MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Bachelor of Technology

In

Chemical Engineering

(Choice Based Credit System)

2016-2020

BoS Chairman	Member Secretary	Chairman
Dean,	Academic Council	Academic Council
School of Chemical Engineering	Dean, Academics	Director, MITAoE

DEAN
School of Chemical Engineering
MIT Academy of Engineering
Alandi (D.), Pune-412 105.

MIT ACADEMY OF ENGINEERING ALANDI (D), DIST. PUNE

MIT Academy of Engineering

An Autonomous Institute Affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK

The B. Tech Program shall be based on the following type of courses

SL. NO.	TYPE OF COURSE	ABBREVIATION
1.	Natural Science	NSC
2.	Engineering Science	ESC
3.	Program Core	PC
4.	Discipline Core	DC
5.	Department Elective	DE
6.	Open Elective	OE
7.	Humanities and Social Science	HSS
8.	Skill Development and Project	SDP

The Course and Credit Distribution shall be as under,

SL. NO.	TYPE OF COURSE	NO. OF COURSES	TOTAL CREDITS	
			NO.	%
1.	Natural Science	**4**	**18**	**10.98**
2.	Engineering Science	**4**	**16**	**9.76**
3.	Program Core	**5**	**19**	**11.58**
4.	Discipline Core	**12**	**48**	**29.26**
5.	Department Elective	**2**	**6**	**3.66**
6.	Open Elective	**4**	**16**	**9.76**
7.	Humanities and Social Science	**8/9**	**17**	**10.36**
8.	Skill Development and Project	**10/9**	**24**	**14.64**
TOTAL		**49**	**164**	**100**

COURSE DISTRIBUTION: SEMESTER WISE										
SL. NO.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	Natural Science	2	2							**4**
2.	Engineering Science	2	2							**4**
3.	Program Core			3	2					**5**
4.	Discipline Core			2	2	3	3	1	1	**12**
5.	Department Elective							1	1	**2**
6.	Open Elective					1	1	1	1	**4**
7.	Humanities & Social Science	1	1		1	1	2	1/2	1	**8/9**
8.	Skill Development & Project	1	1	1	1	1	1	3/2	1	**10/9**
TOTAL		**6**	**6**	**6**	**6**	**6**	**7**	**7**	**5**	**49**

CREDIT DISTRIBUTION: SEMESTER WISE										
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit										
SL. NO.	**TYPE OF COURSE**	**NO. OF CREDITS/SEMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	Natural Science	9	9							**18**
2.	Engineering Science	8	8							**16**
3.	Program Core			11	8					**19**
4.	Discipline Core			8	8	12	12	4	4	**48**
5.	Department Elective							3	3	**6**
6.	Open Elective					4	4	4	4	**16**
7.	Humanities & Social Science	2	2		3	2	3	3	2	**17**
8.	Skill Development & Project	2	2	2	2	2	2	8	4	**24**
TOTAL		**21**	**21**	**21**	**21**	**20**	**21**	**22**	**17**	**164**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2016-17
FIRST YEAR BACHELOR OF TECHNOLOGY	RELEASE DATE	:	1/06/2016
	REVISION NO.	:	0.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	NSC1	AS101	Mathematics – 1	4	1	5
2.	NSC2	AS102 / AS103	Physics / Chemistry	3	2	4
3.	ESC1	EX101 / CV101	Electrical & Electronics Engg. / Applied Mechanics	3	2	4
4.	ESC2	ME101 / IT101	Engineering Graphics/ Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – 1	1	2	2
6.	SDP1	ME102 / ME103	Experimental Tools & Techniques / Design Thinking	---	4	2
TOTAL				**13**	**15**	**21**

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	NSC3	AS104	Mathematics – 2	4	1	5
2.	NSC4	AS103 / AS102	Chemistry / Physics	3	2	4
3.	ESC3	CV101 / EX101	Applied Mechanics / Electrical& Electronics Engg.	3	2	4
4.	ESC4	IT101 / ME101 /	Computer Programming / Engineering Graphics	2	4	4
5.	HSS2	HP102	Language & Communication – 2	1	2	2
6.	SDP2	ME103 / ME102	Design Thinking / Experimental Tools & Techniques	---	4	2
TOTAL				**13**	**15**	**21**

L: Lecture, P: Practical, T: Tutorial; *Applicable for FY BTech

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2017-18
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEEERING	RELEASE DATE	:	1/06/2017
	REVISION NO.	:	0.0

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS201	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	CH202	Material and Energy Balance	3	2	4
5.	DC2	CH203	Chemical Engineering Operations	3	2	4
6.	SDP3	ET206	Prototyping	---	4	2
TOTAL				**14**	**14**	**21**

SEMESTER: IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	---	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	CH211	Momentum Transfer	3	2	4
5.	DC4	CH212	Advanced Chemistry	3	2	4
6.	SDP4	CH213	Minor Project	---	4	2
TOTAL				**15**	**12**	**21**

L: Lecture, P: Practical

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEEERING	RELEASE DATE	:	1/12/2017
	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	CH301	Chemical Engineering Thermodynamics	3	2	4
2.	DC6	CH302	Heat Transfer	3	2	4
3.	DC7	CH303	Mass Transfer	3	2	4
4.	OE1	CH31#	Open Elective - Refer Annexure.	3	2	4
5.	HSS4	HP302	Professional Skills	0	4	2
6.	SDP5	CH304	Skill Development Lab	---	4	2
TOTAL				**12**	**16**	**20**

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	CH 321	Separation Process	3	2	4
2.	DC9	CH 322	Chemical Reaction Engineering	3	2	4
3.	DC10	CH 323	Chemical Equipment Design	2	4	4
4.	OE2	CH 33#	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP301	Project Management	1	2	2
6.	HSS6	HP303	Basics of Entrepreneurship	---	2	1
7.	SDP6	CH324	Mini Project	---	4	2
TOTAL				**12**	**18**	**21**

L: Lecture, P: Practical

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2019-20 (PART A)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEEERING	RELEASE DATE	:	1/12/2018
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	CH401	Process Dynamics, Control & Instrumentation	3	2	4
2.	DE1	CH41#	Dept. Elective - Refer Annexure.	3	0	3
3.	OE3	CH42#	Open Elective - Refer Annexure.	3	2	4
4.	HSS7	HP402	Sociology	2	---	2
5.	HSS8/ SDP7	HP403/ CH402	Business Strategies / Skill Development Lab 2	---	2	1
6.	SDP8	CH403	Project - I	---	8	4
7.	SDP9	CH404	Summer Internship	---	---	4
TOTAL				**11**	**14**	**22**

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	CH431	Chemical Process Technology	3	2	4
2.	DE2	CH44#	Dept. Elective - Refer Annexure.	3	0	3
3.	OE4	CH45#	Open Elective - Refer Annexure.	3	2	4
4.	HSS9	HP401	Engineering Economics	2	---	2
5.	SDP10	CH432	Project - II	---	8	4
TOTAL				**11**	**12**	**17**

L: Lecture, P: Practical

CREDITS				
1 Lecture hour = 1 Credit		**2 Lab Hours = 1 Credit**		**1 Tutorial Hour = 1 Credit**
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	21	21	**42**
2.	Second Year	21	21	**42**
3.	Third Year	20	21	**41**
4.	Final Year	22	17	**39**
TOTAL				**164**

CONTACT HOURS				
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	28	28	**56**
2.	Second Year	28	27	**55**
3.	Third Year	28	30	**58**
4.	Final Year	25	23	**48**
TOTAL				**217**

ANNEXURE

Natural Science (NSC) : 4 Courses		
Sl. No.	**Course Code**	**Course**
1.	AS101	Mathematics – 1
2.	AS102	Mathematics – 2
3.	AS103	Physics
4.	AS104	Chemistry

Engineering Science (ESC) : 4 Courses		
Sl. No.	**Course Code**	**Course**
1	EX101	Electrical and Electronic Engineering
2	CV101	Applied Mechanics
3	ME101	Engineering Graphics
4	IT101	Computer Programming

Program Core (PC) :5 Courses		
Sl. No.	**Course Code**	**Course**
1.	CH201	Environmental Science
2.	AS201	Applied Mathematics
3.	ET201	System Engineering
4.	IT201	Engineering Informatics
5.	ME201	Material Engineering

Discipline Core (DC) : 12 Courses		
Sl. No.	**Course Code**	**Course**
1.	CH202	Material and Energy Balance
2.	CH203	Chemical Engineering Operations
3	CH211	Momentum Transfer
4	CH212	Advanced Chemistry
5	CH301	Chemical Engineering Thermodynamics
6	CH302	Heat Transfer
7	CH303	Mass Transfer
8	CH321	Separation Process
9	CH322	Chemical Reaction Engineering
10	CH323	Chemical Equipment Design
11	CH401	Process Dynamics, Control & Instrumentation
12	CH431	Chemical Process Technology

Department Elective (DE) : 2 Courses		
Sl. No.	**Course Code**	**Course**
1	CH411	Introduction to Paint Technology
2	CH441	Paint Manufacturing Process
3	CH412	Energy Engineering
4	CH442	Energy Management and Audit
5	CH413	Petroleum Refining Technology
6	CH443	Petrochemical Engineering
7	CH414	Biochemical Engineering
8	CH444	Bioprocess Technology
9	CH415	Environment Engineering
10	CH445	Chemical Process Safety

Open Elective (OE) : 4 Courses		
Sl. No.	**Course Code**	**Course**
1	CH311	Process Modeling and Simulation.
2	CH331	Process Engineering.
3	CH421	Process Synthesis, Design and Optimization
4	CH451	Process Intensification and Integration
5	CH312	Piping Engineering
6	CH332	Piping Layout
7	CH422	Piping Design and Engineering
8	CH452	Pipeline Engineering

Open Elective (OE) :Term - I (List of courses for Academic Year 2018-19)		
Chemical		
1	CH311	Process Modeling and Simulation.
2	CH312	Piping Engineering
Civil		
3	CV311	Construction Planning & Management
Computer		
4	CS311	Descriptive Analytics
5	CS312	Artificial Intelligence & Neural Network
Electronics		
6	EX311	Fundamentals of Robotics
E & TC		
7	ET311	Embedded System Programming (ESP)
8	ET312	IoT Architecture and Sensors
IT		
9	IT311	Cryptography & System Security
Mechanical		
10	ME311	Geometric Modeling & Design
11	ME312	Fundamentals of Robotics
12	ME313	Work Process Assessment

Open Elective (OE) :Term - II (List of courses for Academic Year 2018-19)		
Chemical		
1	CH331	Process Engineering.
2	CH332	Piping Layout
Civil		
3	CV331	Visualization & Information Exchange
Computer		
4	CS331	Data Science-I
5	CS332	Machine Learning
Electronics		
6	EX331	Kinematics and Dynamics of Robotics
E & TC		
7	ET331	Embedded Processor
8	ET332	IoT Networks & Protocols
IT		
9	IT331	Cyber Security
Mechanical		
10	ME331	Finite Element Analysis
11	ME332	Kinematics & Dynamics of Robots
12	ME333	Facility Planning & Design

Open Elective (OE) :Term - I (List of courses for Academic Year 2019-20)		
Chemical		
1	CH421	Process Synthesis, Design and Optimization
2	CH422	Piping Design & Engineering
Civil		
3	CV421	Financial Management
Computer		
4	CS421	Data Science-II
5	CS422	Pattern Recognition
Electronics		
6	EX421	Robotics Vision and Control
E & TC		
7	ET421	Low-Power SoC Architecture & Applications (SoC&A)
8	ET422	Privacy and Security in IoT
IT		
9	IT421	Ethical Hacking & Cyber Laws
Mechanical		
10	ME421	Computational Fluid Dynamics
11	ME422	Robotics Control
12	ME423	Operations Management

Open Elective (OE) :Term - II (List of courses for Academic Year 2019-20)		
Chemical		
1	CH451	Process Intensification & Integration
2	CH452	Pipeline Engineering
Civil		
3	CV451	Operation Research
Computer		
4	CS451	Practitioner's approach for Data analytics
5	CS452	Reinforcement Learning
Electronics		
6	EX451	Intelligent and High-Performance Robotics
E & TC		
7	ET451	Real-Time Embedded System (RES)
8	ET452	Energy Management for IoT Devices
IT		
9	IT451	Cyber Forensics
Mechanical		
10	ME451	Advanced Engineering Analysis
11	ME452	Robotic Actuators
12	ME453	Supply Chain Management

Humanities and Social Science (HSS) :9 Courses		
Sl. No.	**Course Code**	**Course**
1.	HP101	Language & Communication – 1
2.	HP102	Language & Communication – 2
3.	HP201	Psychology
4.	HP301	Project Management
5.	HP302	Professional Skills
6.	HP303	Basics of Entrepreneurship
7.	HP401	Engineering Economics
8	HP402	Sociology
9	HP403	Business Strategies

Skill Development and Project (SDP) : 10 Courses		
Sl. No.	**Course Code**	**Course**
1.	ME102	Engineering Tools and Techniques
2.	ME103	Design Thinking
3.	ET206	Prototyping
4.	CH213	Minor Project
5.	CH304	Skill development Lab.
6.	CH324	Mini Project
7.	CH402	Skill development Lab 2
8.	CH403	Project - I
9.	CH404	Summer Internship
10.	CH432	Project - II

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MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

First Year

Bachelor of Technology

2016-2020

(With Effect from Academic Year: 2016-2017)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2016-17
FIRST YEAR BACHELOR OF TECHNOLOGY	RELEASE DATE	:	1/06/2016
	REVISION NO.	:	0.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	NSC1	AS101	Mathematics – 1	4	1	5
2.	NSC2	AS102 / AS103	Physics / Chemistry	3	2	4
3.	ESC1	EX101 / CV101	Electrical & Electronics Engg. / Applied Mechanics	3	2	4
4.	ESC2	ME101 / IT101	Engineering Graphics/ Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – 1	1	2	2
6.	SDP1	ME102 / ME103	Experimental Tools & Techniques / Design Thinking	---	4	2
TOTAL				**13**	**15**	**21**

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	NSC3	AS104	Mathematics – 2	4	1	5
2.	NSC4	AS103 / AS102	Chemistry / Physics	3	2	4
3.	ESC3	CV101 / EX101	Applied Mechanics / Electrical& Electronics Engg.	3	2	4
4.	ESC4	IT101 / ME101 /	Computer Programming / Engineering Graphics	2	4	4
5.	HSS2	HP102	Language & Communication – 2	1	2	2
6.	SDP2	ME103 / ME102	Design Thinking / Experimental Tools & Techniques	---	4	2
TOTAL				**13**	**15**	**21**

L: Lecture, P: Practical, T: Tutorial; *Applicable for FY BTech

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics I
	COURSE CODE	AS101
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII

COURSE OBJECTIVES :

AS101.CEO.1: To recall and apply the methods of solving system of equations using matrices.
AS101.CEO.2: To find nth derivative and expansion of different functions.
AS101.CEO.3: To classify and solve first order ordinary differential equations.
AS101.CEO.4: To categorize and inspect the applications of first order differential equations.
AS101.CEO.5: To apply the concepts of partial differentiation.
AS101.CEO.6: To demonstrate an understanding towards the applications of partial differentiation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS101.CO.1: Inspect system of equations using matrices. [L4]
AS101.CO.2: Illustrate problems based on nth derivative and expansion of functions. [L2]
AS101.CO.3: Solve first order ordinary differential equations. [L3]
AS101.CO.4: Analyze simple real world phenomenon governed by first order ordinary differential equations. [L4]
AS101.CO.5: Infer the problems based on properties of partial differentiation. [L2]
AS101.CO.6: Examine the applications of partial differentiation. [L4]

THEORY		
UNIT 1	**Matrices**	**12 HOURS**
Rank, Solutions of system of linear equations: Homogeneous and Non Homogeneous systems,Linear dependence and independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem		
UNIT 2	**Successive Differentiation**	**8 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative, Taylors and Maclaurins theorem for expansion of functions .		
UNIT 3	**First order ordinary differential equations**	**10 HOURS**
Exact differential equations, Differential equations reducible to exact by finding integrating factors, linear differential equations, Differential equations reducible to linear form .		
UNIT 4	**Applications of first order ordinary differential equation**	**10 HOURS**
Newtons law of cooling, Electrical circuits, rectilinear motion, one dimensional heat conduction, Chemical applications- Mixing problems .		
UNIT 5	**Partial Differentiation**	**8 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative and differential, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 6	**Applications of Partial Differentiation**	**8 HOURS**
Jacobian, properties of Jacobian, Jacobian of Implicit functions, Finding partial derivative using Jacobians, Functional dependence, maxima and minima of functions of two variables.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Rank, System of Linear equations: Homogeneous and Non Homogeneous systems.		
TUTORIAL NO.02		**1 HOURS**
Linear Dependence and Independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem.		
TUTORIAL NO.03		**1 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative.		
TUTORIAL NO.04		**1 HOURS**
Expansion of functions using Taylors and Maclaurins theorems.		

TUTORIAL NO.05		**1 HOURS**
Finding solutions to exact differential equations, Differential equations reducible to exact by finding integrating factors		
TUTORIAL NO.06		**1 HOURS**
Linear differential equations,Differential equations reducible to linear.		
TUTORIAL NO.07		**1 HOURS**
Newtons law of cooling, Kirchoffs law of electrical circuits, rectilinear motion		
TUTORIAL NO.08		**1 HOURS**
One dimensional heat conduction, Chemical applications Mixing Problems		
TUTORIAL NO.09		**1 HOURS**
Examples on Partial Differentiation and Chain rule,Total derivative and differential		
TUTORIAL NO.10		**1 HOURS**
Examples on Eulers Theorem, Differentiation of an implicit function		
TUTORIAL NO.11		**1 HOURS**
Examples on Jacobian, properties of Jacobian, Functional dependence		
TUTORIAL NO.12		**1 HOURS**
Examples on Functional dependence,Maxima and minima of functions of two variables		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Thomas Calculus by G.B. Thomas, Maurice D. Weir, Joel R. Hass (ISBN:9789332519091, Pearson Education, 12th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig(ISBN-13: 9788126554232, Wiley Eastern Ltd., 10th edition)
3. Advanced Engineering Mathematics by R.K. Jain& S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Physics
	COURSE CODE	AS102
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS102.CEO.1: To make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.(L3).

AS102.CEO.2: To analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.(L4).

AS102.CEO.3: To apply the concept of behavior of light and understand the polarization phenomena.(L3) .

AS102.CEO.4: To classify and understand the difference of classical mechanics and quantum mechanics.(L2).

AS102.CEO.5: To derive the basic laws governing the motion of quantum particles.(L4).

AS102.CEO.6: To apply the concept of quantum mechanics to different applications and supplement the reasoning vis--vis understanding of different branches of Physics.(L3).

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS102.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.(L5).

AS102.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.(L3).

AS102.CO.3: Apply that light is transverse in nature. (L3) .

AS102.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.(L2).

AS102.CO.5: Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.(L5) .

AS102.CO.6: Apply the concepts of Quantum Physics in different branches of engineering.(L3) .

THEORY

UNIT 1	**Measurement and importance of span (order) of physical quantities**	**7 HOURS**

Concept of (i)significant numbers, (ii) accuracy versus precision (iii)error versus uncertainty (iv)systematic error versus random error (v) quantifying the uncertainty. Least-count of an apparatus, Methods to measure least-count with specific examples of vernier-calipers, screw-gauge, travelling microscope and spectrometer. Span (orders of magnitude) of prominent physical parameters with specific examples of Gravitational constant(G), Speed of light(c),Planks constant(h), Boltzmann constant(k) and wavelengths of electromagnetic spectrum. Importance of the orders of G, c, h and k alongwith hypothetical picture of world in case of their order becomes unity (1). Length-scale and time-scale of specific physical phenomenon.

UNIT 2	**Optics (Interference and diffraction of Light)**	**7 HOURS**

Particle nature and wave-nature with examples of wave and particle behavior of light, Introduction to wave nature, Concept of thin film, Stokes law of phase-change on reflection from a thin film, Thin film interference, Coating of lenses as an application of thin film interference, Interference in films of uniform and non-uniform thickness (with derivation), Applications of thin-film interference, Newton Ring Experiment and its applications, Diffraction as a particular case of interference.

UNIT 3	**Polarization of Light**	**6 HOURS**

Polarization of light, Production and analysis of polarized light (Brewsters law, Law of Malus), Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.

UNIT 4	**Quantum Mechanics-I .**	**8 HOURS**

Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Plancks quantum law of blackbody radiation, Matter-waves, De-Broglies concept of matter waves, Heisenbergs Uncertainty Principle, Operators, Eigen values and Eigen functions, Expectation Values, Wave-function, Physical significance of wave function.

UNIT 5	Quantum Mechanics-II .	8 HOURS
Schrodingers equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohrs atomic model.		

UNIT 6	Applications of Quantum Mechanics-LASER .	6 HOURS
Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einsteins coefficients), Principle and working of LASER with example, Application of LASER in optical fibre communication.		

PRACTICALS		
PRACTICAL NO.01		**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02		**2 HOURS**
Determination of the refractive index of a given liquid using Newton Rings Experiment.		
PRACTICAL NO.03		**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04		**2 HOURS**
Determination of the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05		**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06		**2 HOURS**
Verification of Bohrs atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07		**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08		**2 HOURS**
Determination of wavelength of a laser beam using Lloyds mirror arrangement.		

PRACTICAL NO.09		2 HOURS
Determination of Radius of Curvature of a given planoconvex lens using Newtons Rings apparatus.		
PRACTICAL NO.10		**2 HOURS**
Determination of wavelength of different colours present in a white light.		

TEXT BOOK

1. The Feynman Lectures on Physics: Volume-1-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-82-8.(Narosa Publisher)
2. The Feynman Lectures on Physics: Volume-3-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-84-2. (Narosa Publisher)

REFERENCE BOOK

1. Measurement and Instrumentation Principles: Alan S Morris, Butterworth Heinemann, ISBN 07506508184
2. AjoyGhatak ,Optics, Tata Mc Graw Hill Publishing Company. Ltd., 2nd Edition, ISBN- 0-07058583-0
3. Jenkins White, Fundamentals of Optics, Mc Graw Hill Science, ISBN-0070853460.
4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-, Mc Graw Hill Education (India) Pvt. Ltd., 6th Edition, ISBN-10- 0070151555,
5. L. I. Schiff ,Quantum Mechanics, Tata Mc Graw Hill Education (India) Pvt. Ltd., 3rd Edition, ISBN-10- 0070856435, ISBN- 13- 9780070856431.
6. PAM Dirac,Principles of Quantum Mechanics Cbs publishers and Distributors, ISBN-10-0195671074, ISBN- 13- 978019567107
7. D J Griffiths, Introduction to Quantum Mechanics, Pearson Prentice Hall Publishers.
8. Serway and Jewett, University Physics for Scientists and Engineers, Cengage Learning Publishers.
9. K. Thyagarajan and AjoyGhatak, Lasers: Fundamentals and applications, Springer, ISBN 9781441964410.
10. Worsnop and Flint; Advanced Practical Physics, Little Hampton book service Ltd., ISBN-10: 0423738909, ISBN-13: 978-0423738902.
11. Robert Eisberg and Robert Resnick; Quantum Mechanics: Of Atoms, Molecules, Solids, Nuclei and Particles; Wiley

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Chemistry
	COURSE CODE	AS103
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : Basic Chemistry of XI and XII

COURSE OBJECTIVES :

AS103.CEO.1: To summarize the basic chemistry and classic methods of analysis, which includes solution, concentrations and indicators.

AS103.CEO.2: To outline the technology involved in improving quality of water for its industrial use.

AS103.CEO.3: To illustrate the basic concepts of analytical techniques that facilitates rapid and reliable measurements.

AS103.CEO.4: To demonstrate the use of ultra violet visible spectroscopy as invaluable tools in synthetic chemistry.

AS103.CEO.5: To list and explain the principle & techniques of separation methods.

AS103.CEO.6: To define the basic aspects of advanced materials & their applications.

COURSE OUTCOMES :

On successful completion of the course the student will be able to

AS103.CO.1: Relate classic methods of analysis by preparing solutions of desired concentrations & carrying out quantitative analysis by volumetric methods. (L1)

AS103.CO.2: :Identify different methodologies for water quality analysis for industrial application. (L3)

AS103.CO.3: Apply basic concepts of electro-analytical techniques for analysis of various chemical compounds and solutions. (L3)

AS103.CO.4: Extend the knowledge of calculating wavelength of absorption of various chemical compounds using UV-Visible spectroscopy. (L2)

AS103.CO.5: Outline the different methods for separation of mixtures of various chemical compounds.(L2)

AS103.CO.6: Categorize the different engineering materials and to solve engineering problems.(L4)

THEORY

UNIT 1	**Instrumental volumetric analysis**	**7 HOURS**

Introduction, methods of expressing concentrations (Self-study), primary and secondary standard solutions. Instrumental & non instrumental analysis principles & types; Types of Titrations based on reaction, AcidBase titrations: Indicatorstheory of indicators, acid base indicators, mixed and universal indicators; Titration curve for Strong acidStrong base type, Introduction to Weak acidStrong base, Strong acid-Weak base titration, Precipitation titration, Applications in quantitative analysis.

UNIT 2	**Water treatment and effluent management**	**7 HOURS**

Introduction to conventional water treatment: Complexometric titrations: Principle, EDTA titrations, choice of indicators, Hardness of water & Alkalinity of water, causes, types, numerical, internal methods of water softening, Advanced wastewater & water Treatment: i) filtration method: Carbon adsorption ii) ion-exchange method iii) membrane techniques: reverse osmosis and electro-dialysis & their applications in water purification.

UNIT 3	**Electroanalytical Techniques**	**7 HOURS**

Introduction to electrodes, pH metry: Standardization of pH meter, titration curve for the mixture of acids Vs strong base, differential plots, Conductometry: Introduction, Kohlrauschs law, measurement of conductance, Application of conductometer in Acid-Base titrations & Precipitation titrations. Potentiometry: Introduction, application in redox titrations example of Fe/Ce titration.

UNIT 4	Ultra Violet Spectroscopy	7 HOURS
Introduction, nature of UV, Beers law, absorption of UV radiation by organic molecule leading to different excitation, Terms used in UV Spectroscopy- Chromophore, Auxochrome, Bathochromic shift(Red shift), hypsochromic shift(Blue shift), hyperchromic and hypochromic effect. Instrumentation,Effect of conjugation on position of UV band. Calculation of max by Woodward and Fisher rules for dienes and enone systems, Applications of UV Spectroscopy- Determination of structure, Determination of stereo chemistry (Cis and trans)		

UNIT 5	: Chromatography	6 HOURS
Introduction and classification of chromatographic methods, Theory, Principle, technique and applications of-Column Chromatography, Thin layer Chromatography, Paper Chromatography, Gas Chromatography. Applications of chromatographic techniques		

UNIT 6	: Engineering Materials.	8 HOURS
Introduction to Material Sciences, Polymers: Introduction, Specialty polymers, Applications in electronic gadgets, housing & construction, automobiles etc. Biomaterials: Introduction, characteristics, examples, challenges, Carbon nano materials: Introduction, types & applications. Smart materials: Introduction, types, examples like piezo materials, shape memory, thermo responsive etc..		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Preparation and Standardization of solutions		
PRACTICAL NO.02		**2 HOURS**
Estimation of ions from given solution by Redox titration		
PRACTICAL NO.03		**2 HOURS**
Determination of the total hardness of a given water sample by EDTA method		
PRACTICAL NO.04		**2 HOURS**
Adsorption: Removal of organic dyes by activated charcoal		
PRACTICAL NO.05		**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.06		**2 HOURS**
Conduct metric titrations		
PRACTICAL NO.07		**2 HOURS**
Verification of Beers law & colorimetric estimation		

PRACTICAL NO.08		**2 HOURS**
Determination of max of organic/ inorganic compound using UV-visible spectrophotometer		
PRACTICAL NO.09		**2 HOURS**
Separation of mixture of two organic compounds by Thin Layer Chromatography		
PRACTICAL NO.10		**2 HOURS**
Separation of two cations by paper chromatography		
PRACTICAL NO.11		**2 HOURS**
Separation & purification of chemical compounds by Gas chromatography		

TEXT BOOK

1. Jain & Jain, Engineering Chemistry, 15th Edition, Dhanpat Rai Publications company
2. S.M. Khopkar , Basic Concept of Analytical Chemistry,2nd edition, New Age Science Ltd ISBN-10: 1906574006 ISBN-13: 978- 1906574000
3. Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, Laxmi Publications Pvt. Ltd.

REFERENCE BOOK

1. V.M.Parikh , Absorption Spectroscopy of Organic Molecules, Addison Wesley Longman Publishing Co, ISBN 10: 0201057085,ISBN 13: 9780201057089.
2. Skoog, Fundamentals of Analytical Chemistry, Cengage Learning, ISBN-13: 978-0495558286, ISBN-10: 0495558281
3. Willard, Merritt, Dean and Settle, Instrumental Methods of chemical analysis, 6th edition, Wadsworth Publishing Co. ISBN-10: 0534081428, ISBN-13: 978-0534081423.
4. Donald R. Askeland, Pradeep Fulay, W. J. Wright, The Science & Engineering of Materials, 6th Edition, Cengage Learning, 2010
5. O. P. Virmani & A. K. Narula , Applied Chemistry: Theory and Practice , New Age International Pvt. Ltd. Publishers, ISBN-10: 8122408141, ISBN-13: 978-8122408140

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical & Electronics Engineering
	COURSE CODE	EX101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE :

COURSE OBJECTIVES :

EX101.CEO.1: To impart knowledge of energy scenario and use of renewable energy systems.
EX101.CEO.2: To explain the fundamentals of single-phase and three-phase systems.
EX101.CEO.3: To explain power supply components, electronic devices.
EX101.CEO.4: To summarize various Digital systems and application.
EX101.CEO.5: To build the knowledge of measuring system and signal conditioning circuits.
EX101.CEO.6: To get acquainted with different electrical machines.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX101.CO.1: Develop the Renewable energy system (PV) as per given specifications [L3]
EX101.CO.2: Illustrate behavior of single phase A.C. circuits and three phase A.C. circuits. [L2]
EX101.CO.3: Analyze analog circuit applications.[L3]
EX101.CO.4: Design Digital applications.[L5]
EX101.CO.5: the use of Instrumentation system in various fields.[L2]
EX101.CO.6: Identify electrical machines used in typical domestic and industrial sector based on application. [L2]

THEORY		
UNIT 1	**Energy Resources & Technology**	**6 HOURS**
Energy Scenario, Energy Resources, Basic concepts about thermal, hydro and nuclear power stations (block diagram approach only).Energy conversion from thermal and mechanical energy, Energy Conservation, Use of Energy Efficient Technologies, Application of Renewable Energy Systems, Battery technology, Introduction to power quality: Definition, causes, effects, Introduction to energy audit.		
UNIT 2	**A.C. Circuits**	**7 HOURS**
A.C. fundamentals, RMS and average value, R-L,R-C,RLC series parallel circuits, phasor diagram, power and power factor. Three phase voltage generation and their waveforms, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, Difference between neutral and ground conductors.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply. BJT - structure and operation, CE, CB, CC configurations, Transistor as a switch and Amplifier. MOSFET- structure (enhancement), operation and application as a switch. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Digital: Logic gates, Boolean algebra, SOP representation, Combinational circuit Design: Half Adder, Full Adder, MUX, DMUX, Comparator, Code converter, Decoder Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor based systems, Embedded systems		
UNIT 5	**Measuring System**	**6 HOURS**
Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, IR, Speed & LVDT. Op-Amp IC 741 pin configuration, Op-amp parameters, Inverting, Non- Inverting & Differential configuration Applications: Summing & Difference amplifier, Comparator, Voltage follower.		
UNIT 6	**Electrical Machines**	**7 HOURS**
Construction of Transformer, principle of operation, EMF equation. Construction, principle of operation and types of three-phase Induction motor and DC motor, PMDC, BLDC, servo motor, stepper motor, Universal motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICALS : Total 8 Experiments from two groups.		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test it.		
PRACTICAL NO.02	**Single Phase Energy (Watt-hour) measurement.**	**2 HOURS**
To measure energy and power factor. To examine improvement in the power factor. To estimate and compare energy consumption with energy meter.		
PRACTICAL NO.03	**R-L-C series A.C. circuit**	**2 HOURS**
To calculate exact values of R, L and C for lagging and leading power factor To find power losses in R, L and C.		
PRACTICAL NO.04	**Verification of relation between Line and Phase quantities in Star and Delta circuits**	**2 HOURS**
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation. To connect Bulb load in Delta connection and verify the relation.		
PRACTICAL NO.05	**Open circuit & Short circuit test on a Single Phase transformer**	**2 HOURS**
To find iron loss and no load current To find full load copper loss and winding parameters To determine efficiency and regulation of transformer		
PRACTICAL NO.06	**Load test on D.C. Shunt Motor.**	**2 HOURS**
To find the torque and output power of motor To calculate the efficiency of motor.		
PRACTICAL NO.07	**Step angle control of Stepper motor.**	**2 HOURS**
To gain familiarity with the properties of stepper motors. To calculate the step angle of motor.		
PRACTICAL NO.08	**Speed control of BLDC/PMDC Motor.**	**2 HOURS**
To find the relation between voltage and speed of motor To develop any small application.		
PRACTICAL NO.09	**Electronics Components and Measuring instruments:**	**2 HOURS**
To study Passive components Resistors, Capacitors & Inductor. To test semiconducting components Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		
PRACTICAL NO.10	**DC Regulated Power Supply:**	**2 HOURS**
To design 12V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	**BJT as a switch and Amplifier.**	**2 HOURS**
To adapt BJT as a switch On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		

PRACTICAL NO.12	Combinational Digital Circuits:	2 HOURS
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	**Sequential Digital Circuits:**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	**OP-AMP Applications**	**2 HOURS**
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OPAMP as summing and difference amplifier. To verify the application of OPAMP as voltage follower.		
PRACTICAL NO.15	**Sensors and Transducer**	**2 HOURS**
To study and verify operation of LVDT. To study and verify the operation of Temperature sensors. (PT100, LM35)		
PRACTICAL NO.16	**Design and Simulate using MULTISIM(Minimum 2)**	**2 HOURS**
To design a counter to display 2-digit Decimal Number (00 to 99) on 7-Segment Display. To design a Flashing LED Display for a specific Pattern using MUX. To design of Inverting/Non-Inverting Amplifier using Op-Amp IC-741 for a specific gain.		

TEXT BOOK

1. B. H. Khan,Non-Conventional Energy Resources, Tata McGraw Hill, 2nd Edition, 2009, 978-0070142763.
2. Edward Hughes, Electrical and Electronic Technology Pearson India, 10th Edition, 2011, ISBN-978-8131733660
3. Neil Storey, Electronics A Systems Approach, Pearson Education Asia, 5th Edition,2013, ISBN-978-0273773276

REFERENCE BOOK

1. 1. V. N. Mittle and ArvindMittal, Basic Electrical Engineering, McGraw Hill Education, 2ndEdition,2005,ISBN- 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, McGraw Hill, 4th Edition, 2010, 978-0070699670.
3. Thomas L. Floyd, Electronics Devices & Circuits, Pearson Education India, 5th Edition, 1998, 978-0136491385.
4. Paul Horowitz, Winfield Hill, The Art of Electronics, Cambridge University press, 3rd Edition, 978-0521809269.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE : Physics and Mathematics of XI & XII

COURSE OBJECTIVES :

CV101.CEO.1: To classify force systems and explain the conditions of equilibrium.
CV101.CEO.2: To illustrate laws of friction.
CV101.CEO.3: To demonstrate the concepts of centroid and moment of inertia.
CV101.CEO.4: To describe kinematic parameters of motion.
CV101.CEO.5: To make use of laws of motion for kinetics.
CV101.CEO.6: To explain energy and momentum methods.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV101.CO.1: Determine the resultant and support reactions.(L5)
CV101.CO.2: Analyze bodies involving frictional forces. (L4)
CV101.CO.3: Evaluate centroids of bodies and moment of inertia of sections. (L5)
CV101.CO.4: Identify the type of motion and its kinematic parameters. (L3)
CV101.CO.5: Analyze the motion under action of constant and variable forces. (L4)
CV101.CO.6: Apply energy and momentum methods for kinetics. (L3)

THEORY		
UNIT 1	**Fundamentals of statics**	**8 HOURS**
Basic concepts and fundamental principles, force, moment of a force, couple, resolution and composition of forces, Free body diagrams, equations of equilibrium, equilibrium of coplanar and non-coplanar force system, applications to jib crane, beams, and cables.		
UNIT 2	**Friction**	**6 HOURS**
Introduction, types of friction, laws of friction, angle of friction, angle of repose, cone of friction, engineering applications - blocks and wedges, ladder friction, screw jack, pulley and belt drives, band brakes.		
UNIT 3	**Properties of surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity, centroids of composite 1D and 2D objects. Introduction to moment of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, MI of composite objects. Distributed loading, fluid pressure-application to dams and gates.		
UNIT 4	**Kinematics**	**8 HOURS**
Basic concepts in kinematics, Motion with uniform and variable acceleration, Motion curves, Curvilinear Motion in Rectangular coordinates, path coordinates, polar coordinates. Kinematic Link and Kinematic Pair, Kinematic Chain, Mechanisms and its inversions, instantaneous centre of rotation, Kennedy's Theorem, Applications- slider and crank mechanism, Railway engine and its supporting flywheel motions, Linkage mechanism of excavator and its system.		
UNIT 5	**Kinetics**	**6 HOURS**
Kinetics of rectilinear and circular motion of a particle acted upon by a constant and variable force system, Newtons second laws of Motion, Equations of motion, concept of dynamic equilibrium, and motion of connected bodies. Basic principles of vehicle dynamics, Forces acting on a vehicle, tire mechanics, Dynamics of linear and lateral motion.		
UNIT 6	**Energy and Momentum**	**8 HOURS**
Work, power and energy, Principles of work and Energy,Motion under a ConservativeCentral Force. Application to Space Mechanics. Impulse, momentum, Principle of Impulse and Momentum, Collisions-elastic and plastic, Direct central impact, coefficients of restitution.Applications-vehicle collisions, sports viz. cricket, tennis, billiard.		

PRACTICALS		
PRACTICAL NO.01	**Group 1] Basic principles/laws**	**2 HOURS**
1. To verify triangle law/ Lami's theorem 2. To verify polygon law of forces. 3. To verify law of moments. 4. To verify equilibrium of parallel forces. (Beam Reactions) 5. To verify equilibrium of concurrent forces in space.		
PRACTICAL NO.02	**Group 2] Friction**	**2 HOURS**
1.To verify laws of friction. 2. To determine angle of repose for a given block and surface. 3. To determine static coefficient of friction for a block on horizontal plane. 4. To determine static coefficient of friction for a block on inclined plane. 5. To determine static coefficient of friction for flat belt and drum.		
PRACTICAL NO.03	**Group 3] Centroid/centre of gravity**	**2 HOURS**
1. To determine centroid of irregular triangular lamina. 2. To determine centroid of polygonal lamina. 3. To determine centre of gravity of a wire bend. 4. To determine centroid of a composite lamina. 5. To find the shift of centroid after cutting some part of lamina.		
PRACTICAL NO.04	**Group 4] Motion(Dynamics)**	**2 HOURS**
1. To study curvilinear motion of a particle. 2. To verify value of g using compound pendulum. 3. To determine coefficient of restitution. 4. To determine mass moment of inertia of a fly wheel. 5. To verify law of conservation of momentum.		
PRACTICAL NO.05	**Group 5] Graphical Exercises**	**2 HOURS**
1. To determine resultant of concurrent forces. 2. To determine resultant of parallel/general forces. 3. To determine reactions for a simple beam. 4. To draw motion curves for given kinematics problem. 5. To determine relative velocity by graphical method. Part B] Students will have to complete a task/activity after each practical which will be based on the theme of that group. (10 Hrs)		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", Tata McGraw-Hill Education, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics", Pearson Education, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II", Tata Mc-Graw, ISBN: 978-0077402327
2. Ferdinand Singer, Harper and Row "Engineering Mechanics Statics and Dynamics", ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics", Cengage Learning, ISBN:8131509907

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	40	50	10	50	Nil	150

PRE-REQUISITE :

COURSE OBJECTIVES :

ME101.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME101.CEO.2: To develop & apply visualization skill to simple Objects.
ME101.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME101.CO.1: Recall fundamentals of projections (L1)
ME101.CO.2: Interpret engineering drawings (L2)
ME101.CO.3: Apply visualization skill to draw various views of object (L3)
ME101.CO.4: Analyzeengineeringdrawings (L4)
ME101.CO.5: Decide annotations for two dimensional drawings (L5)
ME101.CO.6: Develop and/or comprehend a simple engineeringdrawing in both First and Third angle orthographic projections(L4)

THEORY		
UNIT 1	**Visual Thinking & Solid Geometry**	**5 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections & Sectional Views**	**5 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views.		
UNIT 3	**Isometric Projections**	**5 HOURS**
Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of isometric View of Pyramid, Cone, Sphere.		
UNIT 4	**Interpretation of given view/ missing view**	**5 HOURS**
Identification of lines/ edges and surfaces, visualization of given orthographic views, adding missing/ third view, adding a sectional view, to convert a given view into sectional view.		
UNIT 5	**Auxiliary Projections**	**4 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View.		
UNIT 6	**Freehand Sketching & Technical Drawing**	**4 HOURS**
Free hand sketching- FV & TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles.		

PRACTICALS : Each Assignment contains 2 questions.		
PRACTICAL NO.01		**10 HOURS**
Projection of Lines, Plane, Solids		
PRACTICAL NO.02		**8 HOURS**
Orthographic Projections, Missing Views		
PRACTICAL NO.03		**6 HOURS**
Isometric Projections		
PRACTICAL NO.04		**4 HOURS**
Auxiliary View		

PRACTICALS : Assignments to be drawn on modeling software package.		
PRACTICAL NO.05		**4 HOURS**
Absolute and Incremental drawing.		
PRACTICAL NO.06		**6 HOURS**
Draw commands, Modify commands, Array, fillet, offset commands		
PRACTICAL NO.07		**2 HOURS**
Project drafting		
PRACTICAL NO.08		**12 HOURS**
Sketching, Solid Modeling, Assembly		
PRACTICAL NO.09		**4 HOURS**
Project modeling		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to Auto CAD, TMH Publishing co Ltd, 5th Edition, 2012, (ISBN 13: 9780070648371)
2. Basant Agarwal and C M Agarwal, Engineering Drawing, TMH Publishing co Ltd, 2nd Edition 2013, (ISBN13: 978-1-259-06288-9)
3. K C John, Engineering Graphics for Degree, PHI learning pvt. Ltd. New Delhi,2009, (ISBN: 97881-203-3788-6)
4. R. K. Dhavan, A Text Book of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

1. Luzadder, Warren J., Duff, John M, Fundamentals of Engineering, Prentice Hall of India,11th Edition, 2010, (ISBN: 978-81-203-0885-5)
2. Basudev Bhattacharya, Machine Drawing includes Autocad Supplements, Oxford University Press India, First Edition, 2011, (ISBN 13: 9780198070771)
3. K. Venugopal, Prabhu Raja V., Engineering Drawing and Graphics, New age Publications, First Edition, 2008, (ISBN: 978-81-224-2457-7)
4. N B Shaha and B C Rana, Engineering Drawing, Pearson Education, 2012, (ISBN: 9788131798058)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Computer Programming
	COURSE CODE	IT101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	4	40	50	10	25	NIL	125

PRE-REQUISITE : Knowledge of computer system.

COURSE OBJECTIVES :

IT101.CEO.1: To define and summarize the basic terminologies used in computer programming.
IT101.CEO.2: To develop and demonstrate logic for a given problem using algorithms and Flowcharts.
IT101.CEO.3: To evaluate solutions for the given problem using problem solving tools.
IT101.CEO.4: To identify and analyze different control structures.
IT101.CEO.5: To understand and use of simple data structures using Python.
IT101.CEO.6: To demonstrate and understand different computer applications in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT101.CO.1: Analyze a problem and identify and define the computing requirements appropriate to its solution[L3][L4].
IT101.CO.2: Apply the knowledge and strategies for structuring code, dividing problems up into pieces that can be solved independently, then integrating the pieces into a whole to solve a large problem [L3].
IT101.CO.3: Analyze when to select the different types of data structures such as arrays and lists as a framework for solving a problem [L4].
IT101.CO.4: Design, correctly implement and document solutions to problems using Python [L6].
IT101.CO.5: Analyze and compare alternative solutions to computing problems [L2][L4]
IT101.CO.6: Adapt to new developments in the field of computer science [L6].

THEORY		
UNIT 1	**Problem Solving Concepts**	**6 HOURS**
General Problem Solving Concepts-types of problems, problem solving with computers, difficulties with problem solving, Problem solving concepts for the computer: Constants, Variables, Data types, operators, Expressions, Equations, Problem solving tools.Programming structure-Modules and their functions, Cohesion and Coupling, Local and Global Variables, Parameters, return values		
UNIT 2	**Problem solving and Logic structure**	**8 HOURS**
Logic structures, Problem solving with sequential logic structure - The sequential logic structure, solution development. Problem Solving with Decisions decision logic structure, multiple Decision instructions, straight-through logic, positive logic, negative logic, logic conversion, Problem solving with loops and case logic structures.		
UNIT 3	**Arrays, Strings and File Processing**	**8 HOURS**
One dimensional, multidimensional array,finding maximum number in a set, Partitioning of array, finding smallest element, searching an array for a range. String Handling Operations: Concatenation, Copy, Substring, Compare, Length, Case Change, and Reverse. File handling and file handling operations, File Handling Modes.		
UNIT 4	**Programming Applications**	**6 HOURS**
Programming applications, Predictive analysis with examples, Graphics and animation, working with matrices, Graphics & Visualization, Differential Equation: Linear Differential Equations, Digital Signal Processing: Plotting different waveforms.		

PRACTICALS		
PRACTICAL NO.01		**6 HOURS**
1. Find the result of allthe arithmetic operations (Addition,Subtraction,Multiply, Division and modulo) in Python. 2. Show the distance in miles per gallon with respect user defined value in Python. 3. Find the kinetic energy of an object.		
PRACTICAL NO.02		**6 HOURS**
1. Write a Python program for printing result of five subjects for five students. 2. Choose any value and find whether the number is even or odd. 3. Identify whether the number entered by user is prime or not.		

PRACTICAL NO.03		6 HOURS
1. Solve the Fibonacci sequence using recursive function in Python. 2. Illustrate factorial of non-negative numbers in Python. 3. Build asterisk (*) graph in Python		
PRACTICAL NO.04		**6 HOURS**
Electric circuits, Chemical applications- Mixing problems.		
PRACTICAL NO.05		**6 HOURS**
1. Select the number from the entered list and find its position in Python (use Linear Search). 2. Select the number and find its position of in Python (use Binary search). 3. Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain)		
PRACTICAL NO.06		**6 HOURS**
1. Select a text file and count number of words, repeated words in a file. 2. Choose the words from the file, store in the list and sort the list is ascending order. 3. Create duplicate the file from an original file.		
PRACTICAL NO.07		**6 HOURS**
1. Predict whether the entered string is palindrome or not. 2. Compare two strings and convert in opposite case in Python. 3. Select any two words and perform concatenation operation		
PRACTICAL NO.08		**14 HOURS**
1. Create a simple picture in python using graphics package. 2. Construct 2D and 3D plotting the Objects. 3. Create Sine waveform, Cosine waveform, Square waveform, Saw-tooth waveform, using MATLAB and discrete the same. 4. Solve the matrix operations (Addition, Multiplication, and Transverse) in MATLAB. 5. Design an application to display student result using predictive analysis		

TEXT BOOK

1. 1. Problem Solving and Programming Concepts ,Maureen Sprankle , Pearson Publication, Seventh Edition, ISBN 81-317-0711-3.
2. How to think like a Computer Scientist, Learning with Python Allen Downey, Jeffrey Elkner, Chris Meyers, Green Tea Press ISBN: 0-9716775-0-6.

REFERENCE BOOK

1. 1. Learning Python Mark Lutz Oreilly Publication 5th Edition ISBN-13: 978-1449355739.
2. A MATLAB Exercise Book LudmilaKuncheva, Cameron Gray, Perfect-bound Paperback, ISBN 9781291784794.
3. How to solve it by Computer, R.G.Dromey, First Edition, Pearson Publication, ISBN 978-81-315-0562-9.
4. Introduction To Computation And Programming Using Python "Guttag John V, PHI(2014), ISBN-13 : 978-8120348660.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 1
	COURSE CODE	HP101
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level

COURSE OBJECTIVES :

HP101.CEO.1: To introduce a variety of English texts to the students.
HP101.CEO.2: To teach basic English grammar.
HP101.CEO.3: To guide the students to write in English coherently and formally.
HP101.CEO.4: To improve the students overall communicative competence in English through activities like group discussions and debates.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP101.CO.1: Interpret texts written in English. [L2, L5]
HP101.CO.2: Apply English grammar rules correctly. [L3]
HP101.CO.3: Develop sentences and texts in English coherently and formally. [L3, L6]
HP101.CO.4: Demonstrate overall improvement in communication skills. [L 2]

THEORY		
UNIT 1	**Functional Grammar**	**4 HOURS**
Use of tenses in day to day communication and academic writing, Direct and Indirect Speeches, Active and Passive voices, Degrees of comparison, Use of the parts of speech in sentence composition, Verb forms and Modal auxiliaries		
UNIT 2	**Communication**	**8 HOURS**
Concept of communication, Types-verbal and non-verbal, principles of effective communication, barriers to communication, cross-cultural communication		
UNIT 3	**Academic Writing**	**6 HOURS**
Essentials of good writing, Review writing, Letter writing, Report writing, Prcis writing, and Essay writing		

PRACTICALS		
PRACTICAL NO.01	**Common Errors in Communicative English**	**6 HOURS**
A task of identifying and correcting the common errors in general as well as academic English by using audios and relevant academic texts; tips on punctuation.		
PRACTICAL NO.02	**Debate**	**4 HOURS**
Concept, Dos & Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos & Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.04	**Role Play**	**4 HOURS**
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation		
PRACTICAL NO.05	**Review and Letter Writing**	**4 HOURS**
How to write a review, characteristics and essentials of a good review, writing a review on a book or short story, types of letters- formal, informal; layout of business letters		

PRACTICAL NO.06	Report Writing and Prcis Writing	4 HOURS
Types of reports, format and writing a report, What is prcis writing? Rules of prcis writing		
PRACTICAL NO.07	**Essay Writing**	**2 HOURS**
What is an essay? Tips to write a good essay, Types of essays		

REFERENCE BOOK

1. 1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Raymund Murphy: Essential Grammar in Use, Cambridge, 3rd Edition, ISBN-13: 9780521133890
3. William Sanborn Pfeiffer: Technical Communication A Practical Approach, 6th Edition, Pearson Education, ISBN-13: 978-8131700884
4. Dutt et.al. : A Course in Communication Skills, Foundation, 1st Edition
5. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
6. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
7. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
8. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques- I
	COURSE CODE	ME102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	30	-	20	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME102.CEO.1: To introduce different tools and study the various measurement techniques.
ME102.CEO.2: To study different parts of the system along with its functions and applications.
ME102.CEO.3: To list various tools used for the said application.
ME102.CEO.4: To identify the function of various parts of system.
ME102.CEO.5: To impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME102.CEO.6: To apply the knowledge to find the solutions for basic engineering problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME102.CO.1: Recall the tools required for measurements. (L1)
ME102.CO.2: Summarize the applications of various engineering tools used. (L2)
ME102.CO.3: Identify the right tool for selected purpose. (L3)
ME102.CO.4: Inspect various parts of the system .(L4)
ME102.CO.5: Justify the most appropriate technique which can be compatible with the existing environment. (L5)
ME102.CO.6: Develop the system which will give appropriate solution to the identified problem. (L6)

PRACTICALS		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Study and analysis of various components on the motherboard of a standard desktop computer.
2. Installation of various components like hard disk drive on the motherboard and check the system setup for verification.
3. Formatting the hard disk drive and installation of Windows and Linux operating system making the system dual boot
4. Study of various network components like switch, Router and configure the devices.
5. Crimping of Unshielded Twisted Pair cable. (Cat-6) 6. Study of TCP/IP Stack, and configure as well as develop a Local Area Network.
7. Configuration of Network Monitoring tool and checking the results
8. Installation of DHCP server and checking the results.
9. Installation of web server and checking the results.
10. Configuration of MS Access and Deploying Access 2007 Runtime-Based Solutions
11. Study and usage of Google Tools (creating Forms, Blog).
12. Using the Google form with add on, create a PDF file of the form.
13. Designing a static HTML page
14. Uploading the pages using FTP server on a web site
15. Deploy a simple web site using LAMP server creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Basic electronics component and switches
2. PCB and Soldering Tools And Technique
3. Relay and application
4. Manufacturing of extension board/Spike Guard
5. Series and parallel connection of Electrical Load
6. Actuators and application (Electrical and Mechanical).
7. PCB Wizard
8. Proteus
9. Virtual Instrumentation.
10. Cathode Ray Oscilloscope
11. Power Supply

PRACTICAL NO.03	Mechanical Engineering Laboratories (Minimum 6practicals from the following	12 HOURS

1. Linear and angular measurements.
2. Types of mechanism and making any one mechanism containing four links using card board.
3. Open a household component and explain it with free hand sketches.
4. Draw the outline of the problem identified for project on software package.
5. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
6. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
7. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
8. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
9. Measurement of Relative humidity of air in the lab.
10. Measurement of hardness of Steel and Aluminum.
11. Measurement of stiffness of helical spring (compression or tension). Open IT
12. Mixer or kitchen machine/ Printer.
13. Refrigerator/ Window Air Conditioner.
14. Boiler and accessories / thermal power plant (Mini).
15. Two stroke or four stroke engine.
16. Assembly and Disassembly of parts in any software package.
17. Introduction to threaded fasteners and joints using threaded fasteners.

PRACTICAL NO.04	Chemical Engineering (Minimum 3 practicals from the following	06 HOURS

1. Determination of specific gravity of liquid
2. Study of molecular diffusion
3. Liquid liquid extraction: Separation of one liquid component from the solution.
4. Solid-liquid separation from filtration
5. Membrane Separation process
6. Fuel from Plastic
7. Demonstration of mechanical operation models.
8. Production of Biodiesel
9. Open and Study Heat Exchangers.
10. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Mimimum 3 Practicals from the following)	06 HOURS

1. To find the area and included angle of given plot and fix boundary from given plan.
2. To determine the level difference between 5 points with level tube and determine height of tower with trigonometry.
3. To draw the plan of given housing to a given scale.
4. To draw line diagram of household water supply line and sewage line with list of materials used.
5. To draw line diagram of rain water harvesting unit with all details and its importance.
6. To make report on daily water requirement in public building and its waste water disposal, and reuse.
7. To identify and make report on the earthquake resisting structural members of building and its role.
8. To demonstrate the lifesaving dos and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

TEXT BOOK

1. Bruce Hallberg, Networking A Beginners Guide , 4th edition, Tata McGraw-Hill,2005, ISBN 0-07-060791-5
2. R.S. Khandpur, Printed Circuit Boards Design, Fabrication, Assembly and Testing, Tata McGraw-Hill Education, 2005, ISBN 0070588147, 9780070588141.
3. S R Dara, Engineering Chemistry, 5th edition, S.Chand , ISBN 81-219-0359-9

REFERENCE BOOK

1. Mackenzie L. Davis, Water and Wastewater Engineering, 13th edition, Tata McGraw- Hill, ISBN 978-1-25-906483-8
2. R. S. Khurmi, J. K. Gupta, Theory of Machines, 14th edition, S. Chand, ISBN 81-219-2524-X
3. Philip Wankat, Seperation Process Engineering , 3rd edition, Pearson, ISBN 978-93-325-2484-2
4. N.V. Ragvendra, L. Krishnamurthy, Engineering Metrology and Measurements, Oxford University Press, ISBN 978-0-19-808549-2.
5. Dr. Vinod Hosur, Earthquake- Resistant Design of Building Structures, Wiley, ISBN 978-81265-3859-1
6. M. S. Shetty, Concrete Technology, S. Chand, 2008, ISBN 9788121900034.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME103
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	25	-	25	50

PRE-REQUISITE : -

COURSE OBJECTIVES :

ME103.CEO.1: Disseminate the philosophy of design thinking.
ME103.CEO.2: Impart the information regarding User centric approach.
ME103.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME103.CEO.4: Enhancethinking in order to inspect diverse solutions.
ME103.CEO.5: Sensitize about the feasibility, desirability and viability criterias for selection of appropriate solution.
ME103.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME103.CO.1: Recall fundamental principles of design thinking (L1)
ME103.CO.2: Explain all the dimensions of user and his needs using design thinking approach (L2)
ME103.CO.3: Identify user centric problem by using information gathering techniques (L3)
ME103.CO.4: Compare multiple solutions through ideation process (L4)
ME103.CO.5: Justify most appropriate solution for defined user centric problem (L5)
ME103.CO.6: Develop the most optimum solution (L6)

SESSION		
SESSION 1		**2 HOURS**
Design thinking Methodology General Problem Statement, Random check list, mind mapping, Categorization of random check list.		
SESSION 2		**2 HOURS**
Brainstorming of problem areas, Research Methodology Information gathering Primary, Secondary Sources, data presentation, Preparation of survey forms		
SESSION 3		**2 HOURS**
SWOT analysis, drawing inferences, translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of cuboids, cylinders, simple form products (Isometric views) Ideation sketches, Ergonomic and aesthetic consideration in design		
SESSION 4		**2 HOURS**
Concept validation, evaluation and detailing, prototyping		

PROJECT		
PHASE NO.01		**4 HOURS**
General Problem Statement and problem background		
PHASE NO.02		**4 HOURS**
Research methodology		
PHASE NO.03		**4 HOURS**
Design Brief		
PHASE NO.04		**8 HOURS**
Ideation		
PHASE NO.05		**4 HOURS**
Concept Evaluation, Validation and Concept detailing		
PHASE NO.06		**8 HOURS**
Prototyping		
PHASE NO.07		**8 HOURS**
Report Writing		

TEXT BOOK

1. Engineering Design Process, Second Edition Yousef Haik and Tamer ShahinPublisher, Global Engineering. Cengage Learning. ISBN-13: 978-0-495-66814-5.
2. Product Design and Development, Kevin Otto and Kristin Wood, Product Design: Techniques in Reverse Engineering and New Product Development, Pearson Education Inc. ISBN-10: 0130212717.
3. Product Lifecycle Management, Grieves, Michael, McGraw-Hill, 2006. ISBN 0071452303.
4. Lateral Thinking: Creativity Step by Step Harper Perennial; Reissue edition (24 February 2015) (Perennial Library) Six Thinking Hats by Edward de Bono Paperback ISBN-10: 0060903252.
5. Design Methods, John Chris Jones., John Wiley & Sons, David Fulton Publishers, London, ISBN 0-471-28496-3.

Web references

1. www.designcouncil.org.uk
2. www.surveymonkey.com
3. http://en.red-dot.org

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics II
	COURSE CODE	AS104
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII, Mathematics I

COURSE OBJECTIVES :

AS104.CEO.1: To identify different methods to evaluate integrals.
AS104.CEO.2: To classify and solve linear differential equations of higher order
AS104.CEO.3: To demonstrate an understanding towards evaluating multiple integrals.
AS104.CEO.4: To relate and examine the applications of multiple integrals.
AS104.CEO.5: Analyse different probability distribution functions.
AS104.CEO.6: To study different statistical methods for solving problems

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS104.CO.1: Distnguish different methods to evaluate integrals.(L4)
AS104.CO.2: Conclude solutions for higher order lineardifferential equations(L4)
AS104.CO.3: Evaluate the multiple integrals(L5)
AS104.CO.4: Apply the knowledge of multiple integrals wherever required(L3)
AS104.CO.5: Solve the probability distribution problems(L3)
AS104.CO.6: Assess statistical problems(L5)

THEORY COURSE CONTENT		
UNIT 1	**Integral Calculus**	**8 HOURS**
Reduction Formulae , Beta - Gamma functions and Differentiation under integral sign.		
UNIT 2	**Linear Differential Equations of higher order**	**8 HOURS**
General solution of Linear Differential equations with constant coefficients, Method of Variation of parameters, Equations reducible to Linear Differential equation with constant coefficients: Cauchy&Legendres linear differential equations		
UNIT 3	**Multiple Integrals**	**8 HOURS**
Tracing ofCurves: Cartesian curves, Polar curves, Parametric curves ,Double Integration, Evaluation of Double Integration, Change of order of integration, Integration by transforming Cartesian to Polar Coordinate system, Triple integration, Integration by transforming to spherical and cylindrical polar coordinates		
UNIT 4	**Applications of Multiple Integrals**	**8 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		
UNIT 5	**Probability**	**8 HOURS**
Probability, probability density function, probability distribution:Binomial, Poisson, Normal .		
UNIT 6	**Statistics**	**8 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Examples on Reduction Formulae, Beta and Gamma functions. Examples on Differentiation under integral sign		
TUTORIAL NO.02		**1 HOURS**
General solution of Linear Differential equations with constant coefficients , Method of Variation of parameters.		
TUTORIAL NO.03		**1 HOURS**
Equations reducible to Linear Differential equation with constant coefficients: Cauchy- Euler equations		

TUTORIAL NO.04		**1 HOURS**
Tracing of Cartesian curves .Tracing of Polar and Parametric curves .Double Integration, Evaluation of Double Integration, Change the order of integration.		
TUTORIAL NO.05		**1 HOURS**
Integration by transforming Cartesian to Polar Coordinate system, Triple integration,Integration by transforming to spherical and cylindrical polar coordinates.Applications of multiple integrals:To find Area, Volume		
TUTORIAL NO.06		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.07		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		
TUTORIAL NO.08		**1 HOURS**
Probability, probability density function, Probability distribution:Binomial		
TUTORIAL NO.09		**1 HOURS**
Probabilitydistribution :Poisson, Normal. Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.10		**1 HOURS**
Moments, skewness and kurtosis,correlation and regression.		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Calculus by G.B. Thomas &R.L.Finney (ISBN:81-7758-325-5, Pearson Education, 9th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig, Volume I & II (ISBN-10: 8126543132, ISBN-13: 978-8126543137, Wiley Eastern Ltd.)
3. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

5. Advanced Engineering Mathematics by Dennis G. Zill& Warren S. Wright; Jones and Bartlett Publishers, 4th edition, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.

6. Higher Engineering Mathematics by B.S. Grewal (ISBN:81-7409-195-5,Khanna Publications,39 th edition)

7. Applied statistics and probability for engineers fourth edition by Douglas C. montgomery , George C runger(ISBN No:978-81-265-2315-3 wiley)

8. Miller& Freunds Probability and statistics for engineers by richard A johnson, irwin-miller,johnfreund(ISBN no:978-93325-5041-4,Pearson)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 2
	COURSE CODE	HP102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level; Language and Communication- 1

COURSE OBJECTIVES :

HP102.CEO.1: To familarise the students with sounds in English and introduce phonemic transcription.

HP102.CEO.2: CEO.2: To enrich the vocabulary of the students with AWL and NAWL.

HP102.CEO.3: To acquaint the students with public speaking, presentation and interview skills in English.

HP102.CEO.4: To develop the students reading and listening skills with the use of written audio and video texts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP102.CO.1: Recognise and reproduce the sounds in English effectively. [L1]

HP102.CO.2: Choose and employ appropriate words from AWL and NAWL in communication. [L1, L3]

HP102.CO.3: Express their ideas effectively and demonstrate skills in interpersonal communication. [L2, L3]

HP102.CO.4: Analyse and infer from written, audio and video texts. [L 2, L4]

THEORY		
UNIT 1	**Phonetics and Vocabulary**	**3 HOURS**
Phonemes in English and phonemic transcription; Essential academic vocabulary (Academic Word List and New Academic Word List); Dictionary Skills; Phrasal verbs and collocations		
UNIT 2	**Oral Communication**	**4 HOURS**
Public Speaking; Presentation Skills; Interview Skills and telephonic communication; Meetings (types, agenda and minutes)		
UNIT 3	**Active Listening and Reading with Comprehension**	**5 HOURS**
Concept and types of listening; Steps in listening with comprehension; Essentials of good listening; Concept and types of reading; Guidelines for reading with comprehension; Analytical reading		

PRACTICALS		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**2 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Vocabulary Enrichment**	**2 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills		
PRACTICAL NO.03	**Phrasal Verbs and Collocations**	**2 HOURS**
Use of phrasal verbs and collocations; reading literary pieces, essays to identify phrasal verbs in context; story-telling		
PRACTICAL NO.04	**Public Speaking**	**2 HOURS**
Attributes of a good public speaker; prepared and extemporaneous speech; Listening to and Reading famous speeches		
PRACTICAL NO.05	**: Presentations**	**2 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.06	**Interview Skills and Telephonic Communication**	**2 HOURS**
Etiquettes of attending interviews; Preparation; Telephonic communication; Mock Interviews		

PRACTICAL NO.07	**Mock Meetings**	**2 HOURS**
Importance of effective interpersonal communication; working in teams; Mock Meetings		
PRACTICAL NO.08	**Active Listening**	**6 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		
PRACTICAL NO.09	**Reading with Comprehension**	**4 HOURS**
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
3. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
4. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
5. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
6. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
7. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Second Year

Bachelor of Technology in Chemical Engineering

2016-2020

(With Effect from Academic Year: 2017-2018)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2017-18
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEEERING	RELEASE DATE	:	1/06/2017
	REVISION NO.	:	0.0

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS201	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	CH202	Material and Energy Balance	3	2	4
5.	DC2	CH203	Chemical Engineering Operations	3	2	4
6.	SDP3	ET206	Prototyping	---	4	2
TOTAL				**14**	**14**	**21**

SEMESTER: IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	---	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	CH211	Momentum Transfer	3	2	4
5.	DC4	CH212	Advanced Chemistry	3	2	4
6.	SDP4	CH213	Minor Project	---	4	2
TOTAL				**15**	**12**	**21**

L: Lecture, P: Practical

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Environmental Science
	COURSE CODE	CH201
	COURSE CREDITS	3
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	2	20	40	15	NIL	50	125

PRE-REQUISITE : AS103: Chemistry

COURSE OBJECTIVES :

CH201.CEO.1: Give an overview of exploitation of various natural resources and its impact on the environment.
CH201.CEO.2: Understand the ecosystem and biodiversity.
CH201.CEO.3: Understand the importance of environment and its conservation.
CH201.CEO.4: Learn about the environmental pollution sources, effects and control measures.
CH201.CEO.5: Make aware of the national and international issue for the environment.
CH201.CEO.6: Make aware about the social and environmental responsibility.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH201.CO.1: Identify the various human activities adversely affecting the natural resources and the balance ecosystem.
CH201.CO.2: Observe the various aspects of ecosystems and suggest ways to protect them.
CH201.CO.3: Experiment the pollution of given locality and suggest steps to mitigate pollution.
CH201.CO.4: Record the sources of pollution and their controls.
CH201.CO.5: Compare laws and standards for pollution.
CH201.CO.6: Categorize the social and professional responsibility towards environment.

THEORY COURSE CONTENT		
UNIT 1	**Environment**	**5 HOURS**
Importance of environment, Biosphere, Structure and function of an ecosystem, ecological pyramids, effects of population growth on environment. Natural cycles: hydrologic, carbon, nitrogen, phosphorus and Sulphur cycle. Understanding carbon foot prints, Role of the environmental engineer. Need of environmental legislations and environmental Acts in India. Functions of central and state pollution control boards.		
UNIT 2	**Resources**	**4 HOURS**
Natural, conventional and non-conventional, Natural and manmade disasters on environment. Case studies on use and Impact of overutilization of natural resources: Food, forest, water, energy, land.		
UNIT 3	**Pollution**	**4 HOURS**
Structure and composition of atmosphere, Pollution, types of pollution, causes of pollution effects, control and prevention. Air, solid and water waste management Pollution prevention and control act.		
UNIT 4	**Pollution Impact**	**5 HOURS**
Case study on Nuclear Accidents; floods; land slid; climate change; air pollution in cities, water pollution; noise pollution. Case study on drought situation in Vidarbha-Marathwada.		
UNIT 5	**Social Issues**	**5 HOURS**
Case study on Plastic waste management, domestic waste issue, food problem in India & globally. Modernization of agriculture, traffic and pollution, e-waste disposal.		
UNIT 6	**Sustainable Development**	**5 HOURS**
Concept of sustainable development. Utilization and conservation of natural resources. Rainwater harvesting & Water management techniques. Role of an individual in environment protection. Energy audit, disaster management.		

PRACTICAL		
PRACTICAL NO.01	**Title: Fukushima Japan Nuclear Accident**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.02	**Title: Malin Land Slide**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.03	**Title: Drought Situation in Vidarbha & Marathwada**	**2 HOURS**
Details of the drought situation will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of situations.		
PRACTICAL NO.04	**Title: River water pollution case study**	**2 HOURS**
Details of the River pollution of Ganga, Indrayani etc. will be discussed with the students. Students are supposed to write a case study report on the various causes of river pollution, preventive measures to avoid this & water treatment methodologies forriver water treatment.		
PRACTICAL NO.05	**Title: Project**	**16 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		

TEXT BOOKS

1. Rao C.S. Environmental Pollution Control Engineering, Wiley Eastern Publications. ISBN: 9780470217634.
2. Kamaraj. P & Arthanareeswari .M, Environmental Science Challenges and Changes, 4th Edition, Sudhandhira Publications, 2010.
3. Sharma. B.K. and Kaur, Environmental Chemistry, Goel Publishing House, Meerut, 1994 ISBN:8182830125.
4. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. ISBN-10: 1111988935 ISBN: 9781111988937
5. Metcalf Eddy Wastewater engineering: Treatment and reuse, McGraw Hill, ISBN: 007041878.

REFERENCE BOOKS

1. Garg, S.K and Garg, R., Ecological and Environmental Studies, Khanna Publishers, Delhi, 2006.ISBN: 9788174092182.
2. H. S. Peavy, D. R. Rowe, G. Tchobanoglous, Environmental Engineering, McGraw Hill, ISBN: 8428204470.
3. Helen Kavitha. P Principles of Environmental Science, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
4. Henry J.G. and Heinke G.W., Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
5. Masters G.M., Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall of India, New Delhi, 2004. ISBN: 0131481932 ISBN: 9780131481930.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	50	20	50	NIL	150

PRE-REQUISITE :

COURSE OBJECTIVES :

AS201.CEO.1: To find the Laplace transform of continuous time signals (functions).
AS201.CEO.2: To determine the Fourier constants and construct the Fourier series.
AS201.CEO.3: To construct the integral representation of functions using Fourier transform.
AS201.CEO.4: To solve partial differential equations viz. heat and wave equations theoretically.
AS201.CEO.5: To apply numerical methods for constructing functions and solving Differential Equations.
AS201.CEO.6: To write and execute the program on problems of Laplace, Fourier and numerical methods using MATLAB.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS201.CO.1: Analyze the output response of given linear system using Laplace Transform.
AS201.CO.2: Analyze the frequency response of the system using appropriate Fourier transform.
AS201.CO.3: Justify the selection of appropriate transform for a given system.
AS201.CO.4: Solve and examine the solution of partial differential equations by theoretical methods.
AS201.CO.5: Determine the solution of ordinary differential equations using Eulers, Runge-Kutta 4th order and the interpolation using Newtons and Lagranges interpolating methods.
AS201.CO.6: Implement Laplace Transform, Fourier transform and Numerical methods to find the solution of given problem using MATLAB.

THEORY		
UNIT 1	**Laplace Transform I**	**6 HOURS**
Introduction of Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication by t, Division by t. Laplace Transform of derivatives, integration, Unit Step function, Impulse Function and Periodic Functions.		
UNIT 2	**Laplace Transform II**	**6 HOURS**
Introduction of Inverse Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication bys, Division bys. Inverse Laplace Transform of elementary functions, Derivatives, Integration. Use of partial fractions to find Inverse Laplace Transform. Solution and analysis of linear differential equation to linear system.		
UNIT 3	**Fourier Series**	**6 HOURS**
Periodic functions, Fourier series, Dirichlets conditions, determination of Fourier constants, Half ranges series, Even function series, odd function series, arbitrary period functions series.		
UNIT 4	**Fourier Transform**	**6 HOURS**
Introduction of Fourier Transform, Complex exponential form of Fourier series, Fourier Integral Theorem (without proof), Fourier transform and its properties, Fourier Sine Transform, Fourier Cosine Transform, and Inverse Fourier transforms, Fourier Transform of derivatives of a function, Analysis of frequency response.		
UNIT 5	**Applications of Partial differential Equations**	**6 HOURS**
One dimensional Heat flow and wave equations by method of separation of variables, Solution of Partial Differential equations by Numerical method: Crank Nicolson method.		
UNIT 6	**Numerical Methods**	**6 HOURS**
Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method and Ordinary differential equations by Eulers, Modified Eulers, Runge-Kutta 4th order methods.		

PRACTICAL: Any 10 practicals are performed as per the requirement of a branch.		
PRACTICAL NO.01		**2 HOURS**
Introduction to MATLAB: Syntax, keywords, matrices, polynomials, loops.		
PRACTICAL NO.02		**2 HOURS**
Introduction to MATLAB: In-built functions, 2D/3D plots, creating simple programs.		
PRACTICAL NO.03		**2 HOURS**
Finding Laplace transforms of functions, solution of differential equations using Laplace transforms.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms.		
PRACTICAL NO.05		**2 HOURS**
Numerical Integration: Trapezoidal, Simpsons 1/3rd and Simpsons 3/8th rule.		
PRACTICAL NO.06		**2 HOURS**
Interpolation techniques: Lagranges Interpolation.		
PRACTICAL NO.07		**2 HOURS**
Interpolation techniques: Newtons Interpolation.		
PRACTICAL NO.08		**2 HOURS**
Solution of differential equation by modified Eulers method.		
PRACTICAL NO.09		**2 HOURS**
Solution of differential equation by Runge-Kutta method.		
PRACTICAL NO.10		**2 HOURS**
Curve Fitting: Linear, Quadratic.		
PRACTICAL NO.11		**2 HOURS**
Solution of algebraic equations: Newton- Raphson method.		
PRACTICAL NO.12		**2 HOURS**
Solution of algebraic equations: Bisection method.		
PRACTICAL NO.13		**2 HOURS**
Curve Fitting: Cubic, Exponential.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2003, ISBN-13: 9788126537204, 8126537205.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	System Engineering
	COURSE CODE	ET201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	NIL	25	125

PRE-REQUISITE :

1: ME102 Engineering Tools and Techniques
2: ME103 Design Thinking

COURSE OBJECTIVES :

ET201.CEO.1: To describe the rationale for using systems thinking for complex adaptive systems
ET201.CEO.2: To prioritize with stakeholders in a participatory way for research study
ET201.CEO.3: To design system engineering frame work
ET201.CEO.4: To apply system engineering tools
ET201.CEO.5: To evaluate the system

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET201.CO.1: Explain the rationale for using systems thinking for complex adaptive systems.
ET201.CO.2: Analyze interaction with stakeholders in a participatory way for research study.
ET201.CO.3: Design System Engineering framework.
ET201.CO.4: Apply system engineering tools.
ET201.CO.5: Evaluate the system.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Systems Thinking**	**4 HOURS**
Introduction to Systems Thinking and Understanding simple systems, Complex and Complex Adaptive Systems, Stakeholders and their engagement. **Further Reading : Case studies - Public health system, transportation system, solid waste management system.**		
UNIT 2	**System Dynamics Simulation**	**6 HOURS**
Standard test system conceptualization and mapping: an introduction to causal loop diagrams (Systems Thinking Diagrams; Influence Diagrams), principles of stock-and-flow diagrams, Application of stock and flow diagrams to engineering problems, Analysis using agent-based models, Application of systems thinking to policy decision making. **Further Reading : Case studies - Understand how to use Vensim PLE / Netlogo (Free academic version) to develop causal loop diagrams. Application of Stock and Flow Diagrams to Public Health.**		
UNIT 3	**Introduction to Systems Engineering**	**8 HOURS**
History and definitions, mission of system, types of system, system and its environment, System as a product, Systems Engineering as a profession, System Engineering Process and Management, Life cycle Integration. **Further Reading: Case studies - London Walkie-Scorchie Skyscraper, BRT system, garbage collection, Unmanned aerial vehicle, Washing machine etc.**		
UNIT 4	**System Engineering Design**	**8 HOURS**
System development process - Systems engineering method, Systems testing through out development. Requirement Engineering - Inputs, requirement types, purpose, Requirement analysis, requirement outputs. Case studies – Unmanned Aerial System. Functional Analysis - Schematic, Functional block diagram. Design Synthesis - Process, Product realization, Product implementation, Product Integration, Product verification, product validation, product transition. **Further Reading: Development approaches – Waterfall, incremental spiral, evolutionary acquisition.**		
UNIT 5	**System Engineering Tools**	**8 HOURS**
Context diagrams, QFD (Quality function deployment), House of quality, Timeline analysis sheet and requirement allocation sheet, Functional flow diagrams, Design synthesis tools- Concept description sheet (CDS), Functional matrix diagram, Requirement break down structure, N2 diagrams, data flow diagrams, control flow diagrams, behavioral diagrams. **Further Reading: Popular System life cycle models (DoDMIL STD 499B, IEEE 1220 SEP, EIA 632 SEP, ISO/IEC15288, Professional Engineering model, NASA model, software life cycle models).**		
UNIT 6	**Partial Differential equations.**	**7 HOURS**
Verifying and validating the system, managing the configuration of the system, managing technical risk, project management, ILS (Integrated logistic support). **Further Reading: Case studies - Aircraft system.**		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Community based causal mapping – Developing causal loop diagrams for health care using Vensim.		
PRACTICAL NO.02		**2 HOURS**
Developing stock-and-flow diagrams for health care system using Vensim.		
PRACTICAL NO.03		**2 HOURS**
(Any 02) 1. Unmanned aerial vehicle 2. Conduct some research into the London building known as the Walkie Scorchie. Identify what circumstances led to the building earning that unfortunate name and suggest which aspects of the systems engineering process may not have been followed correctly (at least as the issues have been reported in the media).The following links may assist in your investigations. http://www.dezeen.com/2013/09/06/we-made-a-lot-of-mistakes-with-this-building-says-walkie-scorchie- architect-vinoly/ http://www.ibtimes.co.uk/walkie-scorchie-talkie-building-sunlight-london-reflects-504342. 3. Examine in detail the BRT of New Delhi,Identify what circumstances led to the failure of the system. 4. Garbage collection 5. Washing machine		
PRACTICAL NO.04		**2 HOURS**
Determine the typical structure and contents of the system requirements specification (SyRS) for any one of the case study.		
PRACTICAL NO.05		**2 HOURS**
Choose an example related to your own discipline and then list and describe three detailed design tools to come up with a satisfactory design for anyone of the case study.		
PRACTICAL NO.06		**2 HOURS**
We want to modify our house (or from any one of the case studies) by for futuristic requirement to accommodate your children after marriage.Explain how accurate technical data on the house (as confirmed by PCA and FCA) supports this modification. Explain how the early design stages could have assisted with this modification if expandability/ future growth had been accounted for.		
PRACTICAL NO.07		**2 HOURS**
Mini project based on society, science and technology problem clubbed with Field visit and presentation (Define problem, data collection, requirement analysis,functional analysis.Design solution, progressive presentation of solution and final presentation). Note: The group of students should be from different program (Multidisciplinary group).		

PRACTICAL NO.08		2 HOURS
Watch the movie The Pentagon wars and write a two page report to assess what aspects System Engineering went wrong. (https://www.youtube.com/watch?v=iDYpRhoZqBY) .		
PRACTICAL NO.09		**2 HOURS**
Field visit / Industrial visit from system engineering point of view.		
PRACTICAL NO.10		**2 HOURS**
Working model case study of Quad copter/ aero modeling from system engineering point of view.		

TEXT BOOK

1. John D Sterman, "Business dynamics- Systems Thinking and modelling for a complex world", McGrawHill, ISBN: 007238915X.
2. Weinberg, G.M., An Introduction to General Systems Thinking, New York, NY: Dorset House Publishing, 2001, ISBN-13: 978-0932633491.
3. Alexander Kossiakoff, William N.Sweet, Systems Engineering: Principles and Practice, Wiley, 2009, ISBN-13: 978-8126524532.

REFERENCE BOOK

1. R. C. Dorf Dennis M Buede,The Engineering Design of systems, Wiley; 2nd edition, 2002, ISBN-13: 978-0070530393.
2. International Council of Systems Engineering, Systems Engineering Handbook, A guide for System Life Cycle Processes and Activities, version 3.2.1, January 2011.
3. Department of defense, systems engineering fundamentals, defense acquisition university press (Free e-book), https://www.scribd.com/document/321957824/SEFGuide-01-01.
4. Michael Ryschkewitsch, The Art and Science of Systems Engineering, (free e-book), https://www.nasa.gov/pdf/311198main-Art-and-Sci-of-SE-LONG-1-20-09.pdf
5. EIA 632 standard - www.psconsultech.com/yahoo-site-admin/assets/docs/EIA632.9212432.pdf
6. MIL standard - www.product-lifecycle-management.com/download/mil-std-499b-draft1993.pdf.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Material and Energy Balance
	COURSE CODE	CH202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	25	25	150

PRE-REQUISITE : -

COURSE OBJECTIVES :

CH202.CEO.1: Develop ideas in dimensional analysis and to be familiar with different unit systems and conversion from one set of system to another.

CH202.CEO.2: Understand the various unit operations and unit processes performed in chemical industry.

CH202.CEO.3: Learn the fundamentals of stoichiometry.

CH202.CEO.4: Apply different laws of conservation to solve material and energy balance problems.

CH202.CEO.5: Learn the general energy balance equation to precisely calculate the energy requirement for the given unit operation or process.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH202.CO.1: Interpret the data presented in different unit systems.

CH202.CO.2: Apply the various gas laws to calculate the unknowns in the given system.

CH202.CO.3: Develop the material balance equation for the given system.

CH202.CO.4: Analyze the heating value of the given fuel.

CH202.CO.5: Calculate the heat of reaction for the given reaction at the specific conditions.

CH202.CO.6: Calculate the energy requirement for the given system.

THEORY COURSE CONTENT		
UNIT 1	**Mathematical Principles and Physical Properties of Systems**	**7 HOURS**
Introduction to unit processes and operations and their symbols, process flow sheet. Concept of steady and unsteady state operations, Units and dimensions. Properties of pure substances, PVT behavior, ideal and real gas laws. Mole fractions and partial pressures, concept of vapor pressure, Raoult's law and its applications.		
UNIT 2	**Material Balance for Physical Systems**	**7 HOURS**
Concept of material balance calculations, recycling and bypass and Purge operations. Introduction to unsteady state processes, accumulation of inert components, etc.		
UNIT 3	**Unit Operations**	**7 HOURS**
Distillation, humidification, extraction, crystallization, psychrometry, drying, evaporation and industrial problems.		
UNIT 4	**Stoichiometry**	**7 HOURS**
Introduction to stoichiometry, Concept of limiting reactant, excess reactant, percent excess, Conversion and yield calculations, recycle and By-pass, purging operations in reacting systems.		
UNIT 5	**Energy Balance**	**7 HOURS**
Concept, energy and Thermochemistry, Energy balances, heat capacity of pure substances and mixtures. Latent heats, enthalpy of pure substances and mixtures, absolute enthalpy, heat of reaction, adiabatic reactions, thermochemistry of mixing processes, dissolution, liquid-liquid mixtures, gas-liquid systems.		
UNIT 6	**Fuels and Combustion**	**7 HOURS**
Calorific values, coal, liquid fuels, gaseous fuels, air requirement and flue gases, combustion calculations.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Estimation of the normality of the given unknown solution.		
PRACTICAL NO.02		**2 HOURS**
Estimation of the molarity of the given unknown solution.		
PRACTICAL NO.03		**2 HOURS**
Estimation of the composition of the given liquid mixture using the specific gravity of the mixture.		
PRACTICAL NO.04		**2 HOURS**
Identification of the Feed requirement for the given output (Mixing).		
PRACTICAL NO.05		**2 HOURS**
Identification of the limiting reactant, Excess reactant and percent excess in the given acid base reaction.		

PRACTICAL NO.06		**2 HOURS**
Using Psychrometric chart, find the properties of air water vapor mixture.		
PRACTICAL NO.07		**2 HOURS**
Estimation of the calorific value of the given fuel using Bomb Calorimeter.		
PRACTICAL NO.08		**2 HOURS**
Analysis of flue gases by Orsat Apparatus.		
PRACTICAL NO.09		**2 HOURS**
Estimation of percent conversion for a given reaction.		
PRACTICAL NO.10		**2 HOURS**
Estimation of heat of reaction.		
PRACTICAL NO.11		**2 HOURS**
Estimation of the density of the given composition liquid mixture.		
PRACTICAL NO.12		**2 HOURS**
Identification of the product streams for given feed (Separation).		

TEXT BOOKS

1. Bhatt B.I. and Vora S.M., Stoichiometry, 2nd Edition, Tata McGraw Hill, New Delhi, 2004. ISBN: 0070964041.
2. Hougen O.A., Watson R.M. and Ragatz R.A., Chemical Process Principles Part I, 2nd Edition, CBS Publications, 1976. ISBN: 9798123909539.
3. David M. Himmelblau, Basic Principles and Calculations in Chemical Engineering, 8th Edition, Prentice Hall of India, New Delhi, 2012. ISBN : 0132346605.

REFERENCE BOOKS

1. Narayanan. K.V. and Lakshmikutty.B, Stoichiometry and Process Calculations, 2nd Edition, Prentice Hall of India, New Delhi, 2009. ISBN: 8120329929.
2. Venkatramani V, Ananatharaman N, Sheriffa Begum, Process Calculations, 2nd Edition, Prentice Hall of India, 2011. ISBN: 9788120341999.
3. Richard M. Felder, Ronald W. Rousseau, Elementary Principles of Chemical Processes, 3rd Edition, John Wiley and Sons, 2005. ISBN : 9780471697596.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Engineering Operations
	COURSE CODE	CH203
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	25	25	150

PRE-REQUISITE : -

COURSE OBJECTIVES :

CH203.CEO.1: Comprehendenergy requirement calculation for size reduction and for mixing equipment.
CH203.CEO.2: Evaluate principles, working of various equipment used in filtration, Mixing etc.
CH203.CEO.3: Understand Conveyors types with application.
CH203.CEO.4: Analyze various unit operation and Selection of proper equipment for given requirement.
CH203.CEO.5: Know the significance and usage of different particulate characterization parameters, and equipment to estimate them.
CH203.CEO.6: Design fluidized systems and application of fluidized bed in industry.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH203.CO.1: Apply basics of mechanical operations to solve chemical plant problems.
CH203.CO.2: Classify size reduction, mixing and separation equipment.
CH203.CO.3: Calculate power requirement for various equipment with laws.
CH203.CO.4: Competent to understand working of filtration and mixing.
CH203.CO.5: Analyze filtration data to select systems based on requirements.
CH203.CO.6: Design fluidized bed systems for industrial application.

THEORY COURSE CONTENT		
UNIT 1	**Particle Screening and size reduction**	**7 HOURS**
Particle size and shape, Mixtures of particles, Determination of particle size, Standard screen series, screen analysis, Screen effectiveness and capacity, Industrial screening equipment. Crushing efficiency, energy requirements calculations by using different crushing laws, Size reduction equipment: Primary crushers, secondary crushers, Intermediate & fine grinders, Ultra fine grinders, Cutting machines.		
UNIT 2	**Handling and Transport of Solids**	**6 HOURS**
Storage of solids, characteristics of Bulk solids. Conveyors: Working principles, Construction,Advantages, Disadvantages and design calculation of Screw conveyors, Belt Conveyors, Chain & Flight conveyors, Bucket elevators, Pneumatic conveyors.		
UNIT 3	**Mixing and Agitation**	**8 HOURS**
Necessity of mixing & agitation in chemical industries, Types of Impellers & propellers, Different flow patterns in mixing, Calculation of power requirement of mixing equipment, Mixing equipment of pastes & viscous material, Solid Solid Mixing, segregation mechanisms for solid mixture, mixing mechanisms for mixing solids, Agitator selection.		
UNIT 4	**Flow through Packed Beds and Fluidization**	**7 HOURS**
Flow through packed beds (Kozeny-Carman and Erguns Equation), characteristics of fluidized systems, minimum fluidization velocity, types of fluidization Geldarts powder classification and applications of fluidization technique, Types of fluidization (homogenous and bubbling fluidization) spouted beds and fixed bed.		
UNIT 5	**Filtration**	**7 HOURS**
Filter media and filter aids, classification of filtration, pressure drop through filter cake, filter medium resistance, specific cake resistance, Continuous Filtration, Washing and dewatering of filter cakes, Centrifugal filtration.		
UNIT 6	**Fluid Solid systems**	**7 HOURS**
A: Liquid Solid Separation Gravity settling method: Terminal velocity, Stokes law and Newtons law,free settling, sink and float method, differential settling. Sedimentation and thickening: Batch sedimentation, equipment for sedimentation, Kynch theory of sedimentation, calculation of area and depth of continuous thickeners, batch thickeners, and continuous thickeners. B. Gas Solid Separation :Different types of separation efficiency (Target efficiency, grade efficiency, Total efficiency of separation), Gas-cyclone, Bag house filter, Electrostatic Precipitator, Venturi scrubber.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Screening of Sand		
PRACTICAL NO.02		**2 HOURS**
Jaw Crusher		
PRACTICAL NO.03		**2 HOURS**
Ball Mill		
PRACTICAL NO.04		**2 HOURS**
Effectiveness of Screens		
PRACTICAL NO.05		**2 HOURS**
Properties of Solids		
PRACTICAL NO.06		**2 HOURS**
Trommel		
PRACTICAL NO.07		**2 HOURS**
Power consumption in agitated vessel		
PRACTICAL NO.08		**2 HOURS**
Leaf filter		
PRACTICAL NO.09		**2 HOURS**
Plate and frame filter press		
PRACTICAL NO.10		**2 HOURS**
Cyclone		
PRACTICAL NO.11		**2 HOURS**
Bucket Elevator		
PRACTICAL NO.12		**2 HOURS**
Belt Conveyor		
PRACTICAL NO.13		**2 HOURS**
Sigma Mixer		
PRACTICAL NO.14		**2 HOURS**
Froth Floatation		
PRACTICAL NO.15		.
Industrial Visit		

TEXT BOOKS

1. McCabe W. L. and Smith J.C. Unit Operations in Chemical Engineering, 5th Edition, McGraw Hill Publications, 1993, ISBN 007448442.
2. Badger W. L and Banchero, J.T. Introduction to Chemical Engineering, McGraw Hill Publications, ISBN 0070029954.
3. George G. Brown, Unit operations , CBS publishers and distributors, 2005, ISBN 9788123910994.

REFERENCE BOOKS

1. Coulson J.M. and Richardson J.F., Chemical Engineering, Vol. 2, Butterworth Heinemann Publishers, ISBN 9780750644457.
2. Foust A.S, Principles of Unit Operation, 2nd Edition, John Wiley and Sons, ISBN 0471047872.
3. Levy A, Kalman H, Handbook of conveying and handling of particulate solids, Elsevier Science, 2001, ISBN 0444502351.

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Prototyping
	COURSE CODE	ET206
	COURSE CREDITS	02
RELEASED DATE : 01/06/2018	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	75	75

PRE-REQUISITE :

1.ME101 - Engineering Graphics
2.ME102 - Engineering Tools and Techniques
3. ME103 - Design Thinking
4. EX101 - Electrical and Electronics Engineering
5. CV101 - Applied Mechanics
6. IT101 - Computer Programming

COURSE OBJECTIVES :

ET206.CEO.1: Learn about materiality and techniques.

ET206.CEO.2: Justify the product development cycle through prototype project.

ET206.CEO.3: Inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.

ET206.CEO.4: Develop abilities to transmit technical information clearly and test the same by delivery of presentation based on the prototype Project.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET206.CO.1: Consolidate the techniques, skills and modern engineering tools.

ET206.CO.2: Apply acquired skills to the construction of a prototype project.

ET206.CO.3: Develop a prototype project by performing tasks in team.

ET206.CO.4: Demonstrate the work carried out in a team.

PRACTICAL:

Course Introduction:

This course is aiming at a Project Based Learning methodology. Through a series of projects, students will learn to design, build, and debug engineering prototype systems. They will cover multiple aspects of the prototyping process.

Students will complete four modules in rotational manner,

1. Mechanical Prototyping (MP)
2. Electronic Prototyping (EP)
3. Software Prototyping(SP)
4. Civil Prototyping(CP)

Each module will have on an average six laboratory sessions. The students will complete them in rotational manner. Every module will award for 75 marks.

Marks of all four course modules will be averaged and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

MODULE: 1/4	**Mechanical Prototyping (MP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to prototyping**	**02 HOURS**

1. Introduction to Prototyping, traditional prototyping vs. advance rapid Prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Suitable materials and their properties.
3. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.
4. Formation of a group of 5 students per project team.

PRACTICAL NO. 02	**Design of models**	**04 HOURS**

1. Introduction of CAD software and its interaction with prototype machine.
2. 3D Modeling using CAD software package.
3. Identify physical constraints of prototyping

PRACTICAL NO. 03	Preprocessing of prototype	06 HOURS

1. Generating STL files from the 3D models & working on STL files.
2. Pre-Processing the 3D Model in KISslicer / Cuba software.
3. Suitable filament selection and its properties.

PRACTICAL NO. 04	Orientation and support generation	04 HOURS

1. Operate Repeater / Cuba software, Selection of Orientation, Supports generation.
2. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Assembly of model	08 HOURS

1. Complete machine setup.
2. Hands on experience of rapid prototype machine for part/object, assembly manufacturing.
3. Material selection, cost benefit analysis for prototyping, financial aspect.

PRACTICAL NO. 06	Project presentation	04 HOURS

1. Final Presentation and report submission (assessment).

REFERENCE BOOK

1. Rapid Prototyping: Principles and Applications in Manufacturing, Chua C K, Leong K F, Chu S L, World Scientific, ISBN-13: 978-9812778987.
2. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Gibson D W Rosen, Brent Stucker, Springer, ISBN: 978-1-4419-1119-3.
3. Rapid Prototyping: Principles and Applications in Manufacturing,Noorani R, John Wiley & Sons, ISBN: 978-0-471-73001-9.
4. Rapid Tooling: Technologies and Industrial Applications, Hilton P, Jacobs P F, CRC press. ISBN:978-0824787882
5. Rapid Prototyping and Engineering applications: A tool box for prototype development, Liou W L, Liou F W, CRC Press, ISBN: 978-0849334092.
6. Rapid Prototyping: Theory & practice, Kamrani A K, Nasr E A, Springer, ISBN: 978-0-387-23291-1.
7. Kenneth Cooper, Rapid Prototyping Technology: Selection and Application, Marcel Dekker, Inc. New York, ISBN: 082470261.

MODULE: 2/4	Electronic Prototyping (EP)	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to design and construction of electronic prototyping**	**02 HOURS**

1. Gain familiarity with basic stages; Conceptualization, Detailed Design and Implementation.
2. Acquire concepts of basic processes in electronic prototyping.
3. Form a group of students. (03 max)
4. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span.
5. Develop a plan for construction of electronic proto from a concept.

PRACTICAL NO. 02	Basic electronic prototyping skills	02 HOURS

1. Soldering
   - Demonstrate structure of solder wire, soldering temperature, soldering station and gun.
   - Highlight Industrial safety norms, use of lead free solder, extractor fan etc.
   - Use of flux, desoldering gun, desoldering techniques, removing components/wires.
   - Fix Solder defects and inspect quality of solder joints.
2. Wiring
   - Cleaning, stripping and tinning the wires.
   - Connections and protections for wires.
   - Using cable ties , heat shrink tubes, sleeves and other wire dressing techniques.
3. Breadboard
   - Bending wires and making connections on breadboards.
   - Placing components on breadboards.
   - Testing circuits using breadboards.
4. Perfboards
   - Wire connections and component assembly on perfborads.
   - Debugging assembled circuit and increasing stability.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	04 HOURS

1. Gain familiarity with PCB Design software.
2. Draw schematics for PCB design.
3. Make PCB layout as per circuit diagram.
4. Learn PCB design standards.
5. Export PCB files like gerber (.gbr), .pdf etc.

PRACTICAL NO. 04	PCB fabrication	08 HOURS

1. Develop negative imprints of top and bottom sides and expose to PCB.
2. Perform etching process for PCB.
3. Perform cleaning and shearing for required size.
4. Check continuity of tracks.
5. Use drilling machine to make drills.

PRACTICAL NO. 05	Assembly and testing of electronic proto	08 HOURS

1. Make assembly of electronic prototype as per IPC 610 D.
2. Insert components, perform lead cutting with standard clearance.
3. Review mechanical fitment of PCB with component insertion.
4. Solder components and make wiring.
5. Test prototype for electrical functionality, to perform rework if required.
6. Assemble PCB with mechanical fitments and assemblies.
7. Analyze performance and compare with specifications.

PRACTICAL NO. 06	Final project presentation	04 HOURS

1. Demonstrate an electronic prototype in a team.
2. Write a report on implementation of prototype. (10-15 pages max)
3. Present prototype implementation in a team by Power Point presentation.
4. Enumerate proposed specifications of electronic prototype.
5. Highlight financial aspects including proposed cost and bill of material.

REFERENCE BOOK

1. Printed Circuit Boards: Design and Technology, Walter C. Bosshart, Tata McGraw-Hill Education, 1983, ISBN: 978-0074515495.
2. Electronic Assembly Fabrication, Charles A. Harper, 1st ed.,McGraw-Hill Education, 2002 ISBN: 978-0071378826.
3. Soldering in Electronics Assembly, Frank Riley, 1st ed., Springer, 2013, ISBN: 978-3-662-13163-3.
4. Electronic Techniques: Shop Practices and Construction, R. S. Villanucci, A. W. Avtgis, W.F. Megow, 6th ed., Practice-Hall, 1999. ISBN: 978-0130195661.
5. Printed Circuit Boards: Design, Fabrication, and Assembly, R. S. Khandpur, 1st ed. McGraw-Hill Education, 2005, ISBN: 978-0071464208.
6. Practical Electronics for Inventors, Paul Scherz , Simon Monk ,3rd Edition, McGraw-Hill Education, 2013, ISBN 978-0071771337 (Available on TAB edition, Kindle)
7. IPC-J-STD-001E-2010, Requirements for Soldered Electrical and Electronic Assemblies, IPC. , ISBN: 9781580986922.
8. IPC-A-610 D-2014, Acceptability of Electronic Assemblies, IPC. ISBN: 9781611931549.

MODULE: 3/4	**Software Prototyping (SP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to software engineering**	**04 HOURS**

Concepts, Software development life cycle (SDLC). Student need to use AEIOU Framework (Design Thinking) to decide the problem statement. Students will work in group of three on AEIOU framework

PRACTICAL NO. 02	**Design UML Diagrams for given problem statement**	**04 HOURS**

Students have to work in group on Project Development canvas and then design following,

1. Creation of data Flow diagram
2. Creation of block diagram
3. Design a Activity Diagram

PRACTICAL NO. 03	**Requirement analysis**	**04 HOURS**

1. Find the requirement specification of given problem statement and formulate the feasible solution.
2. Paper (low-fidelity) prototype: choose the interface intend to develop, giving the reasons (pros and cons) and describing it summarily - choose the similar interface, indicating its key characteristics.

PRACTICAL NO. 04	Design analysis	06 HOURS

1. Make an Inspiration board.
2. Start an inspiration board by listing 5-10 words that relate to your design idea or point of view. These words can be anything – from similar designs to feelings that the idea evokes.
3. Once you've listed your words, come up with at least five inspirations, and share them by providing links or images within your assignment submission. For each inspiration, give a brief (1-2 sentences) and insightful explanation of why you chose it (What did you take away from it? What did you learn from it. In other words, why did it inspire you?). Each of these inspirations should offer a different perspective to the design you are working on.

PRACTICAL NO. 05	Design analysis	06 HOURS

1. Create Storyboards
2. A storyboard is a comic-strip-like set of drawings about what interface does and how it is used to accomplish tasks in a real usage scenario. A good storyboard should clearly demonstrate who the user is, the usage situation, and the user's motivations for using the interface. It should show what the user can accomplish with interface, but it needn't (and often shouldn't) show a specific user interface design. For a storyboard including an app screen, the details of the screen are not relevant, but what those screens enable you to accomplish is. Each storyboard should comprise 5-8 panels and will provide all details of end product.

PRACTICAL NO. 06	Presentation	04 HOURS

1. Each group will be given 10 min to present their work.

REFERENCE BOOK

1. Software Engineering A practitioner's Approach, Roger S, Pressman, 7th Edition, ISBN: 978–0–07–337597–7
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MODULE: 4/4	**Civil Prototyping (CP))**	**28 HOURS**
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**04 HOURS**
Introduction of bamboo as a construction material, its physical, mechanical properties, selection, seasoning and treatment, testing, joinery, case studies of bamboo buildings.		
PRACTICAL NO. 02	**Analysis of determinant trusses.**	**04 HOURS**
Study of different types of trusses, analysis of determinant trusses by method of joint and method of section		
PRACTICAL NO. 03	**Design bamboo trusses**	**04 HOURS**
Design of different bamboo trusses (span more than 3m), Hands on for different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo truss**	**08 HOURS**
Making of bamboo truss		
PRACTICAL NO. 05	**Testing bamboo truss**	**04 HOURS**
Testing of different bamboo truss		

PRACTICAL NO. 06	Final project presentation	04 HOURS
Comparative study of analytical and test results of forces in truss members, final project presentation.		

REFERENCE BOOK

1. Vector mechanics for Engineers: statics and dynamics by Beer Johnston 10th edition, McGraw Hill Education , ISBN: 978-0073398242
2. Bamboo Architecture Design (Architecture Materials), by Chris van Uffelen, , ISBN: 978-3037681824
3. Designing and Building with Bamboo ,Jules J.A. Janssen Technical University of Eindhoven Eindhoven, The Netherlands, ISBN 978-8186247464
4. Codes and standards
   IS 1902:1993.Code of Practice for preservation of bamboo and cane for non-structural purposes.
   IS 6874:1973 Methods of test for round bamboos
   IS 7344:1974 Specification for bamboo tent bamboos.
   IS 8242:1976 Methods of tests for split bamboos
   IS 8295 (Part 1): 1976 Specification for bamboo chicks
   ISO 22157 Standard guidelines for tensile, compressive, shear and bending Strength Parallel to grain and Perpendicular to grain.

REFERENCE

1. Paris Agreement(http://unfccc.int/paris$_a$*greement/items*/9485.*php*)
2. Kyoto Protocol(http://unfccc.int/kyoto$_p$*rotocol/items*/2830.*php*)
3. Green Building Objectives Checklist, Auroville Bamboo Centre, Puducherry, Tamilnadu.(http://aurovillebamboocentre.org/)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Psychology
	COURSE CODE	HP201
	COURSE CREDITS	3
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	20	40	15	NIL	NIL	75

PRE-REQUISITE :

COURSE OBJECTIVES :

HP201.CEO.1: To introduce the basic concept and scope of Organizational Behavior.
HP201.CEO.2: To teach the theory of personality and its implications in the organization.
HP201.CEO.3: To evince types and styles of Leadership and the impact of values on the same.
HP201.CEO.4: To guide learners through a decision making process.
HP201.CEO.5: To enhance participants skills when practicing team work concepts through business games.
HP201.CEO.6: To introduce the concept of Motivation and constructive ways of coping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP201.CO.1: Explain human behavior in the workplace from an individual, group, and Organizational perspective.
HP201.CO.2: Develop an ability to analyze ones own personality and that of others in Organizations.
HP201.CO.3: Compare different leadership styles with an understanding of how core values affect Leadership.
HP201.CO.4: Demonstrate decision making ability
HP201.CO.5: Identify the problems associated with organizing and managing teams.
HP201.CO.6: Comprehend the correlation amongst stress, motivation and personality.

THEORY

UNIT 1	Organizational Behaviour	6 HOURS

Meaning of Psychology and Organizational Behaviour, Psychology in Organization: History of Organizational Psychology; Scope and Research in Organizational Behaviour, Structure of Organization, Organizational culture, Strong vs Weak culture, Culture vs Formalization.

UNIT 2	Perception and Decision Making	6 HOURS

Meaning, process and determinants of Perception, Process of Decision Making, The link between Perception and Individual Decision Making, Influences on Decision Making: Individual Differences & Organizational constraints, Process and ethics of decision making.

UNIT 3	Personality, Values and Leadership	6 HOURS

What is Personality, The Big Five Personality Model, The importance of values; values and ethical behavior, Leadership, Understanding Personality, values and Leadership, Emotional Intelligence-Personal and Social Competence.

UNIT 4	Understanding Team Work and Conflict Resolution	6 HOURS

Difference between groups and teams, Types of teams, Turning Individuals into Team players, Team building and Team based work, Team dynamics, Types of conflict and conflict resolution.

UNIT 5	Motivation & Stress	4 HOURS

Motivation and its types, Content and Process Theories of Motivation, Concept and reactions to stress, Potential effects of stress, Coping with and managing stress.

TEXT BOOK

1. S. P. Robbins, Organizational Behavior Prentice-Hall India, 1995, ISBN-11:81-203-2875-2.
2. F. Luthans, Organizational Behavior. McGraw-Hill, 1995, ISBN-13: 0072873876.
3. U. Sekarn, Organizational Behavior: Text and Cases, Tata McGraw Hill, 1996, ISBN: 0074603663.
4. Furnham, The Psychology of Behavior at Work, Psychology Press, 1997, ISBN: 1841695041 .

REFERENCE BOOK

1. M. D. Dunnett, Handbook of Industrial-Organizational Psychology, Jaico Press, 1990, ISBN: 978089106-041-3.
2. M. A. - Ansari, Managing people at work: Leadership styles and influence strategies, Sage, 1990, ISBN: 0803996500.
3. J. B. P. Sinha, Work Culture in Indian Context, Sage, 1990, ISBN: 0019-5286.
4. D.M. Pestonjee, Stress and Coping: The Indian Experience, 2nd ed., Sage Publications, 1999, ISBN: 0761993126.
5. L. N. Jewell & M. Siegall, Contemporary Industrial/Organizational Psychology, West Publishing Company, 1990, ISBN: 0314715991.
6. D. Katz and-R. L. Kahn, The Social Psychology of Organizations, Wiley, 1966, ISBN: 978-0-471-023553.
7. M.L. Blum, and J.C. Naylor, Industrial Psychology, CBS Publishers & Distributors, 1984, ISBN: 8123908601.
8. K. H. Blanchard and P. Hersey, Management of Organizational Behavior: Utilizing Human Resources, Prentice-Hall India, 1993, ISBN: 0-13-5512868-9.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	NIL	25	125

PRE-REQUISITE : IT101: Computer Programming, ME102: Engineering Tools and Techniques

COURSE OBJECTIVES :

IT201.CEO.1: To introduce facts, concept and theory of an information system.
IT201.CEO.2: To understand evolution of an information system.
IT201.CEO.3: To explain an information life cycle.
IT201.CEO.4: To develop IoT based information system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT201.CO.1: Interpret Data, Information and Knowledge. [Understanding]
IT201.CO.2: Make use of data acquisition techniques for an information system. [Apply]
IT201.CO.3: Categories different storage techniques. [Analyze]
IT201.CO.4: Build dashboard for effective communication of information. [Apply]
IT201.CO.5: Determine components of Human computer interaction. [Evaluate]
IT201.CO.6: Examine IoT based information system. [Analyze]

THEORY :		
UNIT 1	**Evolution of Information**	**6 HOURS**
Data, Types of Data: Primary data, Secondary data, Meta data, Operational data and Derived data Information: Life Cycle, Semantics of information, Knowledge Data forms: Analog and Digital (Telephone and Stenography) ADC, DAC Evolution of Information- Man Machine Interaction Self-Study: Grade Sheet Generation system **Further Reading:** Railway reservation, Inventory machine		
UNIT 2	**Information Generation**	**6 HOURS**
Data Acquisition, Human interface, Hardware Interface: Input / Output devices Data Transformation: Rearranging, Classifying, Calculating, Summarizing; Self-Study: Weather forecasting System **Further Reading:** Example on advanced Spark Programming		
UNIT 3	**Information Storage and Transmission**	**6 HOURS**
Need of data storage, Types of storage: stand alone, centralized, distributed, and cloud. Encryption and decryption (define and need) Transmission Type, Synchronous, Asynchronous, Serial, Parallel, Satellite, radio Case Study: Dial up, Broadband Self-Study: Stand Alone and Disk storage **Further Reading:** Wireless (Bluetooth, XBEE)		
UNIT 4	**Information Visualization**	**6 HOURS**
Representations: Graphs and Charts: Pi Chart, Scatter plot, Histogram, Heat map, Maps, Geo maps Case Study: Dynamic dashboard		
UNIT 5	**Human Computer Interface**	**6 HOURS**
Introduction of HCI, Types mobile, stand-alone, computer etc, Interactive devices touch screen, mic, keys, keyboard, scanner, camera etc., HCI design principles- standards, Usability principles portability, scalability, GUI design and evaluation, Interactive Multimedia document search- image, audio, video, animation Case study: Ticket Generation Kiosk Self-Study: Web based systems interactivity **Further Reading:**Usable GUI Design		
UNIT 6	**Internet of things**	**6 HOURS**
IoT: Overview, Characteristics and Architecture Embedded Devices: Sensors, Actuators, Arduino and RaspberryPI IOT Ecosystem: Basic elements / building blocks of IOT application, Systematic method to design IOT application Applications: Asset management, Industrial automation, Smart cities Self-Study: IoT Essentials **Further Reading:**IOT and big Data		

PRACTICAL :		
PRACTICAL NO.01		**8 HOURS**
In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow: Identification of an interdependent elementary data items which have facts and figures Data collection through sensors Processing using Arduino Data Storage using MySQL in an accessible form Data visualization using graphs		
PRACTICAL NO.02		**8 HOURS**
Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system. Create a graph showing how revenue evolves throughout the year for each of the sales channels Create an interactive chart that can be used to switch between different sales channels. Create three different views of the data: monthly sales revenue, sales revenue by category, and revenue by the top five distributors.		
PRACTICAL NO.03		**8 HOURS**
Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi. Identify the home appliances that require human interaction for its operations and state the need of automation. Identify system component Design circuit diagram Assemble system components Program the interface System Testing System Deployment		

TEXT BOOK

1. Ralph M Stair, George W Reynolds, "Fundamentals of Information Systems", Course Technology Inc; 5th edition, 2008, ISBN 978-1423925811.
2. Benny Raphael, Ian F. C. Smith, "Engineering Informatics: Fundamentals of Computer-Aided Engineering", Wiley-Blackwell; 2nd Revised edition, 2013, ISBN-13: 978-1119953418.
3. Paul Mcfedries, Excel Data Analysis: Your Visual Blueprint for Analyzing Data, Charts and Pivot Tables, Wiley; Fourth edition 2013, ISBN-13 978-8126544004

REFERENCE BOOK

1. Gerard Jounghyun Kim, HumanComputer Interaction: Fundamentals and Practice, CRC Press, Auerbach Publications, 1 edition, 2015 ISBN 9781482233896
2. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, 2013 ISBN-13: 978-1118430620

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	NIL	25	125

PRE-REQUISITE : AS102: Physics, AS103: Chemistry

COURSE OBJECTIVES :

ME201.CEO.1: To select material for engineering application.
ME201.CEO.2: To classify the available materials.
ME201.CEO.3: To utilize available material for specified purpose.
ME201.CEO.4: To compare desired quality of materials from standard data.
ME201.CEO.5: To measure useful properties of materials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME201.CO.1: Select material for engineering application.
ME201.CO.2: Classify the available materials.
ME201.CO.3: Utilize available material for specified purpose.
ME201.CO.4: Compare desired quality of materials from standard data.
ME201.CO.5: Measure useful properties of materials.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**8 HOURS**
Classifications and specifications of steels and cast iron. Heat treatment of steels, Defects due to heat treatment and remedial measures. Classification of surface hardening treatments. Classification, Composition, Properties & applications of: Copper and Its alloys, Nickel and Its alloys, Aluminum and Its alloys. Specific alloys: soldering & brazing alloy, Precipitation hardening alloys. Bearing materials and their applications.		
UNIT 2	**Engineering Polymers, Ceramics and Glass**	**6 HOURS**
Classification of polymers, Polymer types-thermoplastics-thermoset-Elastomers, Polymer synthesis and processing-injection moulding-extrusion-blow moulding-calendaring, Degradation of polymers-chemical, thermal, -biological-mechanical. Polymer recycling methods Introduction to Advanced Ceramics-Barium Titanate, Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications, Introduction to Cermets and its application. HIGH PERFORMANCE POLYMERS:Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation		
UNIT 3	**Composite Materials**	**6 HOURS**
Need of composites. Particle-reinforced composites, large-particle composites, dispersion-strengthened composites. Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic-matrix composites, carboncarbon composites, fiber-reinforced composites, structural composites, laminar composites.		
UNIT 4	**Electronic and Photonic materials**	**6 HOURS**
Electronic Materials: Intrinsic and extrinsic semiconductors-p-n junction, Bandgap diagrams for conductor, semiconductor and insulator, IR detectors, Hall effect Superconducting Materials: Normal and High temperature superconductivity, Applications. Photonic Materials: LED, LCD, Photo conducting materials, Photo detectors, Photonic crystals and applications. Advancements in electronic materials: Smart materials		
UNIT 5	**Testing of Engineering Materials**	**8 HOURS**
Need and Comparison of destructive and non-destructive tests, Study of destructive testing: Engineering stress-strain curve, true stress-strain curve, Jominy End Quench Test for hardenability, Izod and Charpy Impact Test. Vickers, Rockwell hardness tests. Non Destructive Testing Non-Destructive testing: Principles & procedure, advantages, disadvantages and Industrial applications of NDT like Sonic & Ultrasonic testing and Radiography tests. Brief overview of another NDT test- Eddy current test, Magnetic Particle Test		
UNIT 6	**Nanomaterials.**	**6 HOURS**
Basic concepts of Nano science and Nanotechnology, Carbon nanotubes, Principle of SEM, TEM and AFM, X ray diffraction Fundamentals principles of SEM, SE and BSE imaging modes, Fracture mode analysis and failure analysis using SEM. Potential uses of nonmaterials in electronics, robotics, sports equipment, mobile electronic devices, Medical applications of nanomaterials-Cancer, AIDS treatment.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Jominy End Quench Test**	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO.02	**Izod / Charpy Impact Test**	**2 HOURS**
Izod / Charpy Impact Test.		
PRACTICAL NO.03	**Hardness Test**	**4 HOURS**
Vickers,/ Rockwell, Brinell/Durometers & Poldi Hardness Test.		
PRACTICAL NO.04	**Magnetic Particle & Dye Penetrant Test**	**4 HOURS**
Magnetic Particle & Dye Penetrant Test.		
PRACTICAL NO.05	**Ultra-sonic Test**	**4 HOURS**
Ultra sonic test for detection of flaws in materials.		
PRACTICAL NO.06	**Determination of Hall coefficient**	**4 HOURS**
Determination of Hall coefficient for a semiconducting material.		
PRACTICAL NO.07	**Soldering**	**4 HOURS**
Hard and Soft soldering using soldering materials.		
PRACTICAL NO.08	**Industrial Visit**	
Visit to advanced materials characterization laboratory.		

TEXT BOOK

1. Material Science & Metallurgy for Engineers, Dr. V.D. Kodgire & S. V. Kodgire, Everest Publications.31st Edition, ISBN No: 8186314008
2. Mechanical Behavior & Testing of Materials, A. K. Bhargava, C.P. Sharma P H I Learning Private Ltd. 2011 edition, ISBN No 13-9788120342507

REFERENCE BOOK

1. Engineering Metallurgy, Higgins R. A., Viva books Pvt. Ltd., 2004 ISBN No 13-9788176490276
2. Material Science & Engineering, Raghavan V., Prentice Hall of India, New Delhi. 2003 ISBN No 13-9788120324558
3. Introduction to Physical Metallurgy, Avner, S. H., Tata McGraw-Hill, 2014, ISBN 13-9780074630068
4. Materials Science & Engineering, W. Callister, Wiley Publications,2013, ISBN No 13-9788126521432
5. Physical Metallurgy for Engineers, Clarke D.S. & Varney W.R. Affiliated East-West Press, New Delhi ISBN No 13-978-8176710350

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Momentum Transfer
	COURSE CODE	CH211
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH211.CEO.1: Understand the basic concepts of fluid mechanics and its application.
CH211.CEO.2: Understand the fluid statics and principles of various pressure measuring devices.
CH211.CEO.3: Learn the fundamentals of fluid, valves and pumps used in pipelines.
CH211.CEO.4: Know about dimensional analysis and principles of similarity.
CH211.CEO.5: Understand the basic energy balance equations and their applications.
CH211.CEO.6: Learn the basic concepts of flow through pipelines.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH211.CO.1: Apply concepts of momentum transfer to different processes in chemical engineering.
CH211.CO.2: Find out the dimensions of unknown variable by using dimensional analysis.
CH211.CO.3: Calculate pressure drop by setting momentum balance.
CH211.CO.4: Perform design calculations related to flow measurements and pumping of fluids.
CH211.CO.5: Calculate different losses in piping.
CH211.CO.6: Apply the equation of motion.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**7 HOURS**
Properties of fluids: Characteristics of fluids. Fluid Kinematics: Types of flows- visualization of flow-field (stream, path and streak Line), Stream function and velocity potential function, Newtons law of viscosity, rheological classification of fluids. Concept of atmospheric, gauge and absolute pressure, manometers, pressure measurement by simple and differential manometer.		
UNIT 2	**Fluid Dynamics**	**7 HOURS**
Continuity equation, equation of motion, Bernoulli equation, Euler's and Navier - Stoke's equations,flow measurement using venturimeter, orificemeter, rotameter and pitot tube, flow through notchesand weirs.		
UNIT 3	**Flow of incompressible fluid through pipe**	**7 HOURS**
Shear stress distribution, relation between skin friction and wall shear, friction factor, laminar flowthrough circular pipe, on inclined plane, relation between average and maximum velocity, major andminor losses, Darcy Weisbach equation, friction factor chart.		
UNIT 4	**Boundary layer and Dimensional analysis**	**7 HOURS**
Concept of hydrodynamic boundary layer, growth over a flat plate, different thickness of boundarylayer. Fundamental dimensions of quantities, dimensional homogeneity, dimensional analysis by Rayleighs method and Buckinghams method, dimensionless numbers.		
UNIT 5	**Fluid Moving Machinery**	**7 HOURS**
Pumps: Types of pumps, centrifugal pump, performance of centrifugal pump. Compressors: Working and applications of Centrifugal and reciprocating compressors Valves : Gate Valve, Globe Vale, Butterfly valve, etc.		
UNIT 6	**Pumps and Introduction to CFD**	**7 HOURS**
Governing equations of fluid flow, mass conservation, momentum and energy equation, differentia-land integral forms, conservation and non-conservation form. Characteristics of turbulent flows, time averaged Navier Strokes equations.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Estimation of kinematic viscosity of Oil		
PRACTICAL NO.02		**2 HOURS**
Calibration of Venturimeter		
PRACTICAL NO.03		**2 HOURS**
Calibration of Orifice meter		
PRACTICAL NO.04		**2 HOURS**
Reynolds Experiment		
PRACTICAL NO.05		**2 HOURS**
Verification of Bernouliis equation		
PRACTICAL NO.06		**2 HOURS**
Calibration of Rotameter		
PRACTICAL NO.07		**2 HOURS**
Calibration of Notches		
PRACTICAL NO.08		**2 HOURS**
Minor losses in Pipe flow		
PRACTICAL NO.09		**2 HOURS**
Major losses in Pipe flow		
PRACTICAL NO.10		**2 HOURS**
Characteristics of Centrifugal Pump		
PRACTICAL NO.11		**2 HOURS**
Study of flow through circular pipe using CFD		
PRACTICAL NO.12		**2 HOURS**
Study of flow in inclined plane using CFD		

TEXT BOOKS

1. Dr Bansal R.K, A Text book of Fluid Mechanics and Hydraulic Machines , 6th edition, Laxmi Publications, 1997. ISBN : 8131808157.
2. Dr Modi P.N and Dr Seth S.M, Hydraulics and Fluid Mechanics , 11th Edition, Standard Book House, 2004. ISBN : 8190089374
3. Yunus A. Cengel, Fluid Mechanics: Fundamentals and Applications 3rd Edition, Tata McGraw-Hill Education. ISBN 9789339204655.

REFERENCE BOOKS

1. White F.M., "Fluid Mechanics , 3rd Edition, McGraw Hill Inc., 1994. ISBN : 9780070696730.
2. Shames I.H, "Mechanics of Fluids", 3rd Edition, McGraw Hill Inc., 1992.ISBN : 9780070563872.
3. Noel de Nevers, Fluid Mechanics for Chemical Engineers , 2nd Edition, McGraw Hill Inc, 1991. ISBN : 0070163758.
4. Daugherty R.L, Franzini J.B and Finnemore E.J., "Fluid Mechanics with Engineering Applications", 10th Edition, McGraw Hill Book Company, 2006.ISBN : 9781259002274.
5. Streeter V.L, Wylie E.B, "Fluid Mechanics", 9th Edition, McGraw Hill Book Company, 2010. ISBN : 0070625379.
6. Liggett J.A, Fluid Mechanics", International Edition, McGraw Hill Inc., 1994.ISBN: 9780070378056

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Advanced Chemistry
	COURSE CODE	CH212
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	25	25	150

PRE-REQUISITE : AS103 Chemistry

COURSE OBJECTIVES :

CH212.CEO.1: Impart the basic concepts of physical and analytical chemistry.
CH212.CEO.2: Develop understanding about concepts on mechanisms of organic reactions.
CH212.CEO.3: Study the different optical, analytical and thermal characterization methods.
CH212.CEO.4: Study the kinetics of various possible chemical reactions and the various factors that influences them.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH212.CO.1: Predict the mechanism of given organic reaction.
CH212.CO.2: Interpret spectral data & identify unknown compounds.
CH212.CO.3: Predict the rates of given chemical processes.
CH212.CO.4: Apply the knowledge of various Biomolecules used in biochemical processes.
CH212.CO.5: Apply adsorption technique for purification processes.
CH212.CO.6: Apply the knowledge of catalytic techniques used in chemical reaction processes.

THEORY COURSE CONTENT		
UNIT 1	**Kinetics and Phase Rule**	**7 HOURS**
a) Kinetics: Rate of reaction, rate constant, order of reaction, kinetics of first and second order reactions, numerical on above, Activated complex theory of reaction rates, kinetics of complex reactions, Unimolecular reactions. b) Phase Rule: Gibbs Phase rule & terms involved it with examples. Phase rule for Chemical reaction nquilibrium. One component system- water. Reduced phase rule. Applications & limitations of phase rule.		
UNIT 2	**Biomolecules**	**6 HOURS**
Carbohydrate: Classification, reactions of monosaccharides, D. L configuration, Polysacharidescellulose, starches and their compounds. Amino acids-alpha- amino acids, classification, properties and reactions. Proteins-formation of peptide linkage, features of peptide linkage, alpha-helical configuration, beta-pleated structure. Enzymes - catalytic site of enzyme, factors affecting enzyme activity, classification of enzymes, Enzyme kinetics. Introduction to vitamins and hormones (in brief).		
UNIT 3	**Adsorption & Catalysis**	**8 HOURS**
a) Adsorption: Introduction to Freundlich and Langmuir theories of adsorption, adsorption fromsolution, B.E.T. Theory of adsorption of gases, activation energy, numerical on above. b) Catalysis: characteristics, types, adsorption theory of catalysis, promoters, poisons, industrialapplications of catalysts; acid base catalysis Biological catalysis- Kinetics of enzyme catalysed reaction. Zeolites- structure, properties applications as catalyst for various reactions.		
UNIT 4	**Reaction Mechanisms**	**7 HOURS**
Substitution at saturated carbon (SN1, SN2) (Self Study) - mechanism, kinetics, stereochemistry, factorsfavoring it. Electrophilic aromatic substitution in benzene and mono substituted benzenes, activating and deactivating groups, nitration, Friedel-Craft reactions, sulphonation, and diazotization. Nucleophilic substitution on carbonyl carbon. Addition of HX on C=C, 1, 2-Eliminations- E1 mechanism, E2, (Saytzeff, Hoffman products), factors favoring it. Rearrangement reactions.		
UNIT 5	**Analytical Techniques**	**7 HOURS**
a) Chromatographic Techniques :GC, GPC, HPLC. b) Spectroscopic Techniques: Infra-red Spectroscopy, FTIR Basic principles, working and applications.		
UNIT 6	**Atomic Spectrometric & Thermal Methods**	**7 HOURS**
a) Atomic Absorption Spectrophotometry & SEM Principles, Instrumentation & applications. b) Thermal Methods: Thermogravimetric Analysis (TGA) Differential thermal Analysis (DTA), Differential Scanning Calorimetry (DSC).		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Rate constant of first order reaction of acid catalyzed hydrolysis of ester.		
PRACTICAL NO.02		**2 HOURS**
Adsorption of acetic acid on charcoal to verify Freundlich isotherm.		
PRACTICAL NO.03		**2 HOURS**
Purification of organic compounds by crystallization and sublimation (one each).		
PRACTICAL NO.04		**2 HOURS**
Preparation of m-dinitro benzene from nitrobenzene, crystallization and purity checking by TLC.		
PRACTICAL NO.05		**2 HOURS**
Determination of the percent purity of sodium bicarbonate (NaHCO3) by gravimetry.		
PRACTICAL NO.06		**2 HOURS**
Diameter of solute molecule by viscosity measurements.		
PRACTICAL NO.07		**2 HOURS**
To determine the energy of activation of reaction between K2S2O8 & KI.		
PRACTICAL NO.08		**2 HOURS**
Preparation of osazone derivative of glucose.		
PRACTICAL NO.09		**2 HOURS**
Analysis of sample on GC.		
PRACTICAL NO.10		**2 HOURS**
Analysis of sample on HPLC.		
PRACTICAL NO.11		**2 HOURS**
Identification of given organic compound (with maximum one functional group) by systematic analysis.		
PRACTICAL NO.12		**2 HOURS**
Identification of given organic compound (with maximum one functional group) by systematic analysis.		

TEXT BOOKS

1. Mehta & Mehta, Organic Chemistry , PHI Learning Pvt. Ltd., 2005.ISBN : 978812032441.
2. Puri, Sharma & Pathania, Inorganic Chemistry ,Shoban Lal Nagin Chand & Co. ISBN : 9788188646999.
3. Gary D. Christian, Analytical Chemistry , 6th Edition, John Wiley and Sons Inc. ISBN : 9780471214724.
4. Soni P.L. Physical chemistry, S. Chand & Company. ISBN: 9788180545870.
5. David L Nelson, Lehninger Principles of Biochemistry 4th edition. ISBN 9780716743392.

REFERENCE BOOKS

1. Finar I.L, Organic chemistry, Vol. I and II, ELBS Longman Limited.ISBN : 978817758542.
2. Sykes Peter, Reaction mechanism , 6th Edition, Orient Longman Private Ltd. ISBN : 9780582266445.
3. Lee J.D, Inorganic chemistry , 5th Edition, (ELBS) Chapman & Hall.ISBN : 9780412402906.
4. Cotton, Wilkinson, Basic Inorganic chemistry , 3rd Edition, Wiley India Pvt. Ltd. ISBN 9780471505327.
5. Skoog and West, Fundamentals of Analytical Chemistry, 8th Edition, Thomson Asia. ISBN : 9780495558286.
6. P. S. Kalsi, Spectroscopy of Organic compounds New age international ISBN 81-224-1543-1.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Minor Project
	COURSE CODE	CH213
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	50	NIL	25	75

PRE-REQUISITE : ME103: Design Thinking, ET206: Prototyping

COURSE OBJECTIVES :

CH213.CEO.1: Learn to identify and define a problem to be solved.
CH213.CEO.2: Develop design for the solution of the problem using engineering tools available.
CH213.CEO.3: Design working model for the solution of the problem.
CH213.CEO.4: Evaluate the model built for its correctness, reliability and sustainability.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH213.CO.1: Illustrate how to define the problem to be solved.
CH213.CO.2: Apply knowledge of various engineering tools to develop the solution to the problem.
CH213.CO.3: Analyze various options available to solve the problem and select the appropriate one.
CH213.CO.4: Justify the selection of the method to solve the problem.
CH213.CO.5: Build the working model of the solution to solve the problem.

PREAMBLE:

It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

GUIDELINES:

1. Every student shall undertake the Minor Project in semester IV
2. Every student shall work on an approved project, a group of 03 students (maximum) shall be allotted for each minor project
3. The group members could be from different departments to support the interdisciplinary functioning
4. The students have to identify the social problem by through discussion with people, site visits, etc.
5. Once the problem is identified, students have to collect the sufficient data to prove the importance of the problem to be solved
6. By analyzing the collected data, students have to define the actual problem
7. Once the problem is defined, the students have to enumerate various approaches and solutions to solve the problem
8. The students have to select and justify one of the solutions identified based on the feasibility, affordability and ease of use
9. The solution of the selected approached has to be developed using some prototype or model or implementation
10. The three-member committee of jury members will be appointed to monitor the progress and continuous evaluation of each project. One of the members will be the project guide. Assessment of the project for award of grade shall be done jointly by the guide and committee of jury members

TIMELINE:

1. Project group formation: 1 Week
2. Identification of the problem to be solved: 2 Weeks
3. Data collection to prove the validity of the problem: 2 Weeks
4. Identification of the various approaches to solve the problem: 2 weeks
5. Justification of the approach selected to solve the problem: 1 week
6. Building the solution to the problem using prototype or implementation: 6 Weeks
7. Report writing: 2 Weeks

ASSESSMENT:

Presentation 1: Motivation and need for the selected problem to be solved

Presentation 2: To prove the validity of the problem to be solved using data collected

Presentation 3: Identified approaches to solve the problem and justification of approach selected

Presentation 4: Progress towards the prototyping or implementation of the solution to the problem

Presentation 5: Final demonstration

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Third Year

Bachelor of Technology in Chemical Engineering

2016-2020

(With Effect from Academic Year: 2018-2019)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEEERING	RELEASE DATE	:	1/12/2017
	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	CH301	Chemical Engineering Thermodynamics	3	2	4
2.	DC6	CH302	Heat Transfer	3	2	4
3.	DC7	CH303	Mass Transfer	3	2	4
4.	OE1	CH31#	Open Elective - Refer Annexure.	3	2	4
5.	HSS4	HP302	Professional Skills	0	4	2
6.	SDP5	CH304	Skill Development Lab	---	4	2
TOTAL				**12**	**16**	**20**

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	CH 321	Separation Process	3	2	4
2.	DC9	CH 322	Chemical Reaction Engineering	3	2	4
3.	DC10	CH 323	Chemical Equipment Design	2	4	4
4.	OE2	CH 33#	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP301	Project Management	1	2	2
6.	HSS6	HP303	Basics of Entrepreneurship	---	2	1
7.	SDP6	CH324	Mini Project	---	4	2
TOTAL				**12**	**18**	**21**

L: Lecture, P: Practical

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Engineering Thermodynamics
	COURSE CODE	CH301
	COURSE CREDITS	4
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : AS201: Applied Mathematics, CH211: Momentum Transfer

COURSE OBJECTIVES :

CH301.CEO.1: Know the concept of thermodynamics and its applications in chemical engineering.
CH301.CEO.2: Get information about the various thermodynamic properties and their applications.
CH301.CEO.3: Get knowledge about the heat effects and refrigeration cycle and its applications.
CH301.CEO.4: Understand the phase and chemical reaction equilibrium with its applications.
CH301.CEO.5: Learn the various thermodynamic relations.
CH301.CEO.6: Know the real thermodynamic applications.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH301.CO.1: Define the thermodynamics laws and its applications.
CH301.CO.2: State and determine the thermodynamic properties of system e.g. enthalpy, entropy.
CH301.CO.3: Apply knowledge of thermodynamics in chemical engineering applications.
CH301.CO.4: Formulate and estimate the involvement of thermodynamics in the system.
CH301.CO.5: Implement knowledge of heat and refrigeration effects in day to day applications.
CH301.CO.6: Evaluate chemical reaction equilibrium constant and its use in actual problem.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Thermodynamics and Basic Concepts**	**7 HOURS**
Basic thermodynamics properties; Concept of internal energy; First law of thermodynamics; thermodynamic systems, state & path functions, reversible processes, Duhems Theorem, Enthalpy and Heat capacity; P-V-T behavior of pure substance, Virial Equations of state and its applications, Ideal Gas, Cubic equations of state.		
UNIT 2	**Laws of Thermodynamics and Thermodynamic Properties**	**7 HOURS**
2nd law of thermodynamics, its statement, Heat engines, Concept of Entropy, Entropy change, mathematical statement of 2nd law of thermodynamics, 3rd law of thermodynamics; Property relations, Maxwell equations, residual properties, two phase system, thermodynamic diagram.		
UNIT 3	**Heat Effects and Refrigeration**	**7 HOURS**
Sensible heat effects, temperature dependence of heat capacity, standard heat of reaction, standard heat of formation, standard heat of combustion, temperature dependence of H0, heat effects of industrial reactions. I-C engine, Refrigeration- Carnot and vapor compression, refrigerant, liquefaction, Heat pumps.		
UNIT 4	**Solution Thermodynamics and its applications**	**7 HOURS**
Fundamental property relations, chemical potential, effect of T and P on chemical potential, criteria for phase equilibrium, partial properties, ideal gas mixtures, fugacity and fugacity coefficients for pure species, Poynting factor, for species in solution, ideal solutions; Excess properties, activity coefficients, Margules equation, Van Laar equation. Peng Robinson equation.		
UNIT 5	**Vapor/Liquid and Phase Equilibrium**	**7 HOURS**
The nature of equilibrium, criteria of equilibrium, Raoults law, dew point and bubble point calculations, Flash calculations, Henrys law; Equilibrium and stability, liquid-liquid equilibrium, solid-liquid equilibrium, osmotic equilibrium.		
UNIT 6	**Chemical Reaction Equilibrium and Equilibrium Constant**	**7 HOURS**
The reaction coordinates, Chemical equilibrium, the standard Gibbs free energy change and the equilibrium constant, effect of temperature on equilibrium constant, evaluation of the equilibrium constant; calculation of equilibrium conversion for single reactions.		

PRACTICAL		
PRACTICAL NO.01	**Enthalpy Calculations**	**2 HOURS**
Determination of enthalpy associated with system.		
PRACTICAL NO.02	**Heat Engine**	**2 HOURS**
Working principle of heat engine.		
PRACTICAL NO.03	**Concept of Entropy**	**2 HOURS**
Determination of entropy for a given system.		
PRACTICAL NO.04	**Heat of Reaction**	**2 HOURS**
Determination of heat of given reaction.		
PRACTICAL NO.05	**Refrigeration**	**2 HOURS**
Working principle of refrigerator and determination of COP.		
PRACTICAL NO.06	**Application of Raoults Law**	**2 HOURS**
Application of Raoults Law for given vapor/liquid equilibrium system.		
PRACTICAL NO.07	**Equilibrium Constant**	**2 HOURS**
Determination of equilibrium constant for a given reaction.		
PRACTICAL NO.08	**Equation of State**	**2 HOURS**
Simulation for equation of state using Aspen HYSYS.		
PRACTICAL NO.09	**Fugacity Coefficient**	**2 HOURS**
Simulation for Fugacity coefficients using Aspen HYSYS.		
PRACTICAL NO.10	**Phase Equilibrium**	**2 HOURS**
Simulation for phase equilibrium using Aspen HYSYS.		
PRACTICAL NO.11	**Project**	**4 HOURS**
Project.		

TEXT BOOKS

1. Smith J.M., Van NessHendrick, Abbott Michael M., Introduction to Chemical Engineering Thermodynamics, McGraw-Hill Education, 7th Edition, 2005 ISBN: 0073104450.
2. Narayanan K. V., Chemical Engineering Thermodynamics, PHI Learning Pvt. Ltd., 2nd Edition, 2013. ISBN: 9788120347472.
3. Rao Y.V.C., Chemical Engineering Thermodynamics:, Universities Press, 1st Edition, 2004. ISBN: 817371048.
4. Daubert T. E., Chemical Engineering Thermodynamics, McGraw-Hill, 2nd Edition, 1987 ISBN: 0070154139.

REFERENCE BOOKS

1. Denbigh Kenneth, Principles of Chemical Equilibrium: With Applications in Chemistry and Chemical Engineering, Cambridge University Press, 4th Edition, 1981, ISBN: 0521236827.
2. Glasstone S., Read Books, Thermodynamics for Chemists, 1st Edition, 2007, ISBN: 1406773220.
3. Yunus A. engel and Michael A. Boles, Thermodynamics: An Engineering Approach, McGraw-Hill, 6th Edition, 2007, ISBN: 0071257713.
4. Kalyan Annamalai and Ishwar K. Puri, Advanced Thermodynamics Engineering, CRC Press, 2nd Edition,2011, ISBN: 9781439805725.
5. John M. Prausnitz, Rudiger N. Lichtenthaler, Edmundo Gomes de Azevedo, Molecular Thermodynamic, Prentice Hall Inc, , 3rd Edition, 1999, ISBN:0139777458.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Heat Transfer
	COURSE CODE	CH302
	COURSE CREDITS	4
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH202: Material and Energy balance, CH211: Momentum Transfer

COURSE OBJECTIVES :

CH302.CEO.1: To learn the different modes of heat transfer and the concept of conductive heat transfer.

CH302.CEO.2: To understand the concept of convection and overall combined heat transfer coefficient for conduction-convection in process heat exchangers.

CH302.CEO.3: To learn heat transfer involving phase changes such as condensation and boiling.

CH302.CEO.4: To study concept of radiation energy and the radiation between surfaces including various theories related to heat radiation.

CH302.CEO.5: To study various heat exchange equipment used in process industry.

CH302.CEO.6: To provide the basic tools those are used in thermal system design and to expose students to heat transfer applications in industry.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH302.CO.1: Identify the different modes of heat transfer and use the conduction calculations for various geometries.

CH302.CO.2: Apply the principles of convection for thermal systems.

CH302.CO.3: Implement the concepts of heat transfer with phase changes.

CH302.CO.4: Analyze the systems involving radiation and to solve problems pertaining to them.

CH302.CO.5: Analyze different types of heat exchangers based on fundamental concepts.

CH302.CO.6: Develop the basic designs of heat transfer equipment.

THEORY COURSE CONTENT		
UNIT 1	**Conduction**	**7 HOURS**
Importance of heat transfer in chemical engineering operations, modes of heat transfer, concept of heat conduction, Fourier's law of heat conduction, one dimensional steady state heat conduction equation for flat plate, hollow cylinder, hollow sphere, heat conduction through a series of resistances, analogy between flow of heat and flow of electricity, thermal conductivity measurement, effect of temperature on thermal conductivity, conduction through liquids, two dimensional steady state conduction, transient heat conduction, conduction with heat source.		
UNIT 2	**Convection**	**7 HOURS**
Concept of heat transfer by convection , natural and forced convection, application of dimensional analysis for convection, equations for forced convection under laminar, transition and turbulent conditions, equations for natural convection, individual and overall heat transfer coefficients and the relationship between them.		
UNIT 3	**Heat Transfer with Phase Change**	**7 HOURS**
Heat transfer from condensing vapors, heat transfer to boiling liquids, influence of boundary layer on heat transfer, heat transfer to molten metals, heat transfer in packed and fluidized beds.		
UNIT 4	**Radiation**	**7 HOURS**
Basic ideas, spectrum, basic definitions, laws of radiation, black body radiation, plancks law, Stefan boltzman law, wiens displacement law, lambert cosine law, radiation exchange between black surfaces, shape factor, radiation exchange between gray surfaces radiosity-Irradiation method, Parallel plates, enclosures, radiation shields, basics of radiative heat transfer and application to furnace design.		
UNIT 5	**Heat Exchangers**	**7 HOURS**
Parallel and counter flow heat exchangers, log mean temperature difference, single pass and multi pass heat exchangers, plate heat exchangers, use of correction factor charts, heat exchangers effectiveness, number of transfer unit, chart for different configurations, fouling factors and Wilson's plot, design of various types of heat exchangers, design of furnaces, design of condensers, design of tubular reactors		
UNIT 6	**Heat transfer in Agitated vessels**	**7 HOURS**
Heat transfer in agitated vessels: coils, jackets, limped coils, calculation of heat transfer coefficients, heating and cooling times, applications to batch reactors and batch processes.		

PRACTICAL		
PRACTICAL NO.01	**Thermal conductivity of metallic and non metallic materials**	**2 HOURS**
To study variation of thermal conductivity of metal rod and insulating powder with temperature.		
PRACTICAL NO.02	**Thermal conductivity of composite slab**	**2 HOURS**
To determine the thermal conductivity of composite wall.		
PRACTICAL NO.03	**Heat transfer in forced convection**	**2 HOURS**
To study the variation of heat transfer coefficient over a horizontal circular pipe in forced convection.		
PRACTICAL NO.04	**Heat transfer in pin fin apparatus**	**2 HOURS**
To study the temperature distribution in pin fin and to evaluate the fin performance under natural convection.		
PRACTICAL NO.05	**Emissivity measurement apparatus**	**2 HOURS**
Emissivity measurement apparatus.		
PRACTICAL NO.06	**Critical heat flux apparatus**	**2 HOURS**
To demonstrate the boiling phenomenon and to calculate the critical heat flux.		
PRACTICAL NO.07	**Study of film wise and drop wise condensation**	**2 HOURS**
To study the phenomenon of film wise and drop wise condensation.		
PRACTICAL NO.08	**Stefan Boltzmanns apparatus**	**2 HOURS**
To determine the value of Stefan Boltzmanns constant for black bodies.		
PRACTICAL NO.09	**Heat transfer in agitated vessel**	**2 HOURS**
To study the effect of flow rate of heating/cooling media, temperature and agitation speed on calculation of overall heat transfer coefficient for heating/cooling in agitated vessel.		
PRACTICAL NO.10	**Plate type heat exchanger**	**2 HOURS**
To determine Logarithmic Mean Temperature Difference (LMTD), overall heat transfer coefficient and effectiveness of plate type heat exchanger.		
PRACTICAL NO.11	**Shell and tube heat exchanger**	**2 HOURS**
To determine Logarithmic Mean Temperature Difference (LMTD), overall heat transfer coefficient and effectiveness shell and tube heat exchanger for cocurrent and counter current flow.		
PRACTICAL NO.12	**Transient heat conduction**	**2 HOURS**
To calculate Biot and Fourier numbers and the determination of heat transfer coefficient.		

TEXT BOOKS

1. McCabe W.L, Smith J.C, Unit Operations in Chemical Engineering", McGraw-Hill, 7th Edition, 2014. ISBN : 9339213238.
2. Sukhatme S.P, A Text Book on Heat Transfer, Universities Press,4thEdition, 2005. ISBN : 8173715440.

REFERENCE BOOK

1. Coulson J.M, Richardson J.F, "Chemical Engineering", Vol.1, Butterworth and Heinemann Publishers, 6th Edition, 1970. ISBN : 9780750644440.
2. Binay K.Dutta, "Heat Transfer Principles and Applications", Prentice Hall of India, 2001. ISBN : 8120316258.
3. Kern D.Q, "Process Heat Transfer ", McGraw Hill Revised edition, 1st Edition, 1999. ISBN 007085353.
4. Holman J.P, Heat Transfer, McGraw Hill,9th Edition, 2008. ISBN : 0070634513.
5. Yunus A. Cengel, Heat and Mass Transfer, Tata McGraw Hill Publications, New Delhi, 3rd Edition, (2007). ISBN 007245893.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Mass Transfer
	COURSE CODE	CH303
	COURSE CREDITS	4
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH211: Momentum Transfer

COURSE OBJECTIVES :

CH303.CEO.1: Understand the concept and use of separation processes.
CH303.CEO.2: Learn the basics of diffusion and the empirical laws that govern diffusion.
CH303.CEO.3: Understand the analogies between momentum, mass and heat transfer.
CH303.CEO.4: Understand the concept and importance of mass transfer coefficient.
CH303.CEO.5: Understand the mechanism of all simultaneous heat and mass transfer operations.
CH303.CEO.6: Understand the uses and design concept of separation processes.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH303.CO.1: Calculate the molar flux for different systems.
CH303.CO.2: Determine the individual and overall transfer coefficients.
CH303.CO.3: Use the Psychrometric chart for humidification operations.
CH303.CO.4: Analyze the drying rate of the given material.
CH303.CO.5: Develop the equilibrium data for crystallization operation.
CH303.CO.6: Design equipment for various mass transfer operations.

THEORY COURSE CONTENT		
UNIT 1	**Diffusion**	**7 HOURS**
Introduction to mass transfer operations, their uses and classification. Molecular and eddy diffusion, Ficks law, measurement and calculation of diffusivity, diffusion in multi-component gaseous mixtures, diffusion in solids and its applications, steady state diffusion under stagnant and laminar flow conditions.		
UNIT 2	**Interphase Mass transfer**	**7 HOURS**
Concept of mass transfer co-efficient, interphase and overall mass transfer coefficient in binary and multi-component systems, mass transfer under laminar and turbulent flow, theories of mass transfer and their applications, boundary layer, correlation of mass transfer co-efficient, analogies between momentum, heat and mass transfer, Jh & Jd factor.		
UNIT 3	**Humidification**	**7 HOURS**
Basic concepts & definitions, psychrometric chart, wet-bulb temperature and Lewis relation, methods of humidification and dehumidification, design calculation, cooling towers principle and operation, equipment.		
UNIT 4	**Drying**	**7 HOURS**
Principles of drying and mechanism of drying, drying characteristics, classification of dryers, working principles of dryers, design and performance of batch and continuous dryers, estimation of drying rates.		
UNIT 5	**Crystallization**	**7 HOURS**
Theory of crystallization, Miers theory of supersaturation, factors governing nucleation and crystal growth, growth coefficient, mass and energy balance, batch and continuous crystallizers, industrial crystallizer.		
UNIT 6	**Evaporation**	**8 HOURS**
Evaporation, single and multiple effect evaporation, types of evaporators, design calculation for single and multiple effect evaporators.		

PRACTICAL		
PRACTICAL NO.01	**Solid Liquid Diffusion**	**2 HOURS**
Estimation of the diffusion coefficient for solid liquid diffusion using benzoic acid in water system.		
PRACTICAL NO.02	**Molecular Diffusion in Liquids**	**2 HOURS**
Estimation of the mass transfer coefficient for liquid liquid diffusion (Molecular).		
PRACTICAL NO.03	**Eddy diffusion in Liquids**	**2 HOURS**
Estimation of the mass transfer coefficient for liquid liquid diffusion (Eddy).		
PRACTICAL NO.04	**Liquid Air Diffusion**	**2 HOURS**
Estimation of the diffusion coefficient for liquid diffusion in air.		
PRACTICAL NO.05	**Psychrometric chart**	**2 HOURS**
Estimation of properties of air water system using Psychrometric chart.		
PRACTICAL NO.06	**Tray Dryer**	**2 HOURS**
Design of tray dryer for the given system (Sand / Saw dust).		
PRACTICAL NO.07	**Crystallizer**	**2 HOURS**
Design of crystallizer for the given capacity.		
PRACTICAL NO.08	**Equilibrium data for Crystallizer**	**2 HOURS**
Batch studies on solubility and yield of crystallizer.		
PRACTICAL NO.09	**Fluidized Bed Dryer**	**2 HOURS**
Studies on fluidized bed dryer.		
PRACTICAL NO.10	**Humidifier**	**2 HOURS**
Estimation of mass transfer flux for the humidification column.		
PRACTICAL NO.11	**Single Effect Evaporator**	**2 HOURS**
Design of single effect evaporator for the given system.		
PRACTICAL NO.12	**Cooling Tower**	**2 HOURS**
Studies on Cooling tower.		

TEXT BOOKS

1. Warren L McCabe, Julian C Smith and Peter Harriott, Unit Operations of Chemical Engineering, McGraw Hill International Edition, 6th Edition, New York 2001, ISBN 9780070448285.
2. Robert E Treybal, Mass Transfer Operations, McGraw Hill International Edition, 3rd Edition, Singapore, 1980, ISBN 9780070651760.
3. Geankoplis C.J, Transport Processes and Unit Operations, Prentice Hall Inc., 4th Edition, New Jersey, 2003, ISBN 013101367X.

REFERENCE BOOKS

1. Coulson J.M, Richardson J.F. Backhurst J.R. and. Harker J.M, Chemical Engineering, Vol. 1 & 2, Butter worth Heinemann, 6th Edition, 1999, ISBN 9780080494227.
2. Foust A.S, Principles of Unit Operations, John Wiley, ISBN 9780471268963.
3. Seader J.D & Henley E.J, Separation Process Principles, John Wiley, 2nd Edition, 2006, ISBN 9780471586265.
4. Welty J.R, Wicks C.E. & Wilson R.E, Fundamentals of Momentum, Heat & Mass Transfer, John Wiley, ISBN 9780471874973.
5. King C.J, Separation Processes, Tata McGraw Hill, 2nd Edition, 1980, ISBN 9780070993860.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Process Modeling and Simulation
	COURSE CODE	CH311
	COURSE CREDITS	4
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH301: Chemical Engineering Thermodynamics, CH303: Mass Transfer

COURSE OBJECTIVES :

CH311.CEO.1: Know the types of models and its applications.
CH311.CEO.2: Understand the steps involved in building mathematical model.
CH311.CEO.3: Understand the selection of models for various chemical process.
CH311.CEO.4: Learn the development of mathematical model for various operations.
CH311.CEO.5: Know the development process of mathematical models for reaction systems.
CH311.CEO.6: Know and use of various simulation softwares.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH311.CO.1: Construct mathematical model and exercise model building procedure for steady and unsteady processes.
CH311.CO.2: Formulate material, energy and momentum balancing for chemical processes.
CH311.CO.3: Develop mathematical model for heat and mass transfer processes and simulate it.
CH311.CO.4: Formulate model for chemical reactors.
CH311.CO.5: Apply developed mathematical model for a given system.
CH311.CO.6: Carry out simulation by using simulation software packages viz Aspen HYSYS, etc.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Modeling and Simulation**	**7 HOURS**
Definition of model, types of models, formation & applications of mathematical model, definition of simulation and its applications, Scope of the modeling and simulation in process industries, fundamental laws: continuity equation, energy equation, equation of motion, transport equation, equation of state, phase and chemical equilibrium, chemical kinetics.		
UNIT 2	**Models in Fluid Flow Operations**	**7 HOURS**
The continuity equation, Flow through Packed bed column, Laminar Flow in narrow Slit, Flow of Film on the outside of circular tube, Momentum fluxes for creeping flow in to slot.		
UNIT 3	**Modeling of Process Equipment**	**7 HOURS**
Agitated vessels, pressure change equipment, mixing process, fluid solid operations, storage tanks, two heated tanks, Heat exchangers, evaporators.		
UNIT 4	**Modeling of Mass Transfer Equipment.**	**7 HOURS**
Flash distillation, differential distillation, and continuous binary distillation in tray and packed column, vaporizers, single phase and multiphase separation, multi-component separation, drying equipment, adsorption, absorbers and strippers.		
UNIT 5	**Modeling of Reaction Equipment**	**7 HOURS**
Examples of mathematical models of chemical engineering systems, batch reactor, constant volume CSTRS, gas phase pressurized CSTR, non-isothermal CSTR.		
UNIT 6	**Applications of Modeling and Simulation**	**7 HOURS**
Transient analysis of staged absorbers, unsteady state analysis in reactor system, Modeling and simulation of effluent treatment plant, Use of numerical methods to solve different models, introduction to Different simulation software.		

PRACTICAL		
PRACTICAL NO.01	**Continuous Stirred Tank Reactor (CSTR)**	**2 HOURS**
Simulation of CSTR using MATLAB for isothermal reaction.		
PRACTICAL NO.02	**Agitated Tank**	**2 HOURS**
Simulation of agitated vessel using MATLAB.		
PRACTICAL NO.03	**Shell and Tube Heat Exchanger**	**2 HOURS**
Simulation of shell and tube heat exchanger using MATLAB.		
PRACTICAL NO.04	**Plug Flow Reactor**	**2 HOURS**
Simulation of plug flow reactor using Aspen HYSYS.		
PRACTICAL NO.05	**Distillation Column**	**2 HOURS**
Simulation of distillation column using Aspen HYSYS.		
PRACTICAL NO.06	**Packed Absorption Column**	**2 HOURS**
Simulation of packed absorption column using Aspen HYSYS.		
PRACTICAL NO.07	**Extraction**	**2 HOURS**
Simulation of extraction column using Aspen HYSYS.		
PRACTICAL NO.08	**Process Flow Diagram**	**2 HOURS**
Steady state simulation of process flow diagram using Aspen HYSYS.		
PRACTICAL NO.09	**Process Flow Diagram**	**2 HOURS**
Steady state simulation of process plant using Aspen HYSYS.		
PRACTICAL NO.10	**Dynamic Simulation**	**2 HOURS**
Introduction to dynamic simulation using Aspen HYSYS.		
PRACTICAL NO.11	**Project**	**4 HOURS**
Project.		

TEXT BOOKS

1. Luyben W. L., Process Modeling Simulation and Control for Chemical Engineers, McGraw Hill, 2nd ed.1988, ISBN: 0070391599, 9780070391598.
2. Davis M. E., Numerical Methods and Modeling for Chemical Engineers, Wiley, New York, 1984, ISBN: 0486782328, 9780486782324.
3. Finlayson B. A., Nonlinear analysis in Chemical Engineering, McGraw Hill, New York, 2003, ISBN: 096317651X, 9780963176516.
4. Chapra S.C., R.P. Canale, Numerical Methods for Engineers, Tata-McGraw Hill Publications, 5th Ed, 2005, ISBN: 0073101567, 9780073101569.
5. Himmelblau D., K.B. Bischoff, Process Analysis and Simulation, John Wiley& Sons, 1968, ISBN: 0471399906, 978-0471399902.

REFERENCE BOOKS

1. Franks R.E.G., Modeling and Simulation in Chemical Engineering, Wiley Interscience, NY, 1972, ISBN: 9780471275350.
2. John Ingam, Irving J. Dunn., Chemical Engineering Dynamic Modeling with PC simulation, VCH Publishers, ISBN: 9783527297764.
3. Kayode Coker A., Chemical Process Design, Analysis and Simulation, Gulf Publishing Company, 1995 ISBN: 008050678X, 9780080506784.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Professional SKills
	COURSE CODE	HP302
	COURSE CREDITS	2
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	50	25	75

PRE-REQUISITE : HP101: Language and Comminucation 1,
HP102: Language and Communication 2

COURSE OBJECTIVES :

HP302.CEO.1: To define the importance of professional skills in students life
HP302.CEO.2: To explain them necessary, specific professional skills
HP302.CEO.3: To appraise students for placements through acquisition of professional skills
HP302.CEO.4: To support them detect their present level in respect of each professional skill and show direction for improvement

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP302.CO.1: Relate the importance of professional skills(L2)
HP302.CO.2: Build necessary, specific professional skills (L3)
HP302.CO.3: Analyze the environment of employ-ability (L4)
HP302.CO.4: Develop various techniques of effective team building in their professional life(L6)

PRACTICALS: (SECTION A)		
PRACTICAL NO.01	**Self Awareness**	**2 HOURS**
Concept of Johari Window, Advantages and disadvantages of every quadrant, Identifying the proportion of each quadrant in respect of self, Using the tools of Feedback & Exposure for self-development		
PRACTICAL NO.02	**Personal Interviews**	**6 HOURS**
Preparing for Interviews, Typical expected questions & suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Parameters of assessment, Initiating the discussion, Effective listening, Own contribution, Paraphrasing, Arguing and counter-arguing, Giving direction to the discussion		
PRACTICAL NO.04	**Team building and Motivation**	**2 HOURS**
Hallmark of effective teams, Barriers to team work, Subjugation of Individual interests for achievement of teams goal, Leading & motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2 HOURS**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique, Collective and individual Brain Storming,		
PRACTICAL NO.06	**Decision Making**	**2 HOURS**
Levels of decisions, Process of decision-making, Types of criteria, Individual and collective decision-making, Barriers in decision making, Keys to sound decision-making		
SECTION B:	**Aptitude Training.**	
.		

REFERENCE BOOK

1. Stephen Covey: The Seven Habits of Highly Effective People, Simon and Schuster Ltd, ISBN: 0-671-71117-2
2. Krishna Mohan, Meera Banerji, Developing Communication Skills, Birla Institute of Technology and Science, ISBN: 033392-919-5
3. Charles Kepner and Benjamin Tregoe, The Rational Manager: A systematic Approach to Problem Solving and Decision Making , Tata McGraw-Hill Publishing Company Ltd., ISBN:13:978-0070341753
4. Priyadarshini Patnaik, Group Discussion and Interview Skills , Foundation Books, 1st Ed.- 2011, ISBN No.: 9788175967847, 8175967846.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Skill Development Lab 1
	COURSE CODE	CH304
	COURSE CREDITS	2
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	50	25	75

PRE-REQUISITE :

COURSE OBJECTIVES :

CH304.CEO.1: Understand the basis of chemical engineering softwares such as Aspen HYSYS.
CH304.CEO.2: Learn the application of simulation software for solution of engineering problems.
CH304.CEO.3: Make aware about the chemical engineering concepts in efficient problem solving.
CH304.CEO.4: Construct a bridge between manual calculation and computer simulation.
CH304.CEO.5: Develop an ability to effectively use computational techniques to solve chemical engineering problems.
CH304.CEO.6: Learn the design aspects of chemical process plant.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH304.CO.1: Identify the operation/process required to solve an engineering problem.
CH304.CO.2: Match manual calculation with computer simulation.
CH304.CO.3: Apply the knowledge of chemical engineering basics to computational techniques.
CH304.CO.4: Categorize different types of equipments based upon application.
CH304.CO.5: Assess complex chemical engineering problems.
CH304.CO.6: Design a chemical engineering process/plant.

PRACTICAL		
PRACTICAL NO.01	**Introduction**	**2 HOURS**
Introduction to ASPEN HYSYS (Fluid Package & Component Addition).		
PRACTICAL NO.02	**Software Tools & Basic Component Drawing**	**2 HOURS**
Interface of Software: Different tools available, Basic Component & commands.		
PRACTICAL NO.03	**Refrigeration Cycle**	**6 HOURS**
Propane Refrigeration Cycle, Industrial Application.		
PRACTICAL NO.04	**Refrigerated Gas Plant**	**6 HOURS**
Refrigerated Gas Plant, Logical operation in Hysys, Interconnection of different equipments.		
PRACTICAL NO.05	**Reactor Simulation**	**4 HOURS**
CSTR Simulation.		
PRACTICAL NO.06	**Natural Gas Sweetening**	**4 HOURS**
Refinery operation process for purification(Sweetening) of natural gas using amine.		
PRACTICAL NO.07	**Natural Gas Fractionation**	**6 HOURS**
NGL fractionation train (Introduction to industry application, requirement, and problem statement), Quiz based on last two sessions.		
PRACTICAL NO.08	**Glycol Dehydration**	**10 HOURS**
Glycol dehydration process(utilization and application in industry), practical example based on project already executed by industry faculty.		
PRACTICAL NO.09	**Separators**	**4 HOURS**
Dynamic analysis of separators (Applications of Controllers and control system). This will mainly focus on level and flow control for the separators.		
PRACTICAL NO.10	**Project**	**12 HOURS**
Students will be given the Project Topics / Case Studies related to Chemical Engineering Problems. They are supposed to prepare flow sheet & solve the problem by using Aspen HYSYS Software.		

TEXT BOOKS

1. Aspentech: Getting Started Aspen HYSYS V8 Manual.
2. Ahmed Deyab Fares, Process Simulation using HYSYS V8.

REFERENCE BOOKS

1. I. M. Kamal, A.L. Malah, Aspen Plus Chemical Engineering Applications, Wiley Publication, ISBN: 9781119293620.
2. G. Rodriguez, A. Leguizamon, Process Analysis & Simulation in Chemical Engineering, Springer Publication, ISBN: 9783319148120.
3. A. K. Jana Process Simulation And Control Using Aspen, PHI Publications, ISBN: 9788120336599.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Separation Process
	COURSE CODE	CH321
	COURSE CREDITS	4
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH303: Mass Transfer

COURSE OBJECTIVES :

CH321.CEO.1: Understand the concept of vapor-liquid equilibrium and distillation.
CH321.CEO.2: Learn the various separation processes used in chemical industry.
CH321.CEO.3: Understand the equilibrium data and its application in the design.
CH321.CEO.4: Understand the mechanism of absorption, extraction, leaching & adsorption.
CH321.CEO.5: Introduce advanced separation techniques.
CH321.CEO.6: Study the working and design concept of various separation processes.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH321.CO.1: Generate the vapor - liquid equilibrium data for the given system.
CH321.CO.2: Perform material balance for batch and continuous distillation.
CH321.CO.3: Calculate the mass transfer coefficient for the different system.
CH321.CO.4: Analyze the effectiveness of the given separation column.
CH321.CO.5: Perform material balance calculations for different types of extraction units.
CH321.CO.6: Design equipment for various separation process.

THEORY COURSE CONTENT		
UNIT 1	**Distillation**	**8 HOURS**
Distillation principle, vapor liquid equilibria, Raoults law and deviations from ideality, relative volatility, methods of distillation, batch, continuous, flash, steam, vacuum, azeotropic, extractive and molecular distillation, reactive distillation.		
UNIT 2	**Design of Distillation Column**	**8 HOURS**
Continuous rectification, reflux, minimum and optimum reflux, number of ideal stages by McCabe Thiele method, Ponchon - Savorit method, Fenskes equation, Fenske Underwood equation, introduction to multi-component distillation.		
UNIT 3	**Absorption**	**8 HOURS**
Equilibrium and operating line concept in absorption calculations, absorption and stripping factors, calculation of NTU, HTU, number of stages, packed and plate type absorbers, absorption with chemical reaction, HETP, operating characteristics of stage wise and differential contactors.		
UNIT 4	**Liquid Liquid Extraction / Leaching**	**8 HOURS**
Liquid - liquid extraction, ternary liquid equilibria, stage wise contact equipment, calculations for batch and continuous extractors, calculation of number of stages. solid liquid equilibrium, equipment, batch and continuous type, calculation of number of stages.		
UNIT 5	**Adsorption.**	**4 HOURS**
Types of adsorption, nature of adsorption, theories of adsorption, adsorption isotherms, operation of adsorption columns, introduction to pressure swing adsorption (PSA), and temperature swing adsorption (TSA) batch and continuous operations, equipment.		
UNIT 6	**Advanced Separation Techniques**	**12 HOURS**
Recent advances in separation techniques, supercritical fluid extraction, Chromatography fundamentals, ion exchange, reactive distillation. Types of membrane separation processes, applications and advantages of membrane separation.		

PRACTICAL		
PRACTICAL NO.01	**Composition Vs Refractive Index**	**2 HOURS**
Estimation of the composition Vs Refractive Index for the given system.		
PRACTICAL NO.02	**Simple Distillation**	**2 HOURS**
Simple Distillation to verify Rayleighs equation.		
PRACTICAL NO.03	**Steam Distillation**	**2 HOURS**
Steam Distillation to find actual distillation temperature.		
PRACTICAL NO.04	**Vapour Liquid Equilibria**	**2 HOURS**
Estimation of VLE for given system (Methanol Water).		
PRACTICAL NO.05	**Wetted Wall Column**	**2 HOURS**
Estimation of mass transfer coefficient in wetted wall column for air water system.		
PRACTICAL NO.06	**Packed Bed Absorption**	**2 HOURS**
Estimation of mass transfer coefficient for packed bed gas absorber.		
PRACTICAL NO.07	**Simple Leaching**	**2 HOURS**
Estimation of separation efficiency for single / multi stage leaching.		
PRACTICAL NO.08	**Counter Current Leaching**	**2 HOURS**
Counter current leaching in 3 stages for the given system.		
PRACTICAL NO.09	**Liquid Liquid Equilibria**	**2 HOURS**
Liquid - Liquid Equilibrium for the given system.		
PRACTICAL NO.10	**Plait Point**	**2 HOURS**
Identification of plait point for the given system.		
PRACTICAL NO.11	**Batch Adsorption**	**2 HOURS**
Batch adsorption studies and identification of Langmuir isotherm constants.		
PRACTICAL NO.12	**Ion Exchange**	**2 HOURS**
Studies on Ion Exchange unit.		

TEXT BOOKS

1. Warren L McCabe, Julian C Smith and Peter Harriott, Unit Operations of Chemical Engineering, McGraw Hill International Edition, 6th Edition, New York 2001, ISBN 9780070448285.
2. Robert E Treybal, Mass Transfer Operations, McGraw Hill International Edition, 3rd Edition, Singapore, 1980, ISBN 9780070651760.
3. Geankoplis C.J, Transport Processes and Unit Operations, Prentice Hall Inc., 4th Edition, New Jersey, 2003, ISBN 013101367X.

REFERENCE BOOKS

1. Coulson J.M, Richardson J.F. Backhurst J.R. and. Harker J.M, Chemical Engineering, Vol. 1 & 2, Butter worth Heinemann, 6th Edition, 1999, ISBN 9780080494227.
2. Foust A.S, Principles of Unit Operations, John Wiley, ISBN 9780471268963.
3. Seader J.D & Henley E.J, Separation Process Principles, John Wiley, 2nd Edition, 2006, ISBN 9780471586265..
4. Welty J.R, Wicks C.E. & Wilson R.E, Fundamentals of Momentum, Heat & Mass Transfer, John Wiley, ISBN 9780471874973.
5. King C.J, Separation Processes, Tata McGraw Hill, 2nd Edition, 1980, ISBN 9780070993860.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Reaction Engineering
	COURSE CODE	CH322
	COURSE CREDITS	4
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH301: Chemical Engineering Thermodynamics, CH303: Mass Transfer

COURSE OBJECTIVES :

CH322.CEO.1: To learn about reaction kinetics for different types of reactions.
CH322.CEO.2: To solve problems involving mass and energy balance with reaction.
CH322.CEO.3: To design chemical reactors such as batch reactor, mixed reactor and plug flow reactor.
CH322.CEO.4: To determine reaction mechanism using experimental data.
CH322.CEO.5: To develop critical and creative thinking skills related to reaction engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH322.CO.1: Identify different reaction types and mechanisms.
CH322.CO.2: Explain the various types of reactors and their applications.
CH322.CO.3: Apply rate equations to determine the kinetic parameters of a reaction.
CH322.CO.4: Compare the behavior of different reaction order systems.
CH322.CO.5: Analyze the data obtained for different reactor systems.
CH322.CO.6: Design a reactor based on the reaction kinetic data.

THEORY COURSE CONTENT		
UNIT 1	**Batch Reactor Data Analysis**	**8 HOURS**
Constant volume & variable volume reactor, fractional conversion, unimolecular & multi-molecular reactions, integral & differential methods of analysis, half-life & fractional life methods, reactions in series & parallel, autocatalytic reactions, homogenous catalyzed reactions, reactions of shifting order.		
UNIT 2	**Reactor Design for Single Reactions**	**8 HOURS**
Ideal batch reactor, steady state mixed flow reactor, steady state plug flow reactor, performance equation, holding time, space time & space velocity, single reactors, size comparison of reactors, mixed flow vs. plug flow, multiple reactor systems, plug flow reactors in series and/or in parallel, equal size mixed flow reactors in series, mixed flow reactors of different sizes in series, reactors of different types in series, recycle reactor, reactor combinations for autocatalytic reactions.		
UNIT 3	**Reactor Design for Multiple Reactions**	**8 HOURS**
Qualitative and quantitative discussion for multiple reactions, contacting patterns for reactions in parallel, selectivity, irreversible reactions of same or different orders in series, reversible reactions in series and parallel, two step irreversible series-parallel reactions, instantaneous and overall fractional yield, product distribution and temperature.		
UNIT 4	**Non-Ideal Flow**	**8 HOURS**
Residence Time Distribution(RTD), state of aggregation, earliness & lateness of mixing, relation between F & E curves, conversion in non-ideal flow reactors, self mixing of a single fluid and mixing of two miscible fluids, compartment models, dispersion model, tanks in series model, convection model for laminar flow, segregated flow model.		
UNIT 5	**Solid Catalyzed Reactions**	**8 HOURS**
Surface chemistry and adsorption, factors affecting rate of reaction, rate equation for surface kinetics, pore diffusion resistance, Thiele modulus, effectiveness factor, rate controlling mechanism, heat effects during reaction, performance equations for reactors containing porous catalysts, product distribution in multiple reactions, staged adiabatic packed bed reactor, single packed bed reactor and two packed bed reactors in series, trickle bed reactor, multiple reactions and product distribution in fluidized beds, three phase fluidized bed reactor, reaction rate and performance equations, reactor design.		
UNIT 6	**Non-Catalytic Systems**	**8 HOURS**
Rate equation for mass transfer with reaction, kinetic regimes, film conversion parameter, Hatta number, application to design (fast and slow reactions), contactor selection, performance equations for different contactors, progressive conversion model (PCM), shrinking core model (SCM), spherical particles of changing and unchanging sizes, determination of rate controlling step, various contacting patterns in fluid-solid reactors, application to design.		

PRACTICAL		
PRACTICAL NO.01	**Isothermal Batch Reactor**	**2 HOURS**
To study the kinetics of a reaction at isothermal conditions using batch reactor.		
PRACTICAL NO.02	**Continuous Stirred Tank Reactor (CSTR)**	**2 HOURS**
To study the kinetics of a reaction at ambient conditions using CSTR.		
PRACTICAL NO.03	**Isothermal CSTR**	**2 HOURS**
To study the kinetics of a reaction at isothermal conditions using CSTR.		
PRACTICAL NO.04	**Plug Flow Reactor (PFR)**	**2 HOURS**
To study the kinetics of a reaction at ambient conditions using PFR.		
PRACTICAL NO.05	**Combined Flow Reactor**	**2 HOURS**
To study the kinetics of a reaction using a CSTR followed by PFR.		
PRACTICAL NO.06	**Cascade CSTR**	**2 HOURS**
To study the kinetics of a reaction using three CSTRs in series.		
PRACTICAL NO.07	**Non-ideal Flow in CSTR**	**2 HOURS**
To study the residence time distribution in CSTR.		
PRACTICAL NO.08	**Non-ideal Flow in PFR**	**2 HOURS**
To study the residence time distribution in PFR.		
PRACTICAL NO.09	**Recycle Reactor**	**2 HOURS**
To study the kinetics of a reaction using a recycle reactor.		
PRACTICAL NO.10	**Project**	**6 HOURS**
Project.		

TEXT BOOKS

1. O. Levenspiel, Chemical Reaction Engineering, 3rd edition, John Willey & sons, 1998, ISBN: 9788126510009.
2. J M Smith, Chemical Engineering Kinetics, 3rd edition, McGraw-Hill Inc., 1990, ISBN: 9780070665743.

REFERENCE BOOKS

1. H. Scott Fogler, "Elements of Chemical Reaction Engineering" , Prentice Hall; 4th edition, 2005, ISBN: 9780130473943.
2. C G Hill, "An Introduction to Chemical Reaction Kinetics and Reactor Design", John Wiley & sons; 1st edition, 1977, ISBN: 978-1118368251.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Equipment Design
	COURSE CODE	CH323
	COURSE CREDITS	4
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	4	30	40	30	25	50	175

PRE-REQUISITE : CH203: Chemical Engineering Operations, ME201: Material Engineering

COURSE OBJECTIVES :

CH323.CEO.1: Give comprehensive knowledge of various process equipment used in the chemical industries.

CH323.CEO.2: Provide knowledge about design principles of pressure vessels used in chemical plants.

CH323.CEO.3: Impart knowledge about standards and codes used in design.

CH323.CEO.4: Impart the knowledge of various design aspects and specifications used for process equipment.

CH323.CEO.5: Understand and calculate various design parameters for process equipment.

CH323.CEO.6: Understand the knowledge of mechanical design of various process equipment.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH323.CO.1: Understand the basics of process equipment design and important parameters of equipment design.

CH323.CO.2: Design different types of pressure vessels.

CH323.CO.3: Have complete knowledge of equipment fabrication and testing methods.

CH323.CO.4: Use various codes and standards used for equipment design.

CH323.CO.5: Find out the suitable material of construction, fabrication methods for various process equipment.

CH323.CO.6: Apply their knowledge for designing of process equipment.

THEORY COURSE CONTENT		
UNIT 1	**Basic Considerations in Design**	**8 HOURS**
Simple stresses and strains, concept of stress, strain, shear stress, shear strain, Hooks law, elastic limit and stress-strain curve for mild steel and elastomeric materials, Poissons ratio and factor of safety, Youngs modulus, strain energy due to axial load and impact, material behavior under stresses, theories of failures, corrosion allowance, weld joint Shear force and bending moment, deflection in beams, bending stress, torsional shear stress, stresses in struts, stresses in flat plates.		
UNIT 2	**Pressure Vessel, Flanges and Nozzles**	**8 HOURS**
Selection of type of vessels, design considerations, optimum length to diameter ratio of pressure vessel using common types of closures, introduction to codes for pressure vessel design and classification of pressure vessels as per codes, design of cylindrical and spherical shells under internal and external pressure, design of jacketed portion of vessels, design of high pressure monoblock and multilayer vessels. Flanges: Selection of gaskets, selection of standard flanges, optimum selection of bolts for flanges, design of flanges. Nozzles: Nozzle types, classification and arrangements, nozzle reinforcements and performance loss in nozzles.		
UNIT 3	**Reaction Vessel**	**8 HOURS**
Agitator: Study of various types of agitators, their selection, applications, baffling, power systems which includes twisting moment, equivalent bending moment, design of blades. Reaction vessel: Introduction, classification, design of vessel, heating systems, study and design of various types of jackets like plain, half coil, channel, limpet oil, study and design of internal coil reaction vessels, Heat transfer coefficients in coils and plain jackets, design of CSTR, Design of shell for all tower used at high wind and seismic conditions. Supports: Design of lug, skirt and saddle support including bearing plates and anchor bolts.		
UNIT 4	**Heat Exchanger**	**8 HOURS**
Process design of shell and tube heat exchanger: Types of heat exchanger, genera design considerations - LMTD correction factor, fluid allocation, fluid velocities, stream temperatures, pressure drop, shell side and tube side heat transfer coefficients, overall heat transfer coefficient. Mechanical design of shell and tube heat exchanger: Thickness of shell and shell cover, channel cover, tube sheet, size and number of tie rods and spacers, design of double pipe heat exchanger, condenser, reboiler.		
UNIT 5	**Auxiliary Equipment, Evaporator & Dryer**	**8 HOURS**
General design considerations of various liquid- liquid, gas-liquid separators, cyclone separators, centrifuges and other separation equipment. Design evaporator: Introduction, types of evaporator, general design consideration of evaporator. Design of dryer: Introduction, type of dryer, design consideration of dryer.		

UNIT 6	Process Design of Mass Transfer Column	8 HOURS
Design of distillation and absorption column: Design variables in distillation, design methods for binary systems, plate efficiency, approximate column sizing, plate contactors, and plate hydraulic design. Packed column: choices of plates or packing, packed column design procedure, packed bed height (distillation and absorption), HTU, Cornells method, column diameter, column internals, wetting rates, column auxiliaries.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Drawing of different heads and closures for pressure vessels.		
PRACTICAL NO.02		**2 HOURS**
Design and drawing of cylindrical and spherical shell.		
PRACTICAL NO.03		**2 HOURS**
Design and drawing of tall towers.		
PRACTICAL NO.04		**2 HOURS**
Design and drawing of jackets and vessels (with AutoCAD).		
PRACTICAL NO.05		**2 HOURS**
Design and drawing of gaskets and flanges (with AutoCAD).		
PRACTICAL NO.06		**2 HOURS**
Drawing of different types of supports (with AutoCAD).		
PRACTICAL NO.07		**2 HOURS**
Design and drawing of double pipe heat exchanger (with AutoCAD).		
PRACTICAL NO.08		**2 HOURS**
Design and drawing of Shell and tube heat exchanger (with AutoCAD).		
PRACTICAL NO.09		**2 HOURS**
Design and drawing Evaporator (with AutoCAD).		
PRACTICAL NO.10		**2 HOURS**
Design and drawing Decanter (with AutoCAD).		

PRACTICAL NO.11		2 HOURS
Drawing of Internal coil reaction vessel assembly (with AutoCAD).		
PRACTICAL NO.12		**2 HOURS**
Drawing of agitated reaction vessel assembly (with AutoCAD).		

TEXT BOOKS

1. Brownell L.E. and Young H.E, "Process Equipment Design", John Wiley, 2004, ISBN : 9780471113195.
2. Joshi M.V, Mahajani V.V, Process Equipment Design, 5th Edition, MacMillan Publishers India limited, ISBN : 9780333924181.
3. Dawande S.D, Process Design of Equipment, Central Techno Publications, Nagpur, 2000, ISBN : 8190322885.

REFERENCE BOOKS

1. Sinnott R.K, "Chemical Engineering Series", Vol. 6, 4th Edition, Butterworth Heinemann, ISBN : 9780080418667.
2. Richardson J.F, Harker J.H. and Backhurst J.R, "Chemical Engineering, Vol. 2, 5th Edition, Butterworth-Heinemann, ISBN : 9780750644457.
3. Kern D.Q, "Process Heat Transfer", McGraw-Hill, Revised edition, 1999, ISBN : 9780070341906.
4. James R Couper, Walas S.M, Chemical Process Equipment: Selection and Design, Gulf Professional Publishing, 1988, ISBN : 9780409901313.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Process Engineering
	COURSE CODE	CH331
	COURSE CREDITS	4
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH311: Process Modeling and Simulation

COURSE OBJECTIVES :

CH331.CEO.1: Learn the fundamentals of process engineering and understand the role of process engineer.
CH331.CEO.2: Know the basis of PFD and P&ID diagrams.
CH331.CEO.3: Learn the development of PFD and P&ID of process.
CH331.CEO.4: Understand the selection and sizing of equipment.
CH331.CEO.5: Learn the selection of equipment as per requirement.
CH331.CEO.6: Understand the design procedure of process equipment.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH331.CO.1: Identify the role of process engineer.
CH331.CO.2: Construct PFD and P&ID with material and energy balance calculations.
CH331.CO.3: Design and size the equipment as per requirement in process industries.
CH331.CO.4: Interpret the process equipment data.
CH331.CO.5: Evaluate sizing of equipment.
CH331.CO.6: Select proper process equipment as per given requirement.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Process Engineering**	**7 HOURS**
Overview of process industry and role of Process Engineer, Responsibilities of Process Engineer/Designer, Introduction to Process, Basic design requirement based on the type of plant / project, Scope of Process- Inputs and Outputs. Basic engineering activities, Basic engineering package (BEP), Front end engineering design (FEED), Relevant Standards/Codes, their importance and applications, Design basis, Major phases in the life cycle of chemical process plant- Technical and Economic Feasibility of General & Specific project.		
UNIT 2	**PFD and P&ID of Equipments**	**7 HOURS**
Relevant Codes and Standards used in industry; Symbols for P&ID, PFD and P&ID for process equipments, Development of PFD: Process & Utility,; Development and preparation P&ID, Mass and Energy balance - Design Basis, Sample Calculations, Development of P&ID : Process and Utility. Material selection, MSD (Material selection Diagram), DPDT Diagram (Design Pressure, Design Temperature Diagram), pipeline sizing.		
UNIT 3	**Selection of Equipments**	**7 HOURS**
Preparation of fluid list, line list, equipment list, utility consumption summery, catalyst and chemicals summery, effluent summery, selection of rotary equipment pumps, compressors, blowers, fans, Valves, reactors, heat exchangers, etc; process data sheets.		
UNIT 4	**Sizing and Design of Equipments**	**7 HOURS**
Sizing of valve, Safety valve sizing; Pump Selection and sizing; Reactor sizing, Pump Design, Pumps and control valve hydraulic calculations, Process designing calculations guidelines for separators, columns, HE, etc, Utility packages / utility selection / utility sizing.		
UNIT 5	**Heat Exchanger Design**	**7 HOURS**
Shell and tube heat exchanger, general design method for shell and tube heat exchanger, Criteria of selection between horizontal and vertical condenser, Process Design of reboiler and vaporizer, Plate heat exchangers.		
UNIT 6	**Process Design of Distillation Column**	**7 HOURS**
Criteria of selection, selection of equipment for distillation, Distillation column design, batch Distillation, short path distillation, Reactive distillation.		

PRACTICAL		
PRACTICAL NO.01	**Process Flow Diagram**	**2 HOURS**
Development of PFD for given process.		
PRACTICAL NO.02	**Process & Instrumentation Diagram**	**2 HOURS**
Development of P&ID for a given process		
PRACTICAL NO.03	**Process Data Sheet**	**2 HOURS**
Development of process data sheets.		
PRACTICAL NO.04	**Safety Valve**	**2 HOURS**
Sizing of safety valve.		
PRACTICAL NO.05	**Reactor Sizing**	**2 HOURS**
Determine the sizing of reactor.		
PRACTICAL NO.06	**Centrifugal Pump**	**2 HOURS**
Design of centrifugal pump for a given capacity..		
PRACTICAL NO.07	**Shell and Tube Heat Exchanger**	**2 HOURS**
Design of shell & Tube heat exchanger.		
PRACTICAL NO.08	**Distillation Column**	**2 HOURS**
Design of distillation column.		
PRACTICAL NO.09	**Project**	**2 HOURS**
Project.		

TEXT BOOKS

1. Thakore & Bhatt, Introduction to Process Engineering and Design, Tata McGraw-Hill Education, 2007, ISBN: 0070634157, 9780070634152.
2. Stanley M. Walas, Chemical Process Equipment - Selection and Design, Butterworth-Heinemann, 1988, ISBN: 0750693851, 9780750693851.

REFERENCE BOOKS

1. Harry Silla, Chemical Process Engineering Design and Economics, CRC Press, 2003,ISBN: 0824756444, 9780824756444.
2. Henry Kister, Distillation Operation, McGraw Hill Professional, 1990, ISBN: 007034910X, 9780070349100.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Project Management
	COURSE CODE	HP301
	COURSE CREDITS	2
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	15	25	10	NIL	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP301.CEO.1: To introduce the basic concept and scope of Project Management.
HP301.CEO.2: To teach the theory of project Initiation and its analysis with project vision.
HP301.CEO.3: To introduce the concept of risk analysis and different types of tools used in project planning.
HP301.CEO.4: To guide learners monitoring and controlling project progress.
HP301.CEO.5: To introduce the concept of System dynamics, project audit and reviews.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP301.CO.1: Explain the concept of project management.
HP301.CO.2: Develop an ability to analyze scope, objective and vision of project initiation.
HP301.CO.3: Able to analyze risk and different tools of project planning.
HP301.CO.4: Develop an ability to measure progress of project by monitoring and controlling
HP301.CO.5: Identify the problems associated with project and reviewing the same.

THEORY		
UNIT 1	**Introduction Project Management**	**5 HOURS**
Meaning of Project Management, Classifications of projects, The Triple Constraint, The PMBOK project management process framework, Standard project team roles and project organisation (Functional, matrix, projectised), System approach, Systems development, System analysis, Project feasibility, Product life cycle, Project appraisal, Project contracting, The phases of SDLC.		
UNIT 2	**Project Initiation**	**5 HOURS**
Determining the project business reason, creating a project charter (market and technical analysis), financial analysis evaluation of project proposals, risk analysis, sensitivity analysis and social cost benefits analysis, defining scope and objectives, define a project vision.		
UNIT 3	**Project Planning**	**6 HOURS**
Planning fundamentals, identifying the project team responsibilities, project master plan, work breakdown structure, and other tools of project planning, estimating the efforts and duration of tasks, Identifying and analyzing risks, PERT,CPM,GERT,SLAM,DPM and resource allocation.		
UNIT 4	**Project monitoring and controlling**	**4 HOURS**
Executingthe project on time, Measuring project progress, Identifying corrective actions, Internal & external project control, control process, variance limit, issues in project control.		
UNIT 5	**Project Learning**	**4 HOURS**
System dynamics, Project audit, Change management, Project reviews and reporting.		

PRACTICALS		
PRACTICAL NO.01	**SDLC**	**2 HOURS**
Preparing for managing and developing a perfect model of SDLC for a particular given problem.		
PRACTICAL NO.02	**PERT and CPM**	**2 HOURS**
Planning a project under PERT and CPM charts		
PRACTICAL NO.03	**GERT and SLAM**	**2 HOURS**
Planning a project under GERT and SLAM charts		
PRACTICAL NO.04	**DPM**	**2 HOURS**
Solving practical problems under DPM		
PRACTICAL NO.05	**Variance Limit**	**2 HOURS**
Project monitoring under variance and controlling according to the given situations.		

PRACTICAL NO.06	System Dynamics	2 HOURS
Understanding System dynamics by solving case studies		
PRACTICAL NO.07	**Change Management**	**2 HOURS**
Solving case studies for learning how change management works.		
PRACTICAL NO.08	**Project Reviewing**	**2 HOURS**
Solving many practical problems by reviewing projects as well as some case studies.		

TEXT BOOK

1. James P. Clements and Gido, Effective Project Management Cengage India 5th Edition , ISBN: 9781111824051
2. John Nicholas, Project Management for Business and Technology: Principles and Practice, PHI-Eastern economy 3rd Edition, ISBN: 0-7506-7824-0
3. Juana Clark Craig, Project Management Lite, 2nd Edition, ISBN-13: 9781478129226
4. Harold R. Kerzner, Project Management, 11th Edition, ISBN: 978-1-118-48322-0

REFERENCE BOOK

1. Erik Larson and Clifford Gray, Project Management: The Managerial Process, McGraw Hill ISBN-10: 0-07-340334-2
2. Enzo Frigneti, The Practice of Project Management, KOGAN PAGE INDIA PRIVATE LIMITED,ISBN: 9788175545397
3. Geogary M. Horine, Project Management, QUE 4th Edition, ISBN: 9780134653914
4. Cynthia Stackpole Snyder, A User manual to The PMBOK Guide, ISBN: 9781118546604
5. Brown, James T., The Handbook of Program Management: How to Facilitate Project Success with Optimal Program Management, Second Edition. The McGraw-Hill Companies, 2014, ISBN 978-0071837859
6. Frame, J. Davidson, Managing Projects in Organizations: How to Make the Best Use of Time, Techniques, and People, 3rd edition, Jossey-Bass, 2003, ISBN 0-787-96831-5
7. Kerzner, Harold, ProjectManagement: Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 10th edition, Wiley, 2009, ISBN 0-470-27870-6
8. Meredith, R. Jack and Mantel, Jr., Samuel J., Project Management: A Managerial Approach, 7th edition, Wiley, 2008, ISBN 0-470-22621-8
9. Stackpole, Cynthia Snyder, A Project Manager's Book of Forms: A Companion to the PMBOK Guide, Wiley, 2009, ISBN 978-0470389843
10. Weiss, Joseph and Wysocki, Robert, Five-phase Project Management: A Practical Planning And Implementation Guide, Basic Books, 1992, ISBN 0-201-56316-9

MIT Academy of Engineering (An Autonomous Institute Affillated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Basics of Entrepreneurship
	COURSE CODE	HP303
	COURSE CREDITS	1
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : Wadhwani Foundation Orientation Course

COURSE OBJECTIVES :

HP303.CEO.1: To understand the fit between you and your entrepreneurialambitions
HP303.CEO.2: To find a problem worthsolving
HP303.CEO.3: To identify yourcustomers
HP303.CEO.4: To develop a solution for your customers' problems and problemsolution
HP303.CEO.5: To build and demonstrate anMVP
HP303.CEO.6: To structure a business model around the problem, customer, and solution and present your Business ModelCanvas.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP303.CO.1: Why entrepreneurship requires
HP303.CO.2: Outline the Problems Worth Solving by using various techniques like DT, JTBD
HP303.CO.3: Identify the Customer Segments and Early Adopters
HP303.CO.4: Develop the solution demo for identify problem.
HP303.CO.5: Create Business Model Canvas and Minimum Viable Product

PRACTICALS:		
PRACTICAL NO.01	**GET STARTED - Discover Yourself**	**2 HOURS**
Find your flow, Effectuation, Case Study: Tristan Walker: The extroverted introvert, Identify your entrepreneurial style.		
PRACTICAL NO.02	**IDEA/PROBLEM - Identify Problems Worth Solving**	**4 HOURS**
What is a business opportunity and how to identify it. Find problems around you that are worth solving. Methods for finding and understanding problems - (Observation, Questioning, DT, Jobs to be done (JTBD) How to run problem interviews to understand the customer's worldview Introduction to Design Thinking - Process and Examples Generate ideas that are potential solutions to the problem identified - DISRUPT GOOTB: Run problem interviews with prospects Class Presentation: Present the problem you "love" Form teams		
PRACTICAL NO.03	**CUSTOMER**	**6 HOURS**
Identify Your Customer Segments and Early Adopters The difference between a consumer and a customer (decision maker); Market Types, Segmentation and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns. Identify the innovators and early adopters for your startup.Craft Your Value Proposition Come up with creative solutions for the identified problems Deep dive into Gains, Pains and Jobs-To-Be-Done (using Value Proposition Canvas, or VPC) Identify the UVP of your solution using the Value Proposition section of the VPC Outcome-Driven InnovationClass Presentation: Communicating the Value Proposition- 1 min Customer Pitch		
PRACTICAL NO.04	**BUSINESS MODEL**	**4 HOURS**
Get Started with Lean Canvas Basics of Lean Approach and Canvas; Types of Business Models (b2b; b2c)		
PRACTICAL NO.05	**VALIDATION**	**9 HOURS**
Develop the Solution Demo Build solution (mockups) demo, How to run solution interviews, GOOTB: Run Solution interviews. Does your solution solve the problem for your customers: The problem-solution test. Sizing the Opportunity Differences between a Startup venture and a small business; Industry Analysis Understanding what is Competition and it's role, Analyze competition Case study: Blue Ocean Strategy Building an MVP Identify an MVP and build it - I; Document and validate your assumptions Build-Measure-Learn feedback loop and the MVP/Javelin Board How to do MVP Interviews GOOTB: Run MVP interviews Is there a market for your product –The product-market fit test Class Presentation: Present your MVP		
PRACTICAL NO.06	**MONEY**	**5 HOURS**
Revenue Streams Basics of how companies make money. Understand income, costs, gross and net margins. Identify primary and secondary revenue streams. Pricing and Costs Value, price, and costs; Different pricing strategies. Understand product costs and operations costs; Basics of unit costing Financing Your New Venture How to finance business ideas, Various sources of funds available to an entrepreneur and pros and cons of each, What investors expect from you, Practice Pitching to Investors and Corporates.		

PRACTICAL NO.07	TEAM	2 HOURS
Team Building Shared Leadership Role of a good team in a venture's success; What to look for in a team; How do you ensure there is a good fit? Defining clear roles and responsibilities. How to pitch to candidates to join your startup Explore collaboration tools and techniques - Brainstorming, Mind mapping, Kanban Board, #Slack.		
PRACTICAL NO.08	**MARKETING & SALES**	**2 HOURS**
Positioning Understand the difference between product and brand and the link between them. Define the positioning statement for your product/service and how it should translate into what your customers should see about that brand in the marketplace. Channels & Strategy Building Digital Presence and leveraging Social media, Creating your company profile page, Measuring the effectiveness of selected channels, Budgeting and planning. Sales Planning Understanding why customers buy and how buying decisions are made; Listening. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale.		
PRACTICAL NO.09	**SUPPORT**	**2 HOURS**
Planning & Tracking Importance of project management to launch and track progress Understanding time management, workflow, and delegation of tasks Business Regulation Basics of business regulations of starting and operating a business; Importance of being compliant and keeping proper documentation How to find help to get started		
PRACTICAL NO.10	**Capstone Project: Present Your BMC (Optional - and MVP)**	**2 HOURS**
BMC: Business Model Canvas. / MVP: Minimum Viable Product.		

REFERENCES

1. Read Forbes article and do Group Discussionhttps://www.forbes.com/sites/chrismyers/2015/12/16/find-your-flow-and-success-will-follow/
2. https://necrophone.com/2014/01/20/effectuation-the-best-theory-of-entrepreneurship-you-actually-follow-whether-youve-heard-of-it-or-not/
3. Use your self awareness to find out what motivates and drives Entrepreneurial activity - Ted Talk "What is your Entrepreneurial style - EntrepreneurKnow
4. Prof. Clay Christensen "IdentifyingCustomerNeeds" https://www.youtube.com/watch?v=yVCZ-7xSsCw
5. Understand the customer problem by GOOTB":by GOOTB":https://www.youtube.com/watch?v=sEENIZgscDw
6. https://www.forbes.com/sites/danschawbel/2013/12/17/geoffrey-moore-why-crossing-the-chasm-is-still-relevant
7. Value Proposition: https://www.youtube.com/watch?v=jZN6CUieuOQ&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
8. Value Proposition & Customer Need:https://www.youtube.com/watch?v=6FnG8pJL8yM&index=3&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
9. https://strategyn.com/turn-customer-input-into-innovation/ CASE STUDIES in ODI: https://jobs-to- be-done.com/tagged/case-study
10. TheLeanBMC https://www.youtube.com/watch?v=FjBe7UO1hc
11. Ash Maurya -Capture your BMC in 20
12. minuteshttps://www.youtube.com/watch?v=7o8uYdUaFR4&t=462s
13. Ash Maurya - How to Prioritize Risks on Your BusinessModel https://www.youtube.com/watch?v=01z7EPXS42k
14. https://pt.slideshare.net/bmorelean/dan-lemberg-lean-pitch
15. https://startups.fb.com/en-in/categories/development/
16. Designing Experiments: https://www.youtube.com/watch?v=WiMZWCg1Hu8&t=111s
17. Customer Development Process:https://www.youtube.com/watch?v=lLEebbiYIkI
18. Beating the Competition: https://www.youtube.com/watch?v=46uP6vOj5G0
19. Q&A with Garr :https://www.youtube.com/watch?v=SmJjjOrusyI
20. Basic Accounting Lingo for Entrepreneurs:https://www.youtube.com/watch?v=Y7Pm1jEEKE
21. Vinod Khosla : How Leaders can BUILDhttps://www.youtube.com/watch?v=bRCoBgCn1Q
22. Vinod Khosla: https://www.youtube.com/watch?v=VIrNLzTs9cw
23. How to Pitch the way VC's think, so you can convince co-founders : https://www.youtube.com/watch?v=fTgU7THoKCw
24. Tony Buzan:http://www.tonybuzan.com/about/mind-mapping/
25. Google : Think branding:https://www.youtube.com/watch?v=1l2CUjkg0ug
26. The Battle for your mind using Positioning:https://www.youtube.com/watch?v=jQrY8xRx-0 Design rules-https://www.igorinternational.com/, Web design course:https://www.coursera.org/specializations/web-designStrikingly Free : https://www.strikingly.com/online-resume/linkedin
27. https://certification.hubspot.com/inbound-sales-certification-course
28. https://www.udemy.com/courses/business/sales/
29. https://www.accountingtools.com/articles/2017/5/17/sales-budget-sales-budget-example

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Mini Project
	COURSE CODE	CH324
	COURSE CREDITS	2
RELEASED DATE : 01/12/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	20	NIL	55	75

PRE-REQUISITE : ET206: Prototyping, CH213: Minor project

COURSE OBJECTIVES :

CH324.CEO.1: Understand the Product Development Cycle through Mini project.

CH324.CEO.2: Undertake & execute a mini Project through a group of students.

CH324.CEO.3: Inculcate skills in engineering product design and development process, budgeting, planning, testing, effective trouble-shooting practices, aesthetics and ergonomics.

CH324.CEO.4: Understand the role of professional and ethical practices, management principles, technical documentation and communication skills in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH324.CO.1: Execute an idea in a team as well as within constraints.

CH324.CO.2: Acquire knowledge of the techniques, skills and modern engineering tools necessary for engineering practices.

CH324.CO.3: Use standard engineering tools and processes for design, simulation, testing, analysis in implementation and deployment of theoretical idea into practice.

CH324.CO.4: Use standard documentation and presentation tools for a professional report and presentation of the work.

PREAMBLE:
It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

PRACTICAL

Stage- 1	**Formation of group and Allocation of project adviser**	**Week-1**

1. Project group formation and project advisor allocation by the department.
2. Project group shall consist of Minimum 02 and maximum 03 students per group (For detailed process please check Annexure-1 Mini project guidelines).
3. Selection of finalized topic from approved project topics by the department.
4. The project design idea shall be based on refereed papers, white papers, product, patent, application notes, industry problem, academic, institute or societal requirement, funded research, innovative thought, modification/ development in existing idea etc.
5. Each student will maintain a logbook/project diary. This diary will be utilized to monitor project progress throughout.

Stage- 2	**Project Review -1 Internal review by project adviser**	**Week-2&3**

1. The project group will work on,
a. Conceptualization of an Idea.
b. Literature review.
c. Market survey.
d. Finalizing the Specifications.
2. Presentation of work progress to project adviser and proceed to project approval.

Stage- 3	**Project Review -2 Project Approval**	**Week-4**

1. Presentation of concept to Department Review Committee (DRC) or Committee appointed by department.
2. Review of concept and feasibility of project and necessary suggestions for implementation by the committee.
3. The project group will make corrections and continue their work.

Stage-4	**Project Review -3 Internal review by project adviser**	**Week- 5to9**

1. The project group will work on, a. System Architecture and Design, b. Simulation /software development (As applicable), c. Manufacturing of project, d. Assembly, e. Testing, f. Troubleshooting.
2. Presentation of work progress to project adviser and proceed to final project progress review.

Stage-5	Project Review -4 Final Project progress review	Week-10&11

1. The project group will work on, a. Result analysis against specifications, b.Enclosure/Aesthetic design (As applicable), c.Technical report generation (Draft copy), d. Users manual (As applicable), e. Bill of material etc.
2. The technical report may incorporate following points:
Title, Introduction and Concept, Literature & Market survey, Theory and relevance, Block diagram, Drawings (As applicable), Specifications, Project plan, Bill of material, Enclosure/aesthetic design (As applicable), Results, Results analysis, Conclusion, References.
3. Presentation of project work, draft copy of technical report, Final presentation etc. to DRC or Committee appointed by department.
4. Review of project progress and necessary suggestions by DRC or Committee appointed by department for final presentation.
5. The project group will make corrections. After clearing all comments from DRC; project can be presented to final l examination.
6. Project must be approved by department to appear for final examination.

Stage-6	Examination: Final Demonstration and presentation	Week-12

1. Final examination will be divided in three parts: a) Demonstration, b) Presentation, c) Project documentation.
2. For final examination project must be demonstrated in front of examiner panel. For Industry sponsored projects or other installations examiner panel can visit the project venue.
3. All students must be physically present in front of examiner panel at the time of examination.
4. Only demonstrated projects can be evaluated for presentation and documentation.
5. Mini Project demonstration: Demo of project works and validation of project results to examiners panel.
6. Mini Project presentation: Presentation of overall project work form project idea to implementation and deployment of project to examiners panel.
7. Mini Project documentation: Presentation of technical documentary report to examiners panel.

Assessment:

1. Internal Assessment:
a. Project Review -2 Project Approval -05 Marks
b. Project Review -3 Internal review by project adviser- -05 Marks
c. Project Review -4 Final Project progress review- 10 Marks
2. Examination: Final Demonstration and presentation:
a. Mini Project demonstration: 20 Marks
b. Mini Project presentation: 20 Marks
c. Mini Project documentation: 15 Marks

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Curriculum

For

Final Year

Bachelor of Technology in Chemical Engineering

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2019-20 (PART A)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEEERING	RELEASE DATE	:	1/12/2018
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	CH401	Process Dynamics, Control & Instrumentation	3	2	4
2.	DE1	CH41#	Dept. Elective - Refer Annexure.	3	0	3
3.	OE3	CH42#	Open Elective - Refer Annexure.	3	2	4
4.	HSS7	HP402	Sociology	2	---	2
5.	HSS8/ SDP7	HP403/ CH402	Business Strategies / Skill Development Lab 2	---	2	1
6.	SDP8	CH403	Project - I	---	8	4
7.	SDP9	CH404	Summer Internship	---	---	4
TOTAL				**11**	**14**	**22**

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	CH431	Chemical Process Technology	3	2	4
2.	DE2	CH44#	Dept. Elective - Refer Annexure.	3	0	3
3.	OE4	CH45#	Open Elective - Refer Annexure.	3	2	4
4.	HSS9	HP401	Engineering Economics	2	---	2
5.	SDP10	CH432	Project - II	---	8	4
TOTAL				**11**	**12**	**17**

L: Lecture, P: Practical

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Process Dynamics and Control
	COURSE CODE	CH401
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH302 Heat Transfer, CH321 Separation Processes

COURSE OBJECTIVES :

CH401.CEO.1: Make aware of dynamics of different systems.
CH401.CEO.2: Learn about the use of computer application in control system design.
CH401.CEO.3: Solve the Bode Plot diagrams.
CH401.CEO.4: Understanding of the system stability criterion.
CH401.CEO.5: Learn the Feedback control system dynamic.
CH401.CEO.6: Understand the plant wide control system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH401.CO.1: Experiment transfer functions of different systems and their response required for stability analysis.
CH401.CO.2: Categorize controller tuning for stable systems in chemical process plants.
CH401.CO.3: Correlate multiple loops and use the computers in process control in chemical process industries.
CH401.CO.4: Compare stable & unstable systems by Bode Stability criterion.
CH401.CO.5: Evaluate control system for various process operations.
CH401.CO.6: Apply various softwares used for control systems.

THEORY COURSE CONTENT		
UNIT 1	**Dynamic behavior of Simple processes**	**7 HOURS**
Characteristics of Chemical Process Control, Mathematical modeling of a chemical process, State variables and state equation, Input-Output model, Linearization of nonlinear systems, Types of Forcing functions, dead-time systems, First order systems Thermometer, Liquid level tank, Liquid level tank with constant outlet (pure capacitive), CSTR, Dynamic response of first order system to step input.		
UNIT 2	**Design of single-loop feedback control systems**	**7 HOURS**
Second order system Damped vibrator, U-tube manometer, Interacting and Non-interacting systems, Step response of second order system, Characteristics of underdamped system. Classical controllers P, PI, PD, PID and ON-OFF controllers. Concept of feed-back control system, Servo & Regulatory problem, Block diagram reduction of complicated control systems, and Dynamic behaviour of feed-back control processes.		
UNIT 3	**Stability Analysis of feed-back systems**	**7 HOURS**
Notion of stability, Characteristic equation, stability analysis of feedback control system using Routh-Hurwitz criteria, Root locus. Simple performance criteria controller tuning with one-quarter decay ratio criteria, Time Integral performance criteria by ISE, IAE, ITAE, etc., selection of feed-back controller, Controller tuning using process reaction curve by Cohen-coon technique.		
UNIT 4	**Frequency response analysis of linear processes**	**7 HOURS**
Response of first order system to sinusoidal input, Frequency response characteristics of general linear system, Bode diagrams - First order system, Second order system, Pure capacitive process, dead time system, P, PI, PD & PID, Bode stability criteria, Gain margin, Phase Margin, Nyquist Stability criteria, Ziegler Nicholes Tuning technique.		
UNIT 5	**Digital and Computer- based Control Systems**	**7 HOURS**
Analysis and design of control systems with multiple loops (cascade, selective, split range control systems) Analysis and design of advanced control systems (feed forward, ratio, adaptive and inferential control systems. Role of digital computer in process control as process interface for data acquisition and control, Centralized control systems.		
UNIT 6	**PLC and SCADA Control Systems**	**7 HOURS**
Supervisory control systems (SCADA), microcomputer- based control systems (PLC, DCS), Plant wide control for plants involving Distillation column, Heat Exchanger, CSTR, Controller Selection.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Dynamic response of thermometer (first order).		
PRACTICAL NO.02		**2 HOURS**
Dynamic response of thermocouple (first order).		
PRACTICAL NO.03		**2 HOURS**
Time constant of thermometer second order system.		
PRACTICAL NO.04		**2 HOURS**
Time constant of thermocouple second order system.		
PRACTICAL NO.05		**2 HOURS**
Time constant of manometer.		
PRACTICAL NO.06		**2 HOURS**
Two tank interacting system.		
PRACTICAL NO.07		**2 HOURS**
Two tank non-interacting system.		
PRACTICAL NO.08		**2 HOURS**
Feedback flow experiment on SCADA.		
PRACTICAL NO.09		**2 HOURS**
Feedback level experiment on SCADA.		
PRACTICAL NO.10		**2 HOURS**
Feedback pressure experiment on SCADA.		
PRACTICAL NO.11		**2 HOURS**
Temperature control study.		

TEXT BOOKS

1. Stephanopoulos George Chemical Process Control, PHI publication, ISBN: 9789332549463.
2. Coughanour Donald R. Process System Analysis & Control, Mc Graw Hill, ISBN: 9780073397894.

REFERENCE BOOKS

1. Bequette B. Wayne Process Control Modeling, Design & Simulation, PHI Publication, Hardcover, ISBN: 9780133536409.
2. Mellichamp Dancan A., Edgar Thomal F., Seborg Dale E Process Dynamics & Control, ISBN: 9780471863892.
3. Ray W. Harmon, Ogunnaike Babatunde A., Process Dynamics, Modeling & Control, Oxford University Press Inc. ISBN: 978019591199.
4. Chindambaram M. Computer Control of Processes, Alpha Science International Ltd. ISBN: 9781842650639.
5. Liptak Bella G. Instrument Engineers Handbook (Process Control), Elsevier, ISBN: 9780801972904.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Introduction to Paint Technology
	COURSE CODE	CH411
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	50	20	NIL	25	125

PRE-REQUISITE :

COURSE OBJECTIVES :

CH411.CEO.1: Understand Global and Indian scenario for paint manufacturing industries with production methods and capacity.

CH411.CEO.2: Recognize different film formation technique and role of chemical engineer in industry.

CH411.CEO.3: Identify and understand various standards followed in Paints industry.

CH411.CEO.4: Evaluate current testing methods with importance of optimization. Analyze importance of raw material quality and specification on processing of material.

CH411.CEO.5: Understand selection of process and various parameters used for process selection with major engineering problem.

CH411.CEO.6: Know safety practices & pollution control norms in paint industries.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH411.CO.1: Interpret growth and market trends in paint manufacturing industries.

CH411.CO.2: Apply knowledge of film formation and proper use of it to avoid defects.

CH411.CO.3: Evaluate methods compared with standard methods.

CH411.CO.4: Problem solving skills and decision making skills needed for working with an industry.

CH411.CO.5: Evaluate effect of raw material quality on product processing and quality

CH411.CO.6: Understand problem solving and decision making skills needed for working with an industry. Develop as team player and follow safety practices.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Paint**	**7 HOURS**
Introduction to Surface Coatings, classification, definition of paints, varnishes, lacquer, pigment, extender. General composition of surface coatings, function of pigments, extenders, binders, driers, additives in surface coatings. History of developments of surface coatings, Global scenario and past, present and future of Indian Coating Industry.		
UNIT 2	**Film Formation**	**7 HOURS**
Fundamental of film formation. Chemical Composition, functionality and degree polymerization and film properties. Concept of functionality. Types of coatings, convertible and non convertible.		
UNIT 3	**Natural surface coatings**	**7 HOURS**
Vegetable and marine Oils for surface coatings. Classification of oils, fats and waxes. Non drying, drying and semidrying oils. Sources and composition. Methods of extraction and refining of drying oils from vegetable and marine origin.		
UNIT 4	**Polymerization**	**7 HOURS**
Polymerisation of drying oils, thermal and oxidative. Formation of stand, blown and boiled oils. Limed oils, Treated Oils. Dehydrated oils, DCO, Copolymerized oils, film formation and deterioration.		
UNIT 5	**Dries**	**7 HOURS**
Dries, mechanism of drying action. Composition of dries, drier metals, drier absorption. Analysis of metal content. Preliminary analysis of Paints, Indian Standards specifications for paints.		
UNIT 6	**Plant layout and Safety**	**7 HOURS**
Factory lay out: Principles, general considerations, typical flow diagrams, single & multi storied buildings, different sections of a paint factory and their locations, Instrumentation and automation. Safety considerations in storage of hazardous and inflammable raw materials. Fire Protection and safety: Sources, types, Fire & explosion index, safety measures for protection.		

TEXT BOOKS

1. W Billmeyer, Text Book of Polymer Science, Interscience Publishers Inc, New York 1962, ISBN 10: 0471072966 / ISBN: 9780471072966.
2. A.S. Khanna, Paints and Varnishes, Indian Central Iolsee Committee, 1959, ISBN: 978817409167.
3. H F Payne, Organic Coating Technology, Vol I, John Wiley and Sons, New York, ISBN: 9780471672869.
4. Rodger Talbert, Paint technology handbook, CRC Press, ISBN: 9781574447033.

REFERENCE BOOKS

1. Paint Technology Manual: Vol I, II Oil and Colour Chemists Association, ISBN: 8978133310847.
2. T P Hilditch, The Chemical Constitution of Natural Fats, 2nd Edition, John Wiley and Sons, 1947 SBN 10: 0412022508 ISBN: 9780412022500
3. J J Matellio, Protective and Decorative Coatings, Vol I, John Wiley and Sons, ISBN: 9780471958185.
4. Surface Coatings: Vol I, Raw Materials and their useage, Oil and Colour Chemists Association, Australia ISBN: 9789401169400.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Energy Engineering
	COURSE CODE	CH412
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	40	30	NIL	25	125

PRE-REQUISITE : CH301: Chemical Engineering Thermodynamics, CH302: Heat Transfer

COURSE OBJECTIVES :

CH412.CEO.1: Know the conventional and renewable energy sources.
CH412.CEO.2: Understand the various ways to harness energy.
CH412.CEO.3: Understand the energy conservation and conversion techniques.
CH412.CEO.4: Develop the insight to use proper energy techniques tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH412.CO.1: Classify the conventional and renewable energy sources.
CH412.CO.2: State the various applications of each form of energy.
CH412.CO.3: Make appropriate use of the energy conversion tools.
CH412.CO.4: Develop a system based on non-conventional energy sources.

THEORY COURSE CONTENT		
UNIT 1	**Conventional Energy Sources**	**7 HOURS**
Energy demand, resources and routes: Indian scenario, projected growth of energy supply in India, fossil fuels, types of coal, classification of Indian coals, coal conversion technologies, coal gasification, coal liquefaction, petroleum and natural gas, energy routes of petroleum, products of petroleum refining, natural gas refinery, liquefaction of natural gas.		
UNIT 2	**Solar Thermal Energy**	**7 HOURS**
Solar insolation, solar radiation data for India, merits and limitations of solar energy utilization, solar energy routes, essential subsystems in a solar energy plant, solar thermal collectors, heat transfer fluid, thermal energy storage, solar pond, combined cycle and co-generation power plants.		
UNIT 3	**Biomass Energy**	**7 HOURS**
Origin of biomass, biomass energy resources, biomass conversion processes, incineration, thermochemical conversion, biochemical conversion, liquid and gaseous fuels from biomass, wood pyrolysis, wood to oil processes, ocean biomass energy conversion.		
UNIT 4	**Waste to Energy**	**7 HOURS**
Urban solid waste, agricultural waste, waste incineration, waste pyrolysis, landfill gas, biogas, types of biogas plants, significance of biogas plants in Indias energy strategy, Uhde-Shwarting process of two stage wet fermentation, dry anaerobic digestion process of municipal solid waste.		
UNIT 5	**Fuel Cells and Hydrogen**	**7 HOURS**
Advantages of fuel cell power sources, classification and types of fuel cells, performance characteristics, commercial fuel cell power plants, future prospects, production of hydrogen, storage and transportation, applications of hydrogen as an energy source.		
UNIT 6	**Energy Storage Systems**	**7 HOURS**
Compressed air energy storage, battery energy storage systems, superconducting magnet energy storage, advanced flywheel energy storage, thermal energy storage, chemical material energy storage.		

TEXT BOOK

1. Rao S., Parulekar B. B., Energy Technology Nonconventional, Renewable and Conventional, Khanna Publishers, 3rded.1999, ISBN: 8174090401.

REFERENCE BOOKS

1. Boyle G., Renewable Energy Power for a sustainable future, Oxford University Press, 2004.
2. Bent Sorensen , Renewable Energy, Elsevier, Academic Press, 2011.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Petroleum Refining Technology
	COURSE CODE	CH413
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	40	30	NIL	25	125

PRE-REQUISITE : CH321: Separation Process

COURSE OBJECTIVES :

CH413.CEO.1: Explain the market drivers for the refining industry.
CH413.CEO.2: Understand composition and characteristics of crude oils.
CH413.CEO.3: Understand various test for petroleum products.
CH413.CEO.4: Classify the processes used in petroleum refining.
CH413.CEO.5: Sketch a flow diagram that integrates all refining processes and the resulting refinery products.
CH413.CEO.6: Examine implications of changing crude oil feedstock on refinery configuration.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH413.CO.1: Interpret the petroleum refinery flow diagram and its major challenges.
CH413.CO.2: Analyze the importance of pre refining operation.
CH413.CO.3: Understand Specification and test methods for fuel.
CH413.CO.4: Understand Hydrogen and Sulphur production Flowsheet.
CH413.CO.5: Interpret processes used in refinery with its importance.
CH413.CO.6: Interpret Lube oil and Bitumen production Flowsheet and specification.

THEORY COURSE CONTENT		
UNIT 1	**Introduction and Crude Oil Composition**	**7 HOURS**
Indian Petroleum Industry: World and Indian and scenario of petroleum industry, major companies. World production, Markets, Offshore and onshore. Composition of Crude: Classification, Evaluation of petroleum, UOP-k factor, TBP analysis, EFV analysis, Average boiling point, ASTM curves, Thermal properties of petroleum fractions, Transportation of crude oil.		
UNIT 2	**Pre- refining and Distillation**	**7 HOURS**
Pre-refining operations such as Settling, Moisture removal, Desalting, Storage, Heating through exchangers and pipe still heaters, Atmospheric distillation, Vacuum distillation.		
UNIT 3	**Testing and Specification of Product**	**7 HOURS**
Gas: Various types of gas and LPG. Gasoline and Naphtha: Octane No, Reid vapor pressure analysis, Oxidation stability, Additives used.. Kerosene: Smoke Point, Flash point or fire point, volatility, burning qualities etc. Diesel: Cetane No, viscosity etc, Grades of diesels e.g. HSD, LDO, Diesel additives. Lube oils: Types, tests-carbon residue and viscosity index. Bitumen and Wax: Softening point, Ductility, Penetration test, Dielectric test.		
UNIT 4	**Process in Refinery**	**7 HOURS**
Catalytic & thermal cracking, reforming and coking, Fluid Catalytic Cracking, alkylation, isomerisation.		
UNIT 5	**Hydrogen and Sulphur Management**	**7 HOURS**
Hydrodesulphurization, Hydro-cracking, Hydrogen Management: Production and recovery, Sulphur Recovery.		
UNIT 6	**Lube oil, Bitumen**	**7 HOURS**
Lube oil production, deasphalting, Solvent extraction, dewaxing, Finishing operations, Lube oil additives. Manufacture of Bitumen. Environmental Pollution aspects in refinery.		

TEXT BOOKS

1. Bhaskara Rao. B.K., Modern Petroleum Refining Process, 3rd Edition, Oxford & IBH, New Delhi, 1984.
2. Ram Prasad, Petroleum Refining Technology, 1st Edition, Khanna Publishers, 2000.
3. Gary, J. & Handwerk, G. Petroleum Refining Technology, 4th Edition, Marcel Dekker, Inc., New York, Basel , ISBN: 0824704827.
4. David S. J. Stan Jones. Handbook of Petroleum Processing, by Institute of Petroleum (IP), John Wiley, ISBN: 9780470850220.

REFERENCE BOOKS

1. Dawe R. A., Modern Petroleum Technology Part I, by Institute of Petroleum (IP), John Wiley, ISBN: 9780470850213.
2. Kirk & Othmer, Concise Encyclopedia of Chemical Technology, 5th Edition, Wiley Publishers, 2007, ISBN 9780470047484.
3. Faith W.L, Lowenheim F.A, Moran M.K, Industrial Chemicals, 4th Edition, Wiley Publishers, ISBN 9780471549642.
4. Groggins P.H, Unit process in organic synthesis, 5th Edition, McGraw Hill, 2004, ISBN 9780074621431.
5. Speight J G, The Chemistry and technology of petroleum, CRC Press, ISBN 9781439873892.
6. Myers, Handbook of Petroleum Processing, McGraw-Hill Education. ISBN: 9780071391092.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Biochemical Engineering
	COURSE CODE	CH414
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	50	20	NIL	25	125

PRE-REQUISITE : CH322: Chemical Reaction Engineering

COURSE OBJECTIVES :

CH414.CEO.1: Provide basic knowledge of biochemical engineering.
CH414.CEO.2: Understand the kinetics of enzymes.
CH414.CEO.3: Learn techniques and industrial applications of enzymes.
CH414.CEO.4: Get concept of metabolic study.
CH414.CEO.5: Study Cell Kinetics study and design of fermentor.
CH414.CEO.6: Learn concept of sterilization.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH414.CO.1: Discuss basics of Biology and Overview of Biotechnology.
CH414.CO.2: Develop cell and enzyme kinetics.
CH414.CO.3: Illustrate methods of immobilization.
CH414.CO.4: Analysis and Stability of Bioreactors.
CH414.CO.5: Apply sterilization methods.
CH414.CO.6: Reframe bio-product Recovery & Bio-separations, Manufacture of Biochemical Products.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**7 HOURS**
Basics of Biology; Overview of Biotechnology; Diversity in Microbial Cells, Cell Constituents, Chemicals for Life.		
UNIT 2	**Fermentation**	**7 HOURS**
Fermentation, types of mechanisms, continuous fermentation, aeration and agitation, kinetics of fermentation processes.		
UNIT 3	**Enzyme Kinetics**	**7 HOURS**
Introduction, Simple Enzyme Kinetics, Enzyme Reactor with Simple Kinetics, Inhibition of Enzyme Reactions, and Other Influences on Enzyme Activity. Immobilized Enzymes: effects of intra and interphase mass transfer on enzyme kinetics.		
UNIT 4	**Metabolic Study**	**7 HOURS**
Major Metabolic Pathways: Bioenergetics, Glucose Metabolism, Biosynthesis. Microbial Growth: Continuum and Stochastic Models.		
UNIT 5	**Study of Sterilization**	**7 HOURS**
Sterilization: Sterilization methods, thermal death kinetics, design criterion, batch sterilization, continuous sterilization and air sterilization. Downstream Processing: introduction, solid-liquid separation, cell rupture, recovery and purification.		
UNIT 6	**Bioreactor Design**	**7 HOURS**
Introduction of Bioreactor design: Continuously stirred aerated tank bioreactors. Mixing power correlation. Determination of volumetric mass transfer rate of oxygen from air bubbles and effect of mechanical mixing and aeration on oxygen transfer rate. Bio-product Recovery and Bio-separations, Manufacture of Biochemical Products.		

TEXT BOOKS

1. Technological Applications of Bio-catalysts, BIOTOL series, Butter worth, 1995, ISBN: 9780750605069.
2. Cornish A. Bowden, Analysis of Enzyme Kinetic Data, Oxford University Press, 1996, ISBN: 0736034625444.

REFERENCE BOOKS

1. J. E. Bailey & D. F. Ollis, Biochemical Engineering Fundamentals , McGraw Hill Book Company, 1986, ISBN: 9780070701236.
2. Lee J.M., Biochemical Engineering, Ebook, version 2.32, 2009, ISBN: 9783527318506.
3. James E. Bailey & David F. Ollis, Biochemical Engineering Fundamentals, 2 nd edition, McGraw Hill International, 1986, ISBN: 9780070032125.
4. Michael L. Shuler & Fikret Kargi, Bioprocess Engineering Basic Concepts, 2 nd edition, Prentice Hall of India, New Delhi, 2002, ISBN: 9788120321106.
5. Wiseman A (Ed.), Topics in enzyme and fermentation Bio-technology, Ellis mand Harwood, U.K. Vol-5, ISBN: 9885177332121.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Environmental Engineering
	COURSE CODE	CH415
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	50	20	NIL	25	125

PRE-REQUISITE : CH201: Environmental Science, CH212: Advanced Chemistry

COURSE OBJECTIVES :

CH415.CEO.1: Acquire knowledge about the importance of environment and environmental standards.
CH415.CEO.2: Ability to work & learn effectively on environmental issues such as air pollution.
CH415.CEO.3: To develop skills of design of control devices for air pollution.
CH415.CEO.4: The ability to apply quantitative reasoning skills to environmental problems including basic calculations related to water quality parameters.
CH415.CEO.5: Ability to work effectively on complex problem of waste water treatment.
CH415.CEO.6: To describe the impact of solid waste on land.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH415.CO.1: Understand the importance of environment and environmental standards.
CH415.CO.2: Identify the sources of Air pollution & suggest the steps to mitigate air pollution.
CH415.CO.3: Specify control devices for air pollution.
CH415.CO.4: Calculate BOD / COD for a given composition of effluent stream.
CH415.CO.5: Identify tools and techniques for tertiary waste water treatment.
CH415.CO.6: Predict the different strategies for solid waste management.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**
Definition, scope and importance of environment, an overview of environmental engineering, environmental impact of thermal, hydro and nuclear energy, Introduction to all prevailing international standards of Environment; Environmental laws and regulations; Standards (air quality, noise, water).		
UNIT 2	**Air Pollution**	**6 HOURS**
Air pollutants: sources (specific pollutants), effects, and dispersion modelling, air pollution, air quality, pollutants minimisation and control, Economic effects of air pollution, sampling and measurement of air pollutants, air pollution control standards: WHO, BIS, MPCB, CPCB role of an individual in prevention of pollution air pollution case studies.		
UNIT 3	**Air Pollution Control Methods and Equipment**	**6 HOURS**
Particulate pollution: cleaning methods, collection efficiency, particulate collection systems, Basic design and operating principles of settling chamber, cyclone separator, fabric filter, electrostatic precipitator, Principles of control by absorption, adsorption, combustion or catalytic oxidation, removal of SOx, NOx.		
UNIT 4	**Water Pollution and Wastewater Treatment**	**6 HOURS**
Groundwater and surface water pollution, Waste water characteristicsDO, BOD, COD, TOC, total suspended solids, colour and odour, bacteriological quality, oxygen deficit, determination of COD, BOD, Water quality standards: ICMR, WHO, MPCB and CPCB, removal of specific water contaminants; Advanced methods of waste water treatment: UASB, photo catalytic reactors, wet-air oxidation, and biosorption.		
UNIT 5	**Tertiary Water Treatment**	**6 HOURS**
Tertiary treatment: disinfection by chlorine, ozone and hydrogen peroxide, UV rays, recovery of materials from process effluents, micro-screening, biological nitrification and denitrification, granular medium filtration, membrane separation processes, ion exchange.		
UNIT 6	**Land Pollution and Solid Waste Management**	**6 HOURS**
Sources and classification of solid wastes, disposal methods, incineration, composting, recovery and recycling.		

TEXT BOOKS

1. Gilbert M.Masters, Introduction to Environmental Engineering and Science, 3rd edition, Pearson Education (2004), ISBN:9780131481930.
2. R. W. Gaikwad and R. S. Sapkal, Environmental Engineering, Denett & Co, ISBN: 9788190322836.
3. Benny Joseph, Environmental Science and Engineering, Tata McGraw-Hill, New Delhi, (2006).2nd edition, ISBN: 9780070648135).

REFERENCE BOOKS

1. Rao C. S. Environmental Pollution Control Engineering, Wiley Eastern Publications, ISBN: 0470217634.
2. Metcalf and Eddy Wastewater Engineering, Tata McGraw Hill Publishers, ISBN10: 0070418780.
3. G. Kiely, Environmental Engineering, McGraw Hill 1997, ISBN: 9780071164245.
4. Rajagopalan, R, Environmental Studies-From Crisis to Cure, Oxford University Press, Third Edition, ISBN: 9780199459759.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Process Synthesis, Design and Optimization
	COURSE CODE	CH421
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH331: Process Engineering

COURSE OBJECTIVES :

CH421.CEO.1: Learn basic concepts of process design.
CH421.CEO.2: Study the fundamental of process synthesis.
CH421.CEO.3: Study the process optimization and development.
CH421.CEO.4: Study reactor synthesis and reaction network in process industries.
CH421.CEO.5: Learn project cost estimation calculations.
CH421.CEO.6: Learn economic viability of project.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH421.CO.1: Apply concepts of process design on given problem.
CH421.CO.2: Apply process synthesis approach.
CH421.CO.3: Optimize the process with given constraints.
CH421.CO.4: Synthesize the reactor with given process requirements.
CH421.CO.5: Estimate project cost.
CH421.CO.6: Do economic feasibility study of process plant.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Process Optimization and Process Design**	**9 HOURS**
Optimization introduction, features of optimization problems, general procedure for solving. Optimization problems, obstacles to optimization, fitting functions to empirical data. The method of least squares, formulation of various process optimization problems. Identification of chemical products & processes to solve societal problems / meet market demands, Characteristics of basic / industrial / consumer products. Process Design team, Steps in product & process design, process engineering Software tools and their applications.		
UNIT 2	**Constituents & Construction of Process Simulation**	**7 HOURS**
Difference between process flow sheet and simulation flow sheet, Formulation of unit processes and operations, selection of feasible operating conditions and appropriate thermodynamic models, Degrees of freedom, Design specifications, Analysis, validation & applications of simulation outputs.		
UNIT 3	**Process Synthesis & Development**	**7 HOURS**
Preliminary database creation- Thermo-physical-chemical property data, Safety data, Prices data, Experiments, Process synthesis, Synthesis steps / tree. Expertise for Chemical process synthesis: Selection of raw materials & reaction paths, Distribution (excess / inert) of constituents, Separation processes, fluid moving machinery, Reactor heating & cooling systems, Heat exchangers & fired heaters, Solids size reduction and separations.		
UNIT 4	**Synthesis Reactor Design & Reaction Network**	**8 HOURS**
Reaction models / types of reactors, reaction stoichiometry, Reaction equilibrium, Reaction kinetics, Complex reactor design, Reactor network design for attainable region. Selection & design of separation trains: Feed separation system, Phase separation of reactor effluent, Industrial separation operations, Criteria for selection of separation methods, Selection of separation equipment, Separation system for gas mixture and Separation sequence for solid fluid system.		
UNIT 5	**Reactor-Separator Recycle Network**	**5 HOURS**
Location of separation section, Optimization between reaction and separation sections, Optimization of reactor conversion, Reaction to extinction, Snowball effect with respect to recycle.		
UNIT 6	**Project Cost Estimation and Economic Viability Study**	**7 HOURS**
Typical capital project cost component, Typical operating cost components, Classes of cost estimates, Cost estimation by applying factors, Detailed cost estimation method, Financial viability calculation (Payback period, Breakeven point, IRR and Net present value).		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Design of process plant.		
PRACTICAL NO.02		**2 HOURS**
Optimization of process design.		
PRACTICAL NO.03		**2 HOURS**
Construction of process simulation.		
PRACTICAL NO.04		**2 HOURS**
Synthesis of chemical process plant: Case study-1.		
PRACTICAL NO.05		**2 HOURS**
Synthesis of chemical process plant: Case study-2.		
PRACTICAL NO.06		**2 HOURS**
Reactor network design for attainable region.		
PRACTICAL NO.07		**2 HOURS**
Reactor conversion optimization.		
PRACTICAL NO.08		**2 HOURS**
Project cost estimation.		
PRACTICAL NO.09		**2 HOURS**
Economic viability study.		

TEXT BOOKS

1. Dale F. Rudd, Gary J. Powers, Jeffrey J. Siirola, Process Synthesis, Prentice-Hall, 1973, ISBN: 0137233531, 9780137233533.
2. E. L. Cussler, Edward Lansing Cussler, G. D. Moggridge, Chemical Product Design, Cambridge University Press, 2001, ISBN: 0521796334, 9780521796330.
3. Thokozani Majozi, Esmael Reshid Seid, Jui-Yuan Lee, Synthesis, Design, and Resource Optimization in Batch Chemical Plants, CRC Press, 2015, ISBN: 9781482252422.
4. Max Stone Peters, Klaus D. Timmerhaus, Ronald Emmett West, Plant Design and Economics for Chemical Engineers, 5th Edition, McGraw-Hill, 2003, ISBN: 0071240446, 9780071240444.

REFERENCE BOOKS

1. Richard Turton, Joseph A. Shaeiwitz, Debangsu Bhattacharyya, Wallace B. Whiting, Analysis, Synthesis and Design of Chemical Processes, 5th Edition, Prentice Hall, 2018, ISBN: 0134177657, 9780134177656.
2. John Happel, Donald G. Jordan, Chemical process economics Volume 1 of Chemical processing and engineering, 2nd Edition, M. Dekker, 1975, ISBN: 0824761553, 9780824761554.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Sociology
	COURSE CODE	HP402
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE :

COURSE OBJECTIVES :

HP402.CEO.1: The course focuses on the society in India with an attempt to acquaint students with sociology as a social science and the distinctiveness as a social science.

HP402.CEO.2: It displays the relevance and significance of sociology in understanding the society and in attempting to solve its problems.

HP402.CEO.3: Many of the Sociological Changes are an answer to the age-old social norms and practices giving rise to a solution which is critical to social issues and problems.

HP402.CEO.4: The course sensitizes students to the emerging social issues and enables them to acquire sociological understanding of these issues with an ability to answer the problems.

HP402.CEO.5: Projects in Sociology are tools that facilitate the construction of knowledge in imparting the right attitude towards social issues .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP402.CO.1: Get acquainted to sociology as a social science.

HP402.CO.2: Explain the significance of sociology in solving problems.

HP402.CO.3: Derive solutions to critical social issues.

HP402.CO.4: Change their attitude towards social issues.

THEORY

UNIT 1	Introduction to Sociology	6 HOURS

The nature of Sociology, meaning of Sociology: Origin, Definition, Scope, Culture, meaning, components, beliefs, values, norms, technology, diversity, towards a global culture.

UNIT 2	Sociolization	5 HOURS

Socialization, Agents of Socialization, Heredity and Environment, Group, Social structure, Status and role, family, school, peer group, media, adult socialization, resocialization, Role of Social moments, Illustrations: Women, Tribal & Dalit Movements .

Further Reading:

UNIT 3	Nature and factors of Social Change	5 HOURS

Change: Meaning. Nature and factors of Social Change: Biological Factors. Demographic Factors, Technological Factors, Economic Factors Cultural Factors, Info-tech factors, Meaning of Gender sensitization, Discrimination, violence and Abuse.

Further Reading:

UNIT 4	Visions of Social Change in India	4 HOURS

Idea of development planning and mixed economy, Constitution, law and social change, Education and social change.

Further Reading:

UNIT 5	Works and Economic Life	4 HOURS

Social organization of work in different types of society- slave society, feudal society, industrial /capitalist society. Formal and informal organization of work. Labour and society.

Further Reading:

UNIT 6	Introduction to Applied sociology	4 HOURS

The use of Sociology: Introduction to applied Sociology-Sociology and social problems, Ecology and Environment: Pollution, Global warming and Greenhouse effect. Impact of Industrialization and Urbanization on Environment.

REFERENCE BOOKS

1. T.B. Bottomore, Sociology: A Guide to Problems and Literature, Blackie and Sons Publishers, 1978, ISBN:978-0043000267
2. Sociology: A guide to problems and literature. Bombay: George Allen and Unwin (India): Harlambos, M.1998. ISBN: 978-0043000267
3. Sociology: Themes and perspectives. New Delhi Oxford University Press.: Inkeles, Alex, 1987
4. What is Sociology, Madras: Macmillan, India: Johnson, Harry M. 1995.
5. Sociology: A Systematic Introduction. New Delhi, Allied Publishers. ISBN: 978-8170231370 .

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Skill Development Lab 2
	COURSE CODE	CH402
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	NIL	50	NIL	50

PRE-REQUISITE :

COURSE OBJECTIVES :

CH402.CEO.1: Understand the basis of chemical engineering softwares such as Aspen HYSYS.
CH402.CEO.2: Learn the application of simulation software for solution of engineering problems.
CH402.CEO.3: Make aware about the chemical engineering concepts in efficient problem solving.
CH402.CEO.4: Construct a bridge between manual calculation and computer simulation.
CH402.CEO.5: Develop an ability to effectively use computational techniques to solve chemical engineering problems.
CH402.CEO.6: Learn the design aspects of chemical process plant.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH402.CO.1: Identify the operation/process required to solve an engineering problem.
CH402.CO.2: Match manual calculation with computer simulation.
CH402.CO.3: Apply the knowledge of chemical engineering basics to computational techniques.
CH402.CO.4: Categorize different types of equipments based upon application.
CH402.CO.5: Assess complex chemical engineering problems.
CH402.CO.6: Design a chemical engineering process/plant.

PRACTICAL		
PRACTICAL NO.01	**Introduction**	**2 HOURS**
Introduction to ASPEN HYSYS Exchanger and Design Rating.		
PRACTICAL NO.02	**Awareness for Software Tools and Basic Components**	**2 HOURS**
Interface of Software: Different tools available, Basic Component & commands.		
PRACTICAL NO.03	**Flash Drum**	**2 HOURS**
Stepwise Aspen Simulation of Flash Drum.		
PRACTICAL NO.04	**Aspen Simulation of Reactor Model**	**2 HOURS**
Aspen simulaion of CSTR Model.		
PRACTICAL NO.05	**Aspen Simulation of Distillation Model**	**2 HOURS**
Aspen Simulation of DSTWU Model.		
PRACTICAL NO.06	**Absorption Column**	**2 HOURS**
Aspen Simulation and Analysis of Absorption Column.		
PRACTICAL NO.07	**Reactive Distillation**	**2 HOURS**
Aspen Sumulation of Reactive Distillation Column.		
PRACTICAL NO.08	**Binary Distilation Column**	**2 HOURS**
Dynamics and Control of Binary Distillation Column.		
PRACTICAL NO.09	**Evaporator**	**2 HOURS**
Aspen Simulation of Evaporator.		
PRACTICAL NO.10	**Project**	**12 HOURS**
Students will be given the Project Topics / Case Studies related to Chemical Engineering Problems. They are supposed to prepare flow sheet & solve the problem by using Aspen HYSYS Software.		

TEXT BOOKS

1. Aspentech: Getting Started Aspen HYSYS V8 Manual.
2. Ahmed Deyab Fares, Process Simulation using HYSYS V8.

REFERENCE BOOKS

1. I. M. Kamal, A.L. Malah, Aspen Plus Chemical Engineering Applications, Wiley Publication, ISBN: 9781119293620.
2. G. Rodriguez, A. Leguizamon, Process Analysis & Simulation in Chemical Engineering, Springer Publication, ISBN: 9783319148120.
3. A. K. Jana Process Simulation And Control Using Aspen, PHI Publications, ISBN: 9788120336599.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Business Strategies
	COURSE CODE	HP403
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : HP303 : Basics of Entrepreneurship

COURSE OBJECTIVES :

HP403.CEO.1: To understand the importance of growth and to be able to chart a path towards growth.
HP403.CEO.2: To revisit your business model
HP403.CEO.3: To give a growth orientation your customer acquisition, operations, revenue and sales strategy
HP403.CEO.4: To list and comply with the requirements relating to regulatory compliance
HP403.CEO.5: To be able to effectively pitch your venture to potential stakeholders .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP403.CO.1: Rephrase business model and Identify additional customer segments
HP403.CO.2: Identify channels and strategy for budgeting and planning.
HP403.CO.3: Make use of Legal aspect, Mentors, Advisors, and Experts in startups
HP403.CO.4: Analyze the growing revenues, sales planning, strengthening sales, improving margins
HP403.CO.5: Estimate customer lifetime value, competitor and peer's financial models for venture growth
HP403.CO.6: Formulate the all procedure for new venture ; Product market fit and A Pitch Deck

PRACTICALS:		
PRACTICAL NO.01	**Orientation to Growth**	**3 HOURS**
Getting Ready for Growth Why growth stage is different compared to startup phase, Why Product-Market fit is not enough, Case study, To assess readiness for growth, To chart a growth path .		
PRACTICAL NO.02	**Customers**	**3 HOURS**
Expanding Customer Base Revisit your business model and develop few variants (more business model types). Identify additional customer segments that your solution can address. Evaluate business models for the new customer segments. Relook at the Problem Statement (can you expand the scope and scalability of your business by repositioning your problem statement?) Explore additional ways to monetize.		
PRACTICAL NO.03	**Traction**	**12 HOURS**
Scaling How to gain traction beyond early customers. Defining traction (in quantifiable terms) and identifying the most important metrics to measure traction. Calculate cost of new customer acquisition. Estimate your customer lifetime value (LTV). Identifying waste in your operations and focusing your team on what is important for traction. **Channels and Strategies** The Bulls eye framework, Identify Channels using Bulls Eye Framework, Measuring the effectiveness of selected channels, Budgeting and planning.		
PRACTICAL NO.04	**Money**	**20 HOURS**
Growing Revenues. Stabilizing key revenue streams. Developing additional revenue streams (licensing, franchising). Exploring new channels and partnerships. Sales Planning. Understanding why customers buy and how buying decisions are made; Listening skills. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale. Strengthening Sales. Building a professional sales team. Sales compensation and incentives. Sales planning, setting targets Improving Margins. Testing price elasticity. Optimizing costs and operational expenses. Advanced concepts of unit costing. Financial Modeling. Financial modeling of your venture's growth. Analyzing competitor and peer's financial models.		
PRACTICAL NO.05	**Support**	**5 HOURS**
Legal Overview of legal issues and their impact on entrepreneurs. Importance of getting professional help (legal and accounting). Importance of being compliant and keeping proper documentation. Patents and Intellectual property. Trademarks. Mentors, Advisors, and Experts. The importance of a Mentor and how to find one. Role of business advisors and experts for specific targets in your growth plan.		
PRACTICAL NO.06	**Capstone Project: Pitch Your Venture**	**2 HOURS**

REFERENCE BOOKS

1. Zero to One: Note on Start Ups, or How to Build the Future, Peter Thiel and Blake Masters, Virgin Books,ISBN: 9780753555194
2. Tools of Titans: The Tactics, Routines, and Habits of Billionaires, Icons, and World-Class Performers, Timothy Ferriss, Random House,ISBN: 9781785041273.
3. Disrupted: My Misadventure in the Start-Up Bubble, Dan Lyons, Penguin Publishers, ISBN: 9781786491022
4. Unshakeable: Your Financial Freedom Playbook, Tony Robbins, Simon & Schuster Publishers,ISBN: 9781471164934
5. Grit: The Power of Passion and Perseverance, Angela Duckworth, Vermilion Publishing,ISBN: 9781785040207
6. Big Magic: Creative Living 4BEyond Fear, Elizabeth Gillbert, Penguin Publishers,ISBN: 9781408886182
7. Pivot: The Only Move That Matters Is Your Next One, Jernny Blake, Random House,ISBN: 9780241975466
8. Financial Management; Text and Problems, 7th Ed., A Khan and P. K. Jain, TataMacGraw Hill, ISBN: 9789353162184
9. Financial Management; Theory and Practice, 4th Ed., Prasanna Chandra, TataMacGraw Hill, ISBN: 9789339222574
10. Essentials of Management : An International and Leadership Perspective, 10th Ed., Harold Koontz and Heinz Weihrich, MGH, ISBN: 9789339222864
11. Kites in a Hurricane: Startups from Cradle to Fame, Rishi Kapal, SAGE Publishing, ISBN: 9789352807895
12. Wadhwani Foundation Advanced Course in Entrepreneurship

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Major Project-I
	COURSE CODE	CH403
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	8	NIL	NIL	NIL	100	50	150

PRE-REQUISITE : CH324: Mini Project

COURSE OBJECTIVES :

CH403.CEO.1: Implement the idea/ real time industrial problem/ current application from engineering domain.

CH403.CEO.2: Evaluate an alternative approaches and justify the use of selected tools and methods.

CH403.CEO.3: Inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.

CH403.CEO.4: Understand the roles and responsibility, accountability and learn team work ethics.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH403.CO.1: Solve real life problems by applying the knowledge and problem solving ability.

CH403.CO.2: Analyze alternative approaches, find feasible solution and apply most appropriate one.

CH403.CO.3: Use standard engineering tools and processes for analysis, design, simulation, testing, Implementation and deployment of idea into practice.

CH403.CO.4: Participate effectively in multidisciplinary and heterogeneous teams exhibiting team work, inter-personal Relationship, conflict management and leadership quality.

PREAMBLE:

The objective of this Major Project-I course is to understand the Product Development through team work. The students will able to shoulder the roles and responsibility and activity distribution amongst them. The students will learn designing, budgeting, planning, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards while developing the application/ product. The students will deliver a presentation on the advancement in Technology pertaining to the selected project topic and able to understand importance of document design and professional ethics.

GUIDELINES:

Project work stage I is an integral part of Project work. In this, the student shall complete the partial work of project, consist of problem statement, literature survey, Project specification and planning. The students expected to complete the project at least up to the design phase. As a part of project phase-I, candidate shall appear for two reviews and delivered the presentation on the advancement of selected project topic. The student shall submit the duly certified project report in standard format for satisfactory completion of work by the concern Advisor and Dean of the School. The examinee will be assessed by panel of examiner of which one is necessarily as a external examiner. The assessment will be broadly based on work undergone, content delivery, presentation skills, documentation, question answer and report. Preparation of the Literature survey paper and communicating and publishing in relevant publishing agency agency is recommended. Bonus 10 marks will be awarded. Follow the guideline and formats as mentioned in guideline document Annexure-I.

TIMELINE:

1. Formation of Project Group: 2 Weeks (1st ,2nd week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (3rd, 4th week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (7th, 8th week)
4. Preparation of Project Progress Report I (week 9th and 10th)
5. Project Phase-I Evaluation by external examiner (End Semester by 12th, 13th week)

ASSESSMENT:

1. Internal Assessment (TW)

a. Project Review -1 Project Approval -30 Marks
b. Project Review -2 Analysis and Design- -30 Marks
c. Project Review -3 Project progress Report-I and Presentation - 40 Marks
d. Paper publication/IPR -10 marks (Bonus)

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks
b. Project design / execution / demonstration : 20 Marks
c. Project Report preparation and documentation: 15 Marks

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Process Technology
	COURSE CODE	CH431
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH203: Chemical Engineering Operation

COURSE OBJECTIVES :

CH431.CEO.1: Understand standard equipment symbols, process control and instrumentation symbols used for flow sheeting and types of flow diagram.

CH431.CEO.2: Recognize different industry, their products and role of chemical engineer in industry.

CH431.CEO.3: Identify and understand manufacturing of various chemicals and sequence of operations and their importance.

CH431.CEO.4: Evaluate current material and energy demand with importance of optimization. Analyze importance of raw material quality and specification on processing of material.

CH431.CEO.5: Understand selection of process and various parameters used for process selection with major engineering problem.

CH431.CEO.6: Know safety practices & pollution control norms in chemical industries. Necessary of moral and ethical value needed.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH431.CO.1: Interpret manufacturing Flowsheet and visualized actual size and shape of equipments.
CH431.CO.2: Categorized chemical industry and understand specification of different raw material and its importance.
CH431.CO.3: Select proper process from available process and evaluate effect of operating parameter on quality.
CH431.CO.4: Problem solving skills and decision making skills needed for working with an industry.
CH431.CO.5: Understand the importance of ecology & energy crisis.
CH431.CO.6: Develop as team player and follow safety practices.

THEORY COURSE CONTENT

UNIT 1	**Basic Concepts of Process Industries**	**8 HOURS**

A. Theory of Unit operations and industrial equipment and systems used in large scale plants; Unit processes, Development of flow diagram, schematic representation and application for unit operations and unit processes.
B. Study the selection and process specific applications knowing available industrial equipment and plant accessories.

UNIT 2	**Sulfur and Sugar Industry**	**8 HOURS**

A. Importance, manufacturing of sulfur by Frasch process, technology for the manufacturing of sulfuric acid. Detailed study and comparison between chamber and DCDA processes; process economics.
B. Sugar Industry: Manufacture of sugar and engineering problems associated Dextrin and starch derivatives.

UNIT 3	**Nitrogen industry**	**8 HOURS**

A. Role of nitrogen in fertilizers, manufacturing of ammonia, nitric acid, urea, the above study must involves different routes adopted, limitations, advantages and disadvantages of the process; steam-reforming process technology.
B. Coal gasification technologies (Fixed bed (Lurgi Process) Fluidised bed (Winkler Process).

UNIT 4	**Phosphorus and Paper Pulp Industry**	**8 HOURS**

A. Importance, manufacturing of super phosphate, triple super phosphate, phosphoric acid, electro thermal processes and NPK fertilizers, Flow sheet and process for manufacture of Phosphoric acid from phosphate rock.
B. Production of pulp, engineering problems involved, paper manufacturing from pulp comparison of methods of manufacturing.

UNIT 5	Chlor-Alkali Industry	8 HOURS
A. Chlor-alkali chart and importance of chlor-alkali industry, manufacturing processes process economics, and plants in India and a few examples of latest technology used in other nations; Manufacturing of soda ash, caustic soda, chlorine and engineering problems. B. Membrane cell, mercury cell diaphragm cell processes and electrolytic cell processes and flowsheets.		
UNIT 6	**Cement and Steel Industry**	**8 HOURS**
A. Importance of Cement and Lime and Production of Cement by rock beneficiation process and Portland cement. Importance of Lime and Manufacturing of lime. B. Blast Furnace construction details and Uses. Manufacturing of Iron and steel.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Preparation of Methyl Esters of Fatty Acids from Soybean Oil (Bio-Diesel) using Unit Process Esterification.		
PRACTICAL NO.02		**2 HOURS**
Preparation of Oxalic Acid from Cane Sugar using Unit Process Oxidation.		
PRACTICAL NO.03		**2 HOURS**
Preparation of Urea Formaldehyde Resin using Unit Process Polymerisation.		
PRACTICAL NO.04		**2 HOURS**
Preparation of Phenol Formaldehyde Resin (PF Resin) using Acid Catalyst using Unit Process Polymerisation.		
PRACTICAL NO.05		**2 HOURS**
Preparation of P-bromo Acetanilide from Acetanilide using Unit Process Halogenation.		
PRACTICAL NO.06		**4 HOURS**
Preparation of m-Dinitrobenzene from Nitrobenzene using Unit Process Nitration.		
PRACTICAL NO.07		**2 HOURS**
Preparation of Acetanilide from Crude Aniline using Unit Process Acetylation.		
PRACTICAL NO.08		**2 HOURS**
Preparation of Pthalamide from Pthalic Anhydride using Unit Process Amination By Ammonolysis.		
PRACTICAL NO.09		**2 HOURS**
Preparation of Nerolin from -Napthol using Unit Process Alkylation.		

PRACTICAL NO.10		**2 HOURS**
Drawing at least two Auto CAD sheets for manufacturing of Urea, Ethanol, Phenol.		
PRACTICAL NO.11		**2 HOURS**
Drawing Unit operation symbols.		
PRACTICAL NO.12		**2 HOURS**
Introduction to Simulation software for chemical engineering.		
PRACTICAL NO.13		**2 HOURS**
Material and Energy balance calculation for any of to process.		

TEXT BOOKS

1. Dryden C.E. and Rao M.G, Outlines of Chemical Technology, Affiliated East West Press, 2010, ISBN: 9788185938790.
2. Austin G.T, Sherves Chemical Process Industries, 5th Edition, McGraw Hill, ISBN: 9780070661677.
3. Groggins P.H, Unit process in organic synthesis, 5th Edition, McGraw Hill, 2004, ISBN: 9780074621431.

REFERENCE BOOKS

1. Kirk & Othmer, Concise Encyclopedia of Chemical Technology, 5th Edition, Wiley Publishers, 2007, ISBN: 9780470047484.
2. Faith W.L, Lowenheim F.A, Moran M.K, Industrial Chemicals, 4th Edition, Wiley Publishers, ISBN: 9780471549642.
3. Smith, R, Chemical Process Design and Integration, 3rd Edition, Wiley, 2005.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Paint Manufacturing Process
	COURSE CODE	CH441
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	40	30	NIL	25	125

PRE-REQUISITE : CH411: Introduction to Paint Technology

COURSE OBJECTIVES :

CH441.CEO.1: Understand different types of unit operations used in paint industries.

CH441.CEO.2: Recognize different equipments with its construction and working and role of chemical engineer in industry.

CH441.CEO.3: Identify and understand manufacturing of various paints and role of each ingredients and their importance.

CH441.CEO.4: Evaluate current testing methods with importance of optimization. Analyze importance of raw material quality and specification on processing of material.

CH441.CEO.5: Understand different surface preparation methods with its importance.

CH441.CEO.6: Select appropriate methods for application of paint on surface.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH441.CO.1: Apply correct unit operation for production of various paints.

CH441.CO.2: Apply knowledge of equipments working for improvement in efficiency for paint industry.

CH441.CO.3: Select proper additives and ingredients for process.

CH441.CO.4: Problem solving skills and decision making skills needed for working with an industry.

CH441.CO.5: Evaluate selection methods for cleaning.

CH441.CO.6: Compare various application methods and choose appropriate methods for application.

THEORY COURSE CONTENT		
UNIT 1	**Process for Manufacturing**	**7 HOURS**
Paint manufacture, steps in manufacture, mixing, grinding and letting down, tinting, straining, filling. Types of coatings, primers, top coats, corrosion resistant finishes, clear finishes.		
UNIT 2	**Equipments used in Process**	**7 HOURS**
Types of machinery required for various steps and their working, construction, designing and function of various parts. Details of machinery for Mixing, edge runners, paint mills (single, twin, three and four roll mills), Ball and pebble mills, sand grinders, attritors, kadymillk, high speed impellers, Filling and labeling machines.		
UNIT 3	**Varnish Manufacture**	**7 HOURS**
Varnish manufacture Oleoresinous varnishes, constituents of varnishes and their function, film properties of varnishes, Types of furnaces and their design, types of kettles and their advantages and disadvantages, design of resin kettle, thinning and cooling tanks, storage of raw materials and finished products, filling and labeling machines.		
UNIT 4	**Testing and Defects**	**7 HOURS**
Coating/printing inks/varnish industry plant layout, flow of material and finishing schedule, sampling of coatings for testing, recording, costing of coatings, Paint Film Defects, their causes and remedies.		
UNIT 5	**Surface Preparation**	**7 HOURS**
Surface preparation for coating, solvent vipeoff, vapour degreasing, alkali cleaning, chemical cleaning, burn off and flame cleaning, mechanical cleaning with hand and power tools, sand blasting, phosphate treatment, treatments for Aluminum and Magnesium.		
UNIT 6	**Application Methods**	**7 HOURS**
Application of coat/paint, brush and roller coating, spray painting (ordinary, Electrostatic, power, airless, two component, hot spray), dipping, flow coating, fluidized bed coating, pressure curtain coating, knife and roller coating, tumbling barrel, silk screen coating, centrifugal coating, design of spray booths.		

TEXT BOOKS

1. Durrans, T.H., Solvents D. Van Nostrand Co., New York, 1950.
2. A.S. Khanna, Paints and Varnishes, Indian Central Iolsee Committee, 1959.
3. H F Payne, Organic Coating Technology, Vol I, John Wiley and Sons, New York.
4. Tank, G. F., Industrial Paint Finishing Techniques and Processes, Ellis Horwood Ltd., 1991.

REFERENCE BOOKS

1. Paint Technology Manual: Vol I, II Oil and Colour Chemists Association.
2. T P Hilditch, The Chemical Constitution of Natural Fats, 2nd Edition, John Wiley and Sons, 1947.
3. J J Matellio, Protective and Decorative Coatings, Vol I, John Wiley and Sons.
4. Surface Coatings: Vol I, Raw Materials and their useage, Oil and Colour Chemists Association, Australia.
5. Bigos Joseph, Steel Structure Painting Mannual, Vol. I and Vol. II, Steel Structures Painting Council, Pittsburg, USA, 1955.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Energy Management and Audit
	COURSE CODE	CH442
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	40	30	NIL	25	125

PRE-REQUISITE : CH412: Energy Engineering

COURSE OBJECTIVES :

CH442.CEO.1: Learn to conserve energy through planning and management.
CH442.CEO.2: Understand Energy Audit procedure along with relevant technologies/tools.
CH442.CEO.3: Develop Energy Audit Report writing skills.
CH442.CEO.4: Improve the thermal efficiency by designing suitable systems for heat recovery and co-generation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH442.CO.1: State the need for energy management and audit.
CH442.CO.2: Execute proper energy management and planning.
CH442.CO.3: Carry out the cost- benefit analysis of various investment alternatives for meeting the energy needs.
CH442.CO.4: Design suitable energy monitoring system to analyze and optimize the energy consumption.

THEORY COURSE CONTENT		
UNIT 1	**Energy Management**	**7 HOURS**
Two sides of energy management, sectors of supply side energy management, objectives, hierarchy, trade-off between energy and environment, energy and economy, transportation of energy, per capita energy consumption, energy management and control systems, energy management in end user plant, seven principles of energy management, organization for energy management.		
UNIT 2	**Energy Planning**	**7 HOURS**
Energy strategies and energy planning, essential imperatives and steps in supply side energy planning, energy planning flow for supply side, essential data, infrastructure planning, essential imperatives and steps in user side energy planning.		
UNIT 3	**Energy Audit**	**7 HOURS**
Introduction, Types of energy audits, walk through energy audit, intermediate energy audit, comprehensive energy audit, end use energy consumption profile, procedure of energy auditing, composition of comprehensive audit team, data for comprehensive audit, site testing and measurement.		
UNIT 4	**Energy Balance & MIS**	**7 HOURS**
First law of efficiency and Second law of efficiency, Facility as an Energy system, Methods forpreparing process flow, Materials and Energy Balance diagram, Identification of losses, improvements, Energy Balance sheet and Management Information System (MIS), Energy Modeling and Optimization.		
UNIT 5	**Energy Monitoring, Targeting Review and Evaluation**	**7 HOURS**
Definition Monitoring and targeting, elements of monitoring and targeting, data andinformation analysis, techniques energy consumption, production, cumulative sum ofdifference (CUSUM), Review and evaluation.		
UNIT 6	**Energy Policy**	**7 HOURS**
Need for Energy Policy for Industries, Formulation of Policy by any industrial Unit,Implementation in Industries, National & State level Policies.		

TEXT BOOKS

1. Rao S., Parulekar B. B., Energy Technology Nonconventional, Renewable and Conventional, Khanna Publishers, 3rded.1999, ISBN: 8174090401.
2. Murphy W. R., McKay G., Energy Management, Butterworth and Co. publishers, Elsevier, 1982, ISBN No. 9780408005081.

REFERENCE BOOKS

1. C.B.Smith, Energy Management Principles, Pergamon Press.
2. W.C. Turner, Energy Management Handbook, John Wiley and Sons, A Wiley Interscience Publication.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Petrochemical Technology
	COURSE CODE	CH443
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	40	30	NIL	25	125

PRE-REQUISITE : CH413: Petroleum Refining Technology

COURSE OBJECTIVES :

CH443.CEO.1: Apply knowledge of petroleum refining operation and process to obtain various raw materials.
CH443.CEO.2: Understand various unit operations and processes used in Petrochemical industry.
CH443.CEO.3: Identify and understand manufacturing of various petrochemicals.
CH443.CEO.4: Apply proper unit operation for desired separation.
CH443.CEO.5: Understand importance of raw material quality on product specification.
CH443.CEO.6: Understand the safety considerations in Petrochemical industry.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH443.CO.1: Understand Indian and world scenario for production and demand for Petrochemical.
CH443.CO.2: Understand specification of different raw material and its importance.
CH443.CO.3: Select proper unit operation and processes in synthesis of various Petrochemicals.
CH443.CO.4: Interpret the petrochemical Flowsheet and its major engineering problems.
CH443.CO.5: Select proper process from available process.
CH443.CO.6: Understand uses of petrochemicals product.

THEORY COURSE CONTENT		
UNIT 1	**Introduction of Petrochemical Industry**	**7 HOURS**
Introduction to petrochemical, petrochemical industry in India, Indian and world scenario of petrochemical industry, basic raw material for petrochemical synthesis and their sources, preparation of feedstock for petrochemical production, main building blocks of petrochemical industry.		
UNIT 2	**C1, C2 and its derivatives**	**7 HOURS**
Methane : Synthesis Gas, FTS, Methanol, Acetic acid, Formaldehyde Production. Ethane: Ethylene, Ethylene oxide, Ethanol, Glycol Production.		
UNIT 3	**Processing of C3, C4 and C5 stream**	**7 HOURS**
Sources of Propylene, Propylene oxide, IPA, acetone Processing of C4 stream from Steam Cracker and FCC, Oxygenates from Refinery C4 and C5 stream: methyl tertiary Butyl ether, tertiary Amyl methyl ether.		
UNIT 4	**Aromatic Production**	**7 HOURS**
Aromatic production and aromatic conversion processes for BTX, advances in reformer Introduction to catalyst, future trend in aromatic production, separation processes in aromatic production, linear alkyl benzene technology and separation processes and design criteria.		
UNIT 5	**Olefin Production**	**7 HOURS**
Olefin production by Steam cracking process technology, Emerging technology for production of olefins.		
UNIT 6	**Aromatic and Olefin derivatives**	**7 HOURS**
Process technology for phenol, benzoic acid from toluene, glycols, amines, acids, ketones.		

TEXT BOOKS

1. I. D. Mall, Petrochemical Process Technology, Macmillan India Ltd., New Delhi, ISBN: 9781403931979.
2. Bhaskara Rao. B.K., Petrochemicals, 3rd Edition, Khanna Publishers 2000.
3. Gary J H, Handwerk G E, Petroleum refining technology and economics, Marcel Dekker Inc. ISBN: 0824704827.
4. Lueas A. G., Modern Petroleum Technology Part II, by Institute of Petroleum (IP), John Wiley ISBN: 9780470850220.

REFERENCE BOOKS

1. Kirk & Othmer, Concise Encyclopedia of Chemical Technology, 5th Edition, Wiley Publishers, 2007, ISBN: 9780470047484.
2. Faith W.L, Lowenheim F.A, Moran M.K, Industrial Chemicals, 4th Edition, Wiley Publishers, ISBN: 9780471549642.
3. Groggins P.H, Unit process in organic synthesis, 5th Edition, McGraw Hill, 2004, ISBN: 9780074621431.
4. Speight J G, The Chemistry and technology of petroleum, CRC Press. ISBN: 9781439873892.
5. Myers, Handbook of Petroleum Processing, McGraw-Hill Education. ISBN: 9780071391092.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Bioprocess Technology
	COURSE CODE	CH444
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	40	30	NIL	25	125

PRE-REQUISITE : CH414: Biochemical Engineering

COURSE OBJECTIVES :

CH444.CEO.1: Provide the basics Of bioreactor engineering.
CH444.CEO.2: Develop bioengineering Skills For The production of biochemical product using integrated biochemical processes.
CH444.CEO.3: Understand engineering principles to address issues in bioprocessing.
CH444.CEO.4: Learn mechanism for enzymatic reaction.
CH444.CEO.5: Estimate kinetics parameters from raw fermentation data.
CH444.CEO.6: Identify limiting factors in downstream processing.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH444.CO.1: Identify role of bioprocess engineering.
CH444.CO.2: Select Appropriate Bioreactor Configurations and Operation Modes Based upon the Nature of Bio products And Cell Lines And Other Process Criteria.
CH444.CO.3: Apply knowledge on the growth of microorganisms, enzyme kinetics and mass transport in order to create a preliminary design for a bioreactor.
CH444.CO.4: Compare which unit operations are required before and after a bioreactor.
CH444.CO.5: Select an appropriate process path and draw a process diagram, e.g. Block Flow Diagram (BFD) and Process Flow Diagram (PFD) for bioprocesses.
CH444.CO.6: Analyze kinetics of cell growth.

THEORY COURSE CONTENT		
UNIT 1	**Basic Principle of Biochemical Engineering**	**7 HOURS**
Isolation, screening and maintenance of industrially important microbes; Microbial growth and death kinetics (an example from each group, particularly with reference to industrially useful microorganisms); Strain improvement for increased yield and other desirable characteristics.		
UNIT 2	**Types of Fermentation Processes**	**7 HOURS**
Bioreactor designs; Types of fermentation and fermenters; Concepts of basic modes of fermentation - Batch, fed batch and continuous; Conventional fermentation v/s biotransformation; Solid substrate, surface and submerged fermentation; Fermentation economics; Fermentation media; Fermenter design-mechanically agitated; Pneumatic and hydrodynamic fermenters; Large scale animal and plant cell cultivation and air sterilization; Upstream processing: Media formulation; Sterilization; Aeration and agitation in bioprocess; Measurement and control of bioprocess parameters; Scale up and scale down process.		
UNIT 3	**Downstream Processing**	**7 HOURS**
Bio-Separation - filtration, centrifugation, sedimentation, flocculation; Cell disruption; Liquid-liquid extraction; Purification by chromatographic techniques; Reverse osmosis and ultra filtration; Drying; Crystallization; Storage and packaging; Treatment of effluent and its disposal.		
UNIT 4	**Design of Enzyme Reactors**	**7 HOURS**
The design and construction of novel enzymes, Design and configuration of immobilized enzyme reactors, applications of immobilized enzyme technology.		
UNIT 5	**Food Bioprocess Technology**	**7 HOURS**
Fermented foods and beverages; Food ingredients and additives prepared by fermentation and their purification; fermentation as a method of preparing and preserving foods; Microbes and their use in pickling, producing colors and flavors, alcoholic beverages and other products; Process wastes-whey, molasses, starch substrates and other food wastes for bioconversion to useful products; Bacteriocins from lactic acid bacteria Production and applications in food preservation.		
UNIT 6	**Industrial Production of Chemicals**	**7 HOURS**
Industrial process using enzymes for production of drugs, Alcohols, acids (citric, acetic and gluconic), solvents (glycerols, acetone, butanol), antibiotics (penicillin, streptomycine, tetracycline) amino acids (lysine, glutamic acid), single cell proteins.		

TEXT BOOKS

1. Glick BR & Pasternak JJ, Molecular Biotechnology, 3rd Edition, ASM Press, 1998, ISBN: 9781555811365.
2. Voet D, Voet JG & Pratt CW, Fundamentals of Biochemistry, 2nd Edition. Wiley 2006.
3. Brown TA, Genomes, 3rd Edition. Garland Science 2006, ISBN: 9780815345244.
4. Campbell AM & Heyer LJ, Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition. Benjamin Cummings 2007, ISBN: 9780805382198.
5. Primrose S & Twyman R, Principles of Gene Manipulation and Genomics, 7th Edition, Blackwell, 2006, ISBN: 9781405135443.

REFERENCE BOOKS

1. J. E. Bailey & D. F. Ollis, Biochemical Engineering Fundamentals , McGraw Hill Book Company, 1986, ISBN: 9780070701236.
2. Michael L. Shuler & Fikret Kargi, Bioprocess Engineering Basic Concepts, 2 nd edition, Prentice Hall of India, New Delhi, 2002, ISBN: 9788120321106.
3. Wiseman A (Ed.), Topics in enzyme and fermentation Bio-technology, Ellis mand Harwood, U.K. Vol-5, ISBN: 9885177332121.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Process Safety
	COURSE CODE	CH445
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	40	30	NIL	25	125

PRE-REQUISITE : CH331: Process Engineering

COURSE OBJECTIVES :

CH445.CEO.1: Know various process utilities.
CH445.CEO.2: Understand about safety aspects in industry.
CH445.CEO.3: Understand the importance of loss of prevention.
CH445.CEO.4: Understand about hazard analysis and toxicology.
CH445.CEO.5: Learn about storage and handling of hazardous chemicals.
CH445.CEO.6: Learn about risk and hazard analysis.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH445.CO.1: Apply the basic principles of safety.
CH445.CO.2: Develop the roots for hazard analysis.
CH445.CO.3: Identify the event tree and fault tree analysis.
CH445.CO.4: Analyze the hazards in a given process and assess them to provide solutions for operating safely.
CH445.CO.5: Knowledge to choose the safety requirements for storage and handling of a given chemical.
CH445.CO.6: Formulate the important of risk factors and factors.

THEORY COURSE CONTENT		
UNIT 1	**Industry Accident, Safety & Personal Protective Equipments**	**7 HOURS**
Industry Accident: Major Chemical Industry Accidents: Flixborough Disaster, Seveso Disaster, The Mexico LPG Disaster, Bhopal Disaster, Phillips Disaster. Safety & Personal Protective Equipments: Risk, Hazard, Chemical Hazard Symbols, Incompatible chemicals, Fire Classification; Occupational Health and Safety Administration, The Factories Act, Personal Protective Equipment (PPE).		
UNIT 2	**Toxic Substance, Fire and Explosion**	**7 HOURS**
Toxic Substance and Confined Spaces: Toxic Substances Definition, Classes of Toxicity, Entry Points for Toxic Agents, Effects of Toxic Substance, Relationship of Doses and Responses, Threshold Limiting Values, Exposure Thresholds, Airborne Contaminants, Confined Spaces Hazards, Respiratory Protection, Prevention and Control. Fire and Explosion: Work Place Hazard, Dangerous Substance Fire triangle, Effective Ignition Source, Static Electricity, Explosion: BLEVE, VCE, Detonation and Deflagration, Flammability Limits, LOC, Flash point, Flammability Diagram, Flammable and Combustible Liquids.		
UNIT 3	**Chemical Process Safety**	**7 HOURS**
Chemical Process Safety: Decomposition & Runaway Reactions, Initiating factors Reactive Chemical Hazard, Case Studies: T2 Laboratories, Florida, Synthron, North Carolina, Phenol-Formaldehyde Reaction. Assessing Reaction Hazard; Tools for evaluating thermal explosion, Steps to Reduce Reactive Hazards. Process Plant Design: Flow Diagrams; Piping and Instrumentation Diagram, Control System, Alarms, Chemical Plant Layout: Passive protection, Active Protection, Emergency Shutdown System, Safety Integrity Level, Inherent Safety Techniques.		
UNIT 4	**Industrial Hygiene**	**7 HOURS**
Government regulations, identification, evaluation: evaluating exposures to volatile toxicants by monitoring, evaluating worker exposures to dusts, evaluating worker exposures to noise, estimating worker exposures to toxic vapors.		
UNIT 5	**Hazard Identification, Risk Assessment and HAZOP**	**7 HOURS**
Hazard Identification & Risk Assessment: The Process of Risk Management, Hazard Identification, Evaluation (Risk Assessment, Risk Matrix), Risk Control Implementation, Action and Recommendation. Hazard and Operability Studies(HAZOP): HAZOP technical approach, Procedure, Analysis Terminology, Guidewords, Parameters. Examples, Advantages, Weakness.		
UNIT 6	**Safety and Production**	**7 HOURS**
Safety versus production, Hazard models and risk data. Tackling disasters, plan for emergency. Risk management routines, Emergency shutdown systems, Role of computers in safety, Prevention of hazard human element, Technology and process selection.		

PROJECT		6 HOURS

Project based on

1. Actual case study
2. Working model
3. 3D-Model

Project possibly related to solution for minimizing the accidents in industry, also running the chemical process in a safer way.

TEXT BOOKS

1. Daniel A. Crowl and Joseph F. Louvar, Chemical Process Safety: Fundamentals with applications, Prentice Hall, Inc, 1990, ISBN: 9780131382268.
2. P. P. Leos, Loss prevention in process Industries, Vol 1 and 2 Butterworth, 1983, (ISBN: 0750615478.

REFERENCE BOOKS

1. R. W. King and J. Magid, Industrial Hazards and Safety Handbook, Butterworth, 1982, ISBN: 9780408003049.
2. Khulman, Introduction of Safety Science, TUV Rheinland, 1986, ISBN 9781461385967.
3. W. E. Baker, Explosion, hazards and Evaluation, Elsevier, Amsterdam, 1983, ISBN: 9780444420947, 9780444599889
4. O. P. Kharbanda and E. A. Stallworthy, Management of Disasters and How to Prevent Them. Grower, 1986, ISBN: 9780876839461.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Process Intensification and Integration
	COURSE CODE	CH451
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : CH421: Process Synthesis, Design and Optimization

COURSE OBJECTIVES :

CH451.CEO.1: Study process integration.
CH451.CEO.2: Learn different techniques of process integration.
CH451.CEO.3: Understand the process integration approach.
CH451.CEO.4: Study heat and power integration.
CH451.CEO.5: Study process design and control.
CH451.CEO.6: Learn concepts of process intensification and its techniques.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH451.CO.1: Understand process integration and intensification.
CH451.CO.2: Use different methods of process integration.
CH451.CO.3: Apply process integration approach to given process.
CH451.CO.4: Identify bottlenecks in process for minimization of energy requirements.
CH451.CO.5: Design optimal process route.
CH451.CO.6: Apply process integration and intensification knowledge to different process industry.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Process Integration**	**6 HOURS**
Process Systems Engineering, Process Integration, Various aspects of process integration, methods of process integration, A brief history of the development of Process Integration.		
UNIT 2	**Process Integration & Techniques**	**7 HOURS**
Overall Mass targeting, Graphical techniques for direct recycle strategies, Synthesis of mass exchange networks, Visualization techniques.		
UNIT 3	**Process Integration Approach**	**8 HOURS**
Targeting direct recycle, Algebraic approach to targeting of mass exchange networks, Recycle strategies using property integration, Heat integration, combined heat and power integration Direct recycle, synthesis of mass and heat exchange, mass integration.		
UNIT 4	**Heat and Power Integration**	**7 HOURS**
Minimum utility target, Network for maximum energy recovery, Minimum number of heat exchangers, Optimum approach temperature, Heat integrated distillation trains and Multiple effect distillation.		
UNIT 5	**Integration of Process Design and Control**	**7 HOURS**
Control system configuration, Qualitative plant wide control system and Plant safety systems, Chemical process design case study.		
UNIT 6	**Introduction to Process Intensification**	**7 HOURS**
Process Intensification, methods of intensification, case studies like, mixing tank, reactors, separation processes.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Heat exchange pinch analysis		
PRACTICAL NO.02		**2 HOURS**
Recycle strategies using property integration		
PRACTICAL NO.03		**2 HOURS**
Synthesis of mass exchange networks		
PRACTICAL NO.04		**2 HOURS**
Heat Exchanger Network		

PRACTICAL NO.05		**2 HOURS**
Intensification of mass transfer operation		
PRACTICAL NO.06		**5 HOURS**
Intensification of reacting system		
PRACTICAL NO.07		**4 HOURS**
Process integration and intensification for petrochemical plant		
PRACTICAL NO.08		**4 HOURS**
Process integration and intensification for fine chemical plant		
PRACTICAL NO.09		**2 HOURS**
Project		

TEXT BOOKS

1. Mahmoud M. El-Halwagi, Process Integration-Process Systems Engineering, Volume 7, Academic Press, 2006, ISBN: 9780123705237.
2. Ian C. Kemp, Pinch Analysis and Process Integration: A User Guide on Process Integration, 2nd Edition, Butterworth Heinemann, Elsevier, 2007, ISBN: 9780750682602.
3. David Reay, Colin Ramshaw, Adam Harvey,Process Intensification, 2nd Edition, Butterworth Heinemann, 2008, ISBN: 9870080983042.
4. Petar Sabev Varbanov, Sharifah Rafidah Wan WanAlwi, Zainuddin Abdul Manan, Jiri Klemes. Process Integration and Intensification Saving Energy, Water and Resources De Gruyter Textbook 1 st Edition 2014, ISBN: 3110306859, 9783110306859.

REFERENCE BOOKS

1. R. Smith, Chemical Process: Design and Integration, 1st Edition, Wiley, 2005, ISBN: 9781118699096.
2. Stankiewicz, A. and Moulijn,Re-engineering the Chemical Process Plants, Process Intensification, Marcel Dekker, 2003, ISBN: 0203913299.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP401
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE :

COURSE OBJECTIVES :

HP401.CEO.1: To enable the students to understand the basic concepts of Economics

HP401.CEO.2: To impart knowledge, with respect to practical applications of Economics .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP401.CO.1: The students would have understood the basic concepts of Economics.

HP401.CO.2: The students would have acquired knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions

HP401.CO.3: The course is designed to improve critical thinking, problem solving skills by using economic models and theories and predict economic relationships

HP401.CO.4: Students entering any profession in the workforce today must be able to utilize these basic economic principles. The course expected to develop critical understanding of current topics in economics and able to formulate their own opinions on economic issues

THEORY

UNIT 1	Introduction to Economics	6 HOURS

Economic Issues and Concepts; How Economist Work ; Theory of Demand & Supply; Meaning, Determinants, Law of Demand and Supply, Equilibrium between Demand & Supply; Elasticity of demand, price elasticity, income elasticity, cross elasticity.

UNIT 2	Micro Economics	6 HOURS

Revenue Concepts; Cost Concepts, Short run & Long run cost Concepts and curves, opportunity cost. Break even analysis; meaning, explanation, numerical. Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Competition , Oligopoly).

UNIT 3	Macro Economy	5 HOURS

National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP,NDP, Personal income, disposal income. Inflation; meaning, types, causes, measures to control.

UNIT 4	Indian Economy	5 HOURS

Characteristics of an Indian Economy; Human Development Index(HDI); Concepts of Foreign Trade, Goods and Services Tax(GST); Micro Small and Medium Enterprise(MSME) ; Foreign Direct Investment(FDI);Unemployment: meaning, types, causes, remedies.

UNIT 5	Introduction to Banking & Money Market	6 HOURS

Banking; meaning, types, functions, Commercial Banks- Instruments in Operation of an Account, Central Bank- RBI; its functions, Concepts- CRR, Bank Rate, Repo Rate, Reverse Repo rate, SLR; Introduction to Money and Capital Market , Introduction to Fiscal policy- meaning and tools.

REFERENCE BOOKS

1. R.Paneerselvam :Engineering Economics, , PHI publication ISBN : 978-81-203-5172-1
2. Robbins S.P. and Decenzo David A :Fundamentals of Management: Essential Concepts and Applications, Pearson Education, ISBN-13: 9780133499919
3. N Gregory Mankiw : Economics: Principles of Economics, Cengage Learning ISBN-10: 1305585127
4. L.M. Prasad: Principles and Practices of Management ISBN-10: 9351610500; ISBN-13: 978-9351610502
5. Tripathy and Reddy :Principles of Management ISBN, 1259050572, 9781259050572
6. Dr. K. K. Dewett & M. H. Navalur, S. Chand :Modern Economic Theory ISBN, : 9788121924634 .

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Major Project-II
	COURSE CODE	CH432
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	8	NIL	NIL	NIL	100	50	150

PRE-REQUISITE : CH403: Major Project-I

COURSE OBJECTIVES :

CH432.CEO.1: Follow the standard guideline to meet the objective for development of Project.
CH432.CEO.2: Test rigorously before deployment of Systems.
CH432.CEO.3: Verify and Validate the work Undertaken.
CH432.CEO.4: Consolidate the work and preparation of final report.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH432.CO.1: Show the evidence of independent evaluation.
CH432.CO.2: Critically analyzed the result and their implementation methodology.
CH432.CO.3: Validate the results with standard tools and techniques.
CH432.CO.4: Understand the importance of documentation and report writing.

PREAMBLE:

The objective of this Major Project-II to implement the full and final project and the report. After The remaining project work which consist of selection of approach / methodology / tools and techniques, Designing, installation, results and performance evaluation. Also includes the comparative analysis and validation of result. Should prepare the Project report as per format for satisfactory completion of work certified by concern project advisor and dean.

GUIDELINES:

In Project Work Stage-II, the student shall complete the remaining project work which consists of Selection of Methodology, Tools and Technology, Installations, Design, Implementations, testing, Results, performance analysis if applicable (discussions using data tables per parameter considered for the improvement with existing/known algorithms/systems) and comparative analysis and validation of results and conclusions. The student shall prepare and submit the report of Project work in standard format for satisfactory completion of the work that is the duly certified by the concerned advisor and Dean of the school. It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded. Follow the guideline and formats as mentioned in guideline document.(Annexure-II).

TIMELINE:

1. Presentation of Project Review- 3 Project Progress Monitoring DRC review (Week 5th)
2. Presentation of Project Review 4 Project Progress Monitoring and Report Preparation (Week-8th)
3. Internal Examination/ Project Expo: Project-2 Demonstration and presentation- (Week 10th)
4. External Examination: Project-2 Demonstration and Presentation- (End semester-Week 12th or 13th)

ASSESSMENT:

1. Internal Assessment (TW)

a. Project Review -3 Progress Monitoring - 30 Marks

b. Project Review -4 Progress Monitoring and Report Preparation -30 Marks

c. Project Expo/ Examination- Evaluation Presentation and Demonstration- 30 Marks

d. Paper publication/presentation/IPR -10 Marks

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

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MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

Final Year

Bachelor of Technology in

Chemical Engineering

(Amendments for Semester Long Internship)

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering

(An Autonomous Institute Affiliated to SPPU)

SEMESTER LONG INTERNSHIP: RULES AND REGULATIONS

(2016 - 2020)

1. ELIGIBILITY:

I. No live backlogs
II. CGPA of 8.50 and above
III. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student)

Only students satisfying the above criteria can be permitted for semester-long internship in any MNCs / R&D laboratories such as DRDO, NCL, NEERI, CDAC and Institutions like IITs/ NITs / International institutes of repute.

2. DEADLINES:

For the current batch, the applications must be submitted by 30, November 2019 by all students desired to go for the semester long internship.

3. APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including details of the organization along with the details of the project in brief, copy of their CV and copies of mark sheet to the respective school Corporate Relations (CR) coordinator. The application must be as per the format given below.

Application for Internship Program

Sr. No.	Particulars	
1	Name of the applicant (in bold letters)	
2	Gender	
3	School	
4	Date of Birth & Age (as on date)	
5	Roll Number & PRN	
6	Address for correspondence with mobile / telephone number and email-id	
7	Name & address of the Institute / Industry	
8	Core Domain of Institute / Industry	
9	Contact details Supervisor / HR Mobile / Telephone number and email-id	
10	Period of internship	24-26 weeks
11	Details of the Project proposed	

Signatures

Student	**School Internship Coordinator**
Approved by:	
No. of credits proposed	6 / 10
Dean – School of _____ Engineering	MIT AOE Seal
Date:	

4. RULES AND CONDITIONS:

I. Sponsored project should be along the same track of the minor (Open Elective) chosen by the student. (desirable)

II. Semester long internship is applicable only in the 8th semester. The distribution of credits for the VIII semester is as follows

DC	Department Core	4 Credits
DE	Department Elective	3 Credits
OE	Open Elective	4 Credits
HSS	Humanities & Social science	2 Credits
SDP	Skill development and Project	4 Credits

III. For a student who are opting for a semester long internship, 10 credits (OE, HSS and SDP) will be awarded if OE is part of the internship otherwise 6 credits will be awarded.

IV. The equivalence courses for the DC, DE and OE are floated by the Schools.

V. The credits of DC, DE and OE should be earned through MOOC courses.

VI. If a student is not able to successfully earn the credits of the DC / DE / OE within the stipulated time, they will not be eligible for the graduation in the same academic year.

5.1 ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel.

I. The Panel for the evaluation should be 3 members (if 3 credits) or 4 members (if 5 credits). The composition of the team would be as follows.

- **a.** Dean, Respective School
- **b.** Project Guide
- **c.** CR Coordinator / Project Coordinator
- **d.** Project Guide (Industry)
- **e.** The domain expert (In case of 5 credits, as per the minor specialization)

II. Presentation I at the end of 45th day and presentation II at the end of 90th day from the start of the project combined to a total weightage of 5 credits **(3 credits if OE is exempted).** It can be possible to do through Skype, if acceptable to the panel. **In Grade card it will be mentioned as SLIP – Project Design.**

III. Presentation at the end of the Internship Work and Final Internship Report after the completion of the Internship Work combined for a total weightage of 5 credits **(3 credits if OE is exempted)** and should be as per the template). **In Grade card it will be mentioned as SLIP – Project Implementation.**

5.2 ASSESSMENT METHOD FOR OTHER COURSES RUN THROUGH INSTITUTE LMS:

Credits for the courses run through Go-Webinar will be assessed using the following methods.

I. There will be SIX assignments (one per unit) to be submitted through the moodle. This will have a weightage of 30% of the total score. This contributes to the IA for the course.

II. There will be SIX quizzes (one per unit) to be conducted through moodle. This will have a weightage of 30% of the total score. This contributes to the ISE for the course.

III. One FINAL presentation to be done at the end and evaluated by a team of THREE members including the Course Champion, Instructor and any other nominated member by the respective School Dean. This will have a weightage of 40% of the total score. This contributed for the ESE of the course.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2019-20 (PART B)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEEERING	RELEASE DATE	:	1/12/2018
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	CH401	Process Dynamics, Control & Instrumentation	3	2	4
2.	DE1	CH41#	Dept. Elective	3	0	3
3.	OE3	CH42#	Open Elective	3	2	4
4.	HSS7	HP402	Sociology	2	---	2
5.	HSS8/ SDP7	HP403/ CH402	Business Strategies / Skill Development Lab 2	---	2	1
6.	SDP8	CH403	Project - I	---	8	4
7.	SDP9	CH404	Summer Internship	---	---	4
TOTAL				**11**	**14**	**22**

SEMESTER: VIII (SLIP not inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	CH431	Chemical Process Technology @	4	0	4
2.	DE2	SWAYAM / NPTEL	Dept. Elective	3	0	3
3.	OE4	CH45#	Open Elective @	4	0	4
4.	SEMESTER LONG INTERNSHIP – Project Design			---	---	3
5.	SEMESTER LONG INTERNSHIP – Project Implementation			---	---	3
TOTAL				**7**	**---**	**17**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**:**	**2019-20 (PART C)**
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEEERING	**RELEASE DATE**	**:**	**1/12/2018**
	REVISION NO.	**:**	**0.0**

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	CH401	Process Dynamics, Control & Instrumentation	3	2	4
2.	DE1	CH41#	Dept. Elective	3	0	3
3.	OE3	CH42#	Open Elective	3	2	4
4.	HSS7	HP402	Sociology	2	---	2
5.	HSS8/ SDP7	HP403/ CH402	Business Strategies / Skill Development Lab 2	---	2	1
6.	SDP8	CH403	Project - I	---	8	4
7.	SDP9	CH404	Summer Internship	---	---	4
TOTAL				**11**	**14**	**22**

SEMESTER: VIII (SLIP inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	CH431	Chemical Process Technology @	4	0	4
2.	DE2	SWAYAM / NPTEL	Dept. Elective	3	0	3
3.	SEMESTER LONG INTERNSHIP – Project Design			---	---	5
4.	SEMESTER LONG INTERNSHIP – Project Implementation			---	---	5
TOTAL				**7**	**---**	**17**

@ -- Courses run through institute LMS

DEPARTMENT ELECTIVE ON MOOCS PLATFORM			
SR. NO.	**COURSE DETAILS**	**MOOC DETAILS**	**NO. OF WEEKS**
1.	Computational Fluid Dynamics, Prof Srinivas Jayanti, IIT Madras	SWAYAM	12
2.	Environmental Quality Monitoring and Analysis, Prof Ravi Krishna, IIT Madras	SWAYAM	12
3.	Waste to Energy conversion, Prof P. Mondal, IIT Roorkee	NPTEL	8

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Bachelor of Technology in

Civil Engineering

(Choice Based Credit System)

2016-2020

BoS Chairman	Member Secretary	Chairman
Dean, School of Mechanical & Civil Engineering	Academic Council Dean Academics	Academic Council Director MITAOE

CHAIRMAN
BOS-Civil Engineering
MIT Academy of Engineering
(An Autonomous Institute)

MIT Academy of Engineering

An autonomous institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK- (CIVIL ENGINEERING)

The B. Tech Program shall be based on the following types of courses

SL. NO.	TYPE OF COURSE	ABBREVIATION
1.	Natural Science	NSC
2.	Engineering Science	ESC
3.	Program Core	PC
4.	Discipline Core	DC
5.	Department Elective	DE
6.	Open Elective	OE
7.	Humanities and Social Science	HSS
8.	Skill Development and Project	SDP

The Course and Credit Distribution shall be as under,

SL. NO.	TYPE OF COURSE	NO. OF COURSES	TOTAL CREDITS	
			NO.	%
1.	Natural Science	**4**	**18**	**10.96**
2.	Engineering Science	**4**	**16**	**9.76**
3.	Program Core	**5**	**19**	**11.59**
4.	Discipline Core	**12**	**48**	**29.27**
5.	Department Elective	**2**	**6**	**3.66**
6.	Open Elective	**4**	**16**	**9.76**
7.	Humanities and Social Science	**8/9**	**17**	**10.37**
8.	Skill Development and Project	**10/9**	**24**	**14.63**
TOTAL		**49**	**164**	**100**

COURSE DISTRIBUTION: SEMESTER WISE										
SL. NO.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	Natural Science	2	2							**4**
2.	Engineering Science	2	2							**4**
3.	Program Core			3	2					**5**
4.	Discipline Core			2	2	3	3	1	1	**12**
5.	Department Elective							1	1	**2**
6.	Open Elective					1	1	1	1	**4**
7.	Humanities & Social Science	1	1		1	1	2	1/2	2	**8/9**
8.	Skill Development & Project	1	1	1	1	1	1	2/3	1	**9/10**
TOTAL		**6**	**6**	**6**	**6**	**6**	**7**	**5**	**6**	**49**

CREDIT DISTRIBUTION: SEMESTER WISE										
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit										
SL. NO.	**TYPE OF COURSE**	**NO. OF CREDITS/SEMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	Natural Science	9	9							**18**
2.	Engineering Science	8	8							**16**
3.	Program Core			11	8					**19**
4.	Discipline Core			8	8	12	12	4	4	**48**
5.	Department Elective							3	3	**6**
6.	Open Elective					4	4	4	4	**16**
7.	Humanities & Social Science	2	2		3	2	3	2	3	**17**
8.	Skill Development & Project	2	2	2	2	2	2	8	4	**24**
TOTAL		**21**	**21**	**21**	**21**	**20**	**21**	**22**	**18**	**164**

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2016-17
FIRST YEAR BACHELOR OF TECHNOLOGY	RELEASE DATE	:	01/06/2016
DEPARTMENT OF CIVIL ENGINEERING	REVISION NO.	:	0.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS101	Mathematics – I	4	1	5
2.	NSC2	AS102/ AS103	Physics/ Chemistry	3	2	4
3.	ESC1	EX101/ CV101	Electrical & Electronics Engg/ Applied Mechanics	3	2	4
4.	ESC2	ME101/ IT101	Engineering Graphics/ Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – I	1	2	2
6.	SDP1	ME102/ ME103	Experimental Tools & Techniques/ Design Thinking	--	4	2
TOTAL				13	15	21

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T	CREDIT
1.	NSC3	AS101	Mathematics – II	4	1	5
2.	NSC4	AS103/ AS102	Chemistry/ Physics	3	2	4
3.	ESC3	CV101/ EX101	Applied Mechanics/ Electrical & Electronics Engg	3	2	4
4.	ESC4	IT101/ ME101	Computer Programming/ Engineering Graphics	2	4	4
5.	HSS2	HP101	Language & Communication – II	1	2	2
6.	SDP2	ME103/ ME102	Design Thinking/ Experimental Tools & Techniques	--	4	2
TOTAL				13	15	21

*L: Lecture, P: Practical, T:Tutorial; *Applicable for FY BTech*

MIT Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2017-18**
SECOND YEAR BACHELOR OF TECHNOLOGY	**RELEASE DATE**	**:**	**01/06/2017**
DEPARTMENT OF CIVIL EGG	**REVISION NO.**	**:**	**0.0**

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS201	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	CV201	Continuum Mechanics of Solids	3	2	4
5.	DC2	CV202	Geospatial Engineering Technology	3	2	4
6.	SDP3	ET206	Prototyping	--	4	2
TOTAL				14	14	21

SEMESTER: IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC4	IT201	Engineering Informatics	3	2	4
2.	PC5	ME201	Materials Engineering	3	2	4
3.	DC3	CV211	Building Design & Construction	3	2	4
4.	DC4	CV212	Geotechnical Engineering	3	2	4
5.	HSS3	HP201	Psychology	3	--	3
6.	SDP4	CV213	Minor Project	--	4	2
TOTAL				15	12	21

L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY	RELEASE DATE	:	01/12/2017
DEPARTMENT OF CIVIL EGG	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	CV301	Mechanics of Fluids	3	2	4
2.	DC6	CV302	Structural Analysis	3	2	4
3.	DC7	CV303	Concrete Technology	3	2	4
4.	OE1	CV31#	Open Elective - Refer Annexure.	3	2	4
5.	HSS4	HP301	Project Management	1	2	2
6.	SDP5	CV30#	Skill Development Lab - Refer Annexure	--	4	2
TOTAL				13	14	20

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	CV321	Design of Structures	3	2	4
2.	DC9	CV322	Transportation Engineering	3	2	4
3.	DC10	CV323	Water Resources Engineering	3	2	4
4.	OE2	CV33#	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP302	Professional Skills	--	4	2
6.	HSS6	HP303	Basics of Entrepreneurship	--	2	1
7.	SDP6	CV324	Mini Project	--	4	2
TOTAL				12	18	21

L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2019-20 (Part A)
FINAL YEAR BACHELOR OF TECHNOLOGY	RELEASE DATE	:	01/12/2018
DEPARTMENT OF CIVIL EGG	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	CV401	Drinking Water & Sanitary Engineering	3	2	4
2.	DE1	CV41#	Discipline Elective - Refer Annexure.	3	--	3
3.	OE3	CV42#	Open Elective - Refer Annexure.	3	2	4
4.	HSS7	HP401	Engineering Economics	2	--	2
5.	HSS9/ SDP7	HP403/ CV403	Business Strategies / Urban & Town Planning	--	2	1
6.	SDP8	CV402	Project - I	--	8	4
7.	SDP9	CV404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	CV431	Estimation & Costing	3	2	4
2.	DE2	CV44#	Discipline Elective - Refer Annexure	3	--	3
3.	OE4	CV45#	Open Elective - Refer Annexure	3	2	4
4.	HSS8	HP402	Sociology	2	--	2
5.	SDP10	CV432	Project - II	--	8	4
TOTAL				11	12	17

L: Lecture, P: Practical

CREDITS				
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit				
SL. No.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	21	21	**42**
2.	Second Year	21	21	**42**
3.	Third Year	20	21	**41**
4.	Final Year	22	17	**39**
TOTAL				**164**

CONTACT HOURS				
SL. No.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	28	28	**56**
2.	Second Year	28	27	**55**
3.	Third Year	28	29	**57**
4.	Final Year	25	23	**48**
TOTAL				**216**

ANNEXURE

Natural Science (NSC): 4 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	AS101	Mathematics – 1
2.	AS104	Mathematics – 2
3.	AS102	Physics
4.	AS103	Chemistry

Engineering Science (ESC): 4 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	EX101	Electrical and Electronics Engineering
2.	ME101	Engineering Graphics
3.	CV101	Applied Mechanics
4.	IT101	Computer Programming

Program Core (PC): 5 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	CH201	Environmental Science
2.	AS201	Applied Mathematics
3.	ET201	System Engineering
4.	IT201	Engineering Informatics
5.	ME201	Materials Engineering

Discipline Core (DC): 12 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	CV201	Continuum Mechanics of Solids
2.	CV202	Geospatial Engineering
3.	CV211	Buildings Design and Construction
4.	CV212	Geotechnical Engineering
5.	CV301	Mechanics of Fluids
6.	CV302	Structural Analysis
7.	CV303	Concrete Technology
8.	CV321	Design of Structures
9.	CV322	Transportation Engineering
10.	CV323	Water Resources Engineering
11.	CV401	Drinking Water & Sanitary Engineering
12.	CV431	Estimation & Costing

Department Elective (DE): 2 Courses		
	Course Code	**Name of Course**
1.	CV411	Building Services
	CV412	Advanced Design of Structures
	CV413	Railway Engineering
	CV414	Hydro Power Engineering
2.	CV441	Foundation Engineering
	CV442	Engineering Geology

	CV443	Design of Hydraulic Structures
	CV444	Air & Noise Pollution and Control measures
	CV445	Advances in Geospatial Engineering

Open Elective (OE): 4 Courses			
Construction Project Management	**Sl. No.**	**Course Code**	**Name of Course**
	1.	CV311	Construction Planning & Management
	2.	CV331	Operation Research
	3.	CV421	Financial Management
	4.	CV451	Statistical Methods in Construction

Open Elective (OE): Term - I (List of courses for Academic Year 2018-19)		
Chemical		
1	CH311	Process Modeling and Simulation.
2	CH312	Piping Engineering
Civil		
3	CV311	Construction Planning & Management
Computer		
4	IT311	Cryptography & System Security
5	CS311	Descriptive Analytics
6	CS312	Artificial Intelligence & Neural Network
Electronics		
7	EX311	Fundamentals of Robotics
E & TC		
8	ET311	Embedded System Programming (ESP)
9	ET312	IoT Architecture and Protocols
IT		
10	IT311	Cryptography & System Security
11	CS311	Descriptive Analytics
12	CS312	Artificial Intelligence & Neural Network
Mechanical		
13	ME311	Geometric Modeling & Design
14	ME312	Fundamentals of Robotics
15	ME313	Work Process Assessment

Open Elective (OE): Term - II (List of courses for Academic Year 2018-19)		
Chemical		
1	CH331	Process Engineering.
2	CH332	Piping Layout
Civil		
3	CV331	Operation Research
Computer		
4	IT331	Cyber Security
5	CS331	Data Science-I
6	CS332	Machine Learning
Electronics		
7	EX331	Kinematics and Dynamics of Robotics
E & TC		
8	ET331	Embedded Processor
9	ET332	IoT Network & Protocols
IT		
10	IT331	Cyber Security
11	CS331	Data Science-I
12	CS332	Machine Learning
Mechanical		
10	ME331	Finite Element Analysis
11	ME332	Kinematics & Dynamics of Robots
12	ME333	Facility Planning & Design

Open Elective (OE): Term - I (List of courses for Academic Year 2019-20)		
Chemical		
1	CH421	Process Optimization
2	CH422	Piping Design & Engineering
Civil		
3	CV421	Financial Management
Computer		
4	IT421	Ethical Hacking & Cyber Laws
5	CS421	Data Science-II
6	CS422	Pattern Recognition
Electronics		
7	EX421	Robotics Vision and Control
E & TC		
8	ET421	Low-Power SoC Architecture & Applications (SoC&A)
9	ET422	Privacy and Security in IoT
IT		
10	IT421	Ethical Hacking & Cyber Laws
11	CS421	Data Science-II
12	CS422	Pattern Recognition
Mechanical		
13	ME421	Computational Fluid Dynamics
14	ME422	Robotics Vision and Control
15	ME423	Operations Management

Open Elective (OE): Term - II (List of courses for Academic Year 2019-20)		
Chemical		
1	CH451	Process Intensification & Integration
2	CH452	Pipeline Engineering
Civil		
3	CV451	Visualization & Information Exchange
Computer		
4	IT451	Cyber Forensics
5	CS451	Practitioner's approach for Data analytics
6	CS452	Reinforcement Learning
Electronics		
7	EX451	Intelligent and High Performance Robotics
E & TC		
8	ET451	Real-Time Embedded System (RES)
9	ET452	Energy Management for IoT Devices
IT		
10	IT451	Cyber Forensics
11	CS451	Practitioner's approach for Data analytics
12	CS452	Reinforcement Learning
Mechanical		
13	ME451	Advanced Analysis
14	ME452	Intelligent and High Performance Robotics
15	ME453	Supply Chain Management

Humanities and Social Science (HSS): 9 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	HP101	Language & Communication – I
2.	HP102	Language & Communication – II
3.	HP201	Psychology
4.	HP301	Project Management
5.	HP302	Professional Skills
6.	HP303	Basics of Entrepreneurship
7.	HP401	Engineering Economics
8	HP402	Sociology
9	HP403	Business Strategies

Skill Development and Project (SDP): 10 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	ME102	Engineering Tools and Techniques
2.	ME103	Design Thinking
3.	ET206	Prototyping
4.	CV213	Minor Project
5.	CV304	ETABS (Extended Three-Dimensional analysis of building system)
6.	CV403	Urban & Town Planning
7.	CV324	Mini Project
8.	CV402	Project - I
9.	CV404	Summer Internship
10.	CV432	Project - II

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

First Year

Bachelor of Technology

2016-2020

(With Effect from Academic Year: 2016-2017)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2016-17
FY BTECH	RELEASE DATE	:	01/06/2016
DEPARTMENT OF MECHANICAL EGG	REVISION NO.	:	0.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS101	Mathematics – I	4	1	5
2.	NSC2	AS102/ AS103	Physics/ Chemistry	3	2	4
3.	ESC1	EX101/ CV101	Electrical & Electronics Engg/ Applied Mechanics	3	2	4
4.	ESC2	ME101/ IT101	Engineering Graphics/ Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – I	1	2	2
6.	SDP1	ME102/ ME103	Experimental Tools & Techniques/ Design Thinking	--	4	2
TOTAL				13	15	21

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T	CREDIT
1.	NSC3	AS101	Mathematics – II	4	1	5
2.	NSC4	AS103/ AS102	Chemistry/ Physics	3	2	4
3.	ESC3	CV101/ EX101	Applied Mechanics/ Electrical & Electronics Engg	3	2	4
4.	ESC4	IT101/ ME101	Computer Programming/ Engineering Graphics	2	4	4
5.	HSS2	HP101	Language & Communication – II	1	2	2
6.	SDP2	ME103/ ME102	Design Thinking/ Experimental Tools & Techniques	--	4	2
TOTAL				13	15	21

*L: Lecture, P: Practical, T:Tutorial; *Applicable for FY BTech*

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics I
	COURSE CODE	AS101
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII

COURSE OBJECTIVES :

AS101.CEO.1: To recall and apply the methods of solving system of equations using matrices.
AS101.CEO.2: To find nth derivative and expansion of different functions.
AS101.CEO.3: To classify and solve first order ordinary differential equations.
AS101.CEO.4: To categorize and inspect the applications of first order differential equations.
AS101.CEO.5: To apply the concepts of partial differentiation.
AS101.CEO.6: To demonstrate an understanding towards the applications of partial differentiation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS101.CO.1: Inspect system of equations using matrices. [L4]
AS101.CO.2: Illustrate problems based on nth derivative and expansion of functions. [L2]
AS101.CO.3: Solve first order ordinary differential equations. [L3]
AS101.CO.4: Analyze simple real world phenomenon governed by first order ordinary differential equations. [L4]
AS101.CO.5: Infer the problems based on properties of partial differentiation. [L2]
AS101.CO.6: Examine the applications of partial differentiation. [L4]

THEORY		
UNIT 1	**Matrices**	**12 HOURS**
Rank, Solutions of system of linear equations: Homogeneous and Non Homogeneous systems,Linear dependence and independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem		
UNIT 2	**Successive Differentiation**	**8 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative, Taylors and Maclaurins theorem for expansion of functions .		
UNIT 3	**First order ordinary differential equations**	**10 HOURS**
Exact differential equations, Differential equations reducible to exact by finding integrating factors, linear differential equations, Differential equations reducible to linear form .		
UNIT 4	**Applications of first order ordinary differential equation**	**10 HOURS**
Newtons law of cooling, Electrical circuits, rectilinear motion, one dimensional heat conduction, Chemical applications- Mixing problems .		
UNIT 5	**Partial Differentiation**	**8 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative and differential, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 6	**Applications of Partial Differentiation**	**8 HOURS**
Jacobian, properties of Jacobian, Jacobian of Implicit functions, Finding partial derivative using Jacobians, Functional dependence, maxima and minima of functions of two variables.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Rank, System of Linear equations: Homogeneous and Non Homogeneous systems.		
TUTORIAL NO.02		**1 HOURS**
Linear Dependence and Independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem.		
TUTORIAL NO.03		**1 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative.		
TUTORIAL NO.04		**1 HOURS**
Expansion of functions using Taylors and Maclaurins theorems.		

TUTORIAL NO.05		**1 HOURS**
Finding solutions to exact differential equations, Differential equations reducible to exact by finding integrating factors		
TUTORIAL NO.06		**1 HOURS**
Linear differential equations,Differential equations reducible to linear.		
TUTORIAL NO.07		**1 HOURS**
Newtons law of cooling, Kirchoffs law of electrical circuits, rectilinear motion		
TUTORIAL NO.08		**1 HOURS**
One dimensional heat conduction, Chemical applications Mixing Problems		
TUTORIAL NO.09		**1 HOURS**
Examples on Partial Differentiation and Chain rule,Total derivative and differential		
TUTORIAL NO.10		**1 HOURS**
Examples on Eulers Theorem, Differentiation of an implicit function		
TUTORIAL NO.11		**1 HOURS**
Examples on Jacobian, properties of Jacobian, Functional dependence		
TUTORIAL NO.12		**1 HOURS**
Examples on Functional dependence,Maxima and minima of functions of two variables		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Thomas Calculus by G.B. Thomas, Maurice D. Weir, Joel R. Hass (ISBN:9789332519091, Pearson Education, 12th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig(ISBN-13: 9788126554232, Wiley Eastern Ltd., 10th edition)
3. Advanced Engineering Mathematics by R.K. Jain& S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Physics
	COURSE CODE	AS102
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS102.CEO.1: To make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.(L3).

AS102.CEO.2: To analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.(L4).

AS102.CEO.3: To apply the concept of behavior of light and understand the polarization phenomena.(L3) .

AS102.CEO.4: To classify and understand the difference of classical mechanics and quantum mechanics.(L2).

AS102.CEO.5: To derive the basic laws governing the motion of quantum particles.(L4).

AS102.CEO.6: To apply the concept of quantum mechanics to different applications and supplement the reasoning vis--vis understanding of different branches of Physics.(L3).

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS102.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.(L5).

AS102.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.(L3).

AS102.CO.3: Apply that light is transverse in nature. (L3) .

AS102.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.(L2).

AS102.CO.5: Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.(L5) .

AS102.CO.6: Apply the concepts of Quantum Physics in different branches of engineering.(L3) .

THEORY

UNIT 1	**Measurement and importance of span (order) of physical quantities**	**7 HOURS**

Concept of (i)significant numbers, (ii) accuracy versus precision (iii)error versus uncertainty (iv)systematic error versus random error (v) quantifying the uncertainty. Least-count of an apparatus, Methods to measure least-count with specific examples of vernier-calipers, screw-gauge, travelling microscope and spectrometer. Span (orders of magnitude) of prominent physical parameters with specific examples of Gravitational constant(G), Speed of light(c),Planks constant(h), Boltzmann constant(k) and wavelengths of electromagnetic spectrum. Importance of the orders of G, c, h and k alongwith hypothetical picture of world in case of their order becomes unity (1). Length-scale and time-scale of specific physical phenomenon.

UNIT 2	**Optics (Interference and diffraction of Light)**	**7 HOURS**

Particle nature and wave-nature with examples of wave and particle behavior of light, Introduction to wave nature, Concept of thin film, Stokes law of phase-change on reflection from a thin film, Thin film interference, Coating of lenses as an application of thin film interference, Interference in films of uniform and non-uniform thickness (with derivation), Applications of thin-film interference, Newton Ring Experiment and its applications, Diffraction as a particular case of interference.

UNIT 3	**Polarization of Light**	**6 HOURS**

Polarization of light, Production and analysis of polarized light (Brewsters law, Law of Malus), Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.

UNIT 4	**Quantum Mechanics-I .**	**8 HOURS**

Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Plancks quantum law of blackbody radiation, Matter-waves, De-Broglies concept of matter waves, Heisenbergs Uncertainty Principle, Operators, Eigen values and Eigen functions, Expectation Values, Wave-function, Physical significance of wave function.

UNIT 5	Quantum Mechanics-II .	8 HOURS
Schrodingers equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohrs atomic model.		

UNIT 6	Applications of Quantum Mechanics-LASER .	6 HOURS
Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einsteins coefficients), Principle and working of LASER with example, Application of LASER in optical fibre communication.		

PRACTICALS		
PRACTICAL NO.01		**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02		**2 HOURS**
Determination of the refractive index of a given liquid using Newton Rings Experiment.		
PRACTICAL NO.03		**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04		**2 HOURS**
Determination of the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05		**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06		**2 HOURS**
Verification of Bohrs atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07		**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08		**2 HOURS**
Determination of wavelength of a laser beam using Lloyds mirror arrangement.		

PRACTICAL NO.09		2 HOURS
Determination of Radius of Curvature of a given planoconvex lens using Newtons Rings apparatus.		
PRACTICAL NO.10		**2 HOURS**
Determination of wavelength of different colours present in a white light.		

TEXT BOOK

1. The Feynman Lectures on Physics: Volume-1-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-82-8.(Narosa Publisher)
2. The Feynman Lectures on Physics: Volume-3-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-84-2. (Narosa Publisher)

REFERENCE BOOK

1. Measurement and Instrumentation Principles: Alan S Morris, Butterworth Heinemann, ISBN 07506508184
2. AjoyGhatak ,Optics, Tata Mc Graw Hill Publishing Company. Ltd., 2nd Edition, ISBN- 0-07058583-0
3. Jenkins White, Fundamentals of Optics, Mc Graw Hill Science, ISBN-0070853460.
4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-, Mc Graw Hill Education (India) Pvt. Ltd., 6th Edition, ISBN-10- 0070151555,
5. L. I. Schiff ,Quantum Mechanics, Tata Mc Graw Hill Education (India) Pvt. Ltd., 3rd Edition, ISBN-10- 0070856435, ISBN- 13- 9780070856431.
6. PAM Dirac,Principles of Quantum Mechanics Cbs publishers and Distributors, ISBN-10-0195671074, ISBN- 13- 978019567107
7. D J Griffiths, Introduction to Quantum Mechanics, Pearson Prentice Hall Publishers.
8. Serway and Jewett, University Physics for Scientists and Engineers, Cengage Learning Publishers.
9. K. Thyagarajan and AjoyGhatak, Lasers: Fundamentals and applications, Springer, ISBN 9781441964410.
10. Worsnop and Flint; Advanced Practical Physics, Little Hampton book service Ltd., ISBN-10: 0423738909, ISBN-13: 978-0423738902.
11. Robert Eisberg and Robert Resnick; Quantum Mechanics: Of Atoms, Molecules, Solids, Nuclei and Particles; Wiley

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Chemistry
	COURSE CODE	AS103
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : Basic Chemistry of XI and XII

COURSE OBJECTIVES :

AS103.CEO.1: To summarize the basic chemistry and classic methods of analysis, which includes solution, concentrations and indicators.

AS103.CEO.2: To outline the technology involved in improving quality of water for its industrial use.

AS103.CEO.3: To illustrate the basic concepts of analytical techniques that facilitates rapid and reliable measurements.

AS103.CEO.4: To demonstrate the use of ultra violet visible spectroscopy as invaluable tools in synthetic chemistry.

AS103.CEO.5: To list and explain the principle & techniques of separation methods.

AS103.CEO.6: To define the basic aspects of advanced materials & their applications.

COURSE OUTCOMES :

On successful completion of the course the student will be able to

AS103.CO.1: Relate classic methods of analysis by preparing solutions of desired concentrations & carrying out quantitative analysis by volumetric methods. (L1)

AS103.CO.2: :Identify different methodologies for water quality analysis for industrial application. (L3)

AS103.CO.3: Apply basic concepts of electro-analytical techniques for analysis of various chemical compounds and solutions. (L3)

AS103.CO.4: Extend the knowledge of calculating wavelength of absorption of various chemical compounds using UV-Visible spectroscopy. (L2)

AS103.CO.5: Outline the different methods for separation of mixtures of various chemical compounds.(L2)

AS103.CO.6: Categorize the different engineering materials and to solve engineering problems.(L4)

THEORY

UNIT 1	**Instrumental volumetric analysis**	**7 HOURS**

Introduction, methods of expressing concentrations (Self-study), primary and secondary standard solutions. Instrumental & non instrumental analysis principles & types; Types of Titrations based on reaction, AcidBase titrations: Indicatorstheory of indicators, acid base indicators, mixed and universal indicators; Titration curve for Strong acidStrong base type, Introduction to Weak acidStrong base, Strong acid-Weak base titration, Precipitation titration, Applications in quantitative analysis.

UNIT 2	**Water treatment and effluent management**	**7 HOURS**

Introduction to conventional water treatment: Complexometric titrations: Principle, EDTA titrations, choice of indicators, Hardness of water & Alkalinity of water, causes, types, numerical, internal methods of water softening, Advanced wastewater & water Treatment: i) filtration method: Carbon adsorption ii) ion-exchange method iii) membrane techniques: reverse osmosis and electro-dialysis & their applications in water purification.

UNIT 3	**Electroanalytical Techniques**	**7 HOURS**

Introduction to electrodes, pH metry: Standardization of pH meter, titration curve for the mixture of acids Vs strong base, differential plots, Conductometry: Introduction, Kohlrauschs law, measurement of conductance, Application of conductometer in Acid-Base titrations & Precipitation titrations. Potentiometry: Introduction, application in redox titrations example of Fe/Ce titration.

UNIT 4	Ultra Violet Spectroscopy	7 HOURS
Introduction, nature of UV, Beers law, absorption of UV radiation by organic molecule leading to different excitation, Terms used in UV Spectroscopy- Chromophore, Auxochrome, Bathochromic shift(Red shift), hypsochromic shift(Blue shift), hyperchromic and hypochromic effect. Instrumentation,Effect of conjugation on position of UV band. Calculation of max by Woodward and Fisher rules for dienes and enone systems, Applications of UV Spectroscopy- Determination of structure, Determination of stereo chemistry (Cis and trans)		
UNIT 5	**: Chromatography**	**6 HOURS**
Introduction and classification of chromatographic methods, Theory, Principle, technique and applications of-Column Chromatography, Thin layer Chromatography, Paper Chromatography, Gas Chromatography. Applications of chromatographic techniques		
UNIT 6	**: Engineering Materials.**	**8 HOURS**
Introduction to Material Sciences, Polymers: Introduction, Specialty polymers, Applications in electronic gadgets, housing & construction, automobiles etc. Biomaterials: Introduction, characteristics, examples, challenges, Carbon nano materials: Introduction, types & applications. Smart materials: Introduction, types, examples like piezo materials, shape memory, thermo responsive etc..		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Preparation and Standardization of solutions		
PRACTICAL NO.02		**2 HOURS**
Estimation of ions from given solution by Redox titration		
PRACTICAL NO.03		**2 HOURS**
Determination of the total hardness of a given water sample by EDTA method		
PRACTICAL NO.04		**2 HOURS**
Adsorption: Removal of organic dyes by activated charcoal		
PRACTICAL NO.05		**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.06		**2 HOURS**
Conduct metric titrations		
PRACTICAL NO.07		**2 HOURS**
Verification of Beers law & colorimetric estimation		

PRACTICAL NO.08		**2 HOURS**
Determination of max of organic/ inorganic compound using UV-visible spectrophotometer		
PRACTICAL NO.09		**2 HOURS**
Separation of mixture of two organic compounds by Thin Layer Chromatography		
PRACTICAL NO.10		**2 HOURS**
Separation of two cations by paper chromatography		
PRACTICAL NO.11		**2 HOURS**
Separation & purification of chemical compounds by Gas chromatography		

TEXT BOOK

1. Jain & Jain, Engineering Chemistry, 15th Edition, Dhanpat Rai Publications company
2. S.M. Khopkar , Basic Concept of Analytical Chemistry,2nd edition, New Age Science Ltd ISBN-10: 1906574006 ISBN-13: 978- 1906574000
3. Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, Laxmi Publications Pvt. Ltd.

REFERENCE BOOK

1. V.M.Parikh , Absorption Spectroscopy of Organic Molecules, Addison Wesley Longman Publishing Co, ISBN 10: 0201057085,ISBN 13: 9780201057089.
2. Skoog, Fundamentals of Analytical Chemistry, Cengage Learning, ISBN-13: 978-0495558286, ISBN-10: 0495558281
3. Willard, Merritt, Dean and Settle, Instrumental Methods of chemical analysis, 6th edition, Wadsworth Publishing Co. ISBN-10: 0534081428, ISBN-13: 978-0534081423.
4. Donald R. Askeland, Pradeep Fulay, W. J. Wright, The Science & Engineering of Materials, 6th Edition, Cengage Learning, 2010
5. O. P. Virmani & A. K. Narula , Applied Chemistry: Theory and Practice , New Age International Pvt. Ltd. Publishers, ISBN-10: 8122408141, ISBN-13: 978-8122408140

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical & Electronics Engineering
	COURSE CODE	EX101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE :

COURSE OBJECTIVES :

EX101.CEO.1: To impart knowledge of energy scenario and use of renewable energy systems.
EX101.CEO.2: To explain the fundamentals of single-phase and three-phase systems.
EX101.CEO.3: To explain power supply components, electronic devices.
EX101.CEO.4: To summarize various Digital systems and application.
EX101.CEO.5: To build the knowledge of measuring system and signal conditioning circuits.
EX101.CEO.6: To get acquainted with different electrical machines.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX101.CO.1: Develop the Renewable energy system (PV) as per given specifications [L3]
EX101.CO.2: Illustrate behavior of single phase A.C. circuits and three phase A.C. circuits. [L2]
EX101.CO.3: Analyze analog circuit applications.[L3]
EX101.CO.4: Design Digital applications.[L5]
EX101.CO.5: the use of Instrumentation system in various fields.[L2]
EX101.CO.6: Identify electrical machines used in typical domestic and industrial sector based on application. [L2]

THEORY

UNIT 1	Energy Resources & Technology	6 HOURS

Energy Scenario, Energy Resources, Basic concepts about thermal, hydro and nuclear power stations (block diagram approach only).Energy conversion from thermal and mechanical energy, Energy Conservation, Use of Energy Efficient Technologies, Application of Renewable Energy Systems, Battery technology, Introduction to power quality: Definition, causes, effects, Introduction to energy audit.

UNIT 2	A.C. Circuits	7 HOURS

A.C. fundamentals, RMS and average value, R-L,R-C,RLC series parallel circuits, phasor diagram, power and power factor. Three phase voltage generation and their waveforms, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, Difference between neutral and ground conductors.

UNIT 3	Power Supply and Electronics Devices	7 HOURS

Rectifiers and Power Supplies, Elements of IC Regulated Power Supply. BJT - structure and operation, CE, CB, CC configurations, Transistor as a switch and Amplifier. MOSFET- structure (enhancement), operation and application as a switch. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.

UNIT 4	Digital Systems	7 HOURS

Digital: Logic gates, Boolean algebra, SOP representation, Combinational circuit Design: Half Adder, Full Adder, MUX, DMUX, Comparator, Code converter, Decoder Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor based systems, Embedded systems

UNIT 5	Measuring System	6 HOURS

Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, IR, Speed & LVDT. Op-Amp IC 741 pin configuration, Op-amp parameters, Inverting, Non- Inverting & Differential configuration Applications: Summing & Difference amplifier, Comparator, Voltage follower.

UNIT 6	Electrical Machines	7 HOURS

Construction of Transformer, principle of operation, EMF equation. Construction, principle of operation and types of three-phase Induction motor and DC motor, PMDC, BLDC, servo motor, stepper motor, Universal motor, Application of Electrical Motors in domestic and Industrial sector.

PRACTICALS : Total 8 Experiments from two groups.		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test it.		
PRACTICAL NO.02	**Single Phase Energy (Watt-hour) measurement.**	**2 HOURS**
To measure energy and power factor. To examine improvement in the power factor. To estimate and compare energy consumption with energy meter.		
PRACTICAL NO.03	**R-L-C series A.C. circuit**	**2 HOURS**
To calculate exact values of R, L and C for lagging and leading power factor To find power losses in R, L and C.		
PRACTICAL NO.04	**Verification of relation between Line and Phase quantities in Star and Delta circuits**	**2 HOURS**
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation. To connect Bulb load in Delta connection and verify the relation.		
PRACTICAL NO.05	**Open circuit & Short circuit test on a Single Phase transformer**	**2 HOURS**
To find iron loss and no load current To find full load copper loss and winding parameters To determine efficiency and regulation of transformer		
PRACTICAL NO.06	**Load test on D.C. Shunt Motor.**	**2 HOURS**
To find the torque and output power of motor To calculate the efficiency of motor.		
PRACTICAL NO.07	**Step angle control of Stepper motor.**	**2 HOURS**
To gain familiarity with the properties of stepper motors. To calculate the step angle of motor.		
PRACTICAL NO.08	**Speed control of BLDC/PMDC Motor.**	**2 HOURS**
To find the relation between voltage and speed of motor To develop any small application.		
PRACTICAL NO.09	**Electronics Components and Measuring instruments:**	**2 HOURS**
To study Passive components Resistors, Capacitors & Inductor. To test semiconducting components Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		
PRACTICAL NO.10	**DC Regulated Power Supply:**	**2 HOURS**
To design 12V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	**BJT as a switch and Amplifier.**	**2 HOURS**
To adapt BJT as a switch On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		

PRACTICAL NO.12	Combinational Digital Circuits:	2 HOURS
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	**Sequential Digital Circuits:**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	**OP-AMP Applications**	**2 HOURS**
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OPAMP as summing and difference amplifier. To verify the application of OPAMP as voltage follower.		
PRACTICAL NO.15	**Sensors and Transducer**	**2 HOURS**
To study and verify operation of LVDT. To study and verify the operation of Temperature sensors. (PT100, LM35)		
PRACTICAL NO.16	**Design and Simulate using MULTISIM(Minimum 2)**	**2 HOURS**
To design a counter to display 2-digit Decimal Number (00 to 99) on 7-Segment Display. To design a Flashing LED Display for a specific Pattern using MUX. To design of Inverting/Non-Inverting Amplifier using Op-Amp IC-741 for a specific gain.		

TEXT BOOK

1. B. H. Khan,Non-Conventional Energy Resources, Tata McGraw Hill, 2nd Edition, 2009, 978-0070142763.
2. Edward Hughes, Electrical and Electronic Technology Pearson India, 10th Edition, 2011, ISBN-978-8131733660
3. Neil Storey, Electronics A Systems Approach, Pearson Education Asia, 5th Edition,2013, ISBN-978-0273773276

REFERENCE BOOK

1. 1. V. N. Mittle and ArvindMittal, Basic Electrical Engineering, McGraw Hill Education, 2ndEdition,2005,ISBN- 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, McGraw Hill, 4th Edition, 2010, 978-0070699670.
3. Thomas L. Floyd, Electronics Devices & Circuits, Pearson Education India, 5th Edition, 1998, 978-0136491385.
4. Paul Horowitz, Winfield Hill, The Art of Electronics, Cambridge University press, 3rd Edition, 978-0521809269.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE : Physics and Mathematics of XI & XII

COURSE OBJECTIVES :

CV101.CEO.1: To classify force systems and explain the conditions of equilibrium.
CV101.CEO.2: To illustrate laws of friction.
CV101.CEO.3: To demonstrate the concepts of centroid and moment of inertia.
CV101.CEO.4: To describe kinematic parameters of motion.
CV101.CEO.5: To make use of laws of motion for kinetics.
CV101.CEO.6: To explain energy and momentum methods.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV101.CO.1: Determine the resultant and support reactions.(L5)
CV101.CO.2: Analyze bodies involving frictional forces. (L4)
CV101.CO.3: Evaluate centroids of bodies and moment of inertia of sections. (L5)
CV101.CO.4: Identify the type of motion and its kinematic parameters. (L3)
CV101.CO.5: Analyze the motion under action of constant and variable forces. (L4)
CV101.CO.6: Apply energy and momentum methods for kinetics. (L3)

THEORY		
UNIT 1	**Fundamentals of statics**	**8 HOURS**
Basic concepts and fundamental principles, force, moment of a force, couple, resolution and composition of forces, Free body diagrams, equations of equilibrium, equilibrium of coplanar and non-coplanar force system, applications to jib crane, beams, and cables.		
UNIT 2	**Friction**	**6 HOURS**
Introduction, types of friction, laws of friction, angle of friction, angle of repose, cone of friction, engineering applications - blocks and wedges, ladder friction, screw jack, pulley and belt drives, band brakes.		
UNIT 3	**Properties of surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity, centroids of composite 1D and 2D objects. Introduction to moment of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, MI of composite objects. Distributed loading, fluid pressure-application to dams and gates.		
UNIT 4	**Kinematics**	**8 HOURS**
Basic concepts in kinematics, Motion with uniform and variable acceleration, Motion curves, Curvilinear Motion in Rectangular coordinates, path coordinates, polar coordinates. Kinematic Link and Kinematic Pair, Kinematic Chain, Mechanisms and its inversions, instantaneous centre of rotation, Kennedy's Theorem, Applications- slider and crank mechanism, Railway engine and its supporting flywheel motions, Linkage mechanism of excavator and its system.		
UNIT 5	**Kinetics**	**6 HOURS**
Kinetics of rectilinear and circular motion of a particle acted upon by a constant and variable force system, Newtons second laws of Motion, Equations of motion, concept of dynamic equilibrium, and motion of connected bodies. Basic principles of vehicle dynamics, Forces acting on a vehicle, tire mechanics, Dynamics of linear and lateral motion.		
UNIT 6	**Energy and Momentum**	**8 HOURS**
Work, power and energy, Principles of work and Energy,Motion under a ConservativeCentral Force. Application to Space Mechanics. Impulse, momentum, Principle of Impulse and Momentum, Collisions-elastic and plastic, Direct central impact, coefficients of restitution.Applications-vehicle collisions, sports viz. cricket, tennis, billiard.		

PRACTICALS		
PRACTICAL NO.01	**Group 1] Basic principles/laws**	**2 HOURS**
1. To verify triangle law/ Lami's theorem 2. To verify polygon law of forces. 3. To verify law of moments. 4. To verify equilibrium of parallel forces. (Beam Reactions) 5. To verify equilibrium of concurrent forces in space.		
PRACTICAL NO.02	**Group 2] Friction**	**2 HOURS**
1.To verify laws of friction. 2. To determine angle of repose for a given block and surface. 3. To determine static coefficient of friction for a block on horizontal plane. 4. To determine static coefficient of friction for a block on inclined plane. 5. To determine static coefficient of friction for flat belt and drum.		
PRACTICAL NO.03	**Group 3] Centroid/centre of gravity**	**2 HOURS**
1. To determine centroid of irregular triangular lamina. 2. To determine centroid of polygonal lamina. 3. To determine centre of gravity of a wire bend. 4. To determine centroid of a composite lamina. 5. To find the shift of centroid after cutting some part of lamina.		
PRACTICAL NO.04	**Group 4] Motion(Dynamics)**	**2 HOURS**
1. To study curvilinear motion of a particle. 2. To verify value of g using compound pendulum. 3. To determine coefficient of restitution. 4. To determine mass moment of inertia of a fly wheel. 5. To verify law of conservation of momentum.		
PRACTICAL NO.05	**Group 5] Graphical Exercises**	**2 HOURS**
1. To determine resultant of concurrent forces. 2. To determine resultant of parallel/general forces. 3. To determine reactions for a simple beam. 4. To draw motion curves for given kinematics problem. 5. To determine relative velocity by graphical method. Part B] Students will have to complete a task/activity after each practical which will be based on the theme of that group. (10 Hrs)		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", Tata McGraw-Hill Education, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics", Pearson Education, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II", Tata Mc-Graw, ISBN: 978-0077402327
2. Ferdinand Singer, Harper and Row "Engineering Mechanics Statics and Dynamics", ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics", Cengage Learning, ISBN:8131509907

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	40	50	10	50	Nil	150

PRE-REQUISITE :

COURSE OBJECTIVES :

ME101.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME101.CEO.2: To develop & apply visualization skill to simple Objects.
ME101.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME101.CO.1: Recall fundamentals of projections (L1)
ME101.CO.2: Interpret engineering drawings (L2)
ME101.CO.3: Apply visualization skill to draw various views of object (L3)
ME101.CO.4: Analyzeengineeringdrawings (L4)
ME101.CO.5: Decide annotations for two dimensional drawings (L5)
ME101.CO.6: Develop and/or comprehend a simple engineeringdrawing in both First and Third angle orthographic projections(L4)

THEORY		
UNIT 1	**Visual Thinking & Solid Geometry**	**5 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections & Sectional Views**	**5 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views.		
UNIT 3	**Isometric Projections**	**5 HOURS**
Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of isometric View of Pyramid, Cone, Sphere.		
UNIT 4	**Interpretation of given view/ missing view**	**5 HOURS**
Identification of lines/ edges and surfaces, visualization of given orthographic views, adding missing/ third view, adding a sectional view, to convert a given view into sectional view.		
UNIT 5	**Auxiliary Projections**	**4 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View.		
UNIT 6	**Freehand Sketching & Technical Drawing**	**4 HOURS**
Free hand sketching- FV & TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles.		

PRACTICALS : Each Assignment contains 2 questions.		
PRACTICAL NO.01		**10 HOURS**
Projection of Lines, Plane, Solids		
PRACTICAL NO.02		**8 HOURS**
Orthographic Projections, Missing Views		
PRACTICAL NO.03		**6 HOURS**
Isometric Projections		
PRACTICAL NO.04		**4 HOURS**
Auxiliary View		

PRACTICALS : Assignments to be drawn on modeling software package.		
PRACTICAL NO.05		**4 HOURS**
Absolute and Incremental drawing.		
PRACTICAL NO.06		**6 HOURS**
Draw commands, Modify commands, Array, fillet, offset commands		
PRACTICAL NO.07		**2 HOURS**
Project drafting		
PRACTICAL NO.08		**12 HOURS**
Sketching, Solid Modeling, Assembly		
PRACTICAL NO.09		**4 HOURS**
Project modeling		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to Auto CAD, TMH Publishing co Ltd, 5th Edition, 2012, (ISBN 13: 9780070648371)
2. Basant Agarwal and C M Agarwal, Engineering Drawing, TMH Publishing co Ltd, 2nd Edition 2013, (ISBN13: 978-1-259-06288-9)
3. K C John, Engineering Graphics for Degree, PHI learning pvt. Ltd. New Delhi,2009, (ISBN: 97881-203-3788-6)
4. R. K. Dhavan, A Text Book of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

1. Luzadder, Warren J., Duff, John M, Fundamentals of Engineering, Prentice Hall of India,11th Edition, 2010, (ISBN: 978-81-203-0885-5)
2. Basudev Bhattacharya, Machine Drawing includes Autocad Supplements, Oxford University Press India, First Edition, 2011, (ISBN 13: 9780198070771)
3. K. Venugopal, Prabhu Raja V., Engineering Drawing and Graphics, New age Publications, First Edition, 2008, (ISBN: 978-81-224-2457-7)
4. N B Shaha and B C Rana, Engineering Drawing, Pearson Education, 2012, (ISBN: 9788131798058)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Computer Programming
	COURSE CODE	IT101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	4	40	50	10	25	NIL	125

PRE-REQUISITE : Knowledge of computer system.

COURSE OBJECTIVES :

IT101.CEO.1: To define and summarize the basic terminologies used in computer programming.
IT101.CEO.2: To develop and demonstrate logic for a given problem using algorithms and Flowcharts.
IT101.CEO.3: To evaluate solutions for the given problem using problem solving tools.
IT101.CEO.4: To identify and analyze different control structures.
IT101.CEO.5: To understand and use of simple data structures using Python.
IT101.CEO.6: To demonstrate and understand different computer applications in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT101.CO.1: Analyze a problem and identify and define the computing requirements appropriate to its solution[L3][L4].
IT101.CO.2: Apply the knowledge and strategies for structuring code, dividing problems up into pieces that can be solved independently, then integrating the pieces into a whole to solve a large problem [L3].
IT101.CO.3: Analyze when to select the different types of data structures such as arrays and lists as a framework for solving a problem [L4].
IT101.CO.4: Design, correctly implement and document solutions to problems using Python [L6].
IT101.CO.5: Analyze and compare alternative solutions to computing problems [L2][L4]
IT101.CO.6: Adapt to new developments in the field of computer science [L6].

THEORY		
UNIT 1	**Problem Solving Concepts**	**6 HOURS**
General Problem Solving Concepts-types of problems, problem solving with computers, difficulties with problem solving, Problem solving concepts for the computer: Constants, Variables, Data types, operators, Expressions, Equations, Problem solving tools.Programming structure-Modules and their functions, Cohesion and Coupling, Local and Global Variables, Parameters, return values		
UNIT 2	**Problem solving and Logic structure**	**8 HOURS**
Logic structures, Problem solving with sequential logic structure - The sequential logic structure, solution development. Problem Solving with Decisions decision logic structure, multiple Decision instructions, straight-through logic, positive logic, negative logic, logic conversion, Problem solving with loops and case logic structures.		
UNIT 3	**Arrays, Strings and File Processing**	**8 HOURS**
One dimensional, multidimensional array,finding maximum number in a set, Partitioning of array, finding smallest element, searching an array for a range. String Handling Operations: Concatenation, Copy, Substring, Compare, Length, Case Change, and Reverse. File handling and file handling operations, File Handling Modes.		
UNIT 4	**Programming Applications**	**6 HOURS**
Programming applications, Predictive analysis with examples, Graphics and animation, working with matrices, Graphics & Visualization, Differential Equation: Linear Differential Equations, Digital Signal Processing: Plotting different waveforms.		

PRACTICALS		
PRACTICAL NO.01		**6 HOURS**
1. Find the result of allthe arithmetic operations (Addition,Subtraction,Multiply, Division and modulo) in Python. 2. Show the distance in miles per gallon with respect user defined value in Python. 3. Find the kinetic energy of an object.		
PRACTICAL NO.02		**6 HOURS**
1. Write a Python program for printing result of five subjects for five students. 2. Choose any value and find whether the number is even or odd. 3. Identify whether the number entered by user is prime or not.		

PRACTICAL NO.03		6 HOURS
1. Solve the Fibonacci sequence using recursive function in Python. 2. Illustrate factorial of non-negative numbers in Python. 3. Build asterisk (*) graph in Python		
PRACTICAL NO.04		**6 HOURS**
Electric circuits, Chemical applications- Mixing problems.		
PRACTICAL NO.05		**6 HOURS**
1. Select the number from the entered list and find its position in Python (use Linear Search). 2. Select the number and find its position of in Python (use Binary search). 3. Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain)		
PRACTICAL NO.06		**6 HOURS**
1. Select a text file and count number of words, repeated words in a file. 2. Choose the words from the file, store in the list and sort the list is ascending order. 3. Create duplicate the file from an original file.		
PRACTICAL NO.07		**6 HOURS**
1. Predict whether the entered string is palindrome or not. 2. Compare two strings and convert in opposite case in Python. 3. Select any two words and perform concatenation operation		
PRACTICAL NO.08		**14 HOURS**
1. Create a simple picture in python using graphics package. 2. Construct 2D and 3D plotting the Objects. 3. Create Sine waveform, Cosine waveform, Square waveform, Saw-tooth waveform, using MATLAB and discrete the same. 4. Solve the matrix operations (Addition, Multiplication, and Transverse) in MATLAB. 5. Design an application to display student result using predictive analysis		

TEXT BOOK

1. 1. Problem Solving and Programming Concepts ,Maureen Sprankle , Pearson Publication, Seventh Edition, ISBN 81-317-0711-3.
2. How to think like a Computer Scientist, Learning with Python Allen Downey, Jeffrey Elkner, Chris Meyers, Green Tea Press ISBN: 0-9716775-0-6.

REFERENCE BOOK

1. 1. Learning Python Mark Lutz Oreilly Publication 5th Edition ISBN-13: 978-1449355739.
2. A MATLAB Exercise Book LudmilaKuncheva, Cameron Gray, Perfect-bound Paperback, ISBN 9781291784794.
3. How to solve it by Computer, R.G.Dromey, First Edition, Pearson Publication, ISBN 978-81-315-0562-9.
4. Introduction To Computation And Programming Using Python "Guttag John V, PHI(2014), ISBN-13 : 978-8120348660.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 1
	COURSE CODE	HP101
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level

COURSE OBJECTIVES :

HP101.CEO.1: To introduce a variety of English texts to the students.
HP101.CEO.2: To teach basic English grammar.
HP101.CEO.3: To guide the students to write in English coherently and formally.
HP101.CEO.4: To improve the students overall communicative competence in English through activities like group discussions and debates.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP101.CO.1: Interpret texts written in English. [L2, L5]
HP101.CO.2: Apply English grammar rules correctly. [L3]
HP101.CO.3: Develop sentences and texts in English coherently and formally. [L3, L6]
HP101.CO.4: Demonstrate overall improvement in communication skills. [L 2]

THEORY		
UNIT 1	**Functional Grammar**	**4 HOURS**
Use of tenses in day to day communication and academic writing, Direct and Indirect Speeches, Active and Passive voices, Degrees of comparison, Use of the parts of speech in sentence composition, Verb forms and Modal auxiliaries		
UNIT 2	**Communication**	**8 HOURS**
Concept of communication, Types-verbal and non-verbal, principles of effective communication, barriers to communication, cross-cultural communication		
UNIT 3	**Academic Writing**	**6 HOURS**
Essentials of good writing, Review writing, Letter writing, Report writing, Prcis writing, and Essay writing		

PRACTICALS		
PRACTICAL NO.01	**Common Errors in Communicative English**	**6 HOURS**
A task of identifying and correcting the common errors in general as well as academic English by using audios and relevant academic texts; tips on punctuation.		
PRACTICAL NO.02	**Debate**	**4 HOURS**
Concept, Dos & Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos & Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.04	**Role Play**	**4 HOURS**
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation		
PRACTICAL NO.05	**Review and Letter Writing**	**4 HOURS**
How to write a review, characteristics and essentials of a good review, writing a review on a book or short story, types of letters- formal, informal; layout of business letters		

PRACTICAL NO.06	Report Writing and Prcis Writing	4 HOURS
Types of reports, format and writing a report, What is prcis writing? Rules of prcis writing		
PRACTICAL NO.07	**Essay Writing**	**2 HOURS**
What is an essay? Tips to write a good essay, Types of essays		

REFERENCE BOOK

1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Raymund Murphy: Essential Grammar in Use, Cambridge, 3rd Edition, ISBN-13: 9780521133890
3. William Sanborn Pfeiffer: Technical Communication A Practical Approach, 6th Edition, Pearson Education, ISBN-13: 978-8131700884
4. Dutt et.al. : A Course in Communication Skills, Foundation, 1st Edition
5. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
6. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
7. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
8. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques- I
	COURSE CODE	ME102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	30	-	20	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME102.CEO.1: To introduce different tools and study the various measurement techniques.
ME102.CEO.2: To study different parts of the system along with its functions and applications.
ME102.CEO.3: To list various tools used for the said application.
ME102.CEO.4: To identify the function of various parts of system.
ME102.CEO.5: To impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME102.CEO.6: To apply the knowledge to find the solutions for basic engineering problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME102.CO.1: Recall the tools required for measurements. (L1)
ME102.CO.2: Summarize the applications of various engineering tools used. (L2)
ME102.CO.3: Identify the right tool for selected purpose. (L3)
ME102.CO.4: Inspect various parts of the system .(L4)
ME102.CO.5: Justify the most appropriate technique which can be compatible with the existing environment. (L5)
ME102.CO.6: Develop the system which will give appropriate solution to the identified problem. (L6)

PRACTICALS		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Study and analysis of various components on the motherboard of a standard desktop computer.
2. Installation of various components like hard disk drive on the motherboard and check the system setup for verification.
3. Formatting the hard disk drive and installation of Windows and Linux operating system making the system dual boot
4. Study of various network components like switch, Router and configure the devices.
5. Crimping of Unshielded Twisted Pair cable. (Cat-6) 6. Study of TCP/IP Stack, and configure as well as develop a Local Area Network.
7. Configuration of Network Monitoring tool and checking the results
8. Installation of DHCP server and checking the results.
9. Installation of web server and checking the results.
10. Configuration of MS Access and Deploying Access 2007 Runtime-Based Solutions
11. Study and usage of Google Tools (creating Forms, Blog).
12. Using the Google form with add on, create a PDF file of the form.
13. Designing a static HTML page
14. Uploading the pages using FTP server on a web site
15. Deploy a simple web site using LAMP server creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Basic electronics component and switches
2. PCB and Soldering Tools And Technique
3. Relay and application
4. Manufacturing of extension board/Spike Guard
5. Series and parallel connection of Electrical Load
6. Actuators and application (Electrical and Mechanical).
7. PCB Wizard
8. Proteus
9. Virtual Instrumentation.
10. Cathode Ray Oscilloscope
11. Power Supply

PRACTICAL NO.03	Mechanical Engineering Laboratories (Minimum 6practicals from the following	12 HOURS

1. Linear and angular measurements.
2. Types of mechanism and making any one mechanism containing four links using card board.
3. Open a household component and explain it with free hand sketches.
4. Draw the outline of the problem identified for project on software package.
5. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
6. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
7. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
8. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
9. Measurement of Relative humidity of air in the lab.
10. Measurement of hardness of Steel and Aluminum.
11. Measurement of stiffness of helical spring (compression or tension). Open IT
12. Mixer or kitchen machine/ Printer.
13. Refrigerator/ Window Air Conditioner.
14. Boiler and accessories / thermal power plant (Mini).
15. Two stroke or four stroke engine.
16. Assembly and Disassembly of parts in any software package.
17. Introduction to threaded fasteners and joints using threaded fasteners.

PRACTICAL NO.04	Chemical Engineering (Minimum 3 practicals from the following	06 HOURS

1. Determination of specific gravity of liquid
2. Study of molecular diffusion
3. Liquid liquid extraction: Separation of one liquid component from the solution.
4. Solid-liquid separation from filtration
5. Membrane Separation process
6. Fuel from Plastic
7. Demonstration of mechanical operation models.
8. Production of Biodiesel
9. Open and Study Heat Exchangers.
10. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Mimimum 3 Practicals from the following)	06 HOURS

1. To find the area and included angle of given plot and fix boundary from given plan.
2. To determine the level difference between 5 points with level tube and determine height of tower with trigonometry.
3. To draw the plan of given housing to a given scale.
4. To draw line diagram of household water supply line and sewage line with list of materials used.
5. To draw line diagram of rain water harvesting unit with all details and its importance.
6. To make report on daily water requirement in public building and its waste water disposal, and reuse.
7. To identify and make report on the earthquake resisting structural members of building and its role.
8. To demonstrate the lifesaving dos and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

TEXT BOOK

1. Bruce Hallberg, Networking A Beginners Guide , 4th edition, Tata McGraw-Hill,2005, ISBN 0-07-060791-5
2. R.S. Khandpur, Printed Circuit Boards Design, Fabrication, Assembly and Testing, Tata McGraw-Hill Education, 2005, ISBN 0070588147, 9780070588141.
3. S R Dara, Engineering Chemistry, 5th edition, S.Chand , ISBN 81-219-0359-9

REFERENCE BOOK

1. Mackenzie L. Davis, Water and Wastewater Engineering, 13th edition, Tata McGraw- Hill, ISBN 978-1-25-906483-8
2. R. S. Khurmi, J. K. Gupta, Theory of Machines, 14th edition, S. Chand, ISBN 81-219-2524-X
3. Philip Wankat, Seperation Process Engineering , 3rd edition, Pearson, ISBN 978-93-325-2484-2
4. N.V. Ragvendra, L. Krishnamurthy, Engineering Metrology and Measurements, Oxford University Press, ISBN 978-0-19-808549-2.
5. Dr. Vinod Hosur, Earthquake- Resistant Design of Building Structures, Wiley, ISBN 978-81265-3859-1
6. M. S. Shetty, Concrete Technology, S. Chand, 2008, ISBN 9788121900034.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME103
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	25	-	25	50

PRE-REQUISITE : -

COURSE OBJECTIVES :

ME103.CEO.1: Disseminate the philosophy of design thinking.
ME103.CEO.2: Impart the information regarding User centric approach.
ME103.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME103.CEO.4: Enhancethinking in order to inspect diverse solutions.
ME103.CEO.5: Sensitize about the feasibility, desirability and viability criterias for selection of appropriate solution.
ME103.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME103.CO.1: Recall fundamental principles of design thinking (L1)
ME103.CO.2: Explain all the dimensions of user and his needs using design thinking approach (L2)
ME103.CO.3: Identify user centric problem by using information gathering techniques (L3)
ME103.CO.4: Compare multiple solutions through ideation process (L4)
ME103.CO.5: Justify most appropriate solution for defined user centric problem (L5)
ME103.CO.6: Develop the most optimum solution (L6)

SESSION		
SESSION 1		**2 HOURS**
Design thinking Methodology General Problem Statement, Random check list, mind mapping, Categorization of random check list.		
SESSION 2		**2 HOURS**
Brainstorming of problem areas, Research Methodology Information gathering Primary, Secondary Sources, data presentation, Preparation of survey forms		
SESSION 3		**2 HOURS**
SWOT analysis, drawing inferences, translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of cuboids, cylinders, simple form products (Isometric views) Ideation sketches, Ergonomic and aesthetic consideration in design		
SESSION 4		**2 HOURS**
Concept validation, evaluation and detailing, prototyping		

PROJECT		
PHASE NO.01		**4 HOURS**
General Problem Statement and problem background		
PHASE NO.02		**4 HOURS**
Research methodology		
PHASE NO.03		**4 HOURS**
Design Brief		
PHASE NO.04		**8 HOURS**
Ideation		
PHASE NO.05		**4 HOURS**
Concept Evaluation, Validation and Concept detailing		
PHASE NO.06		**8 HOURS**
Prototyping		
PHASE NO.07		**8 HOURS**
Report Writing		

TEXT BOOK

1. Engineering Design Process, Second Edition Yousef Haik and Tamer ShahinPublisher, Global Engineering. Cengage Learning. ISBN-13: 978-0-495-66814-5.
2. Product Design and Development, Kevin Otto and Kristin Wood, Product Design: Techniques in Reverse Engineering and New Product Development, Pearson Education Inc. ISBN-10: 0130212717.
3. Product Lifecycle Management, Grieves, Michael, McGraw-Hill, 2006. ISBN 0071452303.
4. Lateral Thinking: Creativity Step by Step Harper Perennial; Reissue edition (24 February 2015) (Perennial Library) Six Thinking Hats by Edward de Bono Paperback ISBN-10: 0060903252.
5. Design Methods, John Chris Jones., John Wiley & Sons, David Fulton Publishers, London, ISBN 0-471-28496-3.

Web references

1. www.designcouncil.org.uk
2. www.surveymonkey.com
3. http://en.red-dot.org

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics II
	COURSE CODE	AS104
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII, Mathematics I

COURSE OBJECTIVES :

AS104.CEO.1: To identify different methods to evaluate integrals.
AS104.CEO.2: To classify and solve linear differential equations of higher order
AS104.CEO.3: To demonstrate an understanding towards evaluating multiple integrals.
AS104.CEO.4: To relate and examine the applications of multiple integrals.
AS104.CEO.5: Analyse different probability distribution functions.
AS104.CEO.6: To study different statistical methods for solving problems

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS104.CO.1: Distnguish different methods to evaluate integrals.(L4)
AS104.CO.2: Conclude solutions for higher order lineardifferential equations(L4)
AS104.CO.3: Evaluate the multiple integrals(L5)
AS104.CO.4: Apply the knowledge of multiple integrals wherever required(L3)
AS104.CO.5: Solve the probability distribution problems(L3)
AS104.CO.6: Assess statistical problems(L5)

THEORY COURSE CONTENT		
UNIT 1	**Integral Calculus**	**8 HOURS**
Reduction Formulae , Beta - Gamma functions and Differentiation under integral sign.		
UNIT 2	**Linear Differential Equations of higher order**	**8 HOURS**
General solution of Linear Differential equations with constant coefficients, Method of Variation of parameters, Equations reducible to Linear Differential equation with constant coefficients: Cauchy&Legendres linear differential equations		
UNIT 3	**Multiple Integrals**	**8 HOURS**
Tracing ofCurves: Cartesian curves, Polar curves, Parametric curves ,Double Integration, Evaluation of Double Integration, Change of order of integration, Integration by transforming Cartesian to Polar Coordinate system, Triple integration, Integration by transforming to spherical and cylindrical polar coordinates		
UNIT 4	**Applications of Multiple Integrals**	**8 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		
UNIT 5	**Probability**	**8 HOURS**
Probability, probability density function, probability distribution:Binomial, Poisson, Normal .		
UNIT 6	**Statistics**	**8 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Examples on Reduction Formulae, Beta and Gamma functions. Examples on Differentiation under integral sign		
TUTORIAL NO.02		**1 HOURS**
General solution of Linear Differential equations with constant coefficients , Method of Variation of parameters.		
TUTORIAL NO.03		**1 HOURS**
Equations reducible to Linear Differential equation with constant coefficients: Cauchy- Euler equations		

TUTORIAL NO.04		**1 HOURS**
Tracing of Cartesian curves .Tracing of Polar and Parametric curves .Double Integration, Evaluation of Double Integration, Change the order of integration.		
TUTORIAL NO.05		**1 HOURS**
Integration by transforming Cartesian to Polar Coordinate system, Triple integration,Integration by transforming to spherical and cylindrical polar coordinates.Applications of multiple integrals:To find Area, Volume		
TUTORIAL NO.06		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.07		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		
TUTORIAL NO.08		**1 HOURS**
Probability, probability density function, Probability distribution:Binomial		
TUTORIAL NO.09		**1 HOURS**
Probabilitydistribution :Poisson, Normal. Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.10		**1 HOURS**
Moments, skewness and kurtosis,correlation and regression.		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Calculus by G.B. Thomas &R.L.Finney (ISBN:81-7758-325-5, Pearson Education, 9th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig, Volume I & II (ISBN-10: 8126543132, ISBN-13: 978-8126543137, Wiley Eastern Ltd.)
3. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

5. Advanced Engineering Mathematics by Dennis G. Zill& Warren S. Wright; Jones and Bartlett Publishers, 4th edition, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.

6. Higher Engineering Mathematics by B.S. Grewal (ISBN:81-7409-195-5,Khanna Publications,39 th edition)

7. Applied statistics and probability for engineers fourth edition by Douglas C. montgomery , George C runger(ISBN No:978-81-265-2315-3 wiley)

8. Miller& Freunds Probability and statistics for engineers by richard A johnson, irwin-miller,johnfreund(ISBN no:978-93325-5041-4,Pearson)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 2
	COURSE CODE	HP102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level; Language and Communication- 1

COURSE OBJECTIVES :

HP102.CEO.1: To familarise the students with sounds in English and introduce phonemic transcription.

HP102.CEO.2: CEO.2: To enrich the vocabulary of the students with AWL and NAWL.

HP102.CEO.3: To acquaint the students with public speaking, presentation and interview skills in English.

HP102.CEO.4: To develop the students reading and listening skills with the use of written audio and video texts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP102.CO.1: Recognise and reproduce the sounds in English effectively. [L1]

HP102.CO.2: Choose and employ appropriate words from AWL and NAWL in communication. [L1, L3]

HP102.CO.3: Express their ideas effectively and demonstrate skills in interpersonal communication. [L2, L3]

HP102.CO.4: Analyse and infer from written, audio and video texts. [L 2, L4]

THEORY		
UNIT 1	**Phonetics and Vocabulary**	**3 HOURS**
Phonemes in English and phonemic transcription; Essential academic vocabulary (Academic Word List and New Academic Word List); Dictionary Skills; Phrasal verbs and collocations		
UNIT 2	**Oral Communication**	**4 HOURS**
Public Speaking; Presentation Skills; Interview Skills and telephonic communication; Meetings (types, agenda and minutes)		
UNIT 3	**Active Listening and Reading with Comprehension**	**5 HOURS**
Concept and types of listening; Steps in listening with comprehension; Essentials of good listening; Concept and types of reading; Guidelines for reading with comprehension; Analytical reading		

PRACTICALS		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**2 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Vocabulary Enrichment**	**2 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills		
PRACTICAL NO.03	**Phrasal Verbs and Collocations**	**2 HOURS**
Use of phrasal verbs and collocations; reading literary pieces, essays to identify phrasal verbs in context; story-telling		
PRACTICAL NO.04	**Public Speaking**	**2 HOURS**
Attributes of a good public speaker; prepared and extemporaneous speech; Listening to and Reading famous speeches		
PRACTICAL NO.05	**: Presentations**	**2 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.06	**Interview Skills and Telephonic Communication**	**2 HOURS**
Etiquettes of attending interviews; Preparation; Telephonic communication; Mock Interviews		

PRACTICAL NO.07	**Mock Meetings**	**2 HOURS**
Importance of effective interpersonal communication; working in teams; Mock Meetings		
PRACTICAL NO.08	**Active Listening**	**6 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		
PRACTICAL NO.09	**Reading with Comprehension**	**4 HOURS**
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
3. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
4. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
5. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
6. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
7. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Second Year

Bachelor of Technology in Civil Engineering

2016-2020

(With Effect from Academic Year: 2017-2018)

MIT | Academy of Engineering
(An Autonomous Institute)

CURRICULUM STRUCTURE (2016 - 2020)

SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2017-18**
SECOND YEAR BACHELOR OF TECHNOLOGY	**RELEASE DATE**	**:**	**01/06/2017**
DEPARTMENT OF CIVIL EGG	**REVISION NO.**	**:**	**0.0**

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS201	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	CV201	Continuum Mechanics of Solids	3	2	4
5.	DC2	CV202	Geospatial Engineering Technology	3	2	4
6.	SDP3	ET206	Prototyping	--	4	2
TOTAL				14	14	21

SEMESTER: IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC4	IT201	Engineering Informatics	3	2	4
2.	PC5	ME201	Materials Engineering	3	2	4
3.	DC3	CV211	Building Design & Construction	3	2	4
4.	DC4	CV212	Geotechnical Engineering	3	2	4
5.	HSS3	HP201	Psychology	3	--	3
6.	SDP4	CV213	Minor Project	--	4	2
TOTAL				15	12	21

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Environmental Science
	COURSE CODE	CH201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	15	NIL	50	125

PRE-REQUISITE : AS103: Chemistry

COURSE OBJECTIVES :

CH201.CEO.1: Give an overview of exploitation of various natural resources and its impact on the environment.
CH201.CEO.2: Understand the ecosystem and biodiversity.
CH201.CEO.3: Understand the importance of environment and its conservation.
CH201.CEO.4: Learn about the environmental pollution sources, effects and control measures.
CH201.CEO.5: Make aware of the national and international issue for the environment.
CH201.CEO.6: Make aware about the social and environmental responsibility.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH201.CO.1: Identify the various human activities adversely affecting the natural resources and the balance ecosystem.
CH201.CO.2: Observe the various aspects of ecosystems and suggest ways to protect them.
CH201.CO.3: Experiment the pollution of given locality and suggest steps to mitigate pollution.
CH201.CO.4: Record the sources of pollution and their controls.
CH201.CO.5: Compare laws and standards for pollution.
CH201.CO.6: Categorize the social and professional responsibility towards environment.

THEORY COURSE CONTENT		
UNIT 1	**Environment**	**5 HOURS**
Importance of environment, Biosphere, Structure and function of an ecosystem, ecological pyramids, effects of population growth on environment. Natural cycles: hydrologic, carbon, nitrogen, phosphorus and Sulphur cycle. Understanding carbon foot prints, Role of the environmental engineer. Need of environmental legislations and environmental Acts in India. Functions of central and state pollution control boards.		
UNIT 2	**Resources**	**4 HOURS**
Natural, conventional and non-conventional, Natural and manmade disasters on environment. Case studies on use and Impact of overutilization of natural resources: Food, forest, water, energy, land.		
UNIT 3	**Pollution**	**4 HOURS**
Structure and composition of atmosphere, Pollution, types of pollution, causes of pollution effects, control and prevention. Air, solid and water waste management Pollution prevention and control act.		
UNIT 4	**Pollution Impact**	**5 HOURS**
Case study on Nuclear Accidents; floods; land slid; climate change; air pollution in cities, water pollution; noise pollution. Case study on drought situation in Vidarbha-Marathwada.		
UNIT 5	**Social Issues**	**5 HOURS**
Case study on Plastic waste management, domestic waste issue, food problem in India & globally. Modernization of agriculture, traffic and pollution, e-waste disposal.		
UNIT 6	**Sustainable Development**	**5 HOURS**
Concept of sustainable development. Utilization and conservation of natural resources. Rainwater harvesting & Water management techniques. Role of an individual in environment protection. Energy audit, disaster management.		

PRACTICAL		
PRACTICAL NO.01	**Title: Fukushima Japan Nuclear Accident**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.02	**Title: Malin Land Slide**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.03	**Title: Drought Situation in Vidarbha & Marathwada**	**2 HOURS**
Details of the drought situation will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of situations.		
PRACTICAL NO.04	**Title: River water pollution case study**	**2 HOURS**
Details of the River pollution of Ganga, Indrayani etc. will be discussed with the students. Students are supposed to write a case study report on the various causes of river pollution, preventive measures to avoid this & water treatment methodologies forriver water treatment.		
PRACTICAL NO.05	**Title: Project**	**16 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		

TEXT BOOKS

1. Rao C.S. Environmental Pollution Control Engineering, Wiley Eastern Publications. ISBN: 9780470217634.
2. Kamaraj. P & Arthanareeswari .M, Environmental Science Challenges and Changes, 4th Edition, Sudhandhira Publications, 2010.
3. Sharma. B.K. and Kaur, Environmental Chemistry, Goel Publishing House, Meerut, 1994 ISBN:8182830125.
4. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. ISBN-10: 1111988935 ISBN: 9781111988937
5. Metcalf Eddy Wastewater engineering: Treatment and reuse, McGraw Hill, ISBN: 007041878.

REFERENCE BOOKS

1. Garg, S.K and Garg, R., Ecological and Environmental Studies, Khanna Publishers, Delhi, 2006.ISBN: 9788174092182.
2. H. S. Peavy, D. R. Rowe, G. Tchobanoglous, Environmental Engineering, McGraw Hill, ISBN: 8428204470.
3. Helen Kavitha. P Principles of Environmental Science, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
4. Henry J.G. and Heinke G.W., Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
5. Masters G.M., Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall of India, New Delhi, 2004. ISBN: 0131481932 ISBN: 9780131481930.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEM/CIVIL/MECH ENGG	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS201.CEO.1: To find the Laplace transform of continuous time signals (functions).
AS201.CEO.2: To determine the Fourier constants and construct the Fourier series.
AS201.CEO.3: To construct the integral representation of functions using Fourier transform.
AS201.CEO.4: To solve partial differential equations viz. heat and wave equations theoretically.
AS201.CEO.5: To apply numerical methods for constructing functions and solving Differential Equations.
AS201.CEO.6: To write and execute the program on problems of Laplace, Fourier and numerical methods using MATLAB.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS201.CO.1: Analyze the output response of given linear system using Laplace Transform.
AS201.CO.2: Analyze the frequency response of the system using appropriate Fourier transform.
AS201.CO.3: Justify the selection of appropriate transform for a given system.
AS201.CO.4: Solve and examine the solution of partial differential equations by theoretical methods.
AS201.CO.5: Determine the solution of ordinary differential equations using Eulers, Runge-Kutta 4th order and the interpolation using Newtons and Lagranges interpolating methods.
AS201.CO.6: Implement Laplace Transform, Fourier transform and Numerical methods to find the solution of given problem using MATLAB.

THEORY		
UNIT 1	**Laplace Transform I**	**6 HOURS**
Introduction of Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication by t, Division by t. Laplace Transform of derivatives, integration, Unit Step function, Impulse Function and Periodic Functions.		
UNIT 2	**Laplace Transform II**	**6 HOURS**
Introduction of Inverse Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication bys, Division bys. Inverse Laplace Transform of elementary functions, Derivatives, Integration. Use of partial fractions to find Inverse Laplace Transform. Solution and analysis of linear differential equation to linear system.		
UNIT 3	**Fourier Series**	**6 HOURS**
Periodic functions, Fourier series, Dirichlets conditions, determination of Fourier constants, Half ranges series, Even function series, odd function series, arbitrary period functions series.		
UNIT 4	**Fourier Transform**	**6 HOURS**
Introduction of Fourier Transform, Complex exponential form of Fourier series, Fourier Integral Theorem (without proof), Fourier transform and its properties, Fourier Sine Transform, Fourier Cosine Transform, and Inverse Fourier transforms, Fourier Transform of derivatives of a function, Analysis of frequency response.		
UNIT 5	**Applications of Partial differential Equations**	**6 HOURS**
One dimensional Heat flow and wave equations by method of separation of variables, Solution of Partial Differential equations by Numerical method: Crank Nicolson method.		
UNIT 6	**Numerical Methods**	**6 HOURS**
Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method and Ordinary differential equations by Eulers, Modified Eulers, Runge-Kutta 4th order methods.		

PRACTICAL: Any 10 practicals are performed as per the requirement of a branch.		
PRACTICAL NO.01		**2 HOURS**
Introduction to MATLAB: Syntax, keywords, matrices, polynomials, loops.		
PRACTICAL NO.02		**2 HOURS**
Introduction to MATLAB: In-built functions, 2D/3D plots, creating simple programs.		
PRACTICAL NO.03		**2 HOURS**
Finding Laplace transforms of functions, solution of differential equations using Laplace transforms.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms.		
PRACTICAL NO.05		**2 HOURS**
Numerical Integration: Trapezoidal, Simpsons 1/3rd and Simpsons 3/8th rule.		
PRACTICAL NO.06		**2 HOURS**
Interpolation techniques: Lagranges Interpolation.		
PRACTICAL NO.07		**2 HOURS**
Interpolation techniques: Newtons Interpolation.		
PRACTICAL NO.08		**2 HOURS**
Solution of differential equation by modified Eulers method.		
PRACTICAL NO.09		**2 HOURS**
Solution of differential equation by Runge-Kutta method.		
PRACTICAL NO.10		**2 HOURS**
Curve Fitting: Linear, Quadratic.		
PRACTICAL NO.11		**2 HOURS**
Solution of algebraic equations: Newton- Raphson method.		
PRACTICAL NO.12		**2 HOURS**
Solution of algebraic equations: Bisection method.		
PRACTICAL NO.13		**2 HOURS**
Curve Fitting: Cubic, Exponential.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2003, ISBN-13: 9788126537204, 8126537205.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	System Engineering
	COURSE CODE	ET201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	NIL	25	125

PRE-REQUISITE :

1: ME102 Engineering Tools and Techniques
2: ME103 Design Thinking

COURSE OBJECTIVES :

ET201.CEO.1: To describe the rationale for using systems thinking for complex adaptive systems
ET201.CEO.2: To prioritize with stakeholders in a participatory way for research study
ET201.CEO.3: To design system engineering frame work
ET201.CEO.4: To apply system engineering tools
ET201.CEO.5: To evaluate the system

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET201.CO.1: Explain the rationale for using systems thinking for complex adaptive systems.
ET201.CO.2: Analyze interaction with stakeholders in a participatory way for research study.
ET201.CO.3: Design System Engineering framework.
ET201.CO.4: Apply system engineering tools.
ET201.CO.5: Evaluate the system.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Systems Thinking**	**4 HOURS**
Introduction to Systems Thinking and Understanding simple systems, Complex and Complex Adaptive Systems, Stakeholders and their engagement. **Further Reading : Case studies - Public health system, transportation system, solid waste management system.**		
UNIT 2	**System Dynamics Simulation**	**6 HOURS**
Standard test system conceptualization and mapping: an introduction to causal loop diagrams (Systems Thinking Diagrams; Influence Diagrams), principles of stock-and-flow diagrams, Application of stock and flow diagrams to engineering problems, Analysis using agent-based models, Application of systems thinking to policy decision making. **Further Reading : Case studies - Understand how to use Vensim PLE / Netlogo (Free academic version) to develop causal loop diagrams. Application of Stock and Flow Diagrams to Public Health.**		
UNIT 3	**Introduction to Systems Engineering**	**8 HOURS**
History and definitions, mission of system, types of system, system and its environment, System as a product, Systems Engineering as a profession, System Engineering Process and Management, Life cycle Integration. **Further Reading: Case studies - London Walkie-Scorchie Skyscraper, BRT system, garbage collection, Unmanned aerial vehicle, Washing machine etc.**		
UNIT 4	**System Engineering Design**	**8 HOURS**
System development process - Systems engineering method, Systems testing through out development. Requirement Engineering - Inputs, requirement types, purpose, Requirement analysis, requirement outputs. Case studies – Unmanned Aerial System. Functional Analysis - Schematic, Functional block diagram. Design Synthesis - Process, Product realization, Product implementation, Product Integration, Product verification, product validation, product transition. **Further Reading: Development approaches – Waterfall, incremental spiral, evolutionary acquisition.**		
UNIT 5	**System Engineering Tools**	**8 HOURS**
Context diagrams, QFD (Quality function deployment), House of quality, Timeline analysis sheet and requirement allocation sheet, Functional flow diagrams, Design synthesis tools- Concept description sheet (CDS), Functional matrix diagram, Requirement break down structure, N2 diagrams, data flow diagrams, control flow diagrams, behavioral diagrams. **Further Reading: Popular System life cycle models (DoDMIL STD 499B, IEEE 1220 SEP, EIA 632 SEP, ISO/IEC15288, Professional Engineering model, NASA model, software life cycle models).**		
UNIT 6	**Partial Differential equations.**	**7 HOURS**
Verifying and validating the system, managing the configuration of the system, managing technical risk, project management, ILS (Integrated logistic support). **Further Reading: Case studies - Aircraft system.**		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Community based causal mapping – Developing causal loop diagrams for health care using Vensim.		
PRACTICAL NO.02		**2 HOURS**
Developing stock-and-flow diagrams for health care system using Vensim.		
PRACTICAL NO.03		**2 HOURS**
(Any 02) 1. Unmanned aerial vehicle 2. Conduct some research into the London building known as the Walkie Scorchie. Identify what circumstances led to the building earning that unfortunate name and suggest which aspects of the systems engineering process may not have been followed correctly (at least as the issues have been reported in the media).The following links may assist in your investigations. http://www.dezeen.com/2013/09/06/we-made-a-lot-of-mistakes-with-this-building-says-walkie-scorchie- architect-vinoly/ http://www.ibtimes.co.uk/walkie-scorchie-talkie-building-sunlight-london-reflects-504342. 3. Examine in detail the BRT of New Delhi,Identify what circumstances led to the failure of the system. 4. Garbage collection 5. Washing machine		
PRACTICAL NO.04		**2 HOURS**
Determine the typical structure and contents of the system requirements specification (SyRS) for any one of the case study.		
PRACTICAL NO.05		**2 HOURS**
Choose an example related to your own discipline and then list and describe three detailed design tools to come up with a satisfactory design for anyone of the case study.		
PRACTICAL NO.06		**2 HOURS**
We want to modify our house (or from any one of the case studies) by for futuristic requirement to accommodate your children after marriage.Explain how accurate technical data on the house (as confirmed by PCA and FCA) supports this modification. Explain how the early design stages could have assisted with this modification if expandability/ future growth had been accounted for.		
PRACTICAL NO.07		**2 HOURS**
Mini project based on society, science and technology problem clubbed with Field visit and presentation (Define problem, data collection, requirement analysis,functional analysis.Design solution, progressive presentation of solution and final presentation). Note: The group of students should be from different program (Multidisciplinary group).		

PRACTICAL NO.08		2 HOURS
Watch the movie The Pentagon wars and write a two page report to assess what aspects System Engineering went wrong. (https://www.youtube.com/watch?v=iDYpRhoZqBY) .		
PRACTICAL NO.09		**2 HOURS**
Field visit / Industrial visit from system engineering point of view.		
PRACTICAL NO.10		**2 HOURS**
Working model case study of Quad copter/ aero modeling from system engineering point of view.		

TEXT BOOK

1. John D Sterman, "Business dynamics- Systems Thinking and modelling for a complex world", McGrawHill, ISBN: 007238915X.
2. Weinberg, G.M., An Introduction to General Systems Thinking, New York, NY: Dorset House Publishing, 2001, ISBN-13: 978-0932633491.
3. Alexander Kossiakoff, William N.Sweet, Systems Engineering: Principles and Practice, Wiley, 2009, ISBN-13: 978-8126524532.

TEXT BOOK

1. R. C. Dorf Dennis M Buede,The Engineering Design of systems, Wiley; 2nd edition, 2002, ISBN-13: 978-0070530393.
2. International Council of Systems Engineering, Systems Engineering Handbook, A guide for System Life Cycle Processes and Activities, version 3.2.1, January 2011.
3. Department of defense, systems engineering fundamentals, defense acquisition university press (Free e-book), https://www.scribd.com/document/321957824/SEFGuide-01-01.
4. Michael Ryschkewitsch, The Art and Science of Systems Engineering, (free e-book), https://www.nasa.gov/pdf/311198main-Art-and-Sci-of-SE-LONG-1-20-09.pdf
5. EIA 632 standard - www.psconsultech.com/yahoo-site-admin/assets/docs/EIA632.9212432.pdf
6. MIL standard - www.product-lifecycle-management.com/download/mil-std-499b-draft1993.pdf.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Continuum Mechanics of Solids
	COURSE CODE	CV201
	COURSE CREDITS	4
RELEASED DATE : 1/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	50	20	50	-	150

PRE-REQUISITE : CV 101 Applied Mechanics

COURSE OBJECTIVES :

CV201.CEO.1: To analyze axially loaded bars, beams, columns and shafts subjected to torsion.

CV201.CEO.2: Learner should be able to identify most critical locations, planes and critical direct and shear stresses for various loading scenarios on different types of structures.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV201.CO.1: Enlist and explain different types of actions on a structural component. [Understand].

CV201.CO.2: Draw axial force diagrams for axially loaded members, shear force diagrams and bending moment diagrams for statically determinate beams and twisting moment diagram for statically determinate shafts. [Apply]

CV201.CO.3: Draw bending stress distribution diagram for beams and shear stress distribution diagrams for beams and shafts. [Apply].

CV201.CO.4: Calculate load corresponding to elastic instability for columns with various end conditions. [Apply]

CV201.CO.5: Calculate principal stresses and absolute maximum shear stresses at various locations of a structural component using analytical method and Mohrs circle whichever is suitable. [Analyse]

CV201.CO.6: Select particular shape of cross section to economically carry calculated bending/shear stresses under flexure/shear. [Evaluate]

THEORY COURSE CONTENT		
UNIT 1	**Linear elasticity**	**6 HOURS**
Deformation and strain, concept of the stress, constitutive matrix for isotropic matrix, strain energy, composite sections subjected to axial/flexure/temperature loading Programming: compute change in volume of a metal cube subjected to tri-axial loading		
UNIT 2	**Axially loaded bars and torsion of shafts**	**6 HOURS**
Axial force diagram, deformation of axially loaded bars, axially composite bars, composite bars subjected to temperature change, twisting moment diagram, torsion formula, angle of twist, torsion of prismatic shafts, shear stress distribution.		
UNIT 3	**Shear force diagram and bending moment diagram**	**8 HOURS**
Introduction, relations between shear force diagram and bending moment at a section, forward and reverse problems. Case studies: Observe locations of flexure and flexure-shear failures in the beams and correlate them with shear force diagram and bending moment diagram. Field studies: Shapes of beams in steel structures/ RCC structures, amount of steel and its correlation with variation of bending moment.		
UNIT 4	**Stresses in beams**	**8 HOURS**
Bending formula, bending stress distribution and shear stress distribution in a beam, economic shape of cross section of beam to maximize moment of inertia. Programming: compute bending and shear stresses at all locations in the prismatic or non-prismatic beams with various support conditions and for complex loading pattern. Reading: Reflections on following research paper, Minamino R and Tateno M, 2014, Tree Branching: Leonardo da Vincis Rule versus Biomechanical Models. PLoS ONE Volume 9, issue 4		
UNIT 5	**Columns**	**8 HOURS**
Stability of columns, Euler buckling of columns, Rankine's and Jhonson's interpretations of critical load on column, eccentric load, initially imperfect columns. Reading: Reflections on how high the trees can grow? Karl J N, 2006, Maximum plant height and the biophysical factors that limit it, Tree Physiology, Vol. 27, pp 433-440		
UNIT 6	**Principal planes and principal stresses**	**6 HOURS**
State of stress, state of pure shear, direct state of stress, analytical and graphical method of finding principal planes and principal stresses, maximum in-plane shear stress, absolute maximum shear stress. Programming: finding out critical planes and maximum shear and normal stresses in beams and shaft (under twisting) problems..		

PRACTICAL		
PRACTICAL NO.01	**Tension test on metals.**	**4 HOURS**
Tensile strength of steel (M.S And TOR Steel)		
PRACTICAL NO.02	**Bending test**	**4 HOURS**
Four point monotonic and half cyclic bending test on timber/concrete beam/steel beam Finding Laplace transforms of functions, solution of differential equations using Laplace transforms.		
PRACTICAL NO.03	**Buckling test of column.**	**4 HOURS**
Buckling tests on columns with different end conditions		
PRACTICAL NO.04	**Desk experiments**	**6 HOURS**
Stiffness of spring, and effect of various combination of springs.		
PRACTICAL NO.05	**Design Experiments**	**6 HOURS**
Design of experiment: Learners are expected to design the experiment that either demonstrates the principles studied in the course or extracts meaningful information for designing the real life structures.		

TEXT BOOK

1. Beer F P, J. E. Russell Johnston, John T. DeWolf, and David F. Mazurek, Mechanics of Materials, McGraw-Hill, 7th edition, 2014, ISBN : 9780073398235
2. Gere J. M. and Timoshenko S. P., Mechanics of Materials, Boston: PWS Kent Publishing, 5th edition, 1970, ISBN: 9788123908946

REFERENCE BOOK

1. Nash W. A., Strength of Materials, Schaum's Outline Series, McGraw-Hill, 1994, 3rd edition, ISBN: 9780070843660
2. R.C.Hibbeler, Mechanics of materials, Prentice Hall, 2011, 8th edition, ISBN: 9780134321233
3. Egor P. Popov, Engineering Mechanics Of Solids, Pearson , 2nd Edition, 2010, ISBN: 9788178085357

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Geospatial Engineering
	COURSE CODE	CV202
	COURSE CREDITS	4
RELEASED DATE : 1/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	-	50	150

PRE-REQUISITE :

COURSE OBJECTIVES :

CV202.CEO.1: To introduce the students, to the theory and application of Surveying in Civil Engineering projects.

CV202.CEO.2: To facilitate understanding of the fundamentals of surveying knowledge and familiarizing them with latest surveying practices.

CV202.CEO.3: To train the students to work in the field with the knowledge acquired in the classroom through mini field projects

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV202.CO.1: Apply the techniques of levelling to solve engineering problems.

CV202.CO.2: Interpret and implement the principles of trigonometry for surveying using standardized methods.

CV202.CO.3: Perform traversing and triangulation by implementing the basic principles of surveying.

CV202.CO.4: Construct different types of curves for alignment of roads and railways and lay out civil engineering structure on field.

CV202.CO.5: Record data and perform analysis by using modern surveying tools

CV202.CO.6: Analyze field data to minimize errors using mathematical models

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Surveying and measurement of elevations**	**8 HOURS**
Introduction: Principle of surveying, classification of surveys. Introduction to coordinate systems. Applications of surveying. Equipment used in surveying. Concept of temporary and permanent adjustments. Errors in measurements- sources and types. Spirit levelling- different types of levels and staffs; booking and reduction of data, methods of levelling, errors in levelling. Introduction to EDM: Study of Total Station. Distance and Coordinate Measurement, Remote Elevation Measurement. Contours- characteristics, uses, and methods of contouring, contour maps, drawing sections, contouring using software. Calculations: Computation of areas from plans, calculation of areas of a closed traverse, measurements from cross section, earth work calculations, practical problems		
UNIT 2	**Measurement of Linear Distances and Directions**	**8 HOURS**
Theodolites- different types, methods of observation and booking of data, Optical methods for linear measurement- Theodolite and Total station. Concept of bearings and angles; magnetic bearings, declination, local attraction errors and adjustments; direction measurement with theodolite, horizontal angles by repetition and reiteration, vertical angles, measurement of reduced levels of inaccessible locations. Self-Study: Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite (assisted with demonstration and practical)		
UNIT 3	**Traversing and Triangulation**	**8 HOURS**
Purpose and classification of traversing, traversing with a theodolite and EDM- balancing of traverses, Computation of coordinates, omitted measurements, measurement of deflection angles using transit theodolite and magnetic bearing. Triangulation- network, strength of figures, selection of stations, intervisibility, satellite stations, measurements and computations. Self-Study: Principle of plane table surveying, advantages and disadvantages		
UNIT 4	**Curves and Survey Projects**	**8 HOURS**
Curve setting: Types of curves, elements of a curve, setting out a simple curve, types of vertical curves, setting out vertical curves. Engineering project surveys- requirements and specifications, various stages of survey work. Setting out of works- buildings Self-Study: Setting out of culverts		
UNIT 5	**Introduction to Geographic Information System**	**8 HOURS**
Introduction to GIS Definition of GIS Evolution GIS Components of GIS, Input data, GIS data models, Creating Network Data - Origin, Destination, Stops, Barriers Closest Facility Analysis, Service Area Analysis, OD Cost matrix analysis, Shortest Path Analysis Address Geocoding Surface Analysis. Application of network data in civil engineering		

UNIT 6	Adjustment computation	4 HOURS
Types of errors, propagation of errors, variance and covariance; Least squares principle and adjustment of field survey data by parametric and condition equation methods		

PRACTICAL: The following practical are to be performed		
PRACTICAL NO.01	**Mini Road Project**	**4 HOURS**
Introduction to simple and differential levelling with AutoLevel. To find the volume of excavation required for laying out a small road with at least one change in direction (differential levelling)		
PRACTICAL NO.02	**Contouring Project with Total Station/Auto level**	**2 HOURS**
To design and perform a contouring project for an area more than 1000 sq m and to draw the contour map of the region either manually or using standard software such as QGIS or ArcGIS.		
PRACTICAL NO.03	**Closed traversing**	**2 HOURS**
Comparison between the angular and linear adjustment necessary for a closed traverse performed with prismatic compass and a total station or 1 micro-optic theodolite.		
PRACTICAL NO.04	**Closed traversing with total station**	**2 HOURS**
Preparation of the plan of a populated area (such as the campus of a college) using total station		
PRACTICAL NO.05	**Reduced level**	**4 HOURS**
To determine the reduced level of inaccessible point using a 1 micro-optic theodolite (at least two cases		
PRACTICAL NO.06	**Setting out of foundation plan with total station**	**4 HOURS**
To perform preliminary survey of an area with a total station and draw a foundation plan on the same area using AutoCAD. To set out to designed foundation plan on the ground		
PRACTICAL NO.07	**Setting out of curves**	**4 HOURS**
Comparison between setting out of simple circular curves using two or more linear methods. Comparison between setting out of simple circular curves using Rankines method and two theodolite methods.		

TEXT BOOK

1. Dr. B. C. Punmia, Ashok K. Jain, ArunK.Jain, Surveying Vol. I and II, Laxmi Publication, ISBN: 81- 7008-054-1.
2. T.P.Kanetkar and S.V.Kulkarni , Surveying and Levelling Vol. I and Vol. II, PVG Publication

REFERENCE BOOK

1. Charles D Ghilani, Paul R Wolf., Elementary Surveying: An introduction to Geomatics, Prentice Hall, 14th Edition, ISBN-13: 978-0132554343/ ISBN-10: 0132554348.
2. A.M.Chandra, Plane Surveying, New Age International Publishers, ISBN 13 : 9788122419023.
3. N. N. Basak, Surveying and Levelling, Tata Mc-Graw Hill, ISBN 10: 007460399X / ISBN 13: 9780074603994.
4. Dr. K. R. Arora, Surveying Vol. I and II, Standard Book House. ISBM-13: 9788189401238
5. Subramanian,Surveying and Levelling, Oxford University Press, ISBN: 0195684249, 9780195684247.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Prototyping
	COURSE CODE	ET206
	COURSE CREDITS	02
RELEASED DATE : 01/06/2018	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	75	75

PRE-REQUISITE:

1. ME101 - Engineering Graphics
2. ME102 - Engineering Tools and Techniques
3. ME103 - Design Thinking
4. EX101 - Electrical and Electronics Engineering
5. CV101 - Applied Mechanics
6. IT101 - Computer Programming

COURSE OBJECTIVES:

ET206.CEO.1: Learn about materiality and techniques.
ET206.CEO.2: Justify the product development cycle through prototype project.
ET206.CEO.3: Inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET206.CEO.4: Develop abilities to transmit technical information clearly and test the same by delivery of presentation based on the prototype Project.

COURSE OUTCOMES:

The students after completion of the course will be able to,

ET206.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET206.CO.2: Apply acquired skills to the construction of a prototype project.
ET206.CO.3: Develop a prototype project by performing tasks in team.
ET206.CO.4: Demonstrate the work carried out in a team.

PRACTICAL:

Course Introduction:

This course is aiming at a Project Based Learning methodology. Through a series of projects, students will learn to design, build, and debug engineering prototype systems. They will cover multiple aspects of the prototyping process.

Students will complete four modules in rotational manner,

1. Mechanical Prototyping (MP)
2. Electronic Prototyping (EP)
3. Software Prototyping(SP)
4. Civil Prototyping(CP)

Each module will have on an average six laboratory sessions. The students will complete them in rotational manner. Every module will award for 75 marks.

Marks of all four course modules will be averaged and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

MODULE: 1/4	**Mechanical Prototyping (MP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to prototyping**	**02 HOURS**

1. Introduction to Prototyping, traditional prototyping vs. advance rapid Prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Suitable materials and their properties.
3. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.
4. Formation of a group of 5 students per project team.

PRACTICAL NO. 02	**Design of models**	**04 HOURS**

1. Introduction of CAD software and its interaction with prototype machine.
2. 3D Modeling using CAD software package.
3. Identify physical constraints of prototyping

PRACTICAL NO. 03	Preprocessing of prototype	06 HOURS

1. Generating STL files from the 3D models & working on STL files.
2. Pre-Processing the 3D Model in KISslicer / Cuba software.
3. Suitable filament selection and its properties.

PRACTICAL NO. 04	Orientation and support generation	04 HOURS

1. Operate Repeater / Cuba software, Selection of Orientation, Supports generation.
2. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Assembly of model	08 HOURS

1. Complete machine setup.
2. Hands on experience of rapid prototype machine for part/object, assembly manufacturing.
3. Material selection, cost benefit analysis for prototyping, financial aspect.

PRACTICAL NO. 06	Project presentation	04 HOURS

1. Final Presentation and report submission (assessment).

REFERENCE BOOK

1. Rapid Prototyping: Principles and Applications in Manufacturing, Chua C K, Leong K F, Chu S L, World Scientific, ISBN-13: 978-9812778987.
2. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Gibson D W Rosen, Brent Stucker, Springer, ISBN: 978-1-4419-1119-3.
3. Rapid Prototyping: Principles and Applications in Manufacturing,Noorani R, John Wiley & Sons, ISBN: 978-0-471-73001-9.
4. Rapid Tooling: Technologies and Industrial Applications, Hilton P, Jacobs P F, CRC press. ISBN:978-0824787882
5. Rapid Prototyping and Engineering applications: A tool box for prototype development, Liou W L, Liou F W, CRC Press, ISBN: 978-0849334092.
6. Rapid Prototyping: Theory & practice, Kamrani A K, Nasr E A, Springer, ISBN: 978-0-387-23291-1.
7. Kenneth Cooper, Rapid Prototyping Technology: Selection and Application, Marcel Dekker, Inc. New York, ISBN: 082470261.

MODULE: 2/4	Electronic Prototyping (EP)	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to design and construction of electronic prototyping**	**02 HOURS**

1. Gain familiarity with basic stages; Conceptualization, Detailed Design and Implementation.
2. Acquire concepts of basic processes in electronic prototyping.
3. Form a group of students. (03 max)
4. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span.
5. Develop a plan for construction of electronic proto from a concept.

PRACTICAL NO. 02	Basic electronic prototyping skills	02 HOURS

1. Soldering
   - Demonstrate structure of solder wire, soldering temperature, soldering station and gun.
   - Highlight Industrial safety norms, use of lead free solder, extractor fan etc.
   - Use of flux, desoldering gun, desoldering techniques, removing components/wires.
   - Fix Solder defects and inspect quality of solder joints.
2. Wiring
   - Cleaning, stripping and tinning the wires.
   - Connections and protections for wires.
   - Using cable ties , heat shrink tubes, sleeves and other wire dressing techniques.
3. Breadboard
   - Bending wires and making connections on breadboards.
   - Placing components on breadboards.
   - Testing circuits using breadboards.
4. Perfboards
   - Wire connections and component assembly on perfborads.
   - Debugging assembled circuit and increasing stability.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	04 HOURS

1. Gain familiarity with PCB Design software.
2. Draw schematics for PCB design.
3. Make PCB layout as per circuit diagram.
4. Learn PCB design standards.
5. Export PCB files like gerber (.gbr), .pdf etc.

PRACTICAL NO. 04	PCB fabrication	08 HOURS

1. Develop negative imprints of top and bottom sides and expose to PCB.
2. Perform etching process for PCB.
3. Perform cleaning and shearing for required size.
4. Check continuity of tracks.
5. Use drilling machine to make drills.

PRACTICAL NO. 05	Assembly and testing of electronic proto	08 HOURS

1. Make assembly of electronic prototype as per IPC 610 D.
2. Insert components, perform lead cutting with standard clearance.
3. Review mechanical fitment of PCB with component insertion.
4. Solder components and make wiring.
5. Test prototype for electrical functionality, to perform rework if required.
6. Assemble PCB with mechanical fitments and assemblies.
7. Analyze performance and compare with specifications.

PRACTICAL NO. 06	Final project presentation	04 HOURS

1. Demonstrate an electronic prototype in a team.
2. Write a report on implementation of prototype. (10-15 pages max)
3. Present prototype implementation in a team by Power Point presentation.
4. Enumerate proposed specifications of electronic prototype.
5. Highlight financial aspects including proposed cost and bill of material.

REFERENCE BOOK

1. Printed Circuit Boards: Design and Technology, Walter C. Bosshart, Tata McGraw-Hill Education, 1983, ISBN: 978-0074515495.
2. Electronic Assembly Fabrication, Charles A. Harper, 1st ed.,McGraw-Hill Education, 2002 ISBN: 978-0071378826.
3. Soldering in Electronics Assembly, Frank Riley, 1st ed., Springer, 2013, ISBN: 978-3-662-13163-3.
4. Electronic Techniques: Shop Practices and Construction, R. S. Villanucci, A. W. Avtgis, W.F. Megow, 6th ed., Practice-Hall, 1999. ISBN: 978-0130195661.
5. Printed Circuit Boards: Design, Fabrication, and Assembly, R. S. Khandpur, 1st ed. McGraw-Hill Education, 2005, ISBN: 978-0071464208.
6. Practical Electronics for Inventors, Paul Scherz , Simon Monk ,3rd Edition, McGraw-Hill Education, 2013, ISBN 978-0071771337 (Available on TAB edition, Kindle)
7. IPC-J-STD-001E-2010, Requirements for Soldered Electrical and Electronic Assemblies, IPC. , ISBN: 9781580986922.
8. IPC-A-610 D-2014, Acceptability of Electronic Assemblies, IPC. ISBN: 9781611931549.

MODULE: 3/4	**Software Prototyping (SP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to software engineering**	**04 HOURS**

Concepts, Software development life cycle (SDLC). Student need to use AEIOU Framework (Design Thinking) to decide the problem statement. Students will work in group of three on AEIOU framework

PRACTICAL NO. 02	**Design UML Diagrams for given problem statement**	**04 HOURS**

Students have to work in group on Project Development canvas and then design following,

1. Creation of data Flow diagram
2. Creation of block diagram
3. Design a Activity Diagram

PRACTICAL NO. 03	**Requirement analysis**	**04 HOURS**

1. Find the requirement specification of given problem statement and formulate the feasible solution.
2. Paper (low-fidelity) prototype: choose the interface intend to develop, giving the reasons (pros and cons) and describing it summarily - choose the similar interface, indicating its key characteristics.

PRACTICAL NO. 04	Design analysis	06 HOURS

1. Make an Inspiration board.
2. Start an inspiration board by listing 5-10 words that relate to your design idea or point of view. These words can be anything – from similar designs to feelings that the idea evokes.
3. Once youve listed your words, come up with at least five inspirations, and share them by providing links or images within your assignment submission. For each inspiration, give a brief (1-2 sentences) and insightful explanation of why you chose it (What did you take away from it? What did you learn from it. In other words, why did it inspire you?). Each of these inspirations should offer a different perspective to the design you are working on.

PRACTICAL NO. 05	Design analysis	06 HOURS

1. Create Storyboards
2. A storyboard is a comic-strip-like set of drawings about what interface does and how it is used to accomplish tasks in a real usage scenario. A good storyboard should clearly demonstrate who the user is, the usage situation, and the user's motivations for using the interface. It should show what the user can accomplish with interface, but it needn't (and often shouldn't) show a specific user interface design. For a storyboard including an app screen, the details of the screen are not relevant, but what those screens enable you to accomplish is. Each storyboard should comprise 5-8 panels and will provide all details of end product.

PRACTICAL NO. 06	Presentation	04 HOURS

1. Each group will be given 10 min to present their work.

REFERENCE BOOK

1. Software Engineering A practitioners Approach, Roger S, Pressman, 7th Edition, ISBN: 9780073375977
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MODULE: 4/4	**Civil Prototyping (CP))**	**28 HOURS**
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**04 HOURS**
Introduction of bamboo as a construction material, its physical, mechanical properties, selection, seasoning and treatment, testing, joinery, case studies of bamboo buildings.		
PRACTICAL NO. 02	**Analysis of determinant trusses.**	**04 HOURS**
Study of different types of trusses, analysis of determinant trusses by method of joint and method of section		
PRACTICAL NO. 03	**Design bamboo trusses**	**04 HOURS**
Design of different bamboo trusses (span more than 3m), Hands on for different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo truss**	**08 HOURS**
Making of bamboo truss		
PRACTICAL NO. 05	**Testing bamboo truss**	**04 HOURS**
Testing of different bamboo truss		

PRACTICAL NO. 06	Final project presentation	04 HOURS
Comparative study of analytical and test results of forces in truss members, final project presentation.		

REFERENCE BOOK

1. Vector mechanics for Engineers: statics and dynamics by Beer & Johnston 10th edition, McGraw Hill Education , ISBN: 978-0073398242
2. Bamboo Architecture & Design (Architecture & Materials), by Chris van Uffelen, , ISBN: 978-3037681824
3. Designing and Building with Bamboo ,Jules J.A. Janssen Technical University of Eindhoven Eindhoven, The Netherlands, ISBN 978-8186247464
4. Codes and standards
5. IS 1902:1993.Code of Practice for preservation of bamboo and cane for non-structural purposes.
6. IS 6874:1973 Methods of test for round bamboos
7. IS 7344:1974 Specification for bamboo tent bamboos.
8. IS 8242:1976 Methods of tests for split bamboos
9. IS 8295 (Part 1): 1976 Specification for bamboo chicks
10. ISO 22157 Standard guidelines for tensile, compressive, shear and bending Strength Parallel to grain and Perpendicular to grain.

REFERENCE

1. Paris Agreement (http://unfccc.int/paris agreement/items/9485.php)
2. Kyoto Protocol(http://unfccc.int/kyoto protocol/items/2830.php)
3. Green Building Objectives & Checklist, Auroville Bamboo Centre, Pudducherry, Tamilnadu.(http://aurovillebamboocentre.org/)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER AND ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	Nil	25	125

PRE-REQUISITE :

IT101 Computer Programming, ME102 Engineering Tools and Techniques

COURSE OBJECTIVES :

IT201.CEO.1: To introduce facts, concept and theory of an information system.
IT201.CEO.2: To understand evolution of an information system.
IT201.CEO.3: To explain an information life cycle.
IT201.CEO.4: To develop IoT based information system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT201.CO.1: Interpretation of Data, Information and Knowledge. [Apply]
IT201.CO.2: Make use of data acquisition techniques for an information system. [Apply]
IT201.CO.3: Categories different storage techniques. [Analyze]
IT201.CO.4: Develop dashboard for effective communication of information. [Apply]
IT201.CO.5: Determine components of Human computer interaction. [Evaluate]
IT201.CO.6: Design IoT based information system. [Analyze].

THEORY COURSE CONTENT		
UNIT 1	**Evolution Of Information**	**6 HOURS**
Data, Types of Data: Primary data, Secondary data, Meta data, Operational data and Derived data Information: Life Cycle, Semantics of information, Knowledge Data forms: Analog and Digital (Telephone and Stenography) ADC, DAC Evolution of Information- Man Machine Interaction Self-Study: Grade Sheet Generation system **Further Reading:Railway reservation, Inventory machine**		
UNIT 2	**Information Generation**	**6 HOURS**
Data Acquisition, Human interface, Hardware Interface: Input / Output devices Data Transformation: Rearranging, Classifying, Calculating, Summarizing; Self-Study: Weather forecasting System **Further Reading:Data Acquisition Applications**		
UNIT 3	**Information Storage And Transmission**	**4 HOURS**
Need of data storage, Types of storage: stand alone, centralized, distributed, and cloud. Encryption and decryption (define and need) Transmission Type, Synchronous, Asynchronous, Serial, Parallel, Satellite, radio **Case Study:**Dial up, Broadband **Self-Study:**Stand Alone and Disk storage **Further Reading:**Wireless(Bluetooth, XBEE)		
UNIT 4	**Information Visualization**	**4 HOURS**
Representations: Graphs and Charts: Pi Chart, Scatter plot, Histogram, Heat map, Maps, Geo maps Case Study: Dynamic dashboard **Further Reading:**		
UNIT 5	**Human Computer Interface**	**4 HOURS**
Introduction of HCI, Types mobile, stand-alone, computer etc, Interactive devices touch screen, mic, keys, keyboard, scanner, camera etc., HCI design principles- standards, Usability principles portability, scalability, GUI design and evaluation, Interactive Multimedia document search- image, audio, video, animation Case study: Ticket Generation Kiosk Self-Study: Web based systems interactivity **Further Reading:** Usable GUI Design		
UNIT 6	**Internet Of Things**	**4 HOURS**
IoT: Overview, Characteristics and Architecture Embedded Devices: Sensors, Actuators, Arduino and RaspberryPI IOT Ecosystem: Basic elements / building blocks of IOT application, Systematic method to design IOT application Applications: Asset management, Industrial automation, Smart cities Self-Study:IoT Essentials. **Further Reading:IOT and big Data**		

PRACTICAL		
PRACTICAL NO.01	**Data Acquisition , Storage and Retrieval Systems**	**8 HOURS**

In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow:
Identification of an interdependent elementary data items which have facts and figure
Data collection through sensors
Processing using Arduino
Data Storage using MySQL in an accessible form
Data visualization using graphs

PRACTICAL NO.02	**Dashboard Design**	**8 HOURS**

Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system.

PRACTICAL NO.03	**IoT Application**	**8 HOURS**

Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi.
Identify the home appliances that require human interaction for its operations and state the need of automation.
Identify system component
Design circuit diagram
Assemble system components
Program the interface
System Testing
System Deployment

TEXT BOOK

1. Ralph M Stair, George W Reynolds, "Fundamentals of Information Systems", Course Technology Inc; 5th edition, 2008, ISBN 978-1423925811.
2. Benny Raphael, Ian F. C. Smith, "Engineering Informatics: Fundamentals of Computer-Aided Engineering", Wiley-Blackwell; 2nd Revised edition, 2013, ISBN-13: 978-1119953418.
3. Paul Mcfedries, Excel Data Analysis: Your Visual Blueprint for Analyzing Data, Charts and Pivot Tables, Wiley; Fourth edition 2013, ISBN-13 978-8126544004

REFERENCE BOOK

1. Gerard Jounghyun Kim, HumanComputer Interaction: Fundamentals and Practice, CRC Press, Auerbach Publications, 1 edition, 2015 ISBN 9781482233896
2. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, 2013 ISBN-13: 978-1118430620
   978-8126544004

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	Nil	25	125

PRE-REQUISITE : Physics, Chemistry

COURSE OBJECTIVES :

ME201.CEO.1: To select material for engineering application.
ME201.CEO.2: To classify the available materials.
ME201.CEO.3: To utilize available material for specified purpose.
ME201.CEO.4: To compare desired quality of materials from standard data.
ME201.CEO.5: To measure useful properties of materials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME201.CO.1: Select material for engineering application.
ME201.CO.2: Classify the available materials.
ME201.CO.3: Utilize available material for specified purpose.
ME201.CO.4: Compare desired quality of materials from standard data.
ME201.CO.5: Measure useful properties of materials.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**8 HOURS**
Classifications and specifications of steels and cast iron. Heat treatment of steels, Defects due to heat treatment and remedial measures. Classification of surface hardening treatments. Classification, Composition, Properties & applications of: Copper and Its alloys, Nickel and Its alloys, Aluminum and Its alloys. Specific alloys: soldering & brazing alloy, Precipitation hardening alloys. Bearing materials and their applications.		
UNIT 2	**Engineering Polymers, Ceramics and Glass**	**6 HOURS**
Classification of polymers, Polymer types-thermoplastics-thermoset-Elastomers, Polymer synthesis and processing-injection moulding-extrusion-blow moulding-calendaring, Degradation of polymers-chemical, thermal, -biological-mechanical. Polymer recycling methods Introduction to Advanced Ceramics-Barium Titanate, Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications, Introduction to Cermets and its application. HIGH PERFORMANCE POLYMERS:Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation		
UNIT 3	**Composite Materials**	**6 HOURS**
Need of composites. Particle-reinforced composites, large-particle composites, dispersion-strengthened composites. Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic-matrix composites, carboncarbon composites, fiber-reinforced composites, structural composites, laminar composites.		
UNIT 4	**Electronic and Photonic materials**	**6 HOURS**
Electronic Materials: Intrinsic and extrinsic semiconductors-p-n junction, Bandgap diagrams for conductor, semiconductor and insulator, IR detectors, Hall effect Superconducting Materials: Normal and High temperature superconductivity, Applications. Photonic Materials: LED, LCD, Photo conducting materials, Photo detectors, Photonic crystals and applications. Advancements in electronic materials: Smart materials		
UNIT 5	**Testing of Engineering Materials**	**8 HOURS**
Need and Comparison of destructive and non-destructive tests, Study of destructive testing: Engineering stress-strain curve, true stress-strain curve, Jominy End Quench Test for hardenability, Izod and Charpy Impact Test. Vickers, Rockwell hardness tests. Non Destructive Testing Non-Destructive testing: Principles & procedure, advantages, disadvantages and Industrial applications of NDT like Sonic & Ultrasonic testing and Radiography tests. Brief overview of another NDT test- Eddy current test, Magnetic Particle Test		
UNIT 6	**Nanomaterials.**	**6 HOURS**
Basic concepts of Nano science and Nanotechnology, Carbon nanotubes, Principle of SEM, TEM and AFM, X ray diffraction Fundamentals principles of SEM, SE and BSE imaging modes, Fracture mode analysis and failure analysis using SEM. Potential uses of nonmaterials in electronics, robotics, sports equipment, mobile electronic devices, Medical applications of nanomaterials-Cancer, AIDS treatment.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Jominy End Quench Test**	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO.02	**Izod / Charpy Impact Test**	**2 HOURS**
Izod / Charpy Impact Test.		
PRACTICAL NO.03	**Hardness Test**	**4 HOURS**
Vickers,/ Rockwell, Brinell/Durometers & Poldi Hardness Test.		
PRACTICAL NO.04	**Magnetic Particle & Dye Penetrant Test**	**4 HOURS**
Magnetic Particle & Dye Penetrant Test.		
PRACTICAL NO.05	**Ultra-sonic Test**	**4 HOURS**
Ultra sonic test for detection of flaws in materials.		
PRACTICAL NO.06	**Determination of Hall coefficient**	**4 HOURS**
Determination of Hall coefficient for a semiconducting material.		
PRACTICAL NO.07	**Soldering**	**4 HOURS**
Hard and Soft soldering using soldering materials.		
PRACTICAL NO.08	**Industrial Visit**	
Visit to advanced materials characterization laboratory.		

TEXT BOOK

1. Material Science & Metallurgy for Engineers, Dr. V.D. Kodgire & S. V. Kodgire, Everest Publications.31st Edition, ISBN No: 8186314008
2. Mechanical Behavior & Testing of Materials, A. K. Bhargava, C.P. Sharma P H I Learning Private Ltd. 2011 edition, ISBN No 13-9788120342507

REFERENCE BOOK

1. Engineering Metallurgy, Higgins R. A., Viva books Pvt. Ltd., 2004 ISBN No 13-9788176490276
2. Material Science & Engineering, Raghavan V., Prentice Hall of India, New Delhi. 2003 ISBN No 13-9788120324558
3. Introduction to Physical Metallurgy, Avner, S. H., Tata McGraw-Hill, 2014, ISBN 13-9780074630068
4. Materials Science & Engineering, W. Callister, Wiley Publications,2013, ISBN No 13-9788126521432
5. Physical Metallurgy for Engineers, Clarke D.S. & Varney W.R. Affiliated East-West Press, New Delhi ISBN No 13-978-8176710350

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Building Design and Construction
	COURSE CODE	CV211
	COURSE CREDITS	4
RELEASED DATE : 1/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : ME101 Engineering Graphics

COURSE OBJECTIVES :

CV211.CEO.1: To know the various building bye laws.
CV211.CEO.2: To know the different rules and regulation for development of any area
CV211.CEO.3: To know the different types of doors and windows.
CV211.CEO.4: To know the various properties and types of different materials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV211.CO.1: Explain various components of residential/commercial buildings and basic building materials used for their construction
CV211.CO.2: Explain various forms of floors, roofs, doors, windows, arches, lintels and masonry construction
CV211.CO.3: Implement relevant bye laws in functional design of buildings in a prescribed locality in India.
CV211.CO.4: Select suitable types of material and masonry for construction of various types of buildings
CV211.CO.5: Functionally design a single/multi-storied residential/commercial building

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Building and Architectural Planning**	**6 HOURS**
Definition and different types of buildings. Components of buildings. Types of structure. Types of foundation, Principles of Architectural Planning and Design. Types of drawings. Conventions as per IS 962.		
UNIT 2	**Building Bye Laws**	**6 HOURS**
Necessity of bye laws. Different rules and regulation according to NBC and IS. Types of areas and area calculations, Rules for ventilation, lighting, drainage, sanitation, Salient features of a Green Building		
UNIT 3	**Legal Aspects**	**6 HOURS**
Different permissions and certificates required before starting of building construction, during building construction and after completion of building construction, permissions and procedure for land acquisitions		
UNIT 4	**Building Materials and Formwork**	**6 HOURS**
Introduction and types of basic building materials (self-study), Formwork: Timber, Aluminum, Mivan and Plastic, Scaffolding: materials, types and procedure		
UNIT 5	**Masonry Construction**	**6 HOURS**
Brick masonry: types of bonds, construction procedure and supervision, Stones masonry: procedure for UCR and CR masonry(self-study), Block masonry: Hollow, solid, CLC, Siporex, cavity wall construction, Pointing and Painting Purpose, types and procedure		
UNIT 6	**Doors, Windows, Arches and Lintels**	**6 HOURS**
Doors and Windows: Types, materials used, purposes, Arches and Lintels: principle of arch action, types of arches, method of arch construction, necessity and types of lintels		
UNIT 7	**Floors and Roofs**	**6 HOURS**
Functional requirements of flooring material, varieties of floor finishes and their suitability, Roofing materials. Roof construction: types and their suitability, Staircase: types, casting procedure, design.		

PRACTICAL/ PROJECT: Project should be performed individually		
PROJECT NO.01	**Prepare a brochure of residential building**	**18 HOURS**
Draw development plan of a residential multistoried building having built up area more than 100 sq.m by using computer software (AutoCAD) and prepare brochure containing following drawings Lay out plan Detailed Plan. Elevation. Section. Foundation plan		
PRACTICAL NO.01	**Drawing of Commercial or Public building**	**6 HOURS**
Draw line plans of two different commercial or public building with scale 1:50 or 1:100 (hand sketch)		
PRACTICAL NO.02	**Site Visit**	**4 HOURS**
Site visit and technical report on the visit (Minimum Two). (Visit should contain Stage of visit, related sketches of components-C/S-Dimensions, Materials used, site plan sketch and detailed report etc.)		

TEXT BOOK

1. Punmia B.C., Building Construction, Laxmi Publications Delhi, sixth edition, 2009, ISBN: 81-7008-053-3
2. Shaha M.G., Kale C.M., Principles of Building Drawing, Macmillan Publishers India Limited, Fourth edition, 2010, ISBN-0333925467
3. Duggal S. K., "Building Materials", New Age International Limited, First Edition, 2003, ISBN -81222414354

REFERENCE BOOK

1. Shah, kale and Patki, " Building Drawings with an Integrated Approach to Build Environment", Tata McGraw Hill Publications, Fifth edition, 2015, ISBN- 0071077871
2. Rangwala, "Civil Engineering Drawing", Charotar Publications, First Edition, 2017, ISBN - 9789385039300
3. Rangwala, "Building Construction", Charotar Publications, 33rd Edition, 2017, ISBN - 978-93-85039-04-1

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Geotechnical Engineering
	COURSE CODE	CV212
	COURSE CREDITS	4
RELEASED DATE : 1/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : CV 101 Applied Mechanics

COURSE OBJECTIVES :

CV212.CEO.1: To describe the basics of soil and its importance in Civil Engineering
CV212.CEO.2: To establish an understanding of the fundamental concepts of mechanics for soil
CV212.CEO.3: To provide students with exposure to the systematic methods for solving geotechnical engineering related problems
CV212.CEO.4: To build the necessary theoretical background for further related courses..

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV212.CO.1: grade engineering properties of soil based on index.
CV212.CO.2: determine engineering properties of soil by performing relevant experiments.
CV212.CO.3: explain seepage and flow net.
CV212.CO.4: apply basic soil mechanics principle to calculate various stresses induced in soil.
CV212.CO.5: choose suitable method for improvement in soil characteristics.
CV212.CO.6: evaluate bearing capacity of different types of soils.

THEORY COURSE CONTENT		
UNIT 1	**Introduction and Site Investigation**	**8 HOURS**
Introduction to Geotechnical Engineering, Introduction to soil. Self-Study: Three phase soil system, properties of soil and their significance. Soil structure and classification systems. (Study of working model on soil structure) Purpose and planning of subsurface exploration. Methods of Investigation, Demo- SPT, DCPT, SCPT		
UNIT 2	**Permeability and Seepage**	**8 HOURS**
Basics of permeability of soils. Laboratory and field tests for determination of permeability. Seepage and Seepage Pressure, hydraulic gradient, Laplace equation, Flow Net, Demonstration: Construction of model for flow net though earthen body		
UNIT 3	**Compaction and Consolidation**	**8 HOURS**
Basics of compaction, Field compaction methods and compaction equipments. (Site Visits). Introduction to consolidation, spring analogy, Terzaghis consolidation theory, Lab methods		
UNIT 4	**Stresses in Soil**	**6 HOURS**
Boussinesqs theory, Pressure bulb and Westergaards theory, Contact Pressure distribution. Earth Pressure-, Rankines theory, Coulombs Wedge theory.		
UNIT 5	**Shear Strength of Soil**	**6 HOURS**
Shear strength- an Engineering Property. Mohr-Coulomb failure theory. The effective stress principle-Total stress, effective stress and neutral stress / pore water pressure		
UNIT 6	**Bearing Capacity of Soil and Foundation**	**6 HOURS**
Basic of bearing capacity of soil, bearing capacity analysis: list of methods and field tests, types of shear failure, Settlement and its types, its causes and remedial measures. Types of Foundation, case studies on failure of foundations.		

PRACTICAL/ PROJECT: Project should be performed in a group of 5 students		
PROJECT NO.01	**Preparation of Soil mass**	**14 HOURS**
Prepare a sub grade of 1m X 1m X 0.15m with well graded locally available soil having dry density of 1.85 gm/cc. Also find for atterberg's limits and coefficient of permeability. Objective: 1) Find water content, Sp. Gravity, and Bulk Density of Borrow soil 2) Calculate dry density and required quantity of borrow soil . 3) Find and fix the gradation of soil 4) Find required W.C. to compact soil embankment at given dry density 5) Compact embankment at site Page 45 of 49 Note: All tests must follow relevant I.S. codes OR Prepare trapezoidal shape hearting of an earthen dam of given dimension using well graded locally available soil having dry density of 1.85 gm/cc. Also check for atterberg's limits and coefficient of permeability. Objective: 1) Find water content, Sp. Gravity and Bulk Density of Borrow soil 2) Calculate dry density and required quantity of borrow soi 3) Find and fix the gradation of soil 4) Find required W.C. to compact hearting at given dry density 5) Compact embankment at site Note: All tests must follow relevant I.S. codes		
PRACTICAL NO.01	**Shear strength of the soil**	**2 HOURS**
To find the unconfined compressive strength of cohesive soil		
PRACTICAL NO.02	**Shear strength of the soil**	**2 HOURS**
To find the shear strength parameters of the soil by direct shear test		
PRACTICAL NO.03	**Shear strength of the soil**	**2 HOURS**
To find the shear strength parameters of the soil by direct shear test		
PRACTICAL NO.04	**Shear strength of the soil**	**2 HOURS**
Demo of Tri-axial Shear test apparatus		
PRACTICAL NO.05	**Consolidation of soil**	**2 HOURS**
To find the consolidation test on soil using oedometer		

TEXT BOOK

1. Gopal Ranjan and A. S. Rao, Basic and Applied Soil Mechanics, G. K. Publications Pvt. Ltd, Dec. 2006, ISBN: 978-81-224-1223-9
2. V. N. S. Murthy, Soil Mechanics and Foundation Engineering, B. S. Publications, Dec 2009, ISBN 0 324 06680 5.
3. B. C. Punmia, Soil Mechanics and Foundation Engineering, Laxmi Publishing Co, Dec. 2005, ISBN: 81-7008-081-9
4. Dr. K.R. Arora, "Soil Mechanics and Foundation Engineering", (8th Edition) 2015, Standard Publishers, ISBN:81-8014-112-8

REFERENCE BOOK

1. Joseph E Bowles, Engineering Properties of Soils and Their Measurements, McGraw Hill Publications, 1992, ISBN: 0070067783, 9780070067783.
2. Palanikumar. M, Soil Mechanics, PHI Learning Private Limited, 2013, ISBN: 978-81203-4838-7
3. R. F. Craig "Craigs Soil Mechanics", E and FN Spon an imprint of Chapman and Hall, 2012, ISBN: 0-415-32702-4, 0-415-32703-2.
4. Venkatramaiah, C. "Geotechnical Engineering", 3rd Edition, New Age International Publishers, New Delhi, 2006, ISBN-10: 8122417930

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Psychology
	COURSE CODE	HP201
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	NIL	20	40	15	NIL	NIL	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP201.CEO.1: To introduce the basic concept and scope of Organizational Behavior.
HP201.CEO.2: To teach the theory of personality and its implications in the organization.
HP201.CEO.3: To evince types and styles of Leadership and the impact of values on the same.
HP201.CEO.4: To guide learners through a decision making process.
HP201.CEO.5: To enhance participants skills when practicing team work concepts through business games.
HP201.CEO.6: To introduce the concept of Motivation and constructive ways of coping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP201.CO.1: Explain human behavior in the workplace from an individual, group, and Organizational perspective.
HP201.CO.2: Develop an ability to analyze ones own personality and that of others in Organizations.
HP201.CO.3: Compare different leadership styles with an understanding of how core values affect Leadership.
HP201.CO.4: Demonstrate decision making ability
HP201.CO.5: Identify the problems associated with organizing and managing teams.
HP201.CO.6: Comprehend the correlation amongst stress, motivation and personality.

THEORY		
UNIT 1	**Organizational Behaviour**	**6 HOURS**
Meaning of Psychology and Organizational Behaviour, Psychology in Organization: History of Organizational Psychology; Scope and Research in Organizational Behaviour, Structure of Organization, Organizational culture, Strong vs Weak culture, Culture vs Formalization.		
UNIT 2	**Perception and Decision Making**	**6 HOURS**
Meaning, process and determinants of Perception, Process of Decision Making, The link between Perception and Individual Decision Making, Influences on Decision Making: Individual Differences & Organizational constraints, Process and ethics of decision making.		
UNIT 3	**Personality, Values and Leadership**	**6 HOURS**
What is Personality, The Big Five Personality Model, The importance of values; values and ethical behavior, Leadership, Understanding Personality, values and Leadership, Emotional Intelligence-Personal and Social Competence.		
UNIT 4	**Understanding Team Work and Conflict Resolution**	**6 HOURS**
Difference between groups and teams, Types of teams, Turning Individuals into Team players, Team building and Team based work, Team dynamics, Types of conflict and conflict resolution.		
UNIT 5	**Motivation & Stress**	**4 HOURS**
Motivation and its types, Content and Process Theories of Motivation, Concept and reactions to stress, Potential effects of stress, Coping with and managing stress.		

TEXT BOOK

1. S. P. Robbins, Organizational Behavior Prentice-Hall India, 1995, ISBN-11:81-203-2875-2.
2. F. Luthans, Organizational Behavior. McGraw-Hill, 1995, ISBN-13: 0072873876.
3. U. Sekarn, Organizational Behavior: Text and Cases, Tata McGraw Hill, 1996, ISBN: 0074603663.
4. Furnham, The Psychology of Behavior at Work, Psychology Press, 1997, ISBN: 1841695041 .

REFERENCE BOOK

1. M. D. Dunnett, Handbook of Industrial-Organizational Psychology, Jaico Press, 1990, ISBN: 978089106-041-3.
2. M. A. - Ansari, Managing people at work: Leadership styles and influence strategies, Sage, 1990, ISBN: 0803996500.
3. J. B. P. Sinha, Work Culture in Indian Context, Sage, 1990, ISBN: 0019-5286.
4. D.M. Pestonjee, Stress and Coping: The Indian Experience, 2nd ed., Sage Publications, 1999, ISBN: 0761993126.
5. L. N. Jewell & M. Siegall, Contemporary Industrial/Organizational Psychology, West Publishing Company, 1990, ISBN: 0314715991.
6. D. Katz and-R. L. Kahn, The Social Psychology of Organizations, Wiley, 1966, ISBN: 978-0-471-023553.
7. M.L. Blum, and J.C. Naylor, Industrial Psychology, CBS Publishers & Distributors, 1984, ISBN: 8123908601.
8. K. H. Blanchard and P. Hersey, Management of Organizational Behavior: Utilizing Human Resources, Prentice-Hall India, 1993, ISBN: 0-13-5512868-9.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Minor Project
	COURSE CODE	ME213
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE		MSE	ESE	IA	TERMWORK	DEMONSTRATION	
-	4	-	-	-	-	75	75

PRE-REQUISITE : Design Thinking, Engineering Tools & Techniques, Prototyping

COURSE OBJECTIVES :

ME213.CEO.1: To identify and define a problem to be solved.
ME213.CEO.2: To develop a design for the solution of the problem using engineering tools available.
ME213.CEO.3: To prepare prototype/working model for solving the problem
ME213.CEO.4: To evaluate the model built for its functionality, reliability, sustainability, maintainability and affordability

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME213.CO1: Define the problem to be solved.
ME213.CO2: Apply knowledge of various engineering tools to develop the solution to the problem.
ME213.CO3: Critically analyze the options available to solve the problem and select the one identified most effective.
ME213.CO4: Justify the selection of the method to solve the problem is-a-vis other options considered.
ME213.CO5: :Build the working model of the solution to solve the problem.

PREAMBLE:

It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

GUIDELINES:

1. Every student shall undertake the Minor Project in semester IV.
2. Every student shall work on an approved project, a group of 03 students (maximum) shall be allotted for each minor project
3. The group members could be from different departments to support the interdisciplinary functioning
4. The students have to identify the social problem by discussion with various stakeholders, site visits and expert-opinions
5. Collect the sufficient data to establish the criticality of the problem to be solved.
6. Define the actual problem
7. Enumerate various approaches and solutions to solve the problem
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use
9. Develop prototype or model for its testing before implementation
10. The three-member committee of jury members will be appointed to monitor the progress and continuous evaluation of each project. One of the members will be the project guide. Assessment of the project for award of grade shall be done jointly by the guide and committee of jury members

TIMELINE

1. Project group formation: 1 Week.
2. Identification of the problem to be solved: 2 Weeks.
3. Data collection to prove the validity of the problem: 2 Weeks
4. Identification of the various approaches to solve the problem: 2 weeks.
5. Justification of the approach selected to solve the problem: 1 week
6. Building the solution to the problem using prototype or implementation: 6 Weeks
7. Report writing: 2Weeks

ASSESSMENT

Presentation 1: Motivation and need for the selected problem to be solved

Presentation 2: To prove the validity of the problem to be solved using data collected

Presentation 3: Identified approaches to solve the problem and justification of approach selected

Presentation 4: Progress towards the prototyping or implementation of the solution to the problem

Presentation 5: Final demonstration

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Third Year

Bachelor of Technology in Civil Engineering

2016-2020

(With Effect from Academic Year: 2018-2019)

MIT | Academy of Engineering
(An Autonomous Institute)

CURRICULUM STRUCTURE (2016 - 2020)

SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2018-19**
T Y B TECH	**RELEASE DATE**	**:**	**01/12/2017**
DEPARTMENT OF CIVIL EGG	**REVISION NO.**	**:**	**0.0**

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	CV301	Mechanics of Fluids	3	2	4
2.	DC6	CV302	Structural Analysis	3	2	4
3.	DC7	CV303	Concrete Technology	3	2	4
4.	OE1	CV31#	Open Elective - Refer Annexure.	3	2	4
5.	HSS4	HP301	Project Management	1	2	2
6.	SDP5	CV30#	Skill Development Lab - Refer Annexure	--	4	2
TOTAL				13	14	20

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	CV321	Design of Structures	3	2	4
2.	DC9	CV322	Transportation Engineering	3	2	4
3.	DC10	CV323	Water Resources Engineering	3	2	4
4.	OE2	CV33#	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP302	Professional Skills	--	4	2
6.	HSS6	HP303	Basics of Entrepreneurship	--	2	1
7.	SDP6	CV324	Mini Project	--	4	2
TOTAL				12	18	21

L: Lecture, P: Practical

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Mechanics of Fluids
	COURSE CODE	CV301
	COURSE CREDITS	4
RELEASED DATE : 1/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : CV101: Applied Mechanics, AS101: Applied Mathematics

COURSE OBJECTIVES :

CV301.CEO.1: To have knowledge of fluid behavior at rest and in motion

CV301.CEO.2: To have familiarity to fundamentals of open channel flow.

CV301.CEO.3: To apply conservation equations to pipe flow and open channel flow problems..

CV301.CEO.4: To apply concepts of dimensional analysis and model studies for design of hydraulic structures

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV301.CO.1: Explain the properties and behavior of the fluid at rest and in motion, visualize the fluid flows.

CV301.CO.2: Apply the principles of statics to find the hydrostatic force in various fluid problems

CV301.CO.3: Apply equations of motion to various flow conditions and compute discharge of the flows

CV301.CO.4: Analyze complex flow patterns using model studies.

CV301.CO.5: Analyze laminar and turbulent flows in a pipeline and design simple pipe networks.

CV301.CO.6: Explain the terms of the open channel flow equations and to solve open channel flow problems using appropriate equations

THEORY COURSE CONTENT		
UNIT 1	**Properties of Fluids and Fluid Statics**	**6 HOURS**
Properties of Fluids: Physical properties of fluids: density, specific weight, specific volume, relative density, viscosity, vapor pressure, compressibility, surface tension, capillarity, buoyancy, stability of floating and submerged objects Pressure and Fluid Statics: Fluid Pressure, Introduction to fluid statics, Pressure Measuring Devices, Hydrostatic forces on submerged plane and curved surfaces		
UNIT 2	**Fundamentals of Fluid Flow and Equations of Motion**	**6 HOURS**
Fundamentals of Fluid Flow: Parameters of Fluid Flow, Flow visualization methods, Types of Fluid Flow, Potential, Stream function, Rotationality, Vorticity and Circulation, Conservation of Mass and Equations of Continuity Equations of Motion: Forces acting on fluid mass in motion, Eulers equation of motion along a streamline, Navier stokes equation, Bernoullis Equation and conservation of Energy, Hydraulic Grade line and Total Energy line, Kinetic Energy Correction Factor, Linear Momentum Equation, Momentum Correction Factor. Partial differential solutions to fluid flow equations. Computational Fluid Dynamics		
UNIT 3	**Applications of Bernoullis Equation and Model Studies**	**6 HOURS**
Applications of Bernoulli Equation: Venturimeter, Orificemeter and Pitot Tube Self-Study: Introduction to Flow through Orifices and Mouthpieces, Notches and Weirs Dimensional Analysis and Model studies: Dimensions of Physical Quantities, Dimensional homogeneity, Dimensional analysis using Buckinghams Pi theorem, Dimensionless Parameters, Similitude, Model Laws Self-Study: Introduction to Flow through Orifices and Mouthpieces, Notches and Weirs		
UNIT 4	**Flow Through Pipes**	**6 HOURS**
Laminar Flow through pipes: Navier flow simplifications for laminar flow, Characteristics of Laminar flow through circular pipes, Reynolds Experiment, Stokes law, Resistance to Flow in Smooth and Rough Pipes, Darcy's law, Energy losses in pipe flow, Flow through simple compound, parallel, branched pipes and siphons. Boundary layer and modelling of boundary layer. Turbulent Flow through pipes: Characteristics of Turbulent Flow through Pipes, Boussinesqs theory, Prandtls mixing length theory, Velocity distribution in turbulent flow, Velocity distribution for smooth and rough boundaries, Average Velocity Concepts.		
UNIT 5	**Introduction to Open Channel Flow and Uniform Flow**	**6 HOURS**
Introduction to Open Channel Flow: Classification of Channels and Channel Flows, Froude Number, Continuity and Energy Equations for Open Channel flows Depth-Energy Relationships in Open Cannels: Specific Force, specific Energy, Critical flow computations Based on Specific force and energy criteria, Hydraulic jump Uniform flow in Open channels: Characteristics and establishment of uniform flow, Chezy's and Manning's formulae, Normal Depth, Conveyance, Section factor, Hydraulic Exponent, Uniform flow computations and Most efficient channel sections		

UNIT 6	Gradually and rapidly varied flows in open channels	6 HOURS
Gradually Varied Flow in Open channels: Assumptions and Differential equations of GVF, Classification of Bed slopes, GVF profiles, GVF computations Rapidly Varied Flow in Open Channels: Phenomenon of Hydraulic Jump and energy Dissipation, Conjugate Depths, Classification of Hydraulic Jump, Practical Uses of Hydraulic Jump		

PRACTICAL		
Practical No. 1	**Measurement of Fluid Properties**	**2 HOURS**
To study and carry out the measurement of different properties of fluid.		
Practical No. 2	**Study of Pressure Measuring Devices**	**2 HOURS**
To study different pressure measuring devices.		
Practical No. 3	**Stability of floating Bodies**	**2 HOURS**
To study and Calculate the metacentric height of a floating body		
Practical No. 4	**Verification of Bernoullis Equation and Introduction to CFD with Python**	**2 HOURS**
To verify experimentally the validity of Bernoullis equation for fluid flow		
Practical No. 5	**Calibration of flow measuring devices**	**2 HOURS**
To determine the coefficient of orificemeter / venturimeter and calibrate it.		
Practical No. 6	**Study of laminar flow using Reynolds apparatus / Heleshaw apparatus**	**2 HOURS**
To study of Laminar Flow using Reynolds/Heleshaw apparatus.		
Practical No. 7	**Study of Laminar and Turbulent flows through pipes**	**2 HOURS**
To study friction factor for laminar and turbulent flow through pipe.		
Practical No. 8	**Study of Uniform flow formulae in Open Channels**	**2 HOURS**
To study uniform flow formula for open channel using Mannings formula.		
Practical No. 9	**Velocity distribution in Open Channel Flows**	**2 HOURS**
To determine the velocity distribution for given flow of water in open channel flow using pitot tube		
Practical No. 10	**Study of Hydraulic Jump as Energy Dissipater**	**2 HOURS**
To determine the percentage dissipation of energy (relative loss) due to hydraulic jump both experimentally and analytically.		

TEXT BOOK

1. Modi, P.N. and S.M. Seth, Hydraulics and Fluid Mechanics including Fluid Machines, Standard Book House, Delhi, Nineteenth edition, 2009, ISBN 13: 9788189401269
2. Subramanya K, Flow in Open Channels, Tata McGraw-Hill Education, Fourth edition, 2015, ISBN-13: 978-9332901339

REFERENCE BOOK

1. Franck M White, Fluid Mechanics in SI Units, Tata McGraw Hill Publication, eighth edition, 2017, ISBN-13: 978-9385965494
2. Subramanya. K., Fluid Mechanics and Hydraulic Machines, Problems and Solutions, Tata McGraw Hill Publishing Company, first edition, 2010, ISBN-10: 0070699801, ISBN-13: 978-0070699809
3. Ranga Raju K G, Flow through Open Channels, Tata McGraw Hill Publication, first edition, 2001, ISBN-10: 007460497X, ISBN-13: 978-0074604977
4. Ven te Chow, Open Channel Hydraulics Tata McGraw Hill, 2009, ISBN-13: 9781932846188.
5. Bansal R K, A test book of Fluid mechanics and Hydraulic Machines, Laxmi Publications, Ninth edition, 2017, ISBN: 9788131808153

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Structural Analysis
	COURSE CODE	CV302
	COURSE CREDITS	4
RELEASED DATE : 1/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	50	-	150

PRE-REQUISITE : CV101 Applied Mechanics , CV 201 Continuum Mechanics of Solids

COURSE OBJECTIVES :

CV302.CEO.1: To understand the process of structural analysis
CV302.CEO.2: To apply geometric and energy methods to determinate structures
CV302.CEO.3: To apply force methods of analysis for indeterminate structures.
CV302.CEO.4: To apply displacement methods of analysis for indeterminate structures.
CV302.CEO.5: To introduce plastic analysis for steel structures

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV302.CO.1: Determine internal forces in structure and sketch deflected shapes.
CV302.CO.2: Determine displacements of determinate structures.
CV302.CO.3: Analyse indeterminate structures by force methods.
CV302.CO.4: Analyse indeterminate structures by displacements methods.
CV302.CO.5: Estimate the collapse load for indeterminate structures

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**
Types of structures and loads. The process of analysis and design of structures. Stability of structures. Degree of static and kinematic indeterminacy. Symmetry of loads and supports. Concept of Axial force, shear force, bending moment diagrams. Deflection diagrams and elastic curves.		
UNIT 2	**Geometrical and Energy methods**	**8 HOURS**
Displacements of Statically Determinate Structures by Macaulays Method. Principles of virtual work, Strain energy, Castiglianos theorems. Principle of superposition, Bettis theorem, Maxwells reciprocal theorem.		
UNIT 3	**Force Methods**	**8 HOURS**
Basic Concepts of the Force Method. Formulation of compatibility equations, Flexibility coefficients, Forming the Flexibility Matrix, Analysis for Temperature and lack of fit.		
UNIT 4	**Displacement Methods**	**8 HOURS**
Basic Concepts of the displacement method, Slope deflection equations, Stiffness coefficients, Formulation of equilibrium equations, forming stiffness matrix, Direct stiffness method, effect of settlement of supports.		
UNIT 5	**Plastic Methods**	**8 HOURS**
Concept, assumptions, shape factor, collapse load, load factor, plastic modulus of section, plastic moment of resistance, computation of collapse load for fixed beam, continuous beam and plane frame subjected to various load cases.		

TUTORIAL: Computer programming/ software analysis based on		
PRACTICAL NO.01	**Moment area method**	**4 HOURS**
Moment area method of calculating slope and deflections		
PRACTICAL NO.02	**Conjugate Beam Method**	**4 HOURS**
Conjugate beam method of calculating slope and deflections		
PRACTICAL NO.03	**Moment Distribution Method (MDM)**	**4 HOURS**
Moment distribution method for analysis of beams / frames		
PRACTICAL NO.04	**Flexibility / Stiffness matrix**	**4 HOURS**
Flexibility/stiffness matrix method for analysis of indeterminate structure		
PRACTICAL NO.05	**Influence line diagrams**	**2 HOURS**
Influence line diagrams for analysis of beams subjected to moving loads.		
PRACTICAL NO.06	**Approximate methods**	**2 HOURS**
Analysis of multistoried building frame by portal/substitute frame method.		
PRACTICAL NO.07	**Computerized analysis**	**4 HOURS**
Analysis of industrial shed by any software package.		

TEXT BOOK

1. Devdas Menon, Structural Analysis, Narosa Publishing House, 2008, ISBN: 978-81-7319750-5
2. Devdas Menon, Advanced Structural Analysis, Narosa Publishing House, 2009, ISBN: 978-81-7319-939-4
3. T.S. Thandavamoorthy, Structural Analysis, Oxford Higher Edu., 2011, ISBN-10: 0198069189

REFERENCE BOOK

1. Amin Ghali, Adam M Neville and Tom G Brown, Structural Analysis: A Unified Classical and Matrix Approach, Sixth Edition, 2007, Chapman and Hall, ISBN: 978-04-1577-433-8
2. R.C.Hibbeler, Structural Analysis, Pearson Education; 9th Edition, 2017, ISBN-10: 9332586144

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Concrete Technology
	COURSE CODE	CV303
	COURSE CREDITS	4
RELEASED DATE : 1/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : CV 211 Building Design and Construction

COURSE OBJECTIVES :

CV303.CEO.1: To understand fundamental knowledge of concrete, its properties, its behaviour under various conditions.

CV303.CEO.2: To design mix of regular and special types of concrete

CV303.CEO.3: To understand special techniques of concreting and machineries used for concreting work

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV303.CO.1: Explain different types concrete ingredients with their properties.

CV303.CO.2: Identify properties of concrete using various IS tests

CV303.CO.3: Produce a concrete with specific mix

CV303.CO.4: Explain special types of concrete techniques.

CV303.CO.5: Illustrate different concrete related equipments .

CV303.CO.6: Analyze various reasons for failure of concrete.

THEORY COURSE CONTENT		
UNIT 1	**Introduction and General Ingredient of Concrete**	**6 HOURS**
Cement: Different types of cement, Important properties and applications, Manufacturing of Portland cement, Chemical composition of Portland cement, Hydration of cement, Setting of cement, Physical and chemical test for cement as per IS:4031. Aggregate: Classification- Fine aggregate, coarse aggregate, Mechanical and Physical properties, Deleterious Materials, Soundness, Alkali aggregate reaction, Grading of Aggregates, Tests on aggregate, Artificial and Recycled aggregate. Water: Mixing Water, Curing water, Tests on water. Fly Ash: Classification of fly ash, properties of fly ash, tests on fly ash. Admixtures: functions, classification, types: mineral and chemical, IS: specifications (9103 and 456), Accelerators, Retarder, water reducing agents, Plasticizers, Water proofing compounds.		
UNIT 2	**Properties of Fresh and Hardened Concrete**	**6 HOURS**
Fresh Concrete: Workability: Factors affecting workability, measurement of workability, cohesion and segregation, bleeding, Mixing, Transporting, Placing, and Compaction of concrete Curing Methods of concrete, Influence of temperature, Maturity rule, Steam curing. Hardened concrete: strength of concrete, factors affecting strength, micro-cracking and stressstrain relationship, other strength properties, relation between tensile and compression strength, impact strength, abrasion resistance, elasticity and creep, shrinkage and swelling .		
UNIT 3	**Concrete Mix Design**	**6 HOURS**
Concrete mix design: Concepts of Mix Design, Factors for proportioning of concrete. Factors to be considered, Statistical quality control, Laboratory trial mixes and guidelines to improve mix, methods of Mix Design- IS and DOE. Demonstration and application of concrete mix design software		
UNIT 4	**Special Concreting Techniques**	**8 HOURS**
Ready mixed concrete, under water concreting, roller compacted concrete Cold weather concreting, hot weather concreting, Light weight concrete, Polymer concrete, Fibre reinforced concrete, High performance concrete, Pumped concrete, self-compacting concrete, Ferrocrete.		
UNIT 5	**Introduction to Concrete Related Equipments**	**6 HOURS**
Batching plants: hauling, pumps, Types of concrete mixers: Tilting, Non-tilting and Reversible drum mixer, Types of vibrators .		
UNIT 6	**Case studies**	**4 HOURS**
Case studies of failure of concretes/new age concrete technology		

PRACTICAL		
Project No. 1	**Design of concrete mix of M25/M30/M35/M40 grade**	**12 HOURS**
Prepare a concrete mix of M25/M30/M35/M40 grade and performed tests on concrete fresh and harden concrete.		
Project No.02	**Design of concrete mix of M25/M30/M35/M40 grade using fly ash and admixtures**	**10 HOURS**
Prepare a concrete mix of M25/M30/M35/M40 grade using fly ash and admixtures and performed tests on concrete		
Project No.03	**Evaluate strength of old concrete by NDT tests**	**4HOURS**
Evaluate strength of old concrete by using following NDT tests 1. Rebound Hammer Test 2. Carbonation Test		
PRACTICAL NO.04	**Site Visit**	**2 HOURS**
1. Site visit to R.M.C. plant 2. Site visit to any concreting work		

TEXT BOOK

1. Gambhir A.L., Concrete technology, Tata McGraw hill Publication, sixth edition, 2009, ISBN: 978-1259062551
2. Santhlujmar A.R., Concrete technology, Oxford University Press, Fourth edition, 2010, ISBN: 978-0195671537

REFERENCE BOOK

1. Shetty M. S., Concrete Technology, S. Chand Publications, eleventh edition, 2015, ISBN13: 978-8121900034
2. Neville A. M., Brooks J.J., "Concrete Technology", Pearson Publications, fifth edition, 2012, ISBN: 978-0273732198

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Construction Planning and Management
	COURSE CODE	CV311
	COURSE CREDITS	4
RELEASED DATE : 1/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : CV 211 - Building Design and Construction

COURSE OBJECTIVES :

CV311.CEO.1: To understand basic concepts and novel technologies in project management and project planning.

CV311.CEO.2: To acquire skills for planning, scheduling, controlling, forecasting, budgeting various construction projects.

CV311.CEO.3: To take part in practical training in the planning and scheduling of construction projects.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV311.CO.1: Explain various project managerial and planning concepts

CV311.CO.2: Explain different methods for project scheduling and controlling.

CV311.CO.3: Analyze project budget with different prospects.

CV311.CO.4: Illustrate various concepts and methods for quality and safety management

CV311.CO.5: Functionally design a schedule for a residential building.

THEORY COURSE CONTENT		
UNIT 1	**Project Management and Planning**	**4 HOURS**
Basic concepts of project management, Management theories, Project Planning Methods, Work study, Method study, Construction Project Life Cycle		
UNIT 2	**Project Scheduling**	**8 HOURS**
Basics of project scheduling, Work Breakdown Structure, Line of balance, Network Analysis, Tool for Optimizing Provider Schedules, Graphical Evaluation and Review Technique.		
UNIT 3	**Project Controlling**	**8 HOURS**
Crashing, Resource allocation		
UNIT 4	**Introduction to project budget**	**6 HOURS**
Budget Forecasting, financial accounting, cash flows, budget updates		
UNIT 5	**Quality and safety management**	**6 HOURS**
Quality and safety concerns, Total Quality Control, Quality Control by statistical methods, Personal protective equipment, Occupational Safety and Health Administration (OSHA) guidelines		
UNIT 6	**Inventory Management**	**6 HOURS**
Application of ABC and Economic Order Quantity analysis in inventory control, Use of Indices in materials/ inventory models Inventory Management, Materials Management Systems.		

PRACTICAL		
Project No. 1	**Project Planning using MS Project**	**16 HOURS**
Developed a schedule for ten storied residential building using MS Project		
Project No. 2	**Prepare Line of Balance for project no. 1**	**4 HOURS**
Prepare LOB for above project		
Project No. 3	**Presentation on Safety Measures at site**	**4 HOURS**
Students must visit any ongoing high-rise construction site and identify various safety measures. Collect the information and give presentation.		

TEXT BOOK

1. S. Seetharaman, " Construction Engineering and Management", Umesh Publications Delhi, sixth edition, 2009, ISBN: 9382533095
2. B. Sengupta and H Guha, " Construction Management and Planning", Tata McGraw Hill Publishing Company, New Delhi, ISBN: 0074623982
3. K.K. Chitkara, "Construction Project Mangement", McGraw Hill Education third edition, ISBN: 9339205448

REFERENCE BOOK

1. Newnan, "Engineering Economic Analysis," tenth edition, Oxford University, ISBN: 091055496X
2. Dennis Lock, "The Essentials of Project Management", 2nd Revised edition, Gower Publishing Ltd, ISBN: 0566082241
3. P S Gahlot and B M Dhir, " Construction Planning and management", First Edition New Age International Limited Publishers

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY **CIVIL ENGINEERING**	**COURSE NAME**	Professional Skills
	COURSE CODE	HP302
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	NIL	NIL	NIL	50	25	75

PRE-REQUISITE : Basic Communication Skills

COURSE OBJECTIVES :

HP302.CEO.1: To define the importance of professional skills in students life
HP302.CEO.2: To explain them necessary, specific professional skills
HP302.CEO.3: To appraise students for placements through acquisition of professional skills
HP302.CEO.4: To support them detect their present level in respect of each professional skill and show direction for improvement

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP302.CO.1: Relate the importance of professional skills(L2)
HP302.CO.2: Build necessary, specific professional skills (L3)
HP302.CO.3: Analyze the environment of employ-ability (L4)
HP302.CO.4: Develop various techniques of effective team building in their professional life(L6)

PRACTICALS: (SECTION A)		
PRACTICAL NO.01	**Self Awareness**	**2 HOURS**
Concept of Johari Window, Advantages and disadvantages of every quadrant, Identifying the proportion of each quadrant in respect of self, Using the tools of Feedback & Exposure for self-development		
PRACTICAL NO.02	**Personal Interviews**	**6 HOURS**
Preparing for Interviews, Typical expected questions & suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Parameters of assessment, Initiating the discussion, Effective listening, Own contribution, Paraphrasing, Arguing and counter-arguing, Giving direction to the discussion		
PRACTICAL NO.04	**Team building and Motivation**	**2 HOURS**
Hallmark of effective teams, Barriers to team work, Subjugation of Individual interests for achievement of teams goal, Leading & motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2 HOURS**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique, Collective and individual Brain Storming,		
PRACTICAL NO.06	**Decision Making**	**2 HOURS**
Levels of decisions, Process of decision-making, Types of criteria, Individual and collective decision-making, Barriers in decision making, Keys to sound decision-making		
SECTION B:	**Aptitude Training.**	

REFERENCE BOOK

1. Stephen Covey: The Seven Habits of Highly Effective People, Simon and Schuster Ltd, ISBN: 0-671-71117-2
2. Krishna Mohan, Meera Banerji, Developing Communication Skills, Birla Institute of Technology and Science, ISBN: 033392-919-5
3. Charles Kepner and Benjamin Tregoe, The Rational Manager: A systematic Approach to Problem Solving and Decision Making , Tata McGraw-Hill Publishing Company Ltd., ISBN:13:978-0070341753
4. Priyadarshini Patnaik, Group Discussion and Interview Skills , Foundation Books, 1st Ed.- 2011, ISBN No.: 9788175967847, 8175967846.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	(ETAB) Extended3D Analysis of building System
	COURSE CODE	CV304
	COURSE CREDITS	2
RELEASED DATE : 1/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	50	-	25	75

PRE-REQUISITE : CV201: Continuum Mechanics of Solids

COURSE OBJECTIVES :

CV304.CEO.1: Understanding the concepts of mathematics, numerical analysis, statistics, computer and information sciences which underpin the engineering discipline.

CV304.CEO.2: To know application of engineering techniques, tools, softwares and resources.

CV304.CEO.3: Gain knowledge in application of software engineering for analysis and design processes of structures.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV304.CO.1: Select major theories, approaches and methodologies used in software for structural engineering

CV304.CO.2: Analysis to real engineering design problems.

CV304.CO.3: Articulate importance of softwares in research and industry by simulation work.

PRACTICAL		
Assignment No.1	**Introduction to ETABS**	**1 HOURS**
a. Overview of ETABS b. Getting Help c. Templates and Defaults d. Graphical User Interface e. ETABS Screen Menus f. Units System g. Coordinate Systems		
Assignment No. 2	**Modelling In ETABS**	**1 HOURS**
a. Starting a New Model b. New Model Quick Templates c. Grid System Data d. Add Structural Objects e. Edit Stories and Grid Systems f. Add Grid at Selected Joints g. Grid Options h. Save the Model		
Assignment No. 3	**Editing Properties**	**2 HOURS**
a. Replicate b. Extrude i. Extrude Joints to Frames ii. Extrude Frame to Shells c. Merge Joints d. Align Joints/Frames/Edges e. Move Joints/Frames/Shells f. Edit Frames g. Edit Shells		
Assignment No. 4	**Defining Properties**	**2 HOURS**
a. Material Properties b. Section Properties c. Load Patterns d. Shell Uniform Load Sets e. Load Cases f. Load Combinations		

Assignment No. 5	**Structural Objects**	**4 HOURS**
a. Draw Grids b. Draw Dimension Lines c. Draw Joint Objects d. Draw Beam/Column/Brace Objects e. Draw Floor/Wall Objects f. Draw Reference Points g. Draw Reference Planes h. Draw Wall Stacks		
Assignment No. 6	**Selection Properties, Assigning the loads**	**2 HOURS**
Selection Properties a. Select b. Deselect c. Invert Selection d. Select, Deselect, Invert Selection Assigning the loads e. Joint f. Frame g. Shell h. Joint Loads i. Frame Loads j. Shell Loads		
Assignment No. 7	**Design**	**4 HOURS**
a. Steel Frame Design b. Concrete Frame Design		
Assignment No. 8	**Detailing**	**2 HOURS**
a. Detailing Process b. Edit Views c. Create and Manage Drawing Sheets		
Assignment No. 9	**Detailing**	**2 HOURS**
a. Obtain Basic Graphical Displays b. Graphical Displays using Model Explorer c. Tabular Display of Results d. Summary Report e. Export Results		
Assignment No. 10	**Application of the software for a considered live scenario**	**4 HOURS**
a. Selection of building/building elements b. Complete 3D analysis for the building using ETAB		

TEXT BOOK

1. Analysis and Design of a Multistorey Building using STAAD.Pro and E-TABS (with Manual Calculation) (First Edition,2016), by D. Rajendran

REFERENCE BOOK

1. ETAB 2016, Users Guide, July 2016, by Computers and Structures Inc.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Design of Structures
	COURSE CODE	CV321
	COURSE CREDITS	4
RELEASED DATE : 1/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : CV101 Applied Mechanics , CV201 Continuum Mechanics of Solids

COURSE OBJECTIVES :

CV321.CEO.1: To design steel and reinforced concrete elements subjected to Axial force/Shear force/ Bending moment or any combination of these actions for Limit State of Collapse.

CV321.CEO.2: To design steel and reinforced concrete elements subjected to Axial force/Shear force/Twisting moment/ Bending moment or any combination of these actions for Limit State of Serviceability.

CV321.CEO.3: To design a structure using software to perform tasks mentioned in CEO.1 and 2

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV321.CO.1: Design axially loaded elements using Limit state method

CV321.CO.2: Design elements subjected to bending and shear using Limit state method.

CV321.CO.3: Design elements subjected to combined axial force, bending and shear using LSM.

CV321.CO.4: Design connections of structural elements for the actions they are subjected to, using limit state method.

CV321.CO.5: Envisage lacunae of Force based design and understand recent trends in design.

THEORY COURSE CONTENT		
UNIT 1	**Introduction and Connections**	**6 HOURS**
Properties of Structural Steel, I. S. Rolled Sections, I. S. Specifications, Factor of Safety, Permissible and Working Stresses, Elastic Method, Plastic Method, Introduction to Limit States of Design. Bolted connections: Bolted including friction grip connections subjected to shear and/or bending. Welded connections: Fillet and Butt weld.		
UNIT 2	**Tension and compression Members**	**10 HOURS**
Design of Tension Member: Modes of failure, permissible stress in tension. Design of compression member: Modes of Failure of compression member, Buckling Failure: Eulers Theory, Effective Length, Slenderness Ratio, Design Formulae: I.S. Code Formulae. Designing of lacing and battening system for columns. Design of column base.		
UNIT 3	**Design of flexure member**	**6 HOURS**
Design of members subjected to flexure: Laterally restrained and unrestrained members.		
UNIT 4	**Preliminaries of RCC design**	**12 HOURS**
Material behaviour under tension and compression: Concrete and steel, Characteristic strength, Loads, Partial safety factors, general requirements for slab, beam, column and foundation. Detailing and Drawing: Reinforcement detailing of beam, column and slab.		
UNIT 5	**Design of Slab and Beams**	**5 HOURS**
A] Design of slab for flexure, shear, bond and deflection falling under following categories 1. One-way slab: Simply supported, continuous, cantilever Slabs. 2. Two-way slabs: Restrained and unrestrained against torsion at corners. B] Simply supported continuous and cantilever beams for limit state of flexure and shear, Design of RCC Beam subjected to bending plus twisting, Redistribution of moments.		
UNIT 6	**Design of Column and Footings**	**5 HOURS**
A] Design of Column: Introduction, Strain and Stress variation diagrams, minimum eccentricity requirements. Design of Short Column for axial load, Uni-axial, Biaxial bending using interaction curves (SP-16). B] Design of footing: Types of Footing, designing of isolated sloped or pad footing for one-way shear and two-way shear		

PRACTICAL : Design of Industrial structures.		
PRACTICAL NO.01	**Planning of Industrial structure**	**2 HOURS**
Planning and drawing of Structural frame system (one full imperial sheet drawn using drafting software).		
PRACTICAL NO.02	**Load Calculations**	**2 HOURS**
Calculate Dead load, Live load and Wind load for given locality and structure		
PRACTICAL NO.03	**Analysis of the frame**	**2 HOURS**
Analyzing the frame for various load combinations and arriving at member forces.		
PRACTICAL NO.04	**Design and Optimization**	**10 HOURS**
Design and optimisation of members subjected to tension, compression and flexure, including base system		

Full imperial size sheets (Hand drawn)
Full imperial size sheets covering all practical from 1 to 4.
1. provisions and details of purlins, trusses, rafter and tie level bracings. 2. Connections showing roof truss to the column cap plate, beam to beam, beam to column, bracings and splicing details. 3. Column, column bracings, gable end bracings, base plates, shear keys, holding down bolts.

Design of G+2 structure (RCC)		
PRACTICAL NO.05	**Planning and load calculation of G+2 Structure**	**2 HOURS**
Planning and drawing of Residential/commercial/Educational/Institutional etc. building having plan area greater than 125 m2. (one full imperial sheet drawn using drafting software). Calculate Dead load, Live load. and various load combinations as per IS stipulations.		
PRACTICAL NO.06	**Design of Slabs**	**6 HOURS**
1. Design of one-way, two-way and cantilever slabs. (at least one of each type) 2. Design of stair case (Dog legged / Open well)		
PRACTICAL NO.07	**Design of Beams**	**4 HOURS**
Design of simply supported Continuous and cantilever beams at Ground, plinth and floor level.		
PRACTICAL NO.08	**Design of columns and footings**	**4 HOURS**
Design of columns along with footing (Axially loaded, uni-axially or bi-axially loaded)		

Full imperial size sheets (Hand drawn)
Full imperial size sheets covering all practical from 7 to 9. 1. Detailing of slabs and stair case. 2. Bar bending schedule and detailing of beams 3. Detailing of column and footing

TEXT BOOK

1. N. Krishnaraju, "Reinforced Concrete Structures",CBS Publishers and distributors, ISBN: 13 978 9385915369.
2. S.K.Duggal, "Design of Steel structures", McGraw Hill, ISBN: 978-0136077909
3. V. L. Shah and Karve,"Design of Reinforced Structures", Structures Publication, ISBN:813150990

REFERENCE BOOK

1. IS 800-2007, IS 456-2000, IS 875 (part I to IV), IS 2502, IS 3757, IS 400, SP-16 and SP6(4).
2. Karuna Moy Ghosh,"Practical Design of Steel Structures", Whittles Publishing ISBN 97814398357
3. Lus Simes da Silva, Rui Simes, Helena Gervsio, "Design of steel structures, Part 1-1 - General rules and rules for buildings", First Edition Author(s): Print ISBN: 9783433029732
4. Jack C. McCormac, Russell H. Brown, "Design of Reinforced Concrete", Feb 2013,2014, 9th Edition ISBN: 978-1-118-12984-5
5. W. H. Mosley J. H. Bungey, "Reinforced Concrete Design, Fourth Edition ISBN 978-0333-53718-3 ISBN 978-1-349-20929-3

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Transportation Engineering
	COURSE CODE	CV322
	COURSE CREDITS	4
RELEASED DATE : 1/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	30	20	150

PRE-REQUISITE : CV 101 Applied Mechanics , CV 201 Continuum Mechanics of Solids

COURSE OBJECTIVES :

CV322.CEO.1: To know about highway planning and geometric design of roads
CV322.CEO.2: To know about the traffic planning and fundamentals of traffic operations
CV322.CEO.3: To know about highway maintenance and public transportation systems
CV322.CEO.4: To know about basics of Bridges

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV322.CO.1: Explain basics of highway network planning
CV322.CO.2: Design highway geometrics
CV322.CO.3: Design Road Intersections
CV322.CO.4: Design flexible and rigid pavements
CV322.CO.5: Perform marshall mix design
CV322.CO.6: Explain factors affecting choice of bridge type

THEORY COURSE CONTENT		
UNIT 1	**Highway Network Planning**	**6 HOURS**
Different modes of transportation, role of highway transportation, classification, network patterns, planning surveys, 20-year road development plans, salient features, determination of road lengths, introduction to highway economics		
UNIT 2	**Traffic Engineering**	**6 HOURS**
Traffic characteristics; components of traffic stream: flow-speed-Density, measurement and analysis, q-k-v relationships, design hourly volume, concept of EPCU, capacity and level of service. Design of intersections. Introduction to grade separated intersections, cloverleaf, trumpet, flyovers. Traffic Management and Control: Traffic regulations, one-way streets, traffic signs, road markings, signals, warrants. Design of isolated fixed time signal, introduction to signal coordination.		
UNIT 3	**Highway Alignment and Geometric Design**	**6 HOURS**
Principles of highway alignment, requirements, controlling factors, engineering surveys, design controls and criteria, cross section elements, pavement surface characteristics, camber, carriageway, kerbs, road margins, formation, right of way, typical cross sections. Sight distance, Design of horizontal alignment, super elevation, transition curves. Design of vertical alignment, gradients, vertical curves.		
UNIT 4	**Pavement Materials, Mix Design and Design Of Pavements**	**6 HOURS**
Subgrade soil properties, CBR test, aggregates, desirable properties, tests, bituminous materials, bitumen and tar, tests. Bituminous mixes, requirements, design, Marshall Method. Types of pavement structures, functions of pavement components, design factors. Design of flexible pavements, methods, GI method, CBR method, IRC method, Burmisters method. Design of rigid pavements, design considerations, wheel load stresses, temperature stresses, frictional stresses, design of joints, IRC method of rigid pavement design.		
UNIT 5	**Highway Construction**	**6 HOURS**
Types of highway construction, construction of earth roads, gravel roads, WBM roads. Bituminous pavements, types, surface dressing, penetration macadam, built up spray grout, bitumen bound macadam, bituminous carpet, bituminous concrete. Cement concrete pavements. Highway Maintenance: Pavement failures, causes, failures in flexible pavements and rigid pavements. Maintenance of highways, routine maintenance, periodic maintenance, Special repairs. Strengthening of existing pavements, evaluation, overlay design. Highway drainage, surface and sub-surface drainage		

UNIT 6	Bridge Engineering	6 HOURS

Classification of bridges, components of bridges, determination of discharge imperical formula, direct methods, economical span, afflux, HFL, scour depth and clearance, factors influencing the choice of bridge super structure, approach roads. Loads on bridges: Brief, forces, stresse coming on bridges, IRC load specification, requirements of traffic in the design of highway bridges Substructure: Abutment, Piers, and wing walls with their types based on requirement and suitability. Type of Bridges

PRACTICAL All practicals are to be performed by students in a group of 4.		
PRACTICAL NO.01	**Aggregate Impact test for aggregate**	**2 HOURS**
Finding suitability of aggregates for different types of construction		
PRACTICAL NO.02	**Aggregate Crushing Strength of aggregate**	**2 HOURS**
Finding suitability of aggregates for different types of construction		
PRACTICAL NO.03	**Los Angeles Abrasion Test of aggregate**	**2 HOURS**
Finding suitability of aggregates for different types of construction		
PRACTICAL NO.04	**Flakiness index and Elongation index under shape Test of aggregate**	**2 HOURS**
Finding suitability of aggregates for different types of construction .		
PRACTICAL NO.05	**Specific Gravity and Water absorption test for aggregate**	**2 HOURS**
Evaluating quality of aggregates		
PRACTICAL NO.06	**Stripping Value test for aggregate**	**2 HOURS**
Evaluating quality of aggregates		
PRACTICAL NO.07	**Soundness test for aggregate**	**2 HOURS**
Evaluating quality of aggregates		
PRACTICAL NO.08	**Penetration test for bitumen**	**2 HOURS**
Classify bitumen based on its Penetration value		
PRACTICAL NO.09	**Ductility test for bitumen**	**2 HOURS**
Finding ductility value of bitumen		
PRACTICAL NO.10	**Softening Point test for bitumen**	**2 HOURS**
Finding Softening point of bitumen		
PRACTICAL NO.11	**Flash Point and Fire Point test for bitumen**	**2 HOURS**
Finding flash and fire point of bitumen		
PRACTICAL NO.12	**Specific gravity of bitumen**	**2 HOURS**
Finding the specific gravity of a bitumen sample		
PRACTICAL NO.13	**Bitumen extraction test**	**2 HOURS**
Finding the percentage content of bitumen in a bituminous mix		
PRACTICAL NO.14	**Marshall stability test**	**2 HOURS**
Finding the stability and flow value of a bituminous mix		

TEXT BOOK

1. S.K. Khanna and C.E.G. Justo, Highway engineering, Nem Chand and Brothers, 10th Edition, 2017, ISBN-10: 8185240930
2. S.P. Bindra, A Course in Highway Engineering, Dhanpat Rai and Sons, 2008, ISBN-10: 8189929860
3. S.P. Bindra, Principles and practice of Bridge Engineering, Dhanpatrai and Sons, 2012, ISBN-10: 8189928848
4. G.V.Rao, Principles of Transportation Engineering, Tata Mac-Graw Hill Publication, 2000, ISBN-10:007462363X

REFERENCE BOOK

1. Rangawala, Highway Engineering, Charotar publishing House, 10th Edition, 2015, ISBN10: 9385039091
2. Dr. L.R. Kadiyali and N.B. Lal, Principles and practices of Highway engineering, Khanna Publishers, 2005, ISBN-10: 8174091653.
3. Partha Chakraborty, Animesh Das, Principles of Transportation Engineering, Prentice Hall of India Pvt. Ltd., . ISBN: 978-81-203-2084-0
4. B.L. Gupta and Amit Gupta, Roads, Railways, Bridges, Tunnels and Harbour Dock, Standard publisher Distributors, 2009, ISBN-10: 8180140091.
5. D. Johnson and Victor, Essentials of Bridge Engineering, Oxford and IBH publishing co. Pvt. Ltd., 6th Edition, 2008, ISBN 13: 9788120417175.
6. S. Ponnuswamy, Bridge Engineering, Tata Mc GrawHill publishing co. Ltd., 3rd Edition, 2017, ISBN-10: 9339221079

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Water Resources Engineering
	COURSE CODE	CV323
	COURSE CREDITS	4
RELEASED DATE : 1/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : CV 301: Fluid Mechanics

COURSE OBJECTIVES :

CV323.CEO.1: To estimate the hydrological parameters for a given catchment or for a river basin
CV323.CEO.2: To analyze rainfall-runoff relationship using hydrograph methods.
CV323.CEO.3: To plan reservoirs as per the availability and demand of water.
CV323.CEO.4: To study the irrigation practices and design theories of canal systems
CV323.CEO.5: To estimate ground water availability using concepts of ground water hydrology

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV323.CO.1: Analyze hydro-meteorological data
CV323.CO.2: Develop rainfall-runoff relationship hydrological models.
CV323.CO.3: Estimate reservoir capacities, yield and losses.
CV323.CO.4: Design irrigation canals and canal network.
CV323.CO.5: Estimate irrigation efficiencies and canal capacity.
CV323.CO.6: Estimate aquifer parameters.

THEORY COURSE CONTENT		
UNIT 1	**Introduction: Hydrology**	**6 HOURS**
Hydrologic Cycle, Forms and types of precipitation, measurement of precipitation, analysis of precipitation data, computation of mean rainfall, Abstractions of Precipitation Evaporation, Evapotranspiration, Penman Monteith method, Infiltration, Hortons equation and Green Ampt method, stream gauging techniques.		
UNIT 2	**Hydrograph Theory and Floods**	**6 HOURS**
Factors affecting runoff, Rainfall-Runoff relationships, Components of Hydrograph, Base flow separation, Effective rainfall, Derivation of unit hydrograph, S-curve hydrograph, synthetic Unit Hydrograph and its derivation, Floods- Estimation of peak discharge, rational method, SCS method and unit hydrograph method, Design flood, return period, flood frequency analysis, probabilistic and statistical concepts in estimating peak discharge through reservoirs and open channels.		
UNIT 3	**Reservoir Planning**	**6 HOURS**
Investigations for reservoir planning, Mass curve and demand curves, Fixation of reservoir capacity from annual inflow and outflow, using elevation capacity curve and dependable yield, Reservoir losses, Reservoir sedimentation, Trap Efficiency, Useful life of reservoir, Costs of reservoir, Apportionment of total cost.		
UNIT 4	**Canal Systems**	**6 HOURS**
Diversion head works: Types of hydraulic structures, Layout of a diversion head work, Types of cross drainage works Canal Systems: Types of canals, Principles of design of stable irrigation canals, Silt theories, Introduction to canal structures. Surface and subsurface flow analysis in hydraulic structures: Hydraulic structures on permeable foundations, Seepage theories		
UNIT 5	**Introduction to Irrigation Engineering**	**6 HOURS**
Irrigation Water Requirements of Crops: Soil moisture and crop water relationship, principal Indian crops - their season and water requirement, crop planning, Calculations of canal and reservoir capacities duty, delta, irrigation efficiency, Assessment of Canal Revenue		
UNIT 6	**Introduction to Ground Water Hydrology**	**6 HOURS**
Occurrence of groundwater, types of aquifers, aquifer properties, Groundwater movement, Darcys law, Conductivity and Transmissivity, yield from a well under steady state conditions, Pumping tests, unsteady flow in unconfined aquifers, well losses and specific capacity.		

PRACTICAL: All assignments to be submitted		
PRACTICAL NO.01	**Rainfall Data collection, preparation of mass curve and hyetograph using MS Excel from the obtained data**	**2 HOURS**
To collect Rainfall data by natural siphon recording type/ Automated rain gauge and plot the mass curve and hyetograph from obtained data for its analysis.		
PRACTICAL NO.2	**Analysis of Inconsistency in rainfall data**	**2 HOURS**
To carry out the double mass curve analysis of rainfall data.		
PRACTICAL NO.3	**Marking catchment area on a topo-sheet and working out average annual precipitation by various methods**	**6 HOURS**
To study and carry out demarcation of the catchment area on a topo-sheet and work out average annual precipitation by Thiessens Polygon and Isohyetel Method		
PRACTICAL NO.4	**Determination of peak flood discharge in a basin using unit hydrograph technique**	**2 HOURS**
To carry out the unit hydrograph analysis to find peak flood dischargest.		
PRACTICAL NO.5	**Design of lined canal**	**2 HOURS**
To design cross section of a lined canal with the help of crop water requirement analysis.		
PRACTICAL NO.6	**Watershed delineation using Remote Sensing data**	**6 HOURS**
To delineate watershed using Remotely Sensed Digital Elevation Model data and develop a stream network for the delineated watershed.		
PRACTICAL NO.7	**Calculation of Normalized Difference Vegetation Index (NDVI) using soft computing tool QGIS**	**4 HOURS**
To perform Normalized Difference Vegetation Index (NDVI) analysis for the delineated watershed using soft computing tool (QGIS).		

TEXT BOOK

1. Punmia B C, Irrigation and Water Power Engineering, Lakshmi Publications, 2016, ISBN13: 978-8131807637
2. Santosh Kumar Garg, Hydrology and Water Resources Engineering, Khanna Publishers, 2017, ISBN-13: 978-8174090614
3. Santosh Kumar Garg, Irrigation engineering and hydraulic structures, Khanna Publishers, 2017, ISBN-13: 978-8174090478

REFERENCE BOOK

1. Engineering Hydrology, Subrahmanya, K., 2008, Tata Mc Graw Hill Pub. Co., New Delhi, ISBN 13: 9781259029974.
2. Patra.K.C, Hydrology and Water Resources engineering, Narosa Publications, New Delhi, 2008, ISBN-13: 978-8173198465
3. Jeya Rami Reddy.P, A text book of Hydrology, Laximi Publications, New Delhi, third edition, 2016, ISBN-13: 978-9380856049.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Operation Research
	COURSE CODE	CV331
	COURSE CREDITS	4
RELEASED DATE : 1/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : CV 311: Construction Planning and Management

COURSE OBJECTIVES :

CV331.CEO.1: To apply various optimization techniques in real world problems related to civil engineering
CV331.CEO.2: To evaluate maximum profit or minimum cost for interdisciplinary problems
CV331.CEO.3: To develop inventory models in terms of optimization
CV331.CEO.4: To study about assigning jobs to people in an efficient way
CV331.CEO.5: To demonstrate the sequencing techniques
CV331.CEO.6: To study how to play a game and replace models

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV331.CO.1: Solve the optimization problems based on real scenario
CV331.CO.2: Apply Linear programming for minimizing the project cost and maximizing its profit.
CV331.CO.3: Apply LPP to Transportations problems and solve assignment problems in an easy way
CV331.CO.4: A Make decision of replacing for suitable outcome using assignment modeling and games theory.
CV331.CO.5: Examine the real conditions of a project so that loss can be avoided
CV331.CO.6: Organize an appropriate order of operations to service facilities

THEORY COURSE CONTENT		
UNIT 1	**Introduction and Linear programming**	**8 HOURS**
Introduction: Definition and Scope of Operations Research in Civil Engineering and Managerial Decision-making process. Linear Programming: Introduction, Formulation of linear programming problems, graphical method of solving LP problem, simplex method, maximization and minimization, Degeneracy in LPP, Unbounded and, Infeasible solutions		
UNIT 2	**Duality and Dynamic Programming**	**8 HOURS**
Duality: Definition, Relationship between primal and dual solutions, Economic Interpretation, Post optimal of sensitivity analysis, Dual Simplex Method. Two phase method, Dynamic Programming multi stage decision process, Non-Linear programming-Uni-modal Function- Sequential Search Techniques		
UNIT 3	**Transportation Models and Assignment Problems**	**6 HOURS**
Transportation Models: Finding an initial feasible solution - North West corner method, least cost method, Vogels Approximation method, Finding the optimal solution, methods of optimal solutions, Special cases in Transportation problems - Unbalanced Transportation problem. Assignment Problems: Hungarian method of Assignment problem, Maximization in Assignment problem, unbalanced problem, problems with restrictions, travelling salesman problems. Decision theory		
UNIT 4	**Replacement Models and Game Theory**	**6 HOURS**
Replacement Models: Introduction, replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly - Individual replacement policy, Group replacement policy. Game Theory: Introduction, 2-person zero sum games, Maximin - Minimax principle, Principle of Dominance, Solution for mixed strategy problems, Graphical method for games.		
UNIT 5	**Sequencing Models and Queuing Theory**	**6 HOURS**
Sequencing Models: Introduction, General assumptions, processing n jobs through 2 machines, processing n jobs through m machines, Processing 2 jobs through m machines. Queuing Theory: Introduction, single channel - poission arrivals - exponential service times with infinite population and finite population, Multi-channel - poisson arrivals - Exponential service times with infinite population		
UNIT 6	**Optimization Techniques**	**6 HOURS**
Optimization Techniques: Introduction to optimization techniques, its application in Engineering Planning, Design and Construction. Various models; Objective function and constraints, Multivariable optimization without constraints, Multivariable optimization with equality constraints, convex and concave functions, regions and sets. Single objective and multi objective optimization Techniques		

PRACTICAL		
PRACTICAL NO.1		**2 HOURS**
Exercise on Graphical solution of linear programing problems		
PRACTICAL NO.2		**2 HOURS**
Exercise and case problems on Dual and Primal LP Problems		
PRACTICAL NO.3		**2 HOURS**
Exercise and case problems on Sensitivity Analysis		
PRACTICAL NO.4		**2 HOURS**
Exercise and case problems on Transportation Problems		
PRACTICAL NO.5		**2 HOURS**
Exercise and case problems on Queuing theory		
PRACTICAL NO.6		**2 HOURS**
Exercise and case problems on Game theory		
PRACTICAL NO.7		**2 HOURS**
Exercise on Inventory model		
PRACTICAL NO.8		**2 HOURS**
Exercise on Replacement theory		

TEXT BOOK

1. S.D. Sharma, Operations Research, Kedarnath, Ramnath and Co., Meerut
2. V.K. Kapoor, Operations Research, S. Chand Publishers, New Delhi.
3. R. Paneer Selvam, Operations Research, Second Edition, PHI Learning Pvt. Ltd., New Delhi.
4. Data Reconciliation by Prof. Shanker Narasimha

REFERENCE BOOK

1. Hamdy, A. Taha, Operations Research-An Introduction, Sixth Edition, Prentice Hall of India Pvt. Ltd
2. Harvey M. Wagner, Principles of Operations Research, Second Edition, Prentice Hall of India Ltd.
3. Operations Research: Principles and Practice-Ravindrav, Philip and S olberg, Wiley, India
4. Engineering Optimization Theory and Practice S.S. Rao., Wiely.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY **CIVIL ENGINEERING**	**COURSE NAME**	Project Management
	COURSE CODE	CV302
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	15	25	10	NIL	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP301.CEO.1: To introduce the basic concept and scope of Project Management.
HP301.CEO.2: To teach the theory of project Initiation and its analysis with project vision.
HP301.CEO.3: To introduce the concept of risk analysis and different types of tools used in project planning.
HP301.CEO.4: To guide learners monitoring and controlling project progress.
HP301.CEO.5: To introduce the concept of System dynamics, project audit and reviews.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP301.CO.1: Explain the concept of project management.
HP301.CO.2: Develop an ability to analyze scope, objective and vision of project initiation.
HP301.CO.3: Able to analyze risk and different tools of project planning.
HP301.CO.4: Develop an ability to measure progress of project by monitoring and controlling
HP301.CO.5: Identify the problems associated with project and reviewing the same.

THEORY		
UNIT 1	**Introduction Project Management**	**5 HOURS**
Meaning of Project Management, Classifications of projects, The Triple Constraint, The PMBOK project management process framework, Standard project team roles and project organisation (Functional, matrix, projectised), System approach, Systems development, System analysis, Project feasibility, Product life cycle, Project appraisal, Project contracting, The phases of SDLC.		
UNIT 2	**Project Initiation**	**5 HOURS**
Determining the project business reason, creating a project charter (market and technical analysis), financial analysis evaluation of project proposals, risk analysis, sensitivity analysis and social cost benefits analysis, defining scope and objectives, define a project vision.		
UNIT 3	**Project Planning**	**6 HOURS**
Planning fundamentals, identifying the project team responsibilities, project master plan, work breakdown structure, and other tools of project planning, estimating the efforts and duration of tasks, Identifying and analyzing risks, PERT,CPM,GERT,SLAM,DPM and resource allocation.		
UNIT 4	**Project monitoring and controlling**	**4 HOURS**
Executingthe project on time, Measuring project progress, Identifying corrective actions, Internal & external project control, control process, variance limit, issues in project control.		
UNIT 5	**Project Learning**	**4 HOURS**
System dynamics, Project audit, Change management, Project reviews and reporting.		

PRACTICALS		
PRACTICAL NO.01	**SDLC**	**2 HOURS**
Preparing for managing and developing a perfect model of SDLC for a particular given problem.		
PRACTICAL NO.02	**PERT and CPM**	**2 HOURS**
Planning a project under PERT and CPM charts		
PRACTICAL NO.03	**GERT and SLAM**	**2 HOURS**
Planning a project under GERT and SLAM charts		
PRACTICAL NO.04	**DPM**	**2 HOURS**
Solving practical problems under DPM		

PRACTICAL NO.05	**Variance Limit**	**2 HOURS**
Project monitoring under variance and controlling according to the given situations.		
PRACTICAL NO.06	**System Dynamics**	**2 HOURS**
Understanding System dynamics by solving case studies		
PRACTICAL NO.07	**Change Management**	**2 HOURS**
Solving case studies for learning how change management works.		
PRACTICAL NO.08	**Project Reviewing**	**2 HOURS**
Solving many practical problems by reviewing projects as well as some case studies.		

TEXT BOOK

1. James P. Clements and Gido, Effective Project Management Cengage India 5th Edition , ISBN: 9781111824051
2. John Nicholas, Project Management for Business and Technology: Principles and Practice, PHI-Eastern economy 3rd Edition, ISBN: 0-7506-7824-0
3. Juana Clark Craig, Project Management Lite, 2nd Edition, ISBN-13: 9781478129226
4. Harold R. Kerzner, Project Management, 11th Edition, ISBN: 978-1-118-48322-0

REFERENCE BOOK

1. Erik Larson and Clifford Gray, Project Management: The Managerial Process, McGraw Hill ISBN-10: 0-07-340334-2
2. Enzo Frigneti, The Practice of Project Management, KOGAN PAGE INDIA PRIVATE LIMITED,ISBN: 9788175545397
3. Geogary M. Horine, Project Management, QUE 4th Edition, ISBN: 9780134653914
4. Cynthia Stackpole Snyder, A User manual to The PMBOK Guide, ISBN: 9781118546604
5. Brown, James T., The Handbook of Program Management: How to Facilitate Project Success with Optimal Program Management, Second Edition. The McGraw-Hill Companies, 2014, ISBN 978-0071837859
6. Frame, J. Davidson, Managing Projects in Organizations: How to Make the Best Use of Time, Techniques, and People, 3rd edition, Jossey-Bass, 2003, ISBN 0-787-96831-5
7. Kerzner, Harold, ProjectManagement: Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 10th edition, Wiley, 2009, ISBN 0-470-27870-6
8. Meredith, R. Jack and Mantel, Jr., Samuel J., Project Management: A Managerial Approach, 7th edition, Wiley, 2008, ISBN 0-470-22621-8
9. Stackpole, Cynthia Snyder, A Project Manager's Book of Forms: A Companion to the PMBOK Guide, Wiley, 2009, ISBN 978-0470389843
10. Weiss, Joseph and Wysocki, Robert, Five-phase Project Management: A Practical Planning And Implementation Guide, Basic Books, 1992, ISBN 0-201-56316-9

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY **CIVIL ENGINEERING**	**COURSE NAME**	Basic Entrepreneurship
	COURSE CODE	CV303
	COURSE CODE	HP 303
	COURSE CREDITS	1
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : WF Orientation Course

COURSE OBJECTIVES :

HP303.CEO.1: To understand the fit between you and your entrepreneurialambitions
HP303.CEO.2: To find a problem worthsolving
HP303.CEO.3: To identify yourcustomers
HP303.CEO.4: To develop a solution for your customers' problems and problemsolution
HP303.CEO.5: To build and demonstrate anMVP
HP303.CEO.6: To structure a business model around the problem, customer, and solution and present your Business ModelCanvas.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP303.CO.1: Why entrepreneurship requires
HP303.CO.2: Outline the Problems Worth Solving by using various techniques like DT, JTBD
HP303.CO.3: Identify the Customer Segments and Early Adopters
HP303.CO.4: Develop the solution demo for identify problem.
HP303.CO.5: Create Business Model Canvas and Minimum Viable Product

PRACTICALS:		
PRACTICAL NO.01	**GET STARTED - Discover Yourself**	**2 HOURS**
Find your flow, Effectuation, Case Study: Tristan Walker: The extroverted introvert, Identify your entrepreneurial style.		
PRACTICAL NO.02	**IDEA/PROBLEM - Identify Problems Worth Solving**	**4 HOURS**
What is a business opportunity and how to identify it. Find problems around you that are worth solving. Methods for finding and understanding problems - (Observation, Questioning, DT, Jobs to be done (JTBD) How to run problem interviews to understand the customer's worldview Introduction to Design Thinking - Process and Examples Generate ideas that are potential solutions to the problem identified - DISRUPT GOOTB: Run problem interviews with prospects Class Presentation: Present the problem you "love" Form teams		
PRACTICAL NO.03	**CUSTOMER**	**6 HOURS**
Identify Your Customer Segments and Early Adopters The difference between a consumer and a customer (decision maker); Market Types, Segmentation and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns. Identify the innovators and early adopters for your startup.Craft Your Value Proposition Come up with creative solutions for the identified problems Deep dive into Gains, Pains and Jobs-To-Be-Done (using Value Proposition Canvas, or VPC) Identify the UVP of your solution using the Value Proposition section of the VPC Outcome-Driven InnovationClass Presentation: Communicating the Value Proposition- 1 min Customer Pitch		
PRACTICAL NO.04	**BUSINESS MODEL**	**4 HOURS**
Get Started with Lean Canvas Basics of Lean Approach and Canvas; Types of Business Models (b2b; b2c)		
PRACTICAL NO.05	**VALIDATION**	**9 HOURS**
Develop the Solution Demo Build solution (mockups) demo, How to run solution interviews, GOOTB: Run Solution interviews. Does your solution solve the problem for your customers: The problem-solution test. Sizing the Opportunity Differences between a Startup venture and a small business; Industry Analysis Understanding what is Competition and it's role, Analyze competition Case study: Blue Ocean Strategy Building an MVP Identify an MVP and build it - I; Document and validate your assumptions Build-Measure-Learn feedback loop and the MVP/Javelin Board How to do MVP Interviews GOOTB: Run MVP interviews Is there a market for your product –The product-market fit test Class Presentation: Present your MVP		
PRACTICAL NO.06	**MONEY**	**5 HOURS**
Revenue Streams Basics of how companies make money. Understand income, costs, gross and net margins. Identify primary and secondary revenue streams. Pricing and Costs Value, price, and costs; Different pricing strategies. Understand product costs and operations costs; Basics of unit costing Financing Your New Venture How to finance business ideas, Various sources of funds available to an entrepreneur and pros and cons of each, What investors expect from you, Practice Pitching to Investors and Corporates.		

PRACTICAL NO.07	TEAM	2 HOURS
Team Building Shared Leadership Role of a good team in a venture's success; What to look for in a team; How do you ensure there is a good fit? Defining clear roles and responsibilities. How to pitch to candidates to join your startup Explore collaboration tools and techniques - Brainstorming, Mind mapping, Kanban Board, #Slack.		
PRACTICAL NO.08	**MARKETING & SALES**	**2 HOURS**
Positioning Understand the difference between product and brand and the link between them. Define the positioning statement for your product/service and how it should translate into what your customers should see about that brand in the marketplace. Channels & Strategy Building Digital Presence and leveraging Social media, Creating your company profile page, Measuring the effectiveness of selected channels, Budgeting and planning. Sales Planning Understanding why customers buy and how buying decisions are made; Listening. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale.		
PRACTICAL NO.09	**SUPPORT**	**2 HOURS**
Planning & Tracking Importance of project management to launch and track progress Understanding time management, workflow, and delegation of tasks Business Regulation Basics of business regulations of starting and operating a business; Importance of being compliant and keeping proper documentation How to find help to get started		
PRACTICAL NO.10	**Capstone Project: Present Your BMC (Optional - and MVP)**	**2 HOURS**
BMC: Business Model Canvas. / MVP: Minimum Viable Product.		

REFERENCES

1. Read Forbes article and do Group Discussionhttps://www.forbes.com/sites/chrismyers/2015/12/16/find-your-flow-and-success-will-follow/
2. https://necrophone.com/2014/01/20/effectuation-the-best-theory-of-entrepreneurship-you-actually-follow-whether-youve-heard-of-it-or-not/
3. Use your self awareness to find out what motivates and drives Entrepreneurial activity - Ted Talk "What is your Entrepreneurial style - EntrepreneurKnow
4. Prof. Clay Christensen "IdentifyingCustomerNeeds" https://www.youtube.com/watch?v=yVCZ-7xSsCw
5. Understand the customer problem by GOOTB":by GOOTB":https://www.youtube.com/watch?v=sEENIZgscDw
6. https://www.forbes.com/sites/danschawbel/2013/12/17/geoffrey-moore-why-crossing-the-chasm-is-still-relevant
7. Value Proposition: https://www.youtube.com/watch?v=jZN6CUieuOQ&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
8. Value Proposition & Customer Need:https://www.youtube.com/watch?v=6FnG8pJL8yM&index=3&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
9. https://strategyn.com/turn-customer-input-into-innovation/ CASE STUDIES in ODI: https://jobs-to- be-done.com/tagged/case-study
10. TheLeanBMC https://www.youtube.com/watch?v=FjBe7UO1hc
11. Ash Maurya -Capture your BMC in 20
12. minuteshttps://www.youtube.com/watch?v=7o8uYdUaFR4&t=462s
13. Ash Maurya - How to Prioritize Risks on Your BusinessModel https://www.youtube.com/watch?v=01z7EPXS42k
14. https://pt.slideshare.net/bmorelean/dan-lemberg-lean-pitch
15. https://startups.fb.com/en-in/categories/development/
16. Designing Experiments: https://www.youtube.com/watch?v=WiMZWCg1Hu8&t=111s
17. Customer Development Process:https://www.youtube.com/watch?v=lLEebbiYIkI
18. Beating the Competition: https://www.youtube.com/watch?v=46uP6vOj5G0
19. Q&A with Garr :https://www.youtube.com/watch?v=SmJjjOrusyI
20. Basic Accounting Lingo for Entrepreneurs:https://www.youtube.com/watch?v=Y7Pm1jEEKE
21. Vinod Khosla : How Leaders can BUILDhttps://www.youtube.com/watch?v=bRCoBgCn1Q
22. Vinod Khosla: https://www.youtube.com/watch?v=VIrNLzTs9cw
23. How to Pitch the way VC's think, so you can convince co-founders : https://www.youtube.com/watch?v=fTgU7THoKCw
24. Tony Buzan:http://www.tonybuzan.com/about/mind-mapping/
25. Google : Think branding:https://www.youtube.com/watch?v=1l2CUjkg0ug
26. The Battle for your mind using Positioning:https://www.youtube.com/watch?v=jQrY8xRx-0 Design rules-https://www.igorinternational.com/, Web design course:https://www.coursera.org/specializations/web-designStrikingly Free : https://www.strikingly.com/online-resume/linkedin
27. https://certification.hubspot.com/inbound-sales-certification-course
28. https://www.udemy.com/courses/business/sales/
29. https://www.accountingtools.com/articles/2017/5/17/sales-budget-sales-budget-example

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Mini Project
	COURSE CODE	CV324
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE		MSE	ESE	IA	TERMWORK	DEMONSTRATION	
-	4	-	-	-	-	75	75

PRE-REQUISITE : Minor Project

COURSE OBJECTIVES :

CV324.CEO.1: To understand the Product Development Cycle through Mini project.

CV324.CEO.2: To undertake & execute a mini Project through a group of students

CV324.CEO.3: To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices, aesthetics and ergonomics.

CV324.CEO.4: To understand the role of professional and ethical practices, management principles,Technical documentation and communication skills in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV324.CO1: Execute an idea in a team as well as within constraints.

CV324.CO2: Acquire knowledge of the techniques, skills and modern engineering tools necessary for engineering practices.

CV324.CO3: Use standard engineering tools and processes for design, simulation, testing,analysis in implementation and deployment of theoretical idea into practice.

CV324.CO4: Use standard documentation and presentation tools for a professional report and presentation of the work.

PREAMBLE:
The main objective of this course is to understand the Product Development Cycle through mini Project, Where students will undertake & execute a project through a group of students. They will plan for various activities of the project and distribute the work amongst team members. The students will learn budgeting, planning for the project, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards, significance of aesthetics & ergonomics while designing a product. This course will develop students.abilities to transmit technical information clearly and delivery of presentation based on the Mini Project. They will understand the importance of document design standards by compiling technical report on the mini Project work carried out in a team.

PRACTICAL

Stage- 1	**Formation of group and Allocation of project adviser**	**Week 1**

- Project group formation and project advisor allocation by the department
- Project group shall consist of Minimum 02 and maximum 03 students per group (For detailed process please check Annexure-1 Mini project guidelines)
- Selection of finalized topic from approved project topics by the department.
- The project design idea shall be based on refereed papers, white papers, product, patent, application notes,industry problem, academic, institute or societal requirement, funded research, innovative thought,modification/ development in existing idea etc.
- Each student will maintain a logbook/project diary. This diary will be utilized to monitor project progress throughout

Stage- 2	Project Review -1 Internal review by project adviser	Week-2,3

- The project group will work on ,
  1. Conceptualization of an Idea
  2. Literature review
  3. Market survey
  4. Finalizing the Specificationsy
- Presentation of work progress to project adviser and proceed to project approval.

Stage- 3	Project Review -2 Project Approval	Week-4

- Presentation of concept to Department Review Committee (DRC) or Committee appointed by department.
- Review of concept and feasibility of project and necessary suggestions for implementation by the committee
- The project group will make corrections and continue their work.

Stage- 4	Project Review -3 Internal review by project adviser	Week-5,6,7,8,9

- The project group will work on ,
  1. System Architecture and Design
  2. Simulation /software development (As applicable)
  3. Manufacturing of project
  4. Assembly
  5. Testing
  6. Troubleshooting
- Presentation of work progress to project adviser and proceed to final project progress review.

Stage- 5	Project Review -4 Final Project progress review	Week-10,11

The project group will work on

1. Result analysis against specifications
2. Enclosure/Aesthetic design (As applicable)
3. Technical report generation (Draft copy)
4. Users manual (As applicable)
5. Bill of material etc.

The technical report may incorporate following points,

1. Title
2. Introduction and Concept
3. Literature & Market survey
4. Theory and relevance
5. Block diagram
6. Drawings (As applicable)
7. Specifications
8. Project plan
9. Bill of material
10. Enclosure/aesthetic design (As applicable)
11. Results
12. Results analysis
13. Conclusion
14. References

- Presentation of project work, draft copy of technical report , Final presentation etc. to DRC or Committee appointed by department.
- Review of project progress and necessary suggestions by DRC or Committee appointed by department for final presentation.
- The project group will make corrections. After clearing all comments from DRC; project can be presented to final l examination.
- Project must be approved by department to appear for final examination.

Practical- 6	Examination: Final Demonstration and presentation	Week-12

- Final examination will be divided in three parts
  1. Demonstration
  2. Presentation
  3. Project documentation
- For final examination project must be demonstrated in front of examiner panel. For Industry sponsored projects or other installations examiner panel can visit the project venue.
- All students must be physically present in front of examiner panel at the time of examination.
- Only demonstrated projects can be evaluated for presentation and documentation.
- Mini Project demonstration: Demo of project works and validation of project results to examiners panel.
- Mini Project presentation: Presentation of overall project work form project idea to implementation and deployment of project to examiners panel.
- Mini Project documentation: Presentation of technical documentary report to examiners panel

Assessment:

Internal Assessment:

1. Project Review -2 Project Approval -05 Marks
2. Project Review -3 Internal review by project adviser- -05 Marks
3. Project Review -4 Final Project progress review- 10 Marks

Examination: Final Demonstration and presentation

1. Mini Project demonstration: 20 Marks
2. Mini Project presentation: 20 Marks
3. Mini Project documentation: 15 Marks

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Curriculum

For

Final Year

Bachelor of Technology in Civil Engineering

2016-2020

(With Effect from Academic Year: 2019-2020)

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CURRICULUM STRUCTURE (2016 - 2020)

SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2019-20 (Part A)**
FINAL YEAR BACHELOR OF TECHNOLOGY	**RELEASE DATE**	**:**	**01/12/2018**
DEPARTMENT OF CIVIL EGG	**REVISION NO.**	**:**	**0.0**

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	CV401	Drinking Water & Sanitary Engineering	3	2	4
2.	DE1	CV41#	Discipline Elective - Refer Annexure.	3	--	3
3.	OE3	CV42#	Open Elective - Refer Annexure.	3	2	4
4.	HSS7	HP401	Engineering Economics	2	--	2
5.	HSS9/ SDP7	HP403/ CV403	Business Strategies / Urban & Town Planning	--	2	1
6.	SDP8	CV402	Project - I	--	8	4
7.	SDP9	CV404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	CV431	Estimation & Costing	3	2	4
2.	DE2	CV44#	Discipline Elective - Refer Annexure	3	--	3
3.	OE4	CV45#	Open Elective - Refer Annexure	3	2	4
4.	HSS8	HP402	Sociology	2	--	2
5.	SDP10	CV432	Project - II	--	8	4
TOTAL				11	12	17

L: Lecture, P: Practical

Department Elective (DE): 2 Courses		
	Course Code	**Name of Course**
1.	CV411	Building Services
	CV412	Advanced Design of Structures
	CV413	Railway Engineering
	CV414	Hydro Power Engineering
2.	CV441	Foundation Engineering
	CV442	Engineering Geology
	CV443	Design of Hydraulic Structures
	CV444	Air & Noise Pollution and Control measures
	CV445	Advances in Geospatial Engineering

Open Elective (OE): 4 Courses			
Construction Project Management	**Sl. No.**	**Course Code**	**Name of Course**
	1.	CV311	Construction Planning & Management
	2.	CV331	Operation Research
	3.	CV421	Financial Management
	4.	CV451	Statistical Methods in Construction

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Drinking Water and Sanitary Engineering
	COURSE CODE	CV401
	COURSE CREDITS	4
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE :

COURSE OBJECTIVES :

CV401.CEO.1: To know the basics, importance, and methods of water supply.
CV401.CEO.2: To study the various sources and properties of water
CV401.CEO.3: To understand the various methods of conveyance of water.
CV401.CEO.4: To learn the objectives and methods of water treatment and to study the features and function of different water treatment units
CV401.CEO.5: To learn the importance of rain water harvesting and water pollution.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV401.CO.1: Analyze characteristics of water and wastewater
CV401.CO.2: Estimate the quantity of drinking water and domestic wastewater generated
CV401.CO.3: Design components of water supply systems and water treatment plant
CV401.CO.4: Design components of sewerage system and sewerage treatment plant

THEORY COURSE CONTENT		
UNIT 1	**SOURCES, QUALITY AND QUANTITY PERSPECTIVES OF WATER**	**8 HOURS**
Surface sources, subsurface sources, physical characteristics, chemical characteristics, biological characteristics, water quantity estimation, water consumption rate, fluctuations in rate of demand, design periods, population forecasting methods. Intakes, types of Intakes, factors governing location of intakes, pumps, types of conduits, types of pipes, pipe appurtenances.		
UNIT 2	**WATER TREATMENT**	**6 HOURS**
Operations involved in water treatment, screening, plain sedimentation, sedimentation aided with coagulation, filtration, disinfection, water softening, miscellaneous treatments, water treatment plants (WTP). .		
UNIT 3	**WATER DISTRIBUTION**	**6 HOURS**
Requirements of a good distribution system, methods of distribution, systems of supply of water, Distribution reservoirs, layout of distribution system, design of distribution system, analysis of pipe networks of distribution system, appurtenances in distribution system, detection, and prevention of wastage of water in a distribution system, use of SCADA in water distribution.		
UNIT 4	**QUALITY AND QUANTITY PERSPECTIVES OF SEWAGE**	**6 HOURS**
Physical, chemical, and biological characteristics of sewage, analysis of sewage, estimation of dry weather flow, estimation of storm water flow		
UNIT 5	**SEWER AND SEWER APPURTENANCES**	**8 HOURS**
Hydraulic design of sewer, minimum velocity of flow in sewer, maximum velocity of flow in sewer, effect of variation in flow of sewage on velocity of flow in sewer, forms of sewer, design of storm water drains. Construction of sewer: factors affecting the selection of material for sewer construction, materials for sewers, joints in sewer, shapes of sewer, maintenance, cleaning and ventilation of sewer. Sewer appurtenances.		
UNIT 6	**TREATMENT OF SEWAGE**	**4 HOURS**
Preliminary and primary treatment of sewage: screening, grit removal basins, tanks for removal of oil and grease, sedimentation, sedimentation aided with coagulation. Secondary treatment of sewage: activated sludge process, sewage filtration, miscellaneous methods such as oxidation ditch, oxidation ponds, aerated lagoons, rotating biological reactors, sewerage treatment plant (STP), sludge disposal, reuse and recycle of effluent from STP.		

PRACTICAL		
Project No. 1		**14 HOURS**
Water quality assessment of river Indrayani and suggesting measures to improve its quality by determining Total Solids, D.O., B.O.D., C.O.D., Phosphates, Sodium, Potassium, calcium, Total nitrogen. Prepare a detailed report on it.		
Project No.02		**8 HOURS**
Checking the potability of water being supplied to the Alandi city and prepare a report on it containing the details like pH, Alkalinity, Total Hardness and its components, Chlorides, Chlorine Demand, Residual Chlorine, Turbidity and optimum dose of alum, MPN and Fluoride or iron. Suggest the various treatment measures to improve the quality of drinking water of Alandi city.		
Project No.03		**2 HOURS**
Determination of Sludge Volume Index of given sample		

TEXT BOOK

1. Water Supply Engineering: S. K. Garg, Khanna Publishers, ISBN-13: 978-8174091208
2. Water Supply and Sanitary Engineering: G. S. Birdie and J. S. Birdie, Dhanpat Rai Publishing Company, ISBN-13, 9788187433798
3. Environmental Engineering 1: Water Supply Engineering: B. C. Punmia, Ashok Jain and Arun Jain. Laxmi Publications (P) Ltd. ISBN 13: 9788174091208
4. Environmental studies by Rajgopalan- Oxford University Press. ISBN: 9780198072089
5. Waste Water Treatment Rao and Dutta. ISBN:9788120417120

REFERENCE BOOK

1. Environmental Engineering, Peavy, H.S, Rowe, D.R., and G. Tchobanoglous (1985), McGraw Hill Inc., ISBN-13: 978-0070491342
2. Water supply Engineering Environmental Engineering (Vol.I) P.N. Modi (2006), Standard Book House. ISBN-13: 978-8189401351
3. Sewage treatment and Disposal and waste water Engineering Environmental Engineering (Vol.II) P.N. Modi (2008), Standard Book House. ISBN-10, 8190089324.
4. Sewage Disposal and Air Pollution Engineering Environmental Engineering (Vol.II) S.K. Garg (1999), Khanna Publishers. ISBN-13: 978-8174092304
5. Wastewater Engineering Treatment and Reuse Metcalf and Eddy, Inc. (2003), McGraw Hill Inc., ISBN-10: 0070418780

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Building Services
	COURSE CODE	CV411
	COURSE CREDITS	3
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : CV 211: Building Design and Construction

COURSE OBJECTIVES :

CV411.CEO.1: To develop proficiency in building service industry.
CV411.CEO.2: To know the practices of building services
CV411.CEO.3: To develop proficiency in calculating estimates of services
CV411.CEO.4: To encourage students for entrepreneurship in service industry.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV411.CO.1: Understand the concepts of plumbing and drainage plan.
CV411.CO.2: Explain the concepts and techniques of water proofing and rain water harvesting.
CV411.CO.3: Develop a model showing details of the electrification work.
CV411.CO.4: Define principles of ventilation and air conditioning
CV411.CO.5: Select proper method for thermal insulating building.
CV411.CO.6: Select proper method for sound insulating building

THEORY COURSE CONTENT		
UNIT 1	**Plumbing and Sanitation**	**6 HOURS**
Plumbing Systems , Various Materials for system like PVC, GI, AC, CI, HDPE and stoneware, Various types of traps, Sanitary Fittings, , Concept of Plumbing and Drainage plan, underground drainage-location and use of manholes, disconnecting chambers, ventilating shafts, Need of Septic Tank, concept of plumbing and drainage plan.		
UNIT 2	**Rain water harvesting and water proofing**	**6 HOURS**
Introduction to rainwater harvesting. Concept of rain water Gutters. Rainwater outlet and Down Tank systems. Specifications as per IS Code. Waterproofing of New and Existing Structures Materials used, Non Destructive Water Proofing, Water proofing of terraces, Damp Proofing .resistance to capillary action.		
UNIT 3	**Electrification and Lighting**	**8 HOURS**
Concealed and Open Wiring, Requirements and Location of various points, Concept of earthling. Natural and artificial lighting-principles and factors, arrangement of luminaries, Distribution of illumination, Utilization factors.		
UNIT 4	**Air conditioning and Thermal Insulation**	**8 HOURS**
Air conditioning: Purpose, Classification, Principles, Various Systems . Various Industry requirements. Thermal Insulation: General concept, Principles, Materials, Methods, Computation of Heat loss and heat gain in Buildings		
UNIT 5	**Fire Safety**	**6 HOURS**
Fire resistance in building, Fire protection precautions, confining of fire, fire hazards, Characteristics of fire resisting materials, building materials and their resistance to fire, fire load.		
UNIT 6	**Acoustics and Sound Insulation**	**6 HOURS**
Acoustics: Absorption of sound, various materials, Sabines formula, optimum reverberation time, conditions for good acoustics. Sound Insulation: Acceptable noise levels, Noise prevention at its source, Transmission of noise. Noise control. Practical Applications.		

TEXT BOOK

1. Water Supply and Sanitary Engineering by S.C. Rangwala, Charotar Publishing House Pvt. Ltd, 29th Edition edition, ISBN-10: 9385039202, 8186314008
2. Building Energy Management Systems by G. Levermore Taylor and Francis. 2nd edition.. ISBN 978-04-1926140-7
3. Building Services Engineering by David V. Chadderton , Taylor and Francis. 5th edition ISBN-10: 0415413559
4. Building Construction by Dr. B.C.Punmia , Ashok Kumar jain , jain Book Depot , ISBN-13: 978- 8131804285

REFERENCE BOOK

1. Building Drawing with an Integrated Approach to Built Environment by M G Shah, C M Kale, S. Y. Patki; 5th Edition ISBN: 9780071077873
2. Building Services Engineers, 2015, by Peter, Trenter, N. A., Earthworks : a guide / London : ICE Publishing, 2015 ISBN: 9780849374920

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Advanced Design of Structures
	COURSE CODE	CV412
	COURSE CREDITS	3
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : CV 302 Structural Analysis, CV 321 Design of Structures

COURSE OBJECTIVES :

CV412.CEO.1: To introduce process of prestressing and prestressed concrete
CV412.CEO.2: To design prestressed beam sections for flexure and shear.
CV412.CEO.3: To analyse and design building frames for vertical and horizontal loads.
CV412.CEO.4: To design rectangular and circular water tanks on ground.
CV412.CEO.5: To analyse and design retaining walls.
CV412.CEO.6: To design special foundations like combined, strap, raft, etc.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV412.CO.1: Understand process of prestressing.
CV412.CO.2: Design prestressed beam sections for flexure and shear.
CV412.CO.3: Design building frames for vertical and horizontal loads.
CV412.CO.4: Design rectangular and circular water tanks on ground.
CV412.CO.5: Analyse and design retaining walls.
CV412.CO.6: Design special foundations like combined, strap, raft, etc

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Prestressed Concrete**	**7 HOURS**
Introduction to prestressed concrete, concepts, systems and methods of prestressing. Losses in prestress, Pre and Post tensioned members.		
UNIT 2	**Prestressed Girders**	**7 HOURS**
General philosophy of design, permissible stresses in concrete and steel, suitability of section, safe cable zone, design of simply supported pretension and post tension beams using limit state method. Design of rectangular and Symmetrical I sections. concept of end block, stress distribution in end block.		
UNIT 3	**RC building frames**	**7 HOURS**
Analysis and design of rectangular portal frame, with vertical loads, design of hinge at the base. Substitute frames, frames subjected to horizontal forces, portal method, cantilever method, factor method. Determination of design forces using load combinations of IS:1893.		
UNIT 4	**Water Tanks**	**7 HOURS**
Design of water tank- design criteria, permissible stresses, design of circular water tank resting on ground with flexible and rigid base, design of rectangular water tank resting on ground by approximate method.		
UNIT 5	**Retaining Walls**	**7 HOURS**
Various types of retaining walls, Analysis and Design of cantilever and counterfort retaining walls with horizontal and inclined surcharge.		
UNIT 6	**Special Foundations**	**7 HOURS**
Design of combined rectangular pad footings, slab beam type footing and strap footing. Design of Raft foundation.		

TEXT BOOKS;

1. N.Krishnaraju, " Prestressed concrete", Tata McGraw Hill, ISBN: 978-00-70634442
2. P. Dayaratnam "Advanced Reinforced Concrete Design" ISBN: 978-8123909899
3. Varghese, P. C "Advanced Reinforced Concrete Design" ISBN: 978-81-203-2787-0
4. Lin T.Y. 'Design of prestressed concrete structures", John Wiley and Sons, ISBN: 978-8126528035
5. Krishna Raju, Advanced Reinforced Concrete, 2nd edition, CBS Publishers, ISBN: 978-8123912257
6. J.E. Bowles, Foundation Analysis and Design Tata McGraw Hill, ISBN: 978007162675
7. N.V .Naik, Foundation Design Manual Dhanpat Rai and sons, ISBN: 9780415469364

REFERENCES

1. IS 3370- 1991- Part 1-4- 'Code of Practice for concrete structures for the storage of liquids' BIS
2. IS: 800 - 2007 "Use of Structural Steel in General Building Constructions", BIS.
3. IS: 875 - 2007 "Code of Practice for Design Loads" (Parts I, II and III).
4. IS: 456- 2000 'Indian Standard code of practice for plain and reinforced concrete", BIS
5. IS: 1893 -2002 'Indian Standard Code of practice for criteria for Earthquake resistant design of Structures", BIS
6. IS: 3370 -2009 "Indian Standard code of practice for concrete structures for storage of liquids", BIS.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Railway Engineering
	COURSE CODE	CV413
	COURSE CREDITS	3
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	50	20	-	-	100

PRE-REQUISITE : CV322 Transportation Engineering

COURSE OBJECTIVES :

CV413.CEO.1: Comprehend different parts of the rail track, their functions and its operation system with respect to construction and engineering applications

CV413.CEO.2: Explain essential features and requirements of different types of crossings and signal system, maintenance of tracks and required procedures

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV413.CO.1: explain components of Railway Track, different Railway Gauges

CV413.CO.2: design track gradients as per given requirements

CV413.CO.3: discuss various Types of Track Turnouts

CV413.CO.4: describe purposes and facilities at Railway Stations

CV413.CO.5: explain Interlocking and modern signal system

CV413.CO.6: describe Surface Defects on Railway Track and their Remedial Measures

THEORY COURSE CONTENT		
UNIT 1	**INTRODUCTION, ALIGNMENT OF RAILWAY LINES RAILS, TRACK FITTINGS AND TRACK STRESSES**	**9 HOURS**
The main objective of this course is to understand the Product Development Cycle through mini Project, where students will undertake and execute a project through a group of students. They will plan for various activities of the project and distribute the work amongst team members. The students will learn budgeting, planning for the project, engineering skills and processes, testing and effective troubleshooting practices, safety norms and standards, significance of aesthetics and ergonomics while designing a product. This course will develop students abilities to transmit technical information clearly and delivery of presentation based on the Mini Project. They will understand the importance of document design standards by compiling technical report on the mini Project work carried out in a team		
UNIT 2	**SLEEPER and GEOMETRIC DESIGN OF TRACK**	**9 HOURS**
Functions and Requirements of sleepers, Types and Spacing of Sleepers, Method Of Fixing Rails With Pre-stressed Concrete And Wooden Sleepers, Function and Specifications of Track Ballast. Necessity and Details of geometric design of track, Design of track Gradients, Grade compensation on curves. Curves and Superelevation.		
UNIT 3	**RESISTANCE TO TRACTION, POINTS AND CROSSINGS**	**9 HOURS**
Resistance to-friction, wave action, speed, track irregularity, wind, resistance to gradient, curvature, starting and accelerating. Stress in rails, sleepers, ballast and formation. Necessity of Points and Crossing. Track Layouts And Sketches of Turn Out, Types Of Crossing, Types of Track Turnouts		
UNIT 4	**RAILWAY STATIONS, YARDS, SIGNALING AND INTERLOCKING**	**9 HOURS**
Purposes, Facilities Required at Railway Stations. Requirements Of Station Yard, Classification Of Railway Stations, Types Of Yards. Visit to an Existing railway station and yard Objectives of signaling, Classification of signals. Types and working of Interlocking. Modern signal system. Visit to nearby railway crossing for signaling and locking system		
UNIT 5	**MAINTENANCE OF RAILWAY TRACK**	**9 HOURS**
Introduction of Maintenance Programme: Monsoon, Pre-Monsoon and Post- Monsoon Maintenance, Causes For Maintenance, Routine Maintenance, Tools For Railway Track Maintenance and Their Functions. Surface Defects And Their Remedial Measures		

TEXT BOOK

1. Satish Chandra and M.M. Agarwal, Railway Engineering, (2nd Edition) 2013, Oxford Higher Edu., ISBN : 9780198083535
2. S.C. Saxena, S.P. Arora, A Text Book of Railway Engineering, Dhanpat Rai Publications (p) Ltd, 2010, ISBN: 978-8189928834.

REFERENCE BOOK

1. J.S. Mundrey, Railway Track Engineering, 5th Edition, 2017, Tata McGraw Hill Publications, ISBN: 9352606485.
2. Clifford F. Bonnett, Practical Railway Engineering, 2nd Edition, 2005, Imperial College Press, ISBN: 1860945155.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Hydropower Engineering
	COURSE CODE	CV414
	COURSE CREDITS	3
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : CV 301: Mechanics of Fluid, CV 443: Water Resources Engineering

COURSE OBJECTIVES :

C414.CEO.1: Get knowledge of various Instruments used in Hydro power Engineering.
C414.CEO.2: Acquaint basic design of hydropower plants.
C414.CEO.3: Understand fundamental concepts of Hydraulic machines.
C414.CEO.4: Apply the design concepts of hydraulic turbines
C414.CEO.5: Describe design aspects of hydraulic pumps and their features
C414.CEO.6: Understand design elements of Power House.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV414.CO.1: Describe Instruments and their measurement techniques.
CV414.CO.2: Investigate requirements of Hydro power plants.
CV414.CO.3: Design components of Hydropower plant.
CV414.CO.4: Design Hydropower pumps
CV414.CO.5: Describe design details of Power House.

THEORY COURSE CONTENT		
UNIT 1	**HYDROLOGY AND INTRODUCTION TO HYDROPOWER ENERGY**	**6 HOURS**
Hydrology: runoff studies, Hydrological Cycle, Hydrograph, Flood Discharge Estimation, flood estimation studies, Forms of Energy, Need for hydropower energy and its power estimation. Law of conservation of energy, Assessment of hydropower potential of a basin, storage and pondage, load studies - Load curves, load duration curve, Connected load, maximum load, peak load, base load and peak load power plants, load factor, plant capacity factor, plant use factor, demand factor, diversity factor		
UNIT 2	**HYDROPOWER PROJECT**	**6 HOURS**
Types of hydropower projects and schemes, Classification of Hydropower Plants, Government Hydropower Policies, Environmental Issues, SWOT of a Hydropower Project, Survey and investigation, Process of development of site, Survey of land for Rehabilitation of affected people		
UNIT 3	**HYDROPOWER STATION**	**8 HOURS**
Brief idea about Major/Small/Mini/Micro Hydropower Stations, Layout Plan of Different Hydropower Stations. Brief idea about Generators and Turbines used in Major/Small/Mini/Micro Hydropower Stations. Pen Stock, Pipe Line and Tunneling, Surge Tank, Valve House, Synchronous Generator, Protection and Control equipment. Governors, Synchronous Generator and its Operational principle.Hydro dynamics of underground systems and types of underground stations, Economics of underground power stations, Civil works of micro/mini hydro schemes		
UNIT 4	**DESIGN OF HYDRAULIC TURBINES**	**8 HOURS**
Classification and Euler's equation for hydraulic machines of hydraulic turbines, Components of hydraulic turbines, energy losses in hydraulic machines, scale effects,cavitation, Standardization and selection of turbine, Francis turbine runner design, design of axial turbine runner including bulb turbine, hydraulic calculations of spiral casing and guide wheel, draft tube theory, standardization and applications draft rube, Pelton turbine design		
UNIT 5	**PUMPED STORAGE HYDROPOWER**	**4 HOURS**
Historical Review, Importance, Potential and Technology of a Pumped Storage Solution, Components and Layout, Reversible Power, Case studies, Seawater Pumped Storage Power Stations (SPSPS), Innovation: Seawater Pumped-Storage in Arid Regions		
UNIT 6	**ENVIRONMENTAL IMPACT ASSESSMENT FOR HYDROPOWER PROJECTS**	**4 HOURS**
Environmental impact of canal, dams, hydropower generation. Environmental impact assessment methodology including statutory requirement and procedures for obtaining environmental clearance for hydropower Projects. Modeling and Forecasting of Environmental parameters including as an environmental management tours and other environmental survey techniques.		

TEXT BOOK

1. Punmia B.C. Ashok K Jain, Arun K Jain, B. B. L Pande, Irrigation and Water Power Engineering, Laxmi Publications (P) Ltd. 2010. ISBN-13: 978-817491208
2. Water Power Engineering - M.M. Dandekar and K.N. Sharma, Dhanpat Rai and Sons
3. Arora, K.R., Irrigation, Water Power and Water Resources Engineering, Standard Publishers Distributors, Delhi, ISBN-10: 007041870.

REFERENCE BOOK

1. Centrifugal and axial flow Pump- A.J. Stephenoff, Krieger Publishing Company
2. Fluid Mechanics of Turbo Machinery- G. Wislicenus, Dever
3. Water Power Engineering - H.K. Barrows, New York: McGraw-Hill Book Company
4. Planning and Design of Hydro Electric Plants- Gilbert Gedeon, P.E, Continuing Education and Development Inc.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Financial Management
	COURSE CODE	CV421
	COURSE CREDITS	4
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : CV311: Project Management

COURSE OBJECTIVES :

CV421.CEO.1: To identify the Goals and Functions of Financial Management
CV421.CEO.2: To understand Financial Forecasting
CV421.CEO.3: To study working capital management

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV421.CO.1: Understand the basic of economic and finacial management
CV421.CO.2: Solve the issues of financial management in business operations
CV421.CO.3: Apply the principles of financial analysis, financial decisions, investment decisions to construction industry
CV421.CO.4: Employ working capital management in Indian construction industry with supply chain inventory management

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Financial Management**	**6 HOURS**
Review of engineering economics, elements of engineering economics, Time value of money, goals, objectives and principles of economic analysis,methods of economic analysis, necessity and importance of cash flows, ESCROW Account, Concept of project for major purchases.		
UNIT 2	**Financial Forecasting**	**6 HOURS**
Introduction, Basic tools: random variables, hypothesis tests, regression, time series. Smoothing and filtering: Simple exponential filters, trends and seasonality with filters.		
UNIT 3	**Financial Analysis**	**6 HOURS**
Introduction to financial analysis, Objectives and Limitations of Financial analysis. analysis of financial decisions, analysis of investment decision, Analysis of Operating Decision, Profitability Analysis, Returns and Liquidity .		
UNIT 4	**Working Capital Management**	**6 HOURS**
Nature and Scope of working capital, Factors determining working capital, estimating working capital, components of working capital. Inventory management, receivable management, working capital financing for Indian industry		
UNIT 5	**Supply Chain Management**	**6 HOURS**
Building blocks of a supply chain network. Business processes in supply chains. Types of supply chains. Strategic, tactical, and operational decisions in supply chains. Supply chain performance measures. Supply chain inventory management. Performance modeling of supply chains.		
UNIT 6	**Risk Management**	**6 HOURS**
Introduction, Types and Sources of Risk in Capital Budgeting, Risk Adjusted Discount Rate, Certainty Equivalent Approach, Probability Distribution Approach, Sensitivity Analysis, Simulation Analysis, Decision Tree Approach.		

PRACTICAL Project should be performed in group of 5 students		
PRACTICAL NO.1	**Title**	**14 HOURS**
Consider a financial management of typical construction industry or construction project. For that starting from planning stage to end of project, prepare detail report comprising of cash flow management, sources of funding, working capital management, profit and loss accounts, balance sheets, Income tax, GST and other necessary factors etc.		

TEXT BOOK

1. Khan M. Y. , Jain P. K. Financial Management McGrawHill, ISBN-13: 978-9339213053
2. Paramasivan C., Subramanian T. "Financial Management New Age International publishers, ISBN-13: 978-8122425734
3. Pandey I. M. "Financial Management", Vikas Publishing House, ISBN-13: 978-9325982291

REFERENCE BOOK

1. Goyal V. K. Financial Accounting2012,Prentice Hall Publications
2. Indian Institute of Banking and Finance (IIBF) Risk Management MacMillan Publishers India, ISBN-13: 978-9387914544
3. Chopra S., Meindl P. and Kalra D. V. Supply Chain Management2016, Pearson Education India, ISBN-13: 978-9332548237

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Sociology
	COURSE CODE	HP402
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP402.CEO.1: The course focuses on the society in India with an attempt to acquaint students with sociology as a social science and the distinctiveness as a social science.

HP402.CEO.2: It displays the relevance and significance of sociology in understanding the society and in attempting to solve its problems.

HP402.CEO.3: Many of the Sociological Changes are an answer to the age-old social norms and practices giving rise to a solution which is critical to social issues and problems.

HP402.CEO.4: The course sensitizes students to the emerging social issues and enables them to acquire sociological understanding of these issues with an ability to answer the problems.

HP402.CEO.5: Projects in Sociology are tools that facilitate the construction of knowledge in imparting the right attitude towards social issues .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP402.CO.1: Get acquainted to sociology as a social science.

HP402.CO.2: Explain the significance of sociology in solving problems.

HP402.CO.3: Derive solutions to critical social issues.

HP402.CO.4: Change their attitude towards social issues.

THEORY		
UNIT 1	**Introduction to Sociology**	**6 HOURS**
The nature of Sociology, meaning of Sociology: Origin, Definition, Scope, Culture, meaning, components, beliefs, values, norms, technology, diversity, towards a global culture.		
UNIT 2	**Sociolization**	**5 HOURS**
Socialization, Agents of Socialization, Heredity and Environment, Group, Social structure, Status and role, family, school, peer group, media, adult socialization, resocialization, Role of Social moments, Illustrations: Women, Tribal & Dalit Movements . **Further Reading:**		
UNIT 3	**Nature and factors of Social Change**	**5 HOURS**
Change: Meaning. Nature and factors of Social Change: Biological Factors. Demographic Factors, Technological Factors, Economic Factors Cultural Factors, Info-tech factors, Meaning of Gender sensitization, Discrimination, violence and Abuse. **Further Reading:**		
UNIT 4	**Visions of Social Change in India**	**4 HOURS**
Idea of development planning and mixed economy, Constitution, law and social change, Education and social change. **Further Reading:**		
UNIT 5	**Works and Economic Life**	**4 HOURS**
Social organization of work in different types of society- slave society, feudal society, industrial /capitalist society. Formal and informal organization of work. Labour and society. **Further Reading:**		
UNIT 6	**Introduction to Applied sociology**	**4 HOURS**
The use of Sociology: Introduction to applied Sociology-Sociology and social problems, Ecology and Environment: Pollution, Global warming and Greenhouse effect. Impact of Industrialization and Urbanization on Environment.		

REFERENCE BOOKS

1. T.B. Bottomore, Sociology: A Guide to Problems and Literature, Blackie and Sons Publishers, 1978, ISBN:978-0043000267
2. Sociology: A guide to problems and literature. Bombay: George Allen and Unwin (India): Harlambos, M.1998. ISBN: 978-0043000267
3. Sociology: Themes and perspectives. New Delhi Oxford University Press.: Inkeles, Alex, 1987
4. What is Sociology, Madras: Macmillan, India: Johnson, Harry M. 1995.
5. Sociology: A Systematic Introduction. New Delhi, Allied Publishers. ISBN: 978-8170231370 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Major Project - I
	COURSE CODE	CV402
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TERMWORK	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
-	8	–	–	–	100	50	150

PRE-REQUISITE : Minor Project, Mini Project

COURSE OBJECTIVES :

ME402.CEO.1: To implement the idea/ real time industrial problem/ current application from engineering domain

ME402.CEO.2: To evaluate an alternative approaches and justify the use of selected tools and methods

ME402.CEO.3: To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.

ME402.CEO.4: To understand the roles and responsibility, accountability and learn team work ethics

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME402.CO1: Solve real life problems by applying the knowledge and problem solving ability.

ME402.CO2: Analyze alternative approaches, find feasible solution and apply most appropriate one.

ME402.CO3: Use standard engineering tools and processes for analysis, design, simulation, testing, Implementation and deployment of idea into practice.

ME402.CO4: Participate effectively in multidisciplinary and heterogeneous teams exhibiting team work, inter-personal Relationship, conflict management and leadership quality.

PREAMBLE:

objective of this Major Project-I course is to understand the Product Development through team work. The students will able to shoulder the roles and responsibility and activity distribution amongst them. The students will learn designing, budgeting, planning, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards while developing the application/ product. The students will deliver a presentation on the advancement in Technology pertaining to the selected project topic and able to understand importance of document design and professional ethics.

GUIDELINES:

Project work stage I is an integral part of Project work. In this, the student shall complete the partial work of project, consist of problem statement, literature survey, Project specification and planning. The students expected to complete the project at least up to the design phase. As a part of project phase-I, candidate shall appear for two reviews and delivered the presentation on the advancement of selected project topic. The student shall submit the duly certified project report in standard format for satisfactory completion of work by the concern Advisor and Dean of the School.

The examinee will be assessed by panel of examiner of which one is necessarily as a external examiner. The assessment will be broadly based on work undergone, content delivery, presentation skills, documentation, question answer and report.

Preparation of the Literature survey paper and communicating and publishing in relevant publishing agency agency is recommended. Bonus 10 marks will be awarded.

Follow the guideline and formats as mentioned in guideline document Annexure-I.)

TIMELINE

1. Formation of Project Group: 2 Weeks (1st ,2nd week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (3rd, 4th week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (7th, 8th week)
4. Preparation of Project Progress Report I (week 9th and 10th)
5. Project Phase-I Evaluation by external examiner (End Semester by 12th, 13th week)

ASSESSMENT

1. Internal Assessment (TW)

a. Project Review -1 Project Approval -30 Marks

b. Project Review -2 Analysis and Design- -30 Marks

c. Project Review -3 Project progress Report-I and Presentation - 40 Marks

d. Paper publication/IPR -10 marks (Bonus)

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Estimation and Costing
	COURSE CODE	CV431
	COURSE CREDITS	4
RELEASED DATE : 1/6/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : CV 211: Building Design and Construction

COURSE OBJECTIVES :

CV431.CEO.1: To have knowledge in preparation of block estimates and detail estimation, tender practices, contract procedures, and valuation.

CV431.CEO.2: The student will be able to prepare estimates, call for tenders and execute works.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV431.CO.1: To have understanding of managerial functions like planning, organizing, staffing, leading and controlling and have same basic knowledge on international aspect of management

CV431.CO.2: To take out of quantities for various construction projects

CV431.CO.3: To prepare estimates for various civil engineering works

CV431.CO.4: To calculate rates for various items of construction

CV431.CO.5: To draft specifications and tender notice.

CV431.CO.6: To prepare valuation report for residential building

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Estimation**	**6 HOURS**
Philosophy, Purpose, Methods of estimation, Types of estimates - Approximate estimates and detailed estimate, Approximate Estimates- Meaning, purpose, methods of approximate estimation of building and other civil engineering projects like roads, irrigation/ water supply, sanitary engineering, electrical works.		
UNIT 2	**Quantity Surveying**	**10 HOURS**
Methods of estimating-P.W.D. and center-line methods of working out quantities. Calculation of quantities for Load bearing and R.C.C framed structures		
UNIT 3	**Rate Analysis**	**8 HOURS**
Standard Data, Observed Data, Schedule of rates, Market rates, Assessment of Man Hours and Machineries for common civil works, Rate Analysis,		
UNIT 4	**Specifications**	**6 HOURS**
Specifications: Meaning, purpose and types. Drafting detailed specifications for materials, quality, workmanship, method of execution, mode of measurement and payment for major items like, excavation, stone/ brick masonry, plastering, ceramic tile flooring, R.C.C. work.		
UNIT 5	**Tenders and Contracts**	**6 HOURS**
Tende: Tender notices, types, tender procedures, Drafting model tenders and E-tendering. Contract Types of contracts, Formation of contract and Contract conditions.		
UNIT 6	**Valuation**	**4 HOURS**
Valuation: Purpose of valuation. Meaning of price, cost and value. Factors affecting value. Types of value: only Fair Market Value, Book Value, Salvage/ Scrap Value, Distressed Value and Sentimental Value. Concept of freehold and leasehold property. Estimation versus valuation. Meanings of depreciation and obsolescence. Valuation of any building		

PRACTICAL All assignments to be submitted		
PRACTICAL NO.1	**Working out quantities**	**12 HOURS**
Working out Detailed Quantities for i) A Two storied R.C.C. framed building based on prevailing DSR rates for Pune District ii) Estimation of quantities of steel reinforcement for an R.C.C. frame structure		
PRACTICAL NO.02	**Earthwork Estimate**	**6 HOURS**
Preparation of Estimate for Earthwork (for a road, Railway, Canal or a small dam) using Computer Software		
PRACTICAL NO.03	**Rate Analysis**	**4 HOURS**
Analysis of Rates For the two Items of Works based on the prevailing market rates of various items and labour involved.		
PRACTICAL NO.04	**Draft Tender Notice**	**4 HOURS**
Preparation of draft of tender notice For the Work for which Detailed Estimate is Prepared		

TEXT BOOK

1. Building Construction by Dr. B.C.Punmia , Ashok Kumar jain , jain Book Depot , ISBN-13: 978-8131804285

REFERENCES

1. Building Drawing with an Integrated Approach to Built Environment by M G Shah, C M Kale, S. Y. Patki; 5th Edition ISBN: 9780071077873
2. Building Services Engineers, 2015, by Peter, Trenter, N. A., Earthworks : a guide / London : ICE Publishing, 2015 ISBN: 9780849374920
3. Building Energy Management Systems by G. Levermore Taylor and Francis. 2nd edition.. ISBN 978-04-1926140-7
4. Building Services Engineering by David V. Chadderton , Taylor and Francis. 5th edition ISBN-10: 0415413559

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Foundation Engineering
	COURSE CODE	CV441
	COURSE CREDITS	3
RELEASED DATE : 1/6/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : CV212 Geotechnical Engineering

COURSE OBJECTIVES :

CV441.CEO.1: To have knowledge about exploration of soil .
CV441.CEO.2: To acquire the capacity to design both shallow and deep foundations
CV441.CEO.3: To have adequate knowledge about concept and design of special types of foundation

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV441.CO.1: identify types of soil and its characteristics
CV441.CO.2: adopt suitable soil exploration technique and interpretation of related data
CV441.CO.3: design both shallow and deep foundation
CV441.CO.4: design special cases of foundations

THEORY COURSE CONTENT		
UNIT 1	**Soil Properties and Exploration**	**9 HOURS**
Soil properties and its applications, Soil exploration techniques comparisons, Sounding tests, Geophysical methods, Sampling, Interpretation of Laboratory and field Testing		
UNIT 2	**Introduction Shallow Foundation**	**9 HOURS**
Introduction to bearing capacity of soil Basic definitions Bearing capacity theories Types of shear failure Effect of water table Bearing capacity from plate load test. Shallow foundation- Types and Applications. Floating foundation. IS code method - Rectangular and Circular Footings. Settlement of Foundations		
UNIT 3	**Deep Foundations**	**9 HOURS**
Pile foundations Types of piles, Factors affecting choice of types of piles, Load carrying capacity of piles, Pile group, Group efficiency, Lateral resistance of piles, settlement of piles, Negative skin friction, Settlement of pile group in cohesive soil by approximate method. Piers and Caissons- Definition, Types and uses. Well foundation: components, sand island method		
UNIT 4	**Special Foundations**	**9 HOURS**
Classification of Foundations, Special foundations, Raft foundation, types of rafts, Beams on elastic foundation, Footing subjected to moments, Footing subjected to tension, Geotextiles, various methods of foundations design, Technological consideration in Geotechnical Engineering.		

TEXT BOOK

1. Gopal Ranjan and A. S. Rao, Basic and Applied Soil Mechanics, G. K. Publications Pvt. Ltd, Dec. 2006, ISBN : 978-81-224-1223-9 .
2. V. N. S. Murthy, Soil Mechanics and Foundation Engineering, B. S. Publications, Dec 2009, ISBN 0 324 06680 5.
3. B. C. Punmia, Soil Mechanics and Foundation Engineering, Laxmi Publishing Co, Dec. 2005, ISBN: 81-7008-081-9.
4. Dr. K .R. Arora, "Soil Mechanics and Foundation Engineering", (8th Edition) 2015, Standard Publishers, ISBN:81-8014-112-8
5. Donald P. Coduto, Foundation Design: Principles and Practices, Prentice Hall 2 edition (July 20, 2000)ISBN-10: 0135897068

REFERENCE BOOK

1. Joseph E Bowles, Engineering Properties of Soils And Their Measurements, McGraw Hill Publications, 1992, ISBN: 0070067783, 9780070067783.
2. Palanikumar. M, Soil Mechanics, PHI Learning Private Limited, 2013, ISBN: 978-81-203-4838-7.
3. R. F. Craig "Craigs Soil Mechanics", E and FN Spon an imprint of Chapman and Hall, 2012, ISBN: 0-415-32702-4, 0-415-32703-2
4. Venkatramaiah, C. Geotechnical Engineering, (3rd edn.) New Age International Publishers, New Delhi, 2006.
5. Braja M. Das, Principles of Foundation Engineering, Cengage India Private Limited, Eighth edition (1 August 2017), ISBN-10: 9386650959

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Engineering Geology
	COURSE CODE	CV442
	COURSE CREDITS	3
RELEASED DATE :	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : CV212 Geotechnical Engineering

COURSE OBJECTIVES :

CV442.CEO.1: To understand the basic building units of which the solid crust of the earth

CV442.CEO.2: To have knowledge about the nature of geological structures and their importance in the civil engineering structures.

CV442.CEO.3: To study the nature of geographic distribution of rocks and engineering properties of rock on the earth.

COURSE OUTCOMES :

Students successfully completing the course will be able to

CV442.CO.1: classify the geological hazards, erosion, flooding, dewatering and seismic investigations etc.

CV442.CO.2: demonstrate the earthquake and landslide to check the stability of structure

THEORY COURSE CONTENT

UNIT 1	Engineering Geology	9 HOURS

Applications of geology to Civil Engineering projects, Engineering properties of rocks. Engineering considerations of structures of rocks. Rock as a construction material, Building stone, Road metal and Ballast. Surface and subsurface geotechnical investigation, Geological mapping, sampling, drilling, photogeology, geophysical methods. Application of geology for location, design and construction of dams, hydraulic structures, bridges and tunnels

UNIT 2	Indian Geology and Geomorphology	9 HOURS

Principles of stratigraphy and geological time scale, Physiographic and tectonic divisions of India, Introduction to the stratigraphy of India. Geomorphologic processes and their external and internal agents, Geological action of wind, glaciers, running water and oceans and their resulting landforms, Geomorphic forms and their consideration in engineering structures.

UNIT 3	Structural Geology and Earthquake Engineering	9 HOURS

Deformation of rocks, folds, parts of fold, its classification and nomenclature, Identification joints, its definition, nomenclature and classification, Definition, nomenclature and classification of fault, Recognition of fault and fold in the field and its effect on outcrops, Outliers and inliers, Problems on dip, strikes, thickness and depth of rock strata. Earthquake waves, causes and effects, magnitude and intensity. Tectonic zones of India. Landslides: causes of landslides and their prevention .

UNIT 4	Geohydrology	9 HOURS

Hydrologic cycle, Occurrence and distribution of groundwater, Water table and water table maps. Aquiclude, Aquifuge and aquifers, confined and unconfined aquifers, Springs and geysers, Importance of ground water studies in Civil Engineering Works

TEXT BOOK

1. Singh Parbin, Engineering and General Geology, 2009,S. K. Kataria and Sons
2. Kesavulu, Textbook of Engineering Geology,2009,Macmillan India Ltd
3. Aggarwal P,"Earthquake Resistant Design of Structures" Prentice Hall India Learning Private Limited; 1 edition (2006) ISBN-10: 9788120328921

REFERENCE BOOK

1. Sengupta Supriya, Introduction to Sedimentology 1994, A. A. Balkema
2. Park R. G., Foundation of Structural Geology, 2004 Routledge Publishing House
3. Roberto Villaverde , "Fundamental Concepts of Earthquake Engineering" CRC Press; 1 edition (26 January 2009) ISBN-10 : 9781420064957 NPTEL Videos and Web notes of course Soil Mechanics

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Design of Hydraulic Structures
	COURSE CODE	CV443
	COURSE CREDITS	3
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE :

CV 301: Mechanics of Fluid
CV 323: Water Resources Engineering
CV212: Geotechnical Engineering

COURSE OBJECTIVES :

CV443.CEO.1: Get knowledge of various types of dam and its components
CV443.CEO.2: Understanding of advanced fluid mechanics principles
CV443.CEO.3: Convey the knowledge on design criteria and stability analysis of different types of dams
CV443.CEO.4: Apply the design concepts of hydraulic structures
CV443.CEO.5: Describe theories of structures on Pervious Foundations.
CV443.CEO.6: Design different Canal regulatory works.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV443.CO.1: Perform the stability analysis of gravity dams.
CV443.CO.2: Explain the causes of failure of different types of dams and their design criteria
CV443.CO.3: Design components of dam outlet works.
CV443.CO.4: Design minor irrigation structures.
CV443.CO.5: Integrate relevant concept and methodologies in the area of hydraulics, water resources and geotechnical engineering.

THEORY COURSE CONTENT		
UNIT 1	**Reservoir Planning**	**6 HOURS**
Investigations, Capacities, Zones of storage, Mass Inflow and Mass Demand curves, Life of Reservoir, site assessment and selection of type of dam, Introductory perspectives, Embankment types and Characteristics - Gravity dams and characteristics - Spillways and ancillary works		
UNIT 2	**Structures on Pervious Foundations**	**6 HOURS**
Diversion head works- layout and functions of components, Weir and Barrage- Causes of failure of weir on permeable soils, Blighs theory, limitations, Design of vertical drop weir, Khoslas theory of independent variables, Khoslas corrections.		
UNIT 3	**Earthen Dam**	**6 HOURS**
Types, principles of design, Material and construction, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden drawdown, steady seepage condition		
UNIT 4	**Gravity Dam**	**6 HOURS**
Concepts and design criteria, Loading, Gravity dam analysis, Stability, Elementary profile of gravity dam, Concrete for dams, Roller Compacted Concrete gravity dams, Foundation treatment, Construction joints, Galleries in gravity dams. (Dam site visit is recommended)		
UNIT 5	**Dam outlets works**	**6 HOURS**
Ogee spillway and its design, Cavitations on spillway, design feature, Design principles and Design of spillways, Chute spillways, Principles of Energy dissipators based on jump height curves, stilling basins, Spillway crest gates, vertical lift and radial gates, their design principles		
UNIT 6	**Design of canal regulating structures**	**6 HOURS**
Design of Hydraulic Structures: Aqueduct (Type-III), siphon aqueduct (Type-III), Canal falls - notch type, Siphon well type, Sarda type (High Discharge only),Glacis fall and Cross regulator, Head regulator and functions. (Regulatory structures site visit is recommended).		

TEXT BOOK

1. Modi, P.N., Introduction to Water Resources And Waterpower Engineering, Standard Publication, Delhi, ISBN-13: 978-8189401290
2. Punmia B.C. Ashok K Jain, Arun K Jain, B. B. L Pande, Irrigation and Water Power Engineering, Laxmi Publications (P) Ltd. 2010. ISBN-13:978-8131807637
3. Garg, S.K., Irrigation Engineering and Hydraulic Structures, Khanna Publishers, ISBN-13: 978-8174090478.
4. Arora, K.R., Irrigation, Water Power and Water Resources Engineering, Standard Publishers Distributors, Delhi, ISBN-10: 8180140075

REFERENCE BOOK

1. Asawa, G, L Irrigation And Water Resources Engineering, New Age Int. Ltd. ISBN-13: 978-8122416732.
2. Sathyanarayana M. C. Water Resources Engineering-Principles and Practice, New Age Internatio ISBN-13:
3. Varshney, R.S. Theory and Design of Irrigation Structures - Vol III, Nem Chand and Bros., Roorkee, ISBN-13:
4. P. Novak, A. I. B. Moffat, C. Nalluri and R.Narayanan, Taylor and Francis, U. K., Hydraulic Structures, ISBN-13:
5. Manual on Barrages and Weirs on Permeable Foundation, Publication 179, (Volumes I and II), Central Board of Irrigation and Power, New Delhi.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Air and Noise Pollution and Control Measure
	COURSE CODE	CV444
	COURSE CREDITS	3
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE :

COURSE OBJECTIVES :

CV444.CO.1: To study various metrological parameters affecting air pollution
CV444.CO.2: To understand the plume behavior for atmospheric stability conditions
CV444.CO.3: To study dispersion modeling and assess the concentrations
CV444.CO.4: To know about air pollution controlling devices
CV444.CO.5: To understand the effects of pollutants on the environment
CV444.CO.6: To study the effects of noise pollution and its control techniques.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV444.CO.1: Understand meteorological aspects of air pollution
CV444.CO.2: Understand air pollution control methods
CV444.CO.3: Design unit operations for pollution control.
CV444.CO.4: Identify sampling and analysis techniques for air quality assessment
CV444.CO.5: Understand noise pollution control methods

THEORY COURSE CONTENT		
UNIT 1	**INTRODUCTION**	**6 HOURS**
Definition, Types of pollution, Indoor and outdoor air pollution, Sources and classification of Air Pollutants, Photochemical smog, Effects of air pollution on health, vegetation and materials, Global effects of air pollution..		
UNIT 2	**METEOROLOGICAL ASPECTS**	**6 HOURS**
Basis and statistical consideration of sampling sites, Devices and methods used for sampling gases and particulates, Isokinetic sampling, Ambient air quality monitoring as per the procedure laid down by CPCB, Air Pollution indices, National Ambient Air Quality Standards (NAAQS) 2009.		
UNIT 3	**AMBIENT AIR SAMPLING AND MONITORING**	**6 HOURS**
Investigations for reservoir planning, Mass curve and demand curves, Fixation of reservoir capacity from annual inflow and outflow, using elevation capacity curve and dependable yield, Reservoir losses, Reservoir sedimentation, Trap Efficiency, Useful life of reservoir, Costs of reservoir, Apportionment of total cost.		
UNIT 4	**AIR POLLUTION CONTROL**	**6 HOURS**
Air (Prevention and Control) Pollution Act, 1981, The Environment (Protection) Act, 1986, Environmental Related Current Topics- Ozone Layer depletion, Carbon credit, Green bench, Carbon Sequestration, Carbon footprints, Emission standards for stationary and mobile sources.		
UNIT 5	**LEGISLATION AND REGULATION**	**6 HOURS**
Air (Prevention and Control) Pollution Act, 1981, The Environment (Protection) Act, 1986, Environmental Related Current Topics- Ozone Layer depletion, Carbon credit, Green bench, Carbon Sequestration, Carbon footprints, Emission standards for stationary and mobile sources. .		
UNIT 6	**NOISE POLLUTION AND CONTROL**	**8 HOURS**
Noise: Definition, Characteristics, Sources, Types of noise, Impact of noise, Permissible limits, Noise Acts. Noise measuring equipment: Sound Level Meter, Octave Band Analyser, Statistical Analyser and Noise Average Meter Enclosures and Barriers: Lead as a noise barrier, Plenum barriers, Barrier around pipe, wires and rectangular ductwork, High transmission loss ceilings, Acoustical foams, Nylon in noise reduction, damping compounds.		

TEXT BOOK

1. Air pollution and control, C.S. Rao, New age international publication, ISBN: 812241835X, 9788122418354
2. Air Pollution, Rao M.N. and Rao H.V.N., Tata McGraw Hill Publishing Company Ltd., ISBN 10: 0074518712
3. Advanced Air and noise pollution control, Wang L.K., Pereira N.C., Hung Y.T., Volume I and II, Humana Press, ISBN 1-58829-359-9

REFERENCES

1. Environmental Engineering, Peavy, Rowe and Tchobanoglous: McGraw-Hill , ISBN 13: 9780070491342
2. Air Pollution Control Theory, Martin Crawford: McGraw-Hill Inc., ISBN 13: 9780070134904
3. Air Pollution: Its Origin and Control, Wark and Warner: Prentice Hall, ISBN 13: 9780673994165
4. Noise pollution and control strategy, Singal S.P., Alpha Science International, ISBN 13: 9781842652374
5. Environmental Pollution Principles, Analysis and Control, Narayanan P., CBS Publishers, ISBN 13: 9788123914510

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Advances In Geospatial Engineering
	COURSE CODE	CV445
	COURSE CREDITS	3
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	-	30	40	30	-	-	100

PRE-REQUISITE : CV 202: Geospatial Engineering Technology

COURSE OBJECTIVES :

CV445.CEO.1: To understand the basics of Geodetic Surveying
CV445.CEO.2: To understand how to perform Hydrographic Surveying using Nautical Sextant
CV445.CEO.3: To know setting out of construction
CV445.CEO.4: To find points on earth surface and in space
CV445.CEO.5: To prepare plans of an area by aerial Photogrammetry
CV445.CEO.6: To know in detail the concept of remote sensing and GPS in identification of land features from space

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV445.CO.1: Locate points from fixed baseline and determine positioning using GPS
CV445.CO.2: Utilize knowledge of Hydrographic Surveying to identify points and solve problems
CV445.CO.3: Develop Setting out various Civil Engineering works
CV445.CO.4: Make necessary adjustment of errors occurred during geospatial observation
CV445.CO.5: Read photographs and prepare plans by aerial survey
CV445.CO.6: Interpret satellite images in terms of utility and precision of data collection

THEORY COURSE CONTENT		
UNIT 1	**Geodetic Surveying, Total station**	**4 HOURS**
Introduction to Plane and Geodetic Surveying, Geodetic surveying- Objects, Methods of Geodetic Surveying, Introduction to Triangulation, classification of Triangulation Systems, Triangulation figures, Concept of well-conditioned Triangle, selection of stations, intervisibility and height of stations		
UNIT 2	**Hydrographic Surveying**	**8 HOURS**
Objects, applications, Establishing controls, Shore line survey, Sounding, Sounding Equipment, Methods of locating soundings conventional and using GPS , Reduction of soundings, Plotting of soundings, Nautical Sextant and its use, Three point problem and its use, solution of three point problem by all methods, Tides and tide gauges, determination of MSL.		
UNIT 3	**Setting out works**	**8 HOURS**
a) Trignometric Levelling - Terrestrial refraction, Angular corrections for curvature and refraction, Axis Signal correction, Determination of Difference in Elevation by single observation and reciprocal observations. b) Setting out of Construction works. Setting out of a bridge, determination of the length of the central line and the location of piers. Setting out of a tunnel		
UNIT 4	**Triangulation Adjustment**	**8 HOURS**
Kinds of errors, Laws of weights, Determination of most probable values (MPV) of conditioned and independent quantities, Method of Least Squares, Indirect observations, Probable error and its determination, Distribution of error to the field measurements, Normal equation, Method of correlates. Station and figure adjustment of Geodetic Quadrilateral without central station. Spherical triangle, Calculations of spherical excess and sides of spherical triangle.		
UNIT 5	**Aerial Photogrammetry**	**8 HOURS**
Objects, Classification- qualitative and quantitative photogrammetry Applications, comparison of map and aerial photograph, Vertical, Tilted and Oblique photographs, Scale of and Relief displacement in vertical photograph, Ground control points (GCPs), Flight planning Introduction to digital photogrammetry, different stereo viewing techniques in digital photogrammetry, Method of creation of elevation data, Different products of digital photogrammetry, Drones/UVA in aerial surveying.		
UNIT 6	**Remote Sensing and GPS**	**8 HOURS**
Remote sensing concepts Idealized remote sensing system characteristics Types of remote sensing system Remote sensing from space Data interpretation application of remote sensing LIDAR RADAR -SONAR. GPS Basics system overview working principle of GPS Satellite ranging calculating position Ranging errors and its correction GPS surveying Methods static, Rapid static, DGPS and Kinematic methods Real time and post processing DGPS visibility diagram GAGAN		

TEXT BOOK

1. R Subramanian, Surveying and Levelling, Oxford University Press, 2013 2nd Revised edition. Revised, ISBN-13: 9780198085423
2. Dr. B. C. Punmia, Ashok Kumar Jain, A.K. Jain Higher Surveying- III, Laxmi Publication 2005 Edition, ISBN-13: 9788170088257
3. T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling Vol. II, Pune Vidyarthi Publication

REFERENCE BOOK

1. Alfred Leick,GPS Sattelite Surveying, Wiley Publishers, 2003 3rd Revised ed, ISBN- 13: 9780471059301
2. M. Chandra and S. K. Ghosh, Remote sensing and Geographical Information System, Narosa Publishing House, 2006 Edition, ISBN-13: 9781842652787
3. Peter Burrough, Rachel A McDonnell, Rachael A McDonnell, Principles of Geographical Information System Oxford University Press, 1998 2nd ed, ISBN-13: 9780198233657
4. M.D.Saikia, Surveying, PHI Learning Pvt . Ltd, 2010 Edition, ISBN-13:97881203398

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Statistical Methods in Construction
	COURSE CODE	CV451
	COURSE CREDITS	4
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : CV311 Construction Planning and Management, CV331 Operation Research

COURSE OBJECTIVES :

CV451.CEO.1: To furnish students with statistical methods which will let them to solve Construction Engineering and Management problems

CV451.CEO.2: To pioneer students to quantitative and qualitative methods for conducting meaningful inquisition and research in construction

CV451.CEO.3: To develop optimizing approach towards construction problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV451.CO.1: Simulate, Sample, and test the data that will accurately addresses the research problem

CV451.CO.2: Analyze result appropriateness using correlation and regression analysis.

CV451.CO.3: Understand basic principles of statistical inference

CV451.CO.4: Apply probability and distribution concepts in construction.

CV451.CO.5: Compute probabilities and check for hypothesis and failure conditions.

THEORY COURSE CONTENT		
UNIT 1	**Project Probability and Distributions**	**8 HOURS**
Probability theory and its importance: Definition of probability, Rules of Probability, The Bayes theorem. Random variable. Probability distribution. Mean or Expectation of Random variable. Properties of Mean of Expectation. Theoretical probability Distributions: Binomial Distribution, Poisson distribution. Normal Distribution, Exponential Distribution, Beta, Gamma.		
UNIT 2	**Sampling and Testing**	**8 HOURS**
Sampling and sampling distribution: Probability samples, Non-probability samples, sample Random sampling, Other sampling schemes, sampling distribution and standard error, some Sampling and Quality control. Use of concepts of standard deviation, coefficient of variance, ranges in quality control of concreting and similar such activities. Testing Hypothesis: Sampling of distribution Test based on Normal Distribution, students- t test, chisquare, K-S test for goodness of fit and distribution. Analysis of variance- one way and two way classification.		
UNIT 3	**Correlation and Regression Analysis**	**8 HOURS**
Correlation types, co-efficients. Bi-variate Frequency Distribution, Scatter Diagram, Correlation Analysis. Regression and Multivariate Analysis, Multiple Regression Analysis-Non linear Regression. Use of regression analysis in resources management		
UNIT 4	**Simulation**	**6 HOURS**
Simulation Types, case studies in construction using simulation techniques, simulation softwares used. Griffis waiting line Method.		

ASSIGNMENTS		
Assignment No. 1	**Exercise of Probability distribution**	**4 HOURS**
Apply principles of Probability and distribution to real life construction Problems		
Assignment No. 2	**Sampling and Testing**	**6 HOURS**
a. Collect data using one of the methods of sampling. b. Test the data collected through testing methods (Any two)		
Assignment No. 3	**Data Simulation**	**8 HOURS**
Simulate data using Monte-Carlo simulation using random numbers.		
Assignment No. 4	**Correlation and Regression Analysis**	**6 HOURS**
Exercise on correlation and regression analysis		

TEXT BOOK

1. Probability and Statistics for Engineers Miller, Freund-Hall, Prentice India Ltd. 20092
2. Applied Mathematics for Engineers and Physiscists-pipes and Harvill. McGraw Hill 8 International Edition, 1970
3. Sampling techniques-Cochran, Wiley Series, 2008.
4. Shrivastava, Shenoy and Sharma, Quantitative Techniques for Managerial Decisions, Wiley, 1989
5. Applied Statistics for Civil and Environmental Engineers by Kottegoda.- Stratford Books

REFERENCE BOOK

1. Statistics-Concepts and Controversies-David S. Moore-Freeman Company, New York.
2. Reliability Principles and practices-Calabro-McGraw Hill Book Company, 1963
3. P S Gahlot and B M Dhir, " Construction Planning and management", First Edition New Age International Limited Publishers

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP401
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP401.CEO.1: To enable the students to understand the basic concepts of Economics

HP401.CEO.2: To impart knowledge, with respect to practical applications of Economics .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP401.CO.1: The students would have understood the basic concepts of Economics.

HP401.CO.2: The students would have acquired knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions

HP401.CO.3: The course is designed to improve critical thinking, problem solving skills by using economic models and theories and predict economic relationships

HP401.CO.4: Students entering any profession in the workforce today must be able to utilize these basic economic principles. The course expected to develop critical understanding of current topics in economics and able to formulate their own opinions on economic issues

THEORY		
UNIT 1	**Introduction to Economics**	**6 HOURS**
Economic Issues and Concepts; How Economist Work ; Theory of Demand & Supply; Meaning, Determinants, Law of Demand and Supply, Equilibrium between Demand & Supply; Elasticity of demand, price elasticity, income elasticity, cross elasticity.		
UNIT 2	**Micro Economics**	**6 HOURS**
Revenue Concepts; Cost Concepts, Short run & Long run cost Concepts and curves, opportunity cost. Break even analysis; meaning, explanation, numerical. Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Competition , Oligopoly). **Further Reading:**		
UNIT 3	**Macro Economy**	**5 HOURS**
National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP,NDP, Personal income, disposal income. Inflation; meaning, types, causes, measures to control. **Further Reading:**		
UNIT 4	**Indian Economy**	**5 HOURS**
Characteristics of an Indian Economy; Human Development Index(HDI); Concepts of Foreign Trade, Goods and Services Tax(GST); Micro Small and Medium Enterprise(MSME) ; Foreign Direct Investment(FDI);Unemployment: meaning, types, causes, remedies. **Further Reading:**		
UNIT 5	**Introduction to Banking & Money Market**	**6 HOURS**
Banking; meaning, types, functions, Commercial Banks- Instruments in Operation of an Account, Central Bank- RBI; its functions, Concepts- CRR, Bank Rate, Repo Rate, Reverse Repo rate, SLR; Introduction to Money and Capital Market , Introduction to Fiscal policy- meaning and tools. **Further Reading:**		

REFERENCE BOOKS

1. R.Paneerselvam :Engineering Economics, , PHI publication ISBN : 978-81-203-5172-1
2. Robbins S.P. and Decenzo David A :Fundamentals of Management: Essential Concepts and Applications, Pearson Education, ISBN-13: 9780133499919
3. N Gregory Mankiw : Economics: Principles of Economics, Cengage Learning ISBN-10: 1305585127
4. L.M. Prasad: Principles and Practices of Management ISBN-10: 9351610500; ISBN-13: 978-9351610502
5. Tripathy and Reddy :Principles of Management ISBN, 1259050572, 9781259050572
6. Dr. K. K. Dewett & M. H. Navalur, S. Chand :Modern Economic Theory ISBN, : 9788121924634 .

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Bussiness Strategies
	COURSE CODE	HP403
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : HP303 : Basics of Entrepreneurship

COURSE OBJECTIVES :

HP403.CEO.1: To understand the importance of growth and to be able to chart a path towards growth.
HP403.CEO.2: To revisit your business model
HP403.CEO.3: To give a growth orientation your customer acquisition, operations, revenue and sales strategy
HP403.CEO.4: To list and comply with the requirements relating to regulatory compliance
HP403.CEO.5: To be able to effectively pitch your venture to potential stakeholders .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP403.CO.1: Rephrase business model and Identify additional customer segments
HP403.CO.2: Identify channels and strategy for budgeting and planning.
HP403.CO.3: Make use of Legal aspect, Mentors, Advisors, and Experts in startups
HP403.CO.4: Analyze the growing revenues, sales planning, strengthening sales, improving margins
HP403.CO.5: Estimate customer lifetime value, competitor and peer's financial models for venture growth
HP403.CO.6: Formulate the all procedure for new venture ; Product market fit and A Pitch Deck

PRACTICALS:		
PRACTICAL NO.01	**Orientation to Growth**	**3 HOURS**
Getting Ready for Growth Why growth stage is different compared to startup phase, Why Product-Market fit is not enough, Case study, To assess readiness for growth, To chart a growth path .		
PRACTICAL NO.02	**Customers**	**3 HOURS**
Expanding Customer Base Revisit your business model and develop few variants (more business model types). Identify additional customer segments that your solution can address. Evaluate business models for the new customer segments. Relook at the Problem Statement (can you expand the scope and scalability of your business by repositioning your problem statement?) Explore additional ways to monetize.		
PRACTICAL NO.03	**Traction**	**12 HOURS**
Scaling How to gain traction beyond early customers. Defining traction (in quantifiable terms) and identifying the most important metrics to measure traction. Calculate cost of new customer acquisition. Estimate your customer lifetime value (LTV). Identifying waste in your operations and focusing your team on what is important for traction. **Channels and Strategies** The Bulls eye framework, Identify Channels using Bulls Eye Framework, Measuring the effectiveness of selected channels, Budgeting and planning.		
PRACTICAL NO.04	**Money**	**20 HOURS**
Growing Revenues. Stabilizing key revenue streams. Developing additional revenue streams (licensing, franchising). Exploring new channels and partnerships. Sales Planning. Understanding why customers buy and how buying decisions are made; Listening skills. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale. Strengthening Sales. Building a professional sales team. Sales compensation and incentives. Sales planning, setting targets Improving Margins. Testing price elasticity. Optimizing costs and operational expenses. Advanced concepts of unit costing. Financial Modeling. Financial modeling of your venture's growth. Analyzing competitor and peer's financial models.		
PRACTICAL NO.05	**Support**	**5 HOURS**
Legal Overview of legal issues and their impact on entrepreneurs. Importance of getting professional help (legal and accounting). Importance of being compliant and keeping proper documentation. Patents and Intellectual property. Trademarks. Mentors, Advisors, and Experts. The importance of a Mentor and how to find one. Role of business advisors and experts for specific targets in your growth plan.		
PRACTICAL NO.06	**Capstone Project: Pitch Your Venture**	**2 HOURS**

REFERENCE BOOKS

1. Zero to One: Note on Start Ups, or How to Build the Future, Peter Thiel and Blake Masters, Virgin Books,ISBN: 9780753555194
2. Tools of Titans: The Tactics, Routines, and Habits of Billionaires, Icons, and World-Class Performers, Timothy Ferriss, Random House,ISBN: 9781785041273.
3. Disrupted: My Misadventure in the Start-Up Bubble, Dan Lyons, Penguin Publishers, ISBN: 9781786491022
4. Unshakeable: Your Financial Freedom Playbook, Tony Robbins, Simon & Schuster Publishers,ISBN: 9781471164934
5. Grit: The Power of Passion and Perseverance, Angela Duckworth, Vermilion Publishing,ISBN: 9781785040207
6. Big Magic: Creative Living 4BEyond Fear, Elizabeth Gillbert, Penguin Publishers,ISBN: 9781408886182
7. Pivot: The Only Move That Matters Is Your Next One, Jernny Blake, Random House,ISBN: 9780241975466
8. Financial Management; Text and Problems, 7th Ed., A Khan and P. K. Jain, TataMacGraw Hill, ISBN: 9789353162184
9. Financial Management; Theory and Practice, 4th Ed., Prasanna Chandra, TataMacGraw Hill, ISBN: 9789339222574
10. Essentials of Management : An International and Leadership Perspective, 10th Ed., Harold Koontz and Heinz Weihrich, MGH, ISBN: 9789339222864
11. Kites in a Hurricane: Startups from Cradle to Fame, Rishi Kapal, SAGE Publishing, ISBN: 9789352807895
12. Wadhwani Foundation Advanced Course in Entrepreneurship

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Urban and Town Planning
	COURSE CODE	CV403
	COURSE CREDITS	1
RELEASED DATE : 1/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
-	2	-	-	25	-	25	50

PRE-REQUISITE : CV 211: Buildings Design and Construction, CV 202: Geospatial Engineering Technology

COURSE OBJECTIVES :

CV403.CEO.1: To familiarize students with potentials of planner and the system of Spatial planning and spatial policy, laws,

CV403.CEO.2: To develop skills in developing and presenting spatial development project for a building complex with greenery and selected urban facilities. .

CV403.CEO.3: To develop skills in preparing land use plan for selected urban area dealing with various acts, guidelines planning agencies

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV403.CO.1: Apply the principles and elements of architectural composition in spatial planning system and spatial policies in India.

CV403.CO.2: Demonstrate the knowledge of contemporary ideas of shaping space in cities, Make Landscape design in urban context by solving issues involved in Urban Renewal

CV403.CO.3: Acknowledge scope and breadth of planning theories, its contemporary manifestation

CV403.CO.4: Conduct civic surveys for development plans and short and long range planning for alternative infrastructure systems while designing for present and future cities and regions.

CV403.CO.5: Apply UDPFI guidelines for new towns and new global trends in planning techniques and carry out spatial analysis, mapping and planning using GIS by Identify specific data and methodologies for effective mapping and evaluation of special townships

PRACTICAL		
PRACTICAL NO.1		**4 HOURS**
Study and analysis of Development Plan of a town with respect to land use, services, infrastructure, street, furniture, housing etc		
PRACTICAL NO.2		**2 HOURS**
Study of salient features of urban renewal program (group work)		
PRACTICAL NO.3		**4 HOURS**
Study of special townships: Report on any existing town planning scheme, visit any project nearby (group work).		
PRACTICAL NO.4		**6 HOURS**
Neighborhood development plan (group work)		
PRACTICAL NO.5		**4 HOURS**
Comparative study on any existing new towns and planned towns like PCNTDA, New Mumbai etc. focusing on disaster management and Infrastructure (individual work).		
PRACTICAL NO.6		**4 HOURS**
The smart city approach as a response to emerging challenges for urban development (individual work)		

TEXT BOOK

1. Town Planning By G K Hiraskar –Town Planning by S Rangwala
2. Building Drawing and Built Environment- 5th Edition Shah, Kale, Patki–Planning
3. Legislation by Koperdekar and Diwan.
4. G. K. Bandopadhyaya, Text Book of Town Planning
5. Climate Responsive Architecture Arvind Krishnan.
6. Introduction to Landscape Architecture by Michael Laurie

REFERENCE BOOK

1. Manual of Tropical Housing And Building By Koenigsbeger. Publisher: Universities Press; Latest Edition edition (1975), ISBN-10: 9788173716973, ISBN-13: 978-8173716973 .
2. Sustainable Building Design Manual. Publisher: The Energy and Resources Institute, TERI (30 January 2009), ISBN-10: 9788179930533 ISBN-13: 978-8179930533
3. The Urban Pattern: City planning and design by Gallion and Eisner. Publisher: Van Nostrand Reinhold; Subsequent edition (1 February 1986, ISBN-10: 0442227310, ISBN-13: 978-044222731
4. Design of cities by Edmond bacon. Publisher: Penguin USA; Revised edition (20 May 1976), ISBN-10: 0140042369, ISBN-13: 978-0140042368

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Major Project - II
	COURSE CODE	CV432
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE		MSE	ESE	IA	TERMWORK	DEMONSTRATION	
-	8	–	–	–	100	50	150

PRE-REQUISITE : Major Project I

COURSE OBJECTIVES :

ME432.CEO.1: To follow the standard guideline to meet the objective for development of Project.
ME432.CEO.2: To test rigorously before deployment of Systems
ME432.CEO.3: To Verify and Validate the work Undertaken
ME432.CEO.4: To Consolidate the work and preparation of final report

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME432.CO1: Show the evidence of independent evaluation.
ME432.CO2: Critically analyzed the result and their implementation methodology.
ME432.CO3: Validate the results with standard tools and techniques.
ME432.CO4: Understand the importance of documentation and report writing.

PREAMBLE:

objective of this Major Project-II to implement the full and final project and the report. After The remaining project work which consist of selection of approach / methodology / tools and techniques, Designing, installation, results and performance evaluation. Also includes the comparative analysis and validation of result. Should prepare the Project report as per format for satisfactory completion of work certified by concern project advisor and dean. .

It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded.:

Follow the guideline and formats as mentioned in guideline document.(Annexure-II):

GUIDELINES:

In Project Work Stage-II, the student shall complete the remaining project work which consists of Selection of Methodology, Tools and Technology, Installations, Design, Implementations, testing, Results, performance analysis if applicable (discussions using data tables per parameter considered for the improvement with existing/known algorithms/systems) and comparative analysis and validation of results and conclusions. The student shall prepare and submit the report of Project work in standard format for satisfactory completion of the work that is the duly certified by the concerned advisor and Dean of the school.

It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded.

Follow the guideline and formats as mentioned in guideline document.(Annexure-II)

TIMELINE

1. Presentation of Project Review- 3 Project Progress Monitoring DRC review (Week 5th)
2. Presentation of Project Review 4 Project Progress Monitoring and Report Preparation (Week-8th)
3. Internal Examination/ Project Expo: Project-2 Demonstration and presentation- (Week 10th)
4. External Examination: Project-2 Demonstration and Presentation- (End semester-Week 12th or 13th)

ASSESSMENT

1. Internal Assessment

a. Project Review -3 Progress Monitoring - 30 Marks

b. Project Review -4 Progress Monitoring and Report Preparation -30 Marks

c. Project Expo/ Examination- Evaluation Presentation and Demonstration- 30 Marks

d. Paper publication/presentation/IPR -10 Marks

2. Examination: Final Demonstration and presentation a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

Final Year

Bachelor of Technology in

Civil Engineering

(Amendments for Semester Long Internship)

2016-2020

(With Effect from Academic Year: 2019-2020)

1. ELIGIBILITY:

I. No live backlogs
II. CGPA of 8.50 and above
III. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student)

Only students satisfying the above criteria can be permitted for semester-long internship in any MNCs / R&D laboratories such as DRDO, NCL, NEERI, CDAC and Institutions like IITs/ NITs / International institutes of repute.

2. DEADLINES:

For the current batch, the applications must be submitted by 30, November 2019 by all students desired to go for the semester long internship.

3. APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including details of the organization along with the details of the project in brief, copy of their CV and copies of mark sheet to the respective school Corporate Relations (CR) coordinator. The application must be as per the format given below.

Application for Internship Program

Sr. No.	Particulars	
1	Name of the applicant (in bold letters)	
2	Gender	
3	School	
4	Date of Birth & Age (as on date)	
5	Roll Number & PRN	
6	Address for correspondence with mobile / telephone number and email-id	
7	Name & address of the Institute / Industry	
8	Core Domain of Institute / Industry	
9	Contact details Supervisor / HR Mobile / Telephone number and email-id	
10	Period of internship	24-26 weeks
11	Details of the Project proposed	

Signatures

Student	**School Internship Coordinator**
Approved by:	
No. of credits proposed	6 / 10
Dean – School of _____ Engineering	MIT AOE Seal
Date:	

4. RULES AND CONDITIONS:

I. Sponsored project should be along the same track of the minor (Open Elective) chosen by the student. (desirable)

II. Semester long internship is applicable only in the 8th semester. The distribution of credits for the VIII semester is as follows

DC	Department Core	4 Credits
DE	Department Elective	3 Credits
OE	Open Elective	4 Credits
HSS	Humanities & Social science	2 Credits
SDP	Skill development and Project	4 Credits

III. For a student who are opting for a semester long internship, 10 credits (OE, HSS and SDP) will be awarded if OE is part of the internship otherwise 6 credits will be awarded.

IV. The equivalence courses for the DC, DE and OE are floated by the Schools.

V. The credits of DC, DE and OE should be earned through MOOC courses.

VI. If a student is not able to successfully earn the credits of the DC / DE / OE within the stipulated time, they will not be eligible for graduation in the same academic year.

5. ASSESSMENT METHOD:

Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel.

I. The Panel for the evaluation should be 3 members (if 3 credits) or 4 members (if 5 credits). The composition of the team would be as follows.

- **a.** Dean, Respective School
- **b.** Project Guide
- **c.** CR Coordinator / Project Coordinator
- **d.** Project Guide (Industry)
- **e.** The domain expert (In case of 5 credits, as per the minor specialization)

II. Presentation I at the end of 45th day and presentation II at the end of 90th day from the start of the project combined to a total weightage of 5 credits **(3 credits if OE is exempted).** It can be possible to do through Skype, if acceptable to the panel. **In Grade card it will be mentioned as SLIP – Project Design.**

III. Presentation at the end of the Internship Work and Final Internship Report after the completion of the Internship Work combined for a total weightage of 5 credits **(3 credits if OE is exempted)** and should be as per the template). **In Grade card it will be mentioned as SLIP – Project Implementation.**

5.2 ASSESSMENT METHOD FOR OTHER COURSES RUN THROUGH INSTITUTE LMS:

Credits for the courses run through Go-Webinar will be assessed using the following methods.

I. There will be SIX assignments (one per unit) to be submitted through the moodle. This will have a weightage of 30% of the total score. This contributes to the IA for the course.

II. There will be SIX quizzes (one per unit) to be conducted through moodle. This will have a weightage of 30% of the total score. This contributes to the ISE for the course.

III. One FINAL presentation to be done at the end and evaluated by a team of THREE members including the Course Champion, Instructor and any other nominated member by the respective School Dean. This will have a weightage of 40% of the total score. This contributed for the ESE of the course.

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2019-20** (PART B)
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**RELEASE DATE**	**:**	**01/12/2018**
	REVISION NO.	**:**	**0.0**

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	CV401	Drinking Water & Sanitary Engineering	3	2	4
2.	DE1	CV41#	Discipline Elective - Refer Annexure.	3	--	3
3.	OE3	CV42#	Open Elective - Refer Annexure.	3	2	4
4.	HSS7	HP401	Engineering Economics	2	--	2
5.	HSS9/ SDP7	HP403/ CV403	Business Strategies / Urban & Town Planning	--	2	1
6.	SDP8	CV402	Project - I	--	8	4
7.	SDP9	CV404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII (SLIP not Online with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	CV431	Estimation & Costing	3	2	4
2.	DE2	CV44#	Discipline Elective - Refer Annexure	3	--	3
3.	OE4	CV45#	Open Elective - Refer Annexure	3	2	4
4.	SEMESTER LONG INTERNSHIP – Project Design			--	6	3
5.	SEMESTER LONG INTERNSHIP – Project Implementation			--	6	3
TOTAL				7	20	17

L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)	**CURRICULUM STRUCTURE (2016 - 2020)**		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2019-20** (PART C)
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**RELEASE DATE**	**:**	**01/12/2018**
	REVISION NO.	**:**	**0.0**

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	CV401	Drinking Water & Sanitary Engineering	3	2	4
2.	DE1	CV41#	Discipline Elective - Refer Annexure.	3	--	3
3.	OE3	CV42#	Open Elective - Refer Annexure.	3	2	4
4.	HSS7	HP401	Engineering Economics	2	--	2
5.	HSS9/ SDP7	HP403/ CV403	Business Strategies / Urban & Town Planning	--	2	1
6.	SDP8	CV402	Project - I	--	8	4
7.	SDP9	CV404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII (SLIP not Online with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	CV431	Estimation & Costing	3	2	4
2.	DE2	CV44#	Discipline Elective - Refer Annexure	3	--	3
3.	SEMESTER LONG INTERNSHIP – Project Design			--	10	5
4.	SEMESTER LONG INTERNSHIP – Project Implementation			--	10	5
TOTAL				6	22	17

L: Lecture, P: Practical

@ - Courses run through institute LMS.

DEPARTMENT ELECTIVE ON MOOCS PLATFORM			
SR. NO.	**COURSE DETAILS**	**MOOC DETAILS**	**NO. OF WEEKS**
1.	Geotechnical Engineering II Foundation EngineeringBy Prof. Dilip Kumar Baidya, IIT KGP	SWAYAM	12
2.	Maintenance and Repair of Concrete Structuresby Prof. Radhakrishna G. Pillai, IIT Madras	SWAYAM	12
3.	Plastic Waste Managementby Prof. Brajesh Kumar Dubey, IIT KGP	SWAYAM	8
4.	Higher Surveying by Prof. Ajay Dashora, Behdad, IITG	COURSERA	12

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Bachelor of Technology

In

Computer Engineering

(Choice Based Credit System)

2016-2020

BoS Chairman
(Dean, SCET)

Member Secretary
Academic Council
(Dean, Academics)

Chairman
Academic Council
(Director, MITAoE)

CHAIRMAN
BOS-Computer Engineering
MIT Academy of Engineering
(An Autonomous Institute)

MIT ACADEMY OF ENGINEERING
ALANDI (D), DIST. PUNE

MIT Academy of Engineering

An Autonomous Institute Affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK COMPUTER ENGINERING

The B. Tech Program shall be based on the following type of courses

SL. NO.	TYPE OF COURSE	ABBREVIATION
1.	Natural Science	NSC
2.	Engineering Science	ESC
3.	Program Core	PC
4.	Discipline Core	DC
5.	Department Elective	DE
6.	Open Elective	OE
7.	Humanities and Social Science	HSS
8.	Skill Development and Project	SDP

The Course and Credit Distribution shall be as under,

SL. NO.	TYPE OF COURSE	NO. OF COURSES	TOTAL CREDITS	
			NO.	%
1.	Natural Science	**4**	**18**	**10.98**
2.	Engineering Science	**4**	**16**	**9.76**
3.	Program Core	**5**	**20**	**12.20**
4.	Discipline Core	**13**	**48**	**30.36**
5.	Department Elective	**2**	**6**	**3.66**
6.	Open Elective	**4**	**16**	**9.76**
7.	Humanities and Social Science	**8/9**	**16**	**9.76**
8.	Skill Development and Project	**10/9**	**24**	**14.62**
TOTAL		**50**	**164**	**100**

COURSE DISTRIBUTION: SEMESTER WISE										
SL. NO.	TYPE OF COURSE	NO. OF COURSES/SEMESTER								TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science	2	2							**4**
2.	Engineering Science	2	2							**4**
3.	Program Core			3	2					**5**
4.	Discipline Core			2	2	4	3	1	1	**13**
5.	Department Elective							1	1	**2**
6.	Open Elective					1	1	1	1	**4**
7.	Humanities & Social Science	1	1		1	1	2	½	1	**8/9**
8.	Skill Development & Project	1	1	1	1	1	1	3/2	1	**10/9**
TOTAL		**6**	**6**	**6**	**6**	**7**	**7**	**7**	**5**	**50**

CREDIT DISTRIBUTION: SEMESTER WISE										
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit										
SL. NO.	TYPE OF COURSE	NO. OF CREDITS/SEMESTER								TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science	9	9							**18**
2.	Engineering Science	8	8							**16**
3.	Program Core			12	8					**20**
4.	Discipline Core			8	8	12	12	4	4	**48**
5.	Department Elective							3	3	**6**
6.	Open Elective					4	4	4	4	**16**
7.	Humanities & Social Science	2	2		2	2	3	3	2	**16**
8.	Skill Development & Project	2	2	2	2	2	2	8	4	**24**
TOTAL		**21**	**21**	**22**	**20**	**20**	**21**	**22**	**17**	**164**

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOLOF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2016-17
FIRST YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	RELEASE DATE	:	01/06/2016
	REVISION NO.	:	0.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	NSC1	AS101	Mathematics – 1	4	1	5
2.	NSC2	AS102 / AS103	Physics / Chemistry	3	2	4
3.	ESC1	EX101 / CV101	Electrical & Electronics Engg. / Applied Mechanics	3	2	4
4.	ESC2	ME101 / IT101	Engineering Graphics/Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – 1	1	2	2
6.	SDP1	ME102 / ME103	Engineering Tools & Techniques / Design Thinking	---	4	2
TOTAL				**13**	**15**	**21**

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	NSC3	AS104	Mathematics – 2	4	1	5
2.	NSC4	AS103 / AS102	Chemistry / Physics	3	2	4
3.	ESC3	CV101 / EX101	Applied Mechanics / Electrical& Electronics Engg.	3	2	4
4.	ESC4	IT101 / ME101 /	Computer Programming / Engineering Graphics	2	4	4
5.	HSS2	HP102	Language & Communication – 2	1	2	2
6.	SDP2	ME103 / ME102	Design Thinking / Engineering Tools & Techniques	---	4	2
TOTAL				**13**	**15**	**21**

L: Lecture, P: Practical, T: Tutorial; *Applicable for FY B. Tech

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOLOF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2017-18
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	RELEASE DATE	:	01/06/2017
	REVISION NO.	:	0.0

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS202	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	CS201	Data and File Structures	3	2	4
5.	DC2	CS202	Digital Electronics and Microprocessors	3	2	4
6.	SDP3	ET206	Prototyping	--	4	2
TOTAL				**14**	**14**	**21**

SEMESTER:IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	--	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	CS211	Discrete Structure and Graph Theory	3	2	4
5.	DC4	CS212	Database Management Systems	3	2	4
6.	SDP4	CS213	Minor Project	--	4	2
TOTAL				**15**	**12**	**21**

Note: L: Lecture, P: Practical, T: Tutorial; **Applicable for FY BTech*

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	RELEASE DATE	:	01/12/2017
	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	CS301	Operating System	3	2	4
2.	DC6	CS302	Computer Organization & Architecture	3	--	3
3.	DC7	CS303	Theory of Computation	3	--	3
4.	DC8	CS304	Computer Graphics & Gaming	--	4	2
5.	OE1	IT 311 CS311 CS312	Open Elective - Refer Annexure.	3	2	4
6.	HSS4	HP301	Project Management	1	2	2
7.	SDP5	CS30#	Skill Development Lab	--	4	2
TOTAL				**13**	**14**	**20**

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC9	CS321	Design and Analysis of Algorithm	3	2	4
2.	DC10	CS322	Compiler Design	3	2	4
3.	DC11	CS323	Computer Networks	3	2	4
4.	OE2	IT 331 CS331 CS332	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP302	Professional Skills	1	2	2
6.	HSS6	HP303	Basics of Entrepreneurship	--	2	1
7.	SDP6	CS324	Mini Project	--	4	2
TOTAL				**13**	**16**	**21**

MIT Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	RELEASE DATE	:	01/12/2017
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 12	CS401	Software Engineering, Testing and Quality Assurance.	3	2	4
2.	DE 1	CS41#	Department (Program) elective - Ref er Annexure	3	0	3
3.	OE 3	CS42#	Open Elective – Refer Annexure	3	2	4
4.	HSS 6	HP402	Sociology	2	--	2
5.	HSS7/SDP7	HP403/CS40#	Business Strategies/ Advance skill development lab(Adv. Java/R Programming/Python with kali Linux)	---	2	1
6.	SDP 8	CS405	Project – I	--	8	4
7.	SDP9	CS406	Summer Internship	--	--	4
TOTAL				**11**	**14**	**22**

SEMESTER:VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 13	CS431	Human Computer Interaction	3	2	4
2.	DE 2	CS44#	Department (Program) elective - Ref er Annexure	3	0	3
3.	OE 4	CS45#	Open Elective – Refer Annexure	3	2	4
4.	HSS8	HP401	Engineering Economics	2	---	2
5.	SDP10	CS432	Project – II	---	8	4
TOTAL				**11**	**12**	**17**

		CREDITS		
		1 Lecture hour = 1 Credit	2 Lab Hours = 1 Credit	1 Tutorial Hour
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	21	21	**42**
2.	Second Year	21	21	**42**
3.	Third Year	20	21	**41**
4.	Final Year	22	17	**39**
TOTAL				**164**

CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	28	28	**56**
2.	Second Year	28	27	**55**
3.	Third Year	27	29	**56**
4.	Final Year	25	23	**48**
TOTAL				**215**

ANNEXURE

Natural Science (NSC) : 4 Courses		
1.	AS101	Mathematics – 1
2.	AS102	Mathematics – 2
3.	AS103	Physics
4.	AS104	Chemistry

Engineering Science (ESC) : 6 Courses		
1	EX101	Electrical and Electronic Engineering
2	CV101	Applied Mechanics
3	ME101	Engineering Graphics
4	IT101	Computer Programming

Program Core (PC) : 5 Courses		
1.	CH201	Environmental Science
2.	AS201	Applied Mathematics
3.	ET201	System Engineering
4.	IT201	Engineering Informatics
5.	ME201	Material Engineering

Discipline Core (DC) : 13 Courses	
CS201	Data and File Structures
CS202	Digital Electronics and Microprocessors
CS211	Discrete Structure and Graph Theory
CS212	Database Management Systems
CS301	Operating System
CS302	Computer Organization & Architecture
CS303	Theory of Computation
CS304	Computer Graphics & Gaming
CS321	Design and Analysis of Algorithm
CS322	Compiler Design
CS323	Computer Networks
CS401	Software Testing
CS431	Human Computer Interaction

Department Elective (DE) : 6 Courses	
CS411	Operating System Design
CS412	Wireless and Mobile Network
CS413	Information Retrieval
CS441	Distributed System
CS442	Ubiquitous Systems
CS443	Cloud & Virtualization

Open Elective (OE) : 4 Courses		
Sl. No.	**Course Code**	**Course**
1	IT311	Cryptography and System Security
2	IT331	Cyber Security
3	IT421	Ethical Hacking & Cyber Laws
4	IT451	Digital Forensics
5	CS311	Descriptive Analytics
6	CS331	Predictive Analytics
7	CS421	Big Data Analytics
8	CS451	Practitioner's Approach for Data Analytics
9	CS312	Artificial Intelligence and Neural Networks
10	CS332	Machine Learning
11	CS422	Deep Learning
12	CS452	Pattern Recognition

Open Elective (OE) :Term – I (List of courses for Academic Year 2018-19)		
Chemical		
1	CH311	Process Modeling and Simulation.
2	CH312	Piping Engineering
Civil		
3	CV311	Construction Planning & Management
Computer		
4	CS311	Descriptive Analytics
5	CS312	Artificial Intelligence and Neural Networks
Electronics		
6	EX311	Fundamentals of Robotics
E & TC		
7	ET311	Embedded System Programming (ESP)
8	ET312	IoT Architecture and Sensors
IT		
9	IT311	Cryptography & System Security
Mechanical		
10	ME311	Geometric Modeling & Design
11	ME312	Fundamentals of Robotics
12	ME313	Work Process Assessment

Open Elective (OE) :Term - II (List of courses for Academic Year 2018-19)		
Chemical		
1	CH331	Process Engineering.
2	CH332	Piping Layout
Civil		
3	CV331	Operation Research
Computer		
4	CS331	Predictive Analysis
5	CS332	Machine Learning
Electronics		
6	EX331	Kinematics and Dynamics of Robotics
E & TC		
7	ET331	Embedded Processor
8	ET332	IoT Networks & Protocols
IT		
9	IT331	Cyber Security
Mechanical		
10	ME331	Finite Element Analysis
11	ME332	Kinematics & Dynamics of Robots
12	ME333	Facility Planning & Design

Open Elective (OE) :Term - I (List of courses for Academic Year 2019-20)		
Chemical		
1	CH421	Process Optimization
2	CH422	Piping Design & Engineering
Civil		
3	CV421	Financial Management
Computer		
4	CS421	Big Data Analytics
5	CS422	Deep Learning
Electronics		
6	EX421	Robotics Vision and Control
E & TC		
7	ET421	Low-Power SoC Architecture & Applications (SoC&A)
8	ET422	Privacy and Security in IoT
IT		
9	IT421	Ethical Hacking & Cyber Laws
Mechanical		
10	ME421	Computational Fluid Dynamics
11	ME422	Robotics Vision and Control
12	ME423	Operations Management

Open Elective (OE) :Term - II (List of courses for Academic Year 2019-20)		
Chemical		
1	CH451	Process Intensification & Integration
2	CH452	Pipeline Engineering
Civil		
3	CV451	Visualization and Information Exchange
Computer		
4	CS451	Practitioner's approach for Data analytics
5	CS452	Pattern Recognition
Electronics		
6	EX451	Intelligent and High-Performance Robotics
E & TC		
7	ET451	Real-Time Embedded System (RES)
8	ET452	Energy Management for IoT Devices
IT		
9	IT451	Digital Forensics
Mechanical		
10	ME451	Advanced Analysis
11	ME452	Intelligent and High Performance Robotics
12	ME453	Supply Chain Management

Humanities and Social Science (HSS) : 9 Courses		
Sl. No.	**Course**	
1.	HP101	Language & Communication – I
2.	HP102	Language & Communication – II
3.	HP201	Psychology
4.	HP301	Project Management
5.	HP302	Professional Skills
6.	HP303	Basics of Entrepreneurship
7.	HP401	Engineering Economics
8	HP402	Sociology
9	HP403	Business Strategies

Skill Development and Project (SDP) : 9 Courses		
Sl. No.	**Course Code**	**Course**
1.	ME102	Engineering Tools and Techniques
2.	ME103	Design Thinking
3.	ET206	Prototyping
4.	CS213	Minor Project
5.	CS30#	Skill development Lab.
6.	CS324	Mini Project
7.	CS40#	Adv Skill development Lab
8.	CS405	Project – I
9.	CS432	Project – II

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

First Year

Bachelor of Technology

2016-2020

(With Effect from Academic Year: 2016-2017)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2016-2017
FIRST YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	RELEASE DATE	:	01/06/2016
	REVISION NO.	:	0.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS 101	Mathematics -1	4	1	5
2.	NSC2	AS 102/ AS 103	Physics/Chemistry	3	2	4
3.	ESC1	EX 101/ CV 101	Electrical & Electronics Engg/Applied Mechanics	3	2	4
4.	ESC2	ME 101/ IT 101	Engineering Graphics/Computer programming.	2	4	4
5.	HSS1	HP 101	Language &Communication -1	1	2	2
6.	SDP1	ME 102/ ME 103	Experimental Tools &Techniques/Design Thinking	--	4	2
TOTAL				13	15	21

SEMESTER:II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC3	AS 104	Mathematics -2	4	1	5
2.	NSC4	AS 103/ AS 102	Chemistry/ Physics	3	2	4
3.	ESC3	CV 101/ EX 101	Applied Mechanics/ Electrical & Electronics Engg	3	2	4
4.	ESC4	IT 101/ ME 101	Computer programming/ Engineering Graphics	2	4	4
5.	HSS2	HP 102	Language &Communication -2	1	2	2
6.	SDP2	ME 103/ ME 102	Design Thinking/ Experimental Tools &Techniques	--	4	2
TOTAL				13	15	21

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics I
	COURSE CODE	AS101
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII

COURSE OBJECTIVES :

AS101.CEO.1:To recall and apply the methods of solving system of equations using matrices.
AS101.CEO.2:To find nth derivative and expansion of different functions.
AS101.CEO.3:To classify and solve first order ordinary differential equations.
AS101.CEO.4:To categorize and inspect the applications of first order differential equations.
AS101.CEO.5:To apply the concepts of partial differentiation.
AS101.CEO.6:To demonstrate an understanding towards the applications of partial differentiation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS101.CO.1:Inspect system of equations using matrices. [L4]
AS101.CO.2:Illustrate problems based on nth derivative and expansion of functions. [L2]
AS101.CO.3:Solve first order ordinary differential equations. [L3]
AS101.CO.4:Analyze simple real world phenomenon governed by first order ordinary differential equations. [L4]
AS101.CO.5:Infer the problems based on properties of partial differentiation. [L2]
AS101.CO.6:Examine the applications of partial differentiation. [L4]

THEORY		
UNIT 1	**Matrices**	**12 HOURS**
Rank, Solutions of system of linear equations: Homogeneous and Non Homogeneous systems,Linear dependence and independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem		
UNIT 2	**Successive Differentiation**	**8 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative, Taylors and Maclaurins theorem for expansion of functions .		
UNIT 3	**First order ordinary differential equations**	**10 HOURS**
Exact differential equations, Differential equations reducible to exact by finding integrating factors, linear differential equations, Differential equations reducible to linear form .		
UNIT 4	**Applications of ftrst order ordinary differential equation**	**10 HOURS**
Newtons law of cooling, Electrical circuits, rectilinear motion, one dimensional heat conduction, Chemical applications- Mixing problems .		
UNIT 5	**Partial Differentiation**	**8 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative and differential, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 6	**Applications of Partial Differentiation**	**8 HOURS**
Jacobian, properties of Jacobian, Jacobian of Implicit functions, Finding partial derivative using Jacobians, Functional dependence, maxima and minima of functions of two variables.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Rank, System of Linear equations: Homogeneous and Non Homogeneous systems.		
TUTORIAL NO.02		**1 HOURS**
Linear Dependence and Independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem.		
TUTORIAL NO.03		**1 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative.		
TUTORIAL NO.04		**1 HOURS**
Expansion of functions using Taylors and Maclaurins theorems.		
TUTORIAL NO.05		**1 HOURS**
Finding solutions to exact differential equations, Differential equations reducible to exact by finding integrating factors		
TUTORIAL NO.06		**1 HOURS**
Linear differential equations,Differential equations reducible to linear.		
TUTORIAL NO.07		**1 HOURS**
Newtons law of cooling, Kirchoffs law of electrical circuits, rectilinear motion		
TUTORIAL NO.08		**1 HOURS**
One dimensional heat conduction, Chemical applications Mixing Problems		
TUTORIAL NO.09		**1 HOURS**
Examples on Partial Differentiation and Chain rule,Total derivative and differential		
TUTORIAL NO.10		**1 HOURS**
Examples on Eulers Theorem, Differentiation of an implicit function		
TUTORIAL NO.11		**1 HOURS**
Examples on Jacobian, properties of Jacobian, Functional dependence		
TUTORIAL NO.12		**1 HOURS**
Examples on Functional dependence,Maxima and minima of functions of two variables		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Thomas Calculus by G.B. Thomas, Maurice D. Weir, Joel R. Hass (ISBN:9789332519091, Pearson Education, 12th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig(ISBN-13: 9788126554232, Wiley Eastern Ltd., 10th edition)
3. Advanced Engineering Mathematics by R.K. Jain& S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)
5. Advanced Engineering Mathematics by Dennis G. Zill& Warren S.Wright (ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5, Jones and Bartlett Publishers, 4th edition)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Physics
	COURSE CODE	AS102
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS102.CEO.1:To make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.(L3).

AS102.CEO.2:To analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.(L4).

AS102.CEO.3:To apply the concept of behavior of light and understand the polarization phenomena.(L3) .

AS102.CEO.4:To classify and understand the difference of classical mechanics and quantum mechanics.(L2).

AS102.CEO.5:To derive the basic laws governing the motion of quantum particles.(L4).

AS102.CEO.6:To apply the concept of quantum mechanics to different applications and supplement the reasoning vis--vis understanding of different branches of Physics.(L3).

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS102.CO.1:Evaluate the importance of order of all physical quantities and compare the order of size of different objects.(L5).

AS102.CO.2:Apply the theoretical knowledge of optics to understand the physics behind engineering applications.(L3).

AS102.CO.3:Apply that light is transverse in nature. (L3) .

AS102.CO.4:Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.(L2).

AS102.CO.5:Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.(L5) .

AS102.CO.6:Apply the concepts of Quantum Physics in different branches of engineering.(L3) .

THEORY

UNIT 1	**Measurement and importance of span (order) of physical quantities**	**7 HOURS**

Concept of (i)significant numbers, (ii) accuracy versus precision (iii)error versus uncertainty (iv)systematic error versus random error (v) quantifying the uncertainty. Least-count of an apparatus, Methods to measure least-count with specific examples of vernier-calipers, screw-gauge, travelling microscope and spectrometer. Span (orders of magnitude) of prominent physical parameters with specific examples of Gravitational constant(G), Speed of light(c),Planks constant(h), Boltzmann constant(k) and wavelengths of electromagnetic spectrum. Importance of the orders of G, c, h and k alongwith hypothetical picture of world in case of their order becomes unity (1). Length-scale and time-scale of specific physical phenomenon.

UNIT 2	**Optics (Interference and diffraction of Light)**	**7 HOURS**

Particle nature and wave-nature with examples of wave and particle behavior of light, Introduction to wave nature, Concept of thin film, Stokes law of phase-change on reflection from a thin film, Thin film interference, Coating of lenses as an application of thin film interference, Interference in films of uniform and non-uniform thickness (with derivation), Applications of thin-film interference, Newton Ring Experiment and its applications, Diffraction as a particular case of interference.

UNIT 3	**Polarization of Light**	**6 HOURS**

Polarization of light, Production and analysis of polarized light (Brewsters law, Law of Malus), Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.

UNIT 4	Quantum Mechanics-I .	8 HOURS
Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Plancks quantum law of blackbody radiation, Matter-waves, De-Broglies concept of matter waves, Heisenbergs Uncertainty Principle, Operators, Eigen values and Eigen functions, Expectation Values, Wave-function, Physical significance of wave function.		
UNIT 5	**Quantum Mechanics-II .**	**8 HOURS**
Schrodingers equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohrs atomic model.		
UNIT 6	**Applications of Quantum Mechanics-LASER .**	**6 HOURS**
Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einsteins coefficients), Principle and working of LASER with example, Application of LASER in optical fibre communication.		

PRACTICALS		
PRACTICAL NO.01		**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02		**2 HOURS**
Determination of the refractive index of a given liquid using Newton Rings Experiment.		
PRACTICAL NO.03		**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04		**2 HOURS**
Determination of the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05		**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06		**2 HOURS**
Verification of Bohrs atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07		**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08		**2 HOURS**
Determination of wavelength of a laser beam using Lloyds mirror arrangement.		
PRACTICAL NO.09		**2 HOURS**
Determination of Radius of Curvature of a given planoconvex lens using Newtons Rings apparatus.		
PRACTICAL NO.10		**2 HOURS**
Determination of wavelength of different colours present in a white light.		

TEXT BOOK

1. The Feynman Lectures on Physics: Volume-1-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-82-8.(Narosa Publisher)
2. The Feynman Lectures on Physics: Volume-3-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-84-2. (Narosa Publisher)

REFERENCE BOOK

1. Measurement and Instrumentation Principles: Alan S Morris, Butterworth Heinemann, ISBN 07506508184
2. AjoyGhatak ,Optics, Tata Mc Graw Hill Publishing Company. Ltd., 2nd Edition, ISBN- 0-07058583-0
3. Jenkins White, Fundamentals of Optics, Mc Graw Hill Science, ISBN-0070853460.
4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-, Mc Graw Hill Education (India) Pvt. Ltd., 6th Edition, ISBN-10- 0070151555,
5. L. I. Schiff ,Quantum Mechanics, Tata Mc Graw Hill Education (India) Pvt. Ltd., 3rd Edition, ISBN-10- 0070856435, ISBN- 13- 9780070856431.
6. PAM Dirac,Principles of Quantum Mechanics Cbs publishers and Distributors, ISBN-10-0195671074, ISBN- 13- 978019567107
7. D J Griffiths, Introduction to Quantum Mechanics, Pearson Prentice Hall Publishers.
8. Serway and Jewett, University Physics for Scientists and Engineers, Cengage Learning Publishers.
9. K. Thyagarajan and AjoyGhatak, Lasers: Fundamentals and applications, Springer, ISBN 9781441964410.
10. Worsnop and Flint; Advanced Practical Physics, Little Hampton book service Ltd., ISBN-10: 0423738909, ISBN-13: 978-0423738902.
11. Robert Eisberg and Robert Resnick; Quantum Mechanics: Of Atoms, Molecules, Solids, Nuclei and Particles; Wiley

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical & Electronics Engineering
	COURSE CODE	EX101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	40	50	10	25	Nil	125

PRE-REQUISITE :

COURSE OBJECTIVES :

EX101.CEO.1:To impart knowledge of energy scenario and use of renewable energy systems.
EX101.CEO.2:To explain the fundamentals of single-phase and three-phase systems.
EX101.CEO.3:To explain power supply components, electronic devices.
EX101.CEO.4:To summarize various Digital systems and application.
EX101.CEO.5:To build the knowledge of measuring system and signal conditioning circuits.
EX101.CEO.6:To get acquainted with different electrical machines.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX101.CO.1:Develop the Renewable energy system (PV) as per given specifications [L3]
EX101.CO.2:Illustrate behavior of single phase A.C. circuits and three phase A.C. circuits. [L2]
EX101.CO.3:Analyze analog circuit applications.[L3]
EX101.CO.4:Design Digital applications.[L5]
EX101.CO.5:the use of Instrumentation system in various fields.[L2]
EX101.CO.6:Identify electrical machines used in typical domestic and industrial sector based on application. [L2]

THEORY		
UNIT 1	**Energy Resources & Technology**	**6 HOURS**
Energy Scenario, Energy Resources, Basic concepts about thermal, hydro and nuclear power stations (block diagram approach only).Energy conversion from thermal and mechanical energy, Energy Conservation, Use of Energy Efficient Technologies, Application of Renewable Energy Systems, Battery technology, Introduction to power quality: Definition, causes, effects, Introduction to energy audit.		
UNIT 2	**A.C. Circuits**	**7 HOURS**
A.C. fundamentals, RMS and average value, R-L,R-C,RLC series parallel circuits, phasor diagram, power and power factor. Three phase voltage generation and their waveforms, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, Difference between neutral and ground conductors.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply. BJT - structure and operation, CE, CB, CC configurations, Transistor as a switch and Amplifier. MOSFET- structure (enhancement), operation and application as a switch. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Digital: Logic gates, Boolean algebra, SOP representation, Combinational circuit Design: Half Adder, Full Adder, MUX, DMUX, Comparator, Code converter, Decoder Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor based systems, Embedded systems		
UNIT 5	**Measuring System**	**6 HOURS**
Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, IR, Speed & LVDT. Op-Amp IC 741 pin configuration, Op-amp parameters, Inverting, Non- Inverting & Differential configuration Applications: Summing & Difference amplifier, Comparator, Voltage follower.		
UNIT 6	**Electrical Machines**	**7 HOURS**
Construction of Transformer, principle of operation, EMF equation. Construction, principle of operation and types of three-phase Induction motor and DC motor, PMDC, BLDC, servo motor, stepper motor, Universal motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICALS : Total 8 Experiments from two groups.		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test it.		
PRACTICAL NO.02	**Single Phase Energy (Watt-hour) measurement.**	**2 HOURS**
To measure energy and power factor. To examine improvement in the power factor. To estimate and compare energy consumption with energy meter.		
PRACTICAL NO.03	**R-L-C series A.C. circuit**	**2 HOURS**
To calculate exact values of R, L and C for lagging and leading power factor To find power losses in R, L and C.		
PRACTICAL NO.04	**Veriftcation of relation between Line and Phase quantities in Star and Delta circuits**	**2 HOURS**
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation. To connect Bulb load in Delta connection and verify the relation.		
PRACTICAL NO.05	**Open circuit & Short circuit test on a Single Phase transformer**	**2 HOURS**
To find iron loss and no load current To find full load copper loss and winding parameters To determine efficiency and regulation of transformer		
PRACTICAL NO.06	**Load test on D.C. Shunt Motor.**	**2 HOURS**
To find the torque and output power of motor To calculate the efficiency of motor.		
PRACTICAL NO.07	**Step angle control of Stepper motor.**	**2 HOURS**
To gain familiarity with the properties of stepper motors. To calculate the step angle of motor.		
PRACTICAL NO.08	**Speed control of BLDC/PMDC Motor.**	**2 HOURS**
To find the relation between voltage and speed of motor To develop any small application.		
PRACTICAL NO.09	**Electronics Components and Measuring instruments:**	**2 HOURS**
To study Passive components Resistors, Capacitors & Inductor. To test semiconducting components Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		
PRACTICAL NO.10	**DC Regulated Power Supply:**	**2 HOURS**
To design 12V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	**BJT as a switch and Amplifter.**	**2 HOURS**
To adapt BJT as a switch On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		

PRACTICAL NO.12	**Combinational Digital Circuits:**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	**Sequential Digital Circuits:**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	**OP-AMP Applications**	**2 HOURS**
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OPAMP as summing and difference amplifier. To verify the application of OPAMP as voltage follower.		
PRACTICAL NO.15	**Sensors and Transducer**	**2 HOURS**
To study and verify operation of LVDT. To study and verify the operation of Temperature sensors. (PT100, LM35)		
PRACTICAL NO.16	**Design and Simulate using MULTISIM(Minimum 2)**	**2 HOURS**
To design a counter to display 2-digit Decimal Number (00 to 99) on 7-Segment Display. To design a Flashing LED Display for a specific Pattern using MUX. To design of Inverting/Non-Inverting Amplifier using Op-Amp IC-741 for a specific gain.		

TEXT BOOK

1. B. H. Khan,Non-Conventional Energy Resources, Tata McGraw Hill, 2nd Edition, 2009, 978-0070142763.
2. Edward Hughes, Electrical and Electronic Technology Pearson India, 10th Edition, 2011, ISBN-978-8131733660
3. Neil Storey, Electronics A Systems Approach, Pearson Education Asia, 5th Edition,2013, ISBN-978-0273773276

REFERENCE BOOK

1.1. V. N. Mittle and ArvindMittal, Basic Electrical Engineering, McGraw Hill Education, 2ndEdition,2005,ISBN- 978-0070593572.

2.D. P. Kothari, I. J. Nagrath, Electric Machines, McGraw Hill, 4th Edition, 2010, 978-0070699670.

3.Thomas L. Floyd, Electronics Devices & Circuits, Pearson Education India, 5th Edition, 1998, 978-0136491385.

4. Paul Horowitz, Winfield Hill, The Art of Electronics, Cambridge University press, 3rd Edition, 978-0521809269.

5. Thomas E. Kissell, Industrial Electronics, Prentice Hall of India, 3rd Edition, 2003, 9788120322608

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	40	50	10	50	Nil	150

PRE-REQUISITE :

COURSE OBJECTIVES :

ME101.CEO.1:To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.

ME101.CEO.2:To develop & apply visualization skill to simple Objects.

ME101.CEO.3:To expose students to computer aided drafting tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME101.CO.1:Recall fundamentals of projections (L1)

ME101.CO.2:Interpret engineering drawings (L2)

ME101.CO.3:Apply visualization skill to draw various views of object (L3)

ME101.CO.4:Analyzeengineeringdrawings (L4)

ME101.CO.5:Decide annotations for two dimensional drawings (L5)

ME101.CO.6:Develop and/or comprehend a simple engineeringdrawing in both First and Third angle orthographic projections(L4)

THEORY		
UNIT 1	**Visual Thinking & Solid Geometry**	**5 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections & Sectional Views**	**5 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views.		
UNIT 3	**Isometric Projections**	**5 HOURS**
Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of isometric View of Pyramid, Cone, Sphere.		
UNIT 4	**Interpretation of given view/ missing view**	**5 HOURS**
Identification of lines/ edges and surfaces, visualization of given orthographic views, adding missing/ third view, adding a sectional view, to convert a given view into sectional view.		
UNIT 5	**Auxiliary Projections**	**4 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View.		
UNIT 6	**Freehand Sketching & Technical Drawing**	**4 HOURS**
Free hand sketching- FV & TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles.		

PRACTICALS : Each Assignment contains 2 questions.		
PRACTICAL NO.01		**10 HOURS**
Projection of Lines, Plane, Solids		
PRACTICAL NO.02		**8 HOURS**
Orthographic Projections, Missing Views		
PRACTICAL NO.03		**6 HOURS**
Isometric Projections		
PRACTICAL NO.04		**4 HOURS**
Auxiliary View		
PRACTICALS : Assignments to be drawn on modelling software package.		
PRACTICAL NO.05		**4 HOURS**
Absolute and Incremental drawing.		
PRACTICAL NO.06		**6 HOURS**
Draw commands, Modify commands, Array, fillet, offset commands		
PRACTICAL NO.07		**2 HOURS**
Project drafting		
PRACTICAL NO.08		**12 HOURS**
Sketching, Solid Modeling, Assembly		
PRACTICAL NO.09		**4 HOURS**
Project modeling		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to Auto CAD, TMH Publishing co Ltd, 5th Edition, 2012, (ISBN 13: 9780070648371)
2. Basant Agarwal and C M Agarwal, Engineering Drawing, TMH Publishing co Ltd, 2nd Edition 2013, (ISBN13: 978-1-259-06288-9)
3. K C John, Engineering Graphics for Degree, PHI learning pvt. Ltd. New Delhi,2009, (ISBN: 97881-203-3788-6)
4. R. K. Dhavan, A Text Book of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

1. Luzadder, Warren J., Duff, John M, Fundamentals of Engineering, Prentice Hall of India,11th Edition, 2010, (ISBN: 978-81-203-0885-5)
2. Basudev Bhattacharya, Machine Drawing includes Autocad Supplements, Oxford University Press India, First Edition, 2011, (ISBN 13: 9780198070771)
3. K. Venugopal, Prabhu Raja V., Engineering Drawing and Graphics, New age Publications, First Edition, 2008, (ISBN: 978-81-224-2457-7)
4. N B Shaha and B C Rana, Engineering Drawing, Pearson Education, 2012, (ISBN: 9788131798058)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 1
	COURSE CODE	HP101
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level

COURSE OBJECTIVES :

HP101.CEO.1:To introduce a variety of English texts to the students.
HP101.CEO.2:To teach basic English grammar.
HP101.CEO.3:To guide the students to write in English coherently and formally.
HP101.CEO.4:To improve the students overall communicative competence in English through activities like group discussions and debates.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP101.CO.1:Interpret texts written in English. [L2, L5]
HP101.CO.2:Apply English grammar rules correctly. [L3]
HP101.CO.3:Develop sentences and texts in English coherently and formally. [L3, L6]
HP101.CO.4:Demonstrate overall improvement in communication skills. [L 2]

THEORY		
UNIT 1	**Functional Grammar**	**4 HOURS**
Use of tenses in day to day communication and academic writing, Direct and Indirect Speeches, Active and Passive voices, Degrees of comparison, Use of the parts of speech in sentence composition, Verb forms and Modal auxiliaries		
UNIT 2	**Communication**	**8 HOURS**
Concept of communication, Types-verbal and non-verbal, principles of effective communication, barriers to communication, cross-cultural communication		
UNIT 3	**Academic Writing**	**6 HOURS**
Essentials of good writing, Review writing, Letter writing, Report writing, Prcis writing, and Essay writing		

PRACTICALS		
PRACTICAL NO.01	**Common Errors in Communicative English**	**6 HOURS**
A task of identifying and correcting the common errors in general as well as academic English by using audios and relevant academic texts; tips on punctuation.		
PRACTICAL NO.02	**Debate**	**4 HOURS**
Concept, Dos & Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos & Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.04	**Role Play**	**4 HOURS**
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation		
PRACTICAL NO.05	**Review and Letter Writing**	**4 HOURS**
How to write a review, characteristics and essentials of a good review, writing a review on a book or short story, types of letters- formal, informal; layout of business letters		
PRACTICAL NO.06	**Report Writing and Prcis Writing**	**4 HOURS**
Types of reports, format and writing a report, What is prcis writing? Rules of prcis writing		
PRACTICAL NO.07	**Essay Writing**	**2 HOURS**
What is an essay? Tips to write a good essay, Types of essays		

REFERENCE BOOK

1.1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983

2.Raymund Murphy: Essential Grammar in Use, Cambridge, 3rd Edition, ISBN-13: 9780521133890

3.William Sanborn Pfeiffer: Technical Communication A Practical Approach, 6th Edition, Pearson Education, ISBN-13: 978-8131700884

4.Dutt et.al. : A Course in Communication Skills, Foundation, 1st Edition

5.Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757

6.Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577

7.S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806

8.Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques- I
	COURSE CODE	ME102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	30	-	20	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME102.CEO.1:To introduce different tools and study the various measurement techniques.
ME102.CEO.2:To study different parts of the system along with its functions and applications.
ME102.CEO.3:To list various tools used for the said application.
ME102.CEO.4:To identify the function of various parts of system.
ME102.CEO.5:To impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME102.CEO.6:To apply the knowledge to find the solutions for basic engineering problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME102.CO.1:Recall the tools required for measurements. (L1)
ME102.CO.2:Summarize the applications of various engineering tools used. (L2)
ME102.CO.3:Identify the right tool for selected purpose. (L3)
ME102.CO.4:Inspect various parts of the system .(L4)
ME102.CO.5:Justify the most appropriate technique which can be compatible with the existing environment. (L5)
ME102.CO.6:Develop the system which will give appropriate solution to the identified problem. (L6)

PRACTICALS		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Minimum 6 practicals from the following**	**12 HOURS**
1. Study and analysis of various components on the motherboard of a standard desktop computer. 2. Installation of various components like hard disk drive on the motherboard and check the system setup for verification. 3. Formatting the hard disk drive and installation of Windows and Linux operating system making the system dual boot 4. Study of various network components like switch, Router and configure the devices. 5. Crimping of Unshielded Twisted Pair cable. (Cat-6) 6. Study of TCP/IP Stack, and configure as well as develop a Local Area Network. 7. Configuration of Network Monitoring tool and checking the results 8. Installation of DHCP server and checking the results. 9. Installation of web server and checking the results. 10. Configuration of MS Access and Deploying Access 2007 Runtime-Based Solutions 11. Study and usage of Google Tools (creating Forms, Blog). 12. Using the Google form with add on, create a PDF file of the form. 13. Designing a static HTML page 14. Uploading the pages using FTP server on a web site 15. Deploy a simple web site using LAMP server creation of a web site using Google sites.		
PRACTICAL NO.02	**Electronics Engineering (Minimum 6 practicals from the following**	**12 HOURS**
1. Basic electronics component and switches 2. PCB and Soldering Tools And Technique 3. Relay and application 4. Manufacturing of extension board/Spike Guard 5. Series and parallel connection of Electrical Load 6. Actuators and application (Electrical and Mechanical). 7. PCB Wizard 8. Proteus 9. Virtual Instrumentation. 10. Cathode Ray Oscilloscope 11. Power Supply		

PRACTICAL NO.03	Mechanical Engineering Laboratories (Minimum 6practicals from the following	12 HOURS

1. Linear and angular measurements.
2. Types of mechanism and making any one mechanism containing four links using card board.
3. Open a household component and explain it with free hand sketches.
4. Draw the outline of the problem identified for project on software package.
5. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
6. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
7. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
8. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
9. Measurement of Relative humidity of air in the lab.
10. Measurement of hardness of Steel and Aluminum.
11. Measurement of stiffness of helical spring (compression or tension). Open IT
12. Mixer or kitchen machine/ Printer.
13. Refrigerator/ Window Air Conditioner.
14. Boiler and accessories / thermal power plant (Mini).
15. Two stroke or four stroke engine.
16. Assembly and Disassembly of parts in any software package.
17. Introduction to threaded fasteners and joints using threaded fasteners.

PRACTICAL NO.04	Chemical Engineering (Minimum 3 practicals from the following	06 HOURS

1. Determination of specific gravity of liquid
2. Study of molecular diffusion
3. Liquid liquid extraction: Separation of one liquid component from the solution.
4. Solid-liquid separation from filtration
5. Membrane Separation process
6. Fuel from Plastic
7. Demonstration of mechanical operation models.
8. Production of Biodiesel
9. Open and Study Heat Exchangers.
10. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Mimimum 3 Practicals from the following)	06 HOURS

1. To find the area and included angle of given plot and fix boundary from given plan.
2. To determine the level difference between 5 points with level tube and determine height of tower with trigonometry.
3. To draw the plan of given housing to a given scale.
4. To draw line diagram of household water supply line and sewage line with list of materials used.
5. To draw line diagram of rain water harvesting unit with all details and its importance.
6. To make report on daily water requirement in public building and its waste water disposal, and reuse.
7. To identify and make report on the earthquake resisting structural members of building and its role.
8. To demonstrate the lifesaving dos and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

TEXT BOOK

1.Bruce Hallberg, Networking A Beginners Guide , 4th edition, Tata McGraw-Hill,2005, ISBN 0-07-060791-5

2.R.S. Khandpur, Printed Circuit Boards Design, Fabrication, Assembly and Testing, Tata McGraw-Hill Education, 2005, ISBN 0070588147, 9780070588141.

3.S R Dara, Engineering Chemistry, 5th edition, S.Chand , ISBN 81-219-0359-9

REFERENCE BOOK

1. Mackenzie L. Davis, Water and Wastewater Engineering, 13th edition, Tata McGraw- Hill, ISBN 978-1-25-906483-8
2. R. S. Khurmi, J. K. Gupta, Theory of Machines, 14th edition, S. Chand, ISBN 81-219-2524-X
3. Philip Wankat, Seperation Process Engineering , 3rd edition, Pearson, ISBN 978-93-325-2484-2
4. N.V. Ragvendra, L. Krishnamurthy, Engineering Metrology and Measurements, Oxford University Press, ISBN 978-0-19-808549-2.
5. Dr. Vinod Hosur, Earthquake- Resistant Design of Building Structures, Wiley, ISBN 978-81265-3859-1
6. M. S. Shetty, Concrete Technology, S. Chand, 2008, ISBN 9788121900034.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 – 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics II
	COURSE CODE	AS104
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII, Mathematics I

COURSE OBJECTIVES :

AS104.CEO.1:To identify different methods to evaluate integrals.
AS104.CEO.2:To classify and solve linear differential equations of higher order
AS104.CEO.3:To demonstrate an understanding towards evaluating multiple integrals.
AS104.CEO.4:To relate and examine the applications of multiple integrals.
AS104.CEO.5:Analyse different probability distribution functions.
AS104.CEO.6:To study different statistical methods for solving problems

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS104.CO.1:Distnguish different methods to evaluate integrals.(L4)
AS104.CO.2:Conclude solutions for higher order lineardifferential equations(L4)
AS104.CO.3:Evaluate the multiple integrals(L5)
AS104.CO.4:Apply the knowledge of multiple integrals wherever required(L3)
AS104.CO.5:Solve the probability distribution problems(L3)
AS104.CO.6:Assess statistical problems(L5)

THEORY COURSE CONTENT		
UNIT 1	**Integral Calculus**	**8 HOURS**
Reduction Formulae , Beta - Gamma functions and Differentiation under integral sign.		
UNIT 2	**Linear Differential Equations of higher order**	**8 HOURS**
General solution of Linear Differential equations with constant coefficients, Method of Variation of parameters, Equations reducible to Linear Differential equation with constant coefficients: Cauchy&Legendres linear differential equations		
UNIT 3	**Multiple Integrals**	**8 HOURS**
Tracing ofCurves: Cartesian curves, Polar curves, Parametric curves ,Double Integration, Evaluation of Double Integration, Change of order of integration, Integration by transforming Cartesian to Polar Coordinate system, Triple integration, Integration by transforming to spherical and cylindrical polar coordinates		
UNIT 4	**Applications of Multiple Integrals**	**8 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		
UNIT 5	**Probability**	**8 HOURS**
Probability, probability density function, probability distribution:Binomial, Poisson, Normal .		
UNIT 6	**Statistics**	**8 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Examples on Reduction Formulae, Beta and Gamma functions. Examples on Differentiation under integral sign		
TUTORIAL NO.02		**1 HOURS**
General solution of Linear Differential equations with constant coefficients , Method of Variation of parameters.		
TUTORIAL NO.03		**1 HOURS**
Equations reducible to Linear Differential equation with constant coefficients: Cauchy- Euler equations		
TUTORIAL NO.04		**1 HOURS**
Tracing of Cartesian curves .Tracing of Polar and Parametric curves .Double Integration, Evaluation of Double Integration, Change the order of integration.		
TUTORIAL NO.05		**1 HOURS**
Integration by transforming Cartesian to Polar Coordinate system, Triple integration,Integration by transforming to spherical and cylindrical polar coordinates.Applications of multiple integrals:To find Area, Volume		
TUTORIAL NO.06		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.07		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		
TUTORIAL NO.08		**1 HOURS**
Probability, probability density function, Probability distribution:Binomial		
TUTORIAL NO.09		**1 HOURS**
Probabilitydistribution :Poisson, Normal. Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.10		**1 HOURS**
Moments, skewness and kurtosis,correlation and regression.		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Calculus by G.B. Thomas &R.L.Finney (ISBN:81-7758-325-5, Pearson Education, 9th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig, Volume I & II (ISBN-10: 8126543132, ISBN-13: 978-8126543137, Wiley Eastern Ltd.)
3. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)
5. Advanced Engineering Mathematics by Dennis G. Zill& Warren S. Wright; Jones and Bartlett Publishers, 4th edition, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.
6. Higher Engineering Mathematics by B.S. Grewal (ISBN:81-7409-195-5,Khanna Publications,39 th edition)
7. Applied statistics and probability for engineers fourth edition by Douglas C. montgomery , George C runger(ISBN No:978-81-265-2315-3 wiley)
8. Miller& Freunds Probability and statistics for engineers by richard A johnson, irwin-miller,johnfreund(ISBN no:978-93325-5041-4,Pearson)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Chemistry
	COURSE CODE	AS103
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : Basic Chemistry of XI and XII

COURSE OBJECTIVES :

AS103.CEO.1:To summarize the basic chemistry and classic methods of analysis, which includes solution, concentrations and indicators.

AS103.CEO.2:To outline the technology involved in improving quality of water for its industrial use.

AS103.CEO.3:To illustrate the basic concepts of analytical techniques that facilitates rapid and reliable measurements.

AS103.CEO.4:To demonstrate the use of ultra violet visible spectroscopy as invaluable tools in synthetic chemistry.

AS103.CEO.5:To list and explain the principle & techniques of separation methods.

AS103.CEO.6:To define the basic aspects of advanced materials & their applications.

COURSE OUTCOMES :

On successful completion of the course the student will be able to

AS103.CO.1:Relate classic methods of analysis by preparing solutions of desired concentrations & carrying out quantitative analysis by volumetric methods. (L1)

AS103.CO.2::Identify different methodologies for water quality analysis for industrial application. (L3)

AS103.CO.3:Apply basic concepts of electro-analytical techniques for analysis of various chemical compounds and solutions. (L3)

AS103.CO.4:Extend the knowledge of calculating wavelength of absorption of various chemical compounds using UV-Visible spectroscopy. (L2)

AS103.CO.5:Outline the different methods for separation of mixtures of various chemical compounds.(L2)

AS103.CO.6:Categorize the different engineering materials and to solve engineering problems.(L4)

THEORY

UNIT 1	**Instrumental volumetric analysis**	**7 HOURS**

Introduction, methods of expressing concentrations (Self-study), primary and secondary standard solutions. Instrumental & non instrumental analysis principles & types; Types of Titrations based on reaction, AcidBase titrations: Indicatorstheory of indicators, acid base indicators, mixed and universal indicators; Titration curve for Strong acidStrong base type, Introduction to Weak acidStrong base, Strong acid-Weak base titration, Precipitation titration, Applications in quantitative analysis.

UNIT 2	**Water treatment and effluent management**	**7 HOURS**

Introduction to conventional water treatment: Complexometric titrations: Principle, EDTA titrations, choice of indicators, Hardness of water & Alkalinity of water, causes, types, numerical, internal methods of water softening, Advanced wastewater & water Treatment: i) filtration method: Carbon adsorption ii) ion-exchange method iii) membrane techniques: reverse osmosis and electro-dialysis & their applications in water purification.

UNIT 3	**Electroanalytical Techniques**	**7 HOURS**

Introduction to electrodes, pH metry: Standardization of pH meter, titration curve for the mixture of acids Vs strong base, differential plots, Conductometry: Introduction, Kohlrauschs law, measurement of conductance, Application of conductometer in Acid-Base titrations & Precipitation titrations. Potentiometry: Introduction, application in redox titrations example of Fe/Ce titration.

UNIT 4	Ultra Violet Spectroscopy	7 HOURS
Introduction, nature of UV, Beers law, absorption of UV radiation by organic molecule leading to different excitation, Terms used in UV Spectroscopy- Chromophore, Auxochrome, Bathochromic shift(Red shift), hypsochromic shift(Blue shift), hyperchromic and hypochromic effect. Instrumentation,Effect of conjugation on position of UV band. Calculation of max by Woodward and Fisher rules for dienes and enone systems, Applications of UV Spectroscopy- Determination of structure, Determination of stereo chemistry (Cis and trans)		
UNIT 5	**: Chromatography**	**6 HOURS**
Introduction and classification of chromatographic methods, Theory, Principle, technique and applications of-Column Chromatography, Thin layer Chromatography, Paper Chromatography, Gas Chromatography. Applications of chromatographic techniques		
UNIT 6	**: Engineering Materials.**	**8 HOURS**
Introduction to Material Sciences, Polymers: Introduction, Specialty polymers, Applications in electronic gadgets, housing & construction, automobiles etc. Biomaterials: Introduction, characteristics, examples, challenges, Carbon nano materials: Introduction, types & applications. Smart materials: Introduction, types, examples like piezo materials, shape memory, thermo responsive etc..		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Preparation and Standardization of solutions		
PRACTICAL NO.02		**2 HOURS**
Estimation of ions from given solution by Redox titration		
PRACTICAL NO.03		**2 HOURS**
Determination of the total hardness of a given water sample by EDTA method		
PRACTICAL NO.04		**2 HOURS**
Adsorption: Removal of organic dyes by activated charcoal		
PRACTICAL NO.05		**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.06		**2 HOURS**
Conduct metric titrations		
PRACTICAL NO.07		**2 HOURS**
Verification of Beers law & colorimetric estimation		
PRACTICAL NO.08		**2 HOURS**
Determination of max of organic/ inorganic compound using UV-visible spectrophotometer		
PRACTICAL NO.09		**2 HOURS**
Separation of mixture of two organic compounds by Thin Layer Chromatography		
PRACTICAL NO.10		**2 HOURS**
Separation of two cations by paper chromatography		
PRACTICAL NO.11		**2 HOURS**
Separation & purification of chemical compounds by Gas chromatography		

TEXT BOOK

1.Jain & Jain, Engineering Chemistry, 15th Edition, Dhanpat Rai Publications company

2.S.M. Khopkar , Basic Concept of Analytical Chemistry,2nd edition, New Age Science Ltd ISBN-10: 1906574006 ISBN-13: 978- 1906574000

3.Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, Laxmi Publications Pvt. Ltd.

REFERENCE BOOK

1.V.M.Parikh , Absorption Spectroscopy of Organic Molecules, Addison Wesley Longman Publishing Co, ISBN 10: 0201057085,ISBN 13: 9780201057089.

2.Skoog, Fundamentals of Analytical Chemistry, Cengage Learning, ISBN-13: 978-0495558286, ISBN-10: 0495558281

3.Willard, Merritt, Dean and Settle, Instrumental Methods of chemical analysis, 6th edition, Wadsworth Publishing Co. ISBN-10: 0534081428, ISBN-13: 978-0534081423.

4.Donald R. Askeland, Pradeep Fulay, W. J. Wright, The Science & Engineering of Materials, 6th Edition, Cengage Learning, 2010

5.O. P. Virmani & A. K. Narula , Applied Chemistry: Theory and Practice , New Age International Pvt. Ltd. Publishers, ISBN-10: 8122408141, ISBN-13: 978-8122408140

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	40	50	10	25	Nil	125

PRE-REQUISITE : Physics and Mathematics of XI & XII

COURSE OBJECTIVES :

CV101.CEO.1:To classify force systems and explain the conditions of equilibrium.
CV101.CEO.2:To illustrate laws of friction.
CV101.CEO.3:To demonstrate the concepts of centroid and moment of inertia.
CV101.CEO.4:To describe kinematic parameters of motion.
CV101.CEO.5:To make use of laws of motion for kinetics.
CV101.CEO.6:To explain energy and momentum methods.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV101.CO.1:Determine the resultant and support reactions.(L5)
CV101.CO.2:Analyze bodies involving frictional forces. (L4)
CV101.CO.3:Evaluate centroids of bodies and moment of inertia of sections. (L5)
CV101.CO.4:Identify the type of motion and its kinematic parameters. (L3)
CV101.CO.5:Analyze the motion under action of constant and variable forces. (L4)
CV101.CO.6:Apply energy and momentum methods for kinetics. (L3)

THEORY		
UNIT 1	**Fundamentals of statics**	**8 HOURS**
Basic concepts and fundamental principles, force, moment of a force, couple, resolution and composition of forces, Free body diagrams, equations of equilibrium, equilibrium of coplanar and non-coplanar force system, applications to jib crane, beams, and cables.		
UNIT 2	**Friction**	**6 HOURS**
Introduction, types of friction, laws of friction, angle of friction, angle of repose, cone of friction, engineering applications - blocks and wedges, ladder friction, screw jack, pulley and belt drives, band brakes.		
UNIT 3	**Properties of surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity, centroids of composite 1D and 2D objects. Introduction to moment of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, MI of composite objects. Distributed loading, fluid pressure-application to dams and gates.		
UNIT 4	**Kinematics**	**8 HOURS**
Basic concepts in kinematics, Motion with uniform and variable acceleration, Motion curves, Curvilinear Motion in Rectangular coordinates, path coordinates, polar coordinates. Kinematic Link and Kinematic Pair, Kinematic Chain, Mechanisms and its inversions, instantaneous centre of rotation, Kennedy's Theorem, Applications- slider and crank mechanism, Railway engine and its supporting flywheel motions, Linkage mechanism of excavator and its system.		
UNIT 5	**Kinetics**	**6 HOURS**
Kinetics of rectilinear and circular motion of a particle acted upon by a constant and variable force system, Newtons second laws of Motion, Equations of motion, concept of dynamic equilibrium, and motion of connected bodies. Basic principles of vehicle dynamics, Forces acting on a vehicle, tire mechanics, Dynamics of linear and lateral motion.		
UNIT 6	**Applications of Partial Differentiation**	**8 HOURS**
Work, power and energy, Principles of work and Energy,Motion under a ConservativeCentral Force. Application to Space Mechanics. Impulse, momentum, Principle of Impulse and Momentum, Collisions-elastic and plastic, Direct central impact, coefficients of restitution.Applications-vehicle collisions, sports viz. cricket, tennis, billiard.		

PRACTICALS		
PRACTICAL NO.01	**Group 1] Basic principles/laws**	**2 HOURS**
1. To verify triangle law/ Lami's theorem 2. To verify polygon law of forces. 3. To verify law of moments. 4. To verify equilibrium of parallel forces. (Beam Reactions) 5. To verify equilibrium of concurrent forces in space.		
PRACTICAL NO.02	**Group 2] Friction**	**2 HOURS**
1. To verify laws of friction. 2. To determine angle of repose for a given block and surface. 3. To determine static coefficient of friction for a block on horizontal plane. 4. To determine static coefficient of friction for a block on inclined plane. 5. To determine static coefficient of friction for flat belt and drum.		
PRACTICAL NO.03	**Group 3] Centroid/centre of gravity**	**2 HOURS**
1. To determine centroid of irregular triangular lamina. 2. To determine centroid of polygonal lamina. 3. To determine centre of gravity of a wire bend. 4. To determine centroid of a composite lamina. 5. To find the shift of centroid after cutting some part of lamina.		
PRACTICAL NO.04	**Group 4] Motion(Dynamics)**	**2 HOURS**
1. To study curvilinear motion of a particle. 2. To verify value of g using compound pendulum. 3. To determine coefficient of restitution. 4. To determine mass moment of inertia of a fly wheel. 5. To verify law of conservation of momentum.		
PRACTICAL NO.05	**Group 5] Graphical Exercises**	**2 HOURS**
1. To determine resultant of concurrent forces. 2. To determine resultant of parallel/general forces. 3. To determine reactions for a simple beam. 4. To draw motion curves for given kinematics problem. 5. To determine relative velocity by graphical method. Part B] Students will have to complete a task/activity after each practical which will be based on the theme of that group. (10 Hrs)		

TEXT BOOK

1. A. Nelson ”Engineering Mechanics: Statics and Dynamics”, Tata McGraw-Hill Education, ISBN: 978-0-07-014614-3
2. R.C Hibbeler ”Engineering Mechanics”, Pearson Education, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston ”Vector Mechanics for Engineers Vol.I and II”, Tata Mc-Graw, ISBN: 978-0077402327
2. Ferdinand Singer, Harper and Row ”Engineering Mechanics Statics and Dynamics”, ISBN:0063506610
3. Manoj K Harbola ”Engineering Mechanics”, Cengage Learning, ISBN:8131509907

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Computer Programming
	COURSE CODE	IT101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	4	40	50	10	25	NIL	125

PRE-REQUISITE : Knowledge of computer system.

COURSE OBJECTIVES :

IT101.CEO.1:To define and summarize the basic terminologies used in computer programming.
IT101.CEO.2:To develop and demonstrate logic for a given problem using algorithms and Flowcharts.
IT101.CEO.3:To evaluate solutions for the given problem using problem solving tools.
IT101.CEO.4:To identify and analyze different control structures.
IT101.CEO.5:To understand and use of simple data structures using Python.
IT101.CEO.6:To demonstrate and understand different computer applications in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT101.CO.1:Analyze a problem and identify and define the computing requirements appropriate to its solution[L3][L4].
IT101.CO.2:Apply the knowledge and strategies for structuring code, dividing problems up into pieces that can be solved independently, then integrating the pieces into a whole to solve a large problem [L3].
IT101.CO.3:Analyze when to select the different types of data structures such as arrays and lists as a framework for solving a problem [L4].
IT101.CO.4:Design, correctly implement and document solutions to problems using Python [L6].
IT101.CO.5:Analyze and compare alternative solutions to computing problems [L2][L4]
IT101.CO.6:Adapt to new developments in the field of computer science [L6].

THEORY		
UNIT 1	**Problem Solving Concepts**	**6 HOURS**
General Problem Solving Concepts-types of problems, problem solving with computers, difficulties with problem solving, Problem solving concepts for the computer: Constants, Variables, Data types, operators, Expressions, Equations, Problem solving tools.Programming structure-Modules and their functions, Cohesion and Coupling, Local and Global Variables, Parameters, return values		
UNIT 2	**Problem solving and Logic structure**	**8 HOURS**
Logic structures, Problem solving with sequential logic structure - The sequential logic structure, solution development. Problem Solving with Decisions decision logic structure, multiple Decision instructions, straight-through logic, positive logic, negative logic, logic conversion, Problem solving with loops and case logic structures.		
UNIT 3	**Arrays, Strings and File Processing**	**8 HOURS**
One dimensional, multidimensional array,finding maximum number in a set, Partitioning of array, finding smallest element, searching an array for a range. String Handling Operations: Concatenation, Copy, Substring, Compare, Length, Case Change, and Reverse. File handling and file handling operations, File Handling Modes.		
UNIT 4	**Programming Applications**	**6 HOURS**
Programming applications, Predictive analysis with examples, Graphics and animation, working with matrices, Graphics & Visualization, Differential Equation: Linear Differential Equations, Digital Signal Processing: Plotting different waveforms.		

PRACTICALS		
PRACTICAL NO.01		**6 HOURS**
1. Find the result of allthe arithmetic operations (Addition,Subtraction,Multiply, Division and modulo) in Python. 2. Show the distance in miles per gallon with respect user defined value in Python. 3. Find the kinetic energy of an object.		
PRACTICAL NO.02		**6 HOURS**
1. Write a Python program for printing result of five subjects for five students. 2. Choose any value and find whether the number is even or odd. 3. Identify whether the number entered by user is prime or not.		
PRACTICAL NO.03		**6 HOURS**
1. Solve the Fibonacci sequence using recursive function in Python. 2. Illustrate factorial of non-negative numbers in Python. 3. Build asterisk (*) graph in Python		
PRACTICAL NO.04		**6 HOURS**
Electric circuits, Chemical applications- Mixing problems.		
PRACTICAL NO.05		**6 HOURS**
1. Select the number from the entered list and find its position in Python (use Linear Search). 2. Select the number and find its position of in Python (use Binary search). 3. Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain)		
PRACTICAL NO.06		**6 HOURS**
1. Select a text file and count number of words, repeated words in a file. 2. Choose the words from the file, store in the list and sort the list is ascending order. 3. Create duplicate the file from an original file.		
PRACTICAL NO.07		**6 HOURS**
1. Predict whether the entered string is palindrome or not. 2. Compare two strings and convert in opposite case in Python. 3. Select any two words and perform concatenation operation		
PRACTICAL NO.08		**14 HOURS**
1. Create a simple picture in python using graphics package. 2. Construct 2D and 3D plotting the Objects. 3. Create Sine waveform, Cosine waveform, Square waveform, Saw-tooth waveform, using MATLAB and discrete the same. 4. Solve the matrix operations (Addition, Multiplication, and Transverse) in MATLAB. 5. Design an application to display student result using predictive analysis		

TEXT BOOK

1.1. Problem Solving and Programming Concepts ,Maureen Sprankle , Pearson Publication, Seventh Edition, ISBN 81-317-0711-3.

2.How to think like a Computer Scientist, Learning with Python Allen Downey, Jeffrey Elkner, Chris Meyers, Green Tea Press ISBN: 0-9716775-0-6.

REFERENCE BOOK

1.1. Learning Python Mark Lutz Oreilly Publication 5th Edition ISBN-13: 978-1449355739.

2. A MATLAB Exercise Book LudmilaKuncheva, Cameron Gray, Perfect-bound Paperback, ISBN 9781291784794.

3. How to solve it by Computer, R.G.Dromey, First Edition, Pearson Publication, ISBN 978-81-315-0562-9.

4. Introduction To Computation And Programming Using Python ”Guttag John V, PHI(2014), ISBN-13 : 978-8120348660.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 2
	COURSE CODE	HP102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level; Language and Communication- 1

COURSE OBJECTIVES :

HP102.CEO.1:To familarise the students with sounds in English and introduce phonemic transcription.
HP102.CEO.2:CEO.2: To enrich the vocabulary of the students with AWL and NAWL.
HP102.CEO.3:To acquaint the students with public speaking, presentation and interview skills in English.
HP102.CEO.4:To develop the students reading and listening skills with the use of written audio and video texts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP102.CO.1:Recognise and reproduce the sounds in English effectively. [L1]
HP102.CO.2:Choose and employ appropriate words from AWL and NAWL in communication. [L1, L3]
HP102.CO.3:Express their ideas effectively and demonstrate skills in interpersonal communication. [L2, L3]
HP102.CO.4:Analyse and infer from written, audio and video texts. [L 2, L4]

THEORY		
UNIT 1	**Phonetics and Vocabulary**	**3 HOURS**
Phonemes in English and phonemic transcription; Essential academic vocabulary (Academic Word List and New Academic Word List); Dictionary Skills; Phrasal verbs and collocations		
UNIT 2	**Oral Communication**	**4 HOURS**
Public Speaking; Presentation Skills; Interview Skills and telephonic communication; Meetings (types, agenda and minutes)		
UNIT 3	**Active Listening and Reading with Comprehension**	**5 HOURS**
Concept and types of listening; Steps in listening with comprehension; Essentials of good listening; Concept and types of reading; Guidelines for reading with comprehension; Analytical reading		

PRACTICALS		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**2 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Vocabulary Enrichment**	**2 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills		
PRACTICAL NO.03	**Phrasal Verbs and Collocations**	**2 HOURS**
Use of phrasal verbs and collocations; reading literary pieces, essays to identify phrasal verbs in context; story-telling		
PRACTICAL NO.04	**Public Speaking**	**2 HOURS**
Attributes of a good public speaker; prepared and extemporaneous speech; Listening to and Reading famous speeches		
PRACTICAL NO.05	**: Presentations**	**2 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.06	**Interview Skills and Telephonic Communication**	**2 HOURS**
Etiquettes of attending interviews; Preparation; Telephonic communication; Mock Interviews		
PRACTICAL NO.07	**Mock Meetings**	**2 HOURS**
Importance of effective interpersonal communication; working in teams; Mock Meetings		
PRACTICAL NO.08	**Active Listening**	**6 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		
PRACTICAL NO.09	**Reading with Comprehension**	**4 HOURS**
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1.Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983

2.Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition

3.Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215

4.Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757

5.Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577

6.S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806

7.Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME103
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
-	4	-	-	25	-	25	50

PRE-REQUISITE : -

COURSE OBJECTIVES :

ME103.CEO.1:Disseminate the philosophy of design thinking.
ME103.CEO.2:Impart the information regarding User centric approach.
ME103.CEO.3:Give exposure to information collection tools to clearly define user centric problem.
ME103.CEO.4:Enhancethinking in order to inspect diverse solutions.
ME103.CEO.5:Sensitize about the feasibility, desirability and viability criterias for selection of appropriate solution.
ME103.CEO.6:Educate about different types of prototyping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME103.CO.1:Recall fundamental principles of design thinking (L1)
ME103.CO.2:Explain all the dimensions of user and his needs using design thinking approach (L2)
ME103.CO.3:Identify user centric problem by using information gathering techniques (L3)
ME103.CO.4:Compare multiple solutions through ideation process (L4)
ME103.CO.5:Justify most appropriate solution for defined user centric problem (L5)
ME103.CO.6:Develop the most optimum solution (L6)

SESSION		
SESSION 1		**2 HOURS**
Design thinking Methodology General Problem Statement, Random check list, mind mapping, Categorization of random check list.		
SESSION 2		**2 HOURS**
Brainstorming of problem areas, Research Methodology Information gathering Primary, Secondary Sources, data presentation, Preparation of survey forms		
SESSION 3		**2 HOURS**
SWOT analysis, drawing inferences, translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of cuboids, cylinders, simple form products (Isometric views) Ideation sketches, Ergonomic and aesthetic consideration in design		
SESSION 4		**2 HOURS**
Concept validation, evaluation and detailing, prototyping		

PROJECT		
PHASE NO.01		**4 HOURS**
General Problem Statement and problem background		
PHASE NO.02		**4 HOURS**
Research methodology		
PHASE NO.03		**4 HOURS**
Design Brief		
PHASE NO.04		**8 HOURS**
Ideation		
PHASE NO.05		**4 HOURS**
Concept Evaluation, Validation and Concept detailing		
PHASE NO.06		**8 HOURS**
Prototyping		
PHASE NO.07		**8 HOURS**
Report Writing		

TEXT BOOK

1. Engineering Design Process, Second Edition Yousef Haik and Tamer Shahin Publisher, Global Engineering. Cengage Learning. ISBN-13: 978-0-495-66814-5.
2. Product Design and Development, Kevin Otto and Kristin Wood, Product Design: Techniques in Reverse Engineering and New Product Development, Pearson Education Inc. ISBN-10: 0130212717.
3. Product Lifecycle Management, Grieves, Michael, McGraw-Hill, 2006. ISBN 0071452303.
4. Lateral Thinking: Creativity Step by Step Harper Perennial; Reissue edition (24 February 2015) (Perennial Library) Six Thinking Hats by Edward de Bono Paperback ISBN-10: 0060903252.
5. Design Methods, John Chris Jones., John Wiley & Sons, David Fulton Publishers, London,

Web references

1.www.designcouncil.org.uk
2.www.surveymonkey.com
3.http://en.red-dot.org

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Second Year

Bachelor of Technology in Computer Engineering

2016-2020

(With Effect from Academic Year: 2017-2018)

MIT | Academy of Engineering (An Autonomous Institute)	COURSE STRUCTURE (2016 - 2020)		
SCHOOLOF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2017- 18
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	RELEASE DATE	:	01/06/2017
	REVISION NO.	:	0.0

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS202	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	CS201	Data and File Structures	3	4	4
5.	DC2	CS202	Digital Electronics and Microprocessors	3	4	4
6.	SDP3	ET206	Prototyping	--	4	2
TOTAL				**14**	**14**	**21**

SEMESTER:IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	--	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	CS211	Discrete Structure and Graph Theory	3	2	4
5.	DC4	CS212	Database Management Systems	3	2	4
6.	SDP4	CS213	Minor Project	--	4	2
TOTAL				**15**	**12**	**21**

Note: L: Lecture, P: Practical, T: Tutorial; **Applicable for FY BTech*

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2016 - 2017
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTR ENGINEERING	**COURSE NAME**	Environmental Science
	COURSE CODE	CH201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	15	-	50	125

PRE-REQUISITE : AS103: Chemistry

COURSE OBJECTIVES :

CH201.CEO.1:Give an overview of exploitation of various natural resources and its impact on the environment.
CH201.CEO.2:Understand the ecosystem and biodiversity.
CH201.CEO.3:Understand the importance of environment and its conservation.
CH201.CEO.4:Learn about the environmental pollution sources, effects and control measures.
CH201.CEO.5:Make aware of the national and international issue for the environment.
CH201.CEO.6:Make aware about the social and environmental responsibility.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH201.CO.1:Identify the various human activities adversely affecting the natural resources and the balance ecosystem.
CH201.CO.2:Observe the various aspects of ecosystems and suggest ways to protect them.
CH201.CO.3:Experiment the pollution of given locality and suggest steps to mitigate pollution.
CH201.CO.4:Record the sources of pollution and their controls.
CH201.CO.5:Compare laws and standards for pollution.
CH201.CO.6:Categorize the social and professional responsibility towards environment.

THEORY COURSE CONTENT		
UNIT 1	**Environment**	**5 HOURS**
Importance of environment, Biosphere, Structure and function of an ecosystem, ecological pyramids, effects of population growth on environment. Natural cycles: hydrologic, carbon, nitrogen, phosphorus and Sulphur cycle. Understanding carbon foot prints, Role of the environmental engineer. Need of environmental legislations and environmental Acts in India. Functions of central and state pollution control boards.		
UNIT 2	**Resources**	**4 HOURS**
Natural, conventional and non-conventional, Natural and manmade disasters on environment. Case studies on use and Impact of overutilization of natural resources: Food, forest, water, energy, land.		
UNIT 3	**Pollution**	**4 HOURS**
Structure and composition of atmosphere, Pollution, types of pollution, causes of pollution effects, control and prevention. Air, solid and water waste management Pollution prevention and control act.		
UNIT 4	**Pollution Impact**	**5 HOURS**
Case study on Nuclear Accidents; floods; land slid; climate change; air pollution in cities, water pollution; noise pollution. Case study on drought situation in Vidarbha-Marathwada.		
UNIT 5	**Social Issues**	**5 HOURS**
Case study on Plastic waste management, domestic waste issue, food problem in India & globally. Modernization of agriculture, traffic and pollution, e-waste disposal.		
UNIT 6	**Sustainable Development**	**5 HOURS**
Concept of sustainable development. Utilization and conservation of natural resources. Rainwater harvesting & Water management techniques. Role of an individual in environment protection. Energy audit, disaster management.		

PRACTICAL		
PRACTICAL NO.01	**Fukushima Japan Nuclear Accident**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.02	**Malin Land Slide**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.03	**Drought Situation in Vidarbha & Marathwada**	**2 HOURS**
Details of the drought situation will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of situations.		
PRACTICAL NO.04	**River water pollution case study**	**2 HOURS**
Details of the River pollution of Ganga, Indrayani etc. will be discussed with the students. Students are supposed to write a case study report on the various causes of river pollution, preventive measures to avoid this & water treatment methodologies forriver water treatment.		
PRACTICAL NO.05	**Project**	**16 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		

TEXT BOOKS

1. Rao C.S. Environmental Pollution Control Engineering, Wiley Eastern Publications. ISBN: 9780470217634.
2. Kamaraj. P & Arthanareeswari .M, Environmental Science Challenges and Changes, 4th Edition, Sudhandhira Publications, 2010.
3. Sharma. B.K. and Kaur, Environmental Chemistry, Goel Publishing House, Meerut, 1994 ISBN:8182830125.
4. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. ISBN-10: 1111988935 ISBN: 9781111988937
5. Metcalf Eddy Wastewater engineering: Treatment and reuse, McGraw Hill, ISBN: 007041878.

REFERENCE BOOKS

1. Garg, S.K and Garg, R., Ecological and Environmental Studies, Khanna Publishers, Delhi, 2006.ISBN: 9788174092182.
2. H. S. Peavy, D. R. Rowe, G. Tchobanoglous, Environmental Engineering, McGraw Hill, ISBN: 8428204470.
3. Helen Kavitha. P Principles of Environmental Science, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
4. Henry J.G. and Heinke G.W., Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
5. Masters G.M., Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall of India, New Delhi, 2004. ISBN: 0131481932 ISBN: 9780131481930.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 – 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	System Engineering
	COURSE CODE	ET201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	NIL	25	125

PRE-REQUISITE :

1:ME102 Engineering Tools and Techniques
2:ME103 Design Thinking

COURSE OBJECTIVES :

ET201.CEO.1:To describe the rationale for using systems thinking for complex adaptive systems
ET201.CEO.2:To prioritize with stakeholders in a participatory way for research study
ET201.CEO.3:To design system engineering frame work
ET201.CEO.4:To apply system engineering tools
ET201.CEO.5:To evaluate the system

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET201.CO.1:Explain the rationale for using systems thinking for complex adaptive systems.
ET201.CO.2:Analyze interaction with stakeholders in a participatory way for research study.
ET201.CO.3:Design System Engineering framework.
ET201.CO.4:Apply system engineering tools.
ET201.CO.5:Evaluate the system.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Systems Thinking**	**4 HOURS**
Introduction to Systems Thinking and Understanding simple systems, Complex and Complex Adaptive Systems, Stakeholders and their engagement. **Further Reading :** Case studies - Public health system, transportation system, solid waste management system.		
UNIT 2	**System Dynamics Simulation**	**6 HOURS**
Standard test system conceptualization and mapping: an introduction to causal loop diagrams (Systems Thinking Diagrams; Influence Diagrams), principles of stock-and-flow diagrams, Application of stock and flow diagrams to engineering problems, Analysis using agent-based models, Application of systems thinking to policy decision making. **Further Reading :** Case studies - Understand how to use Vensim PLE / Netlogo (Free academic version) to develop causal loop diagrams. Application of Stock and Flow Diagrams to public Health.		
UNIT 3	**Introduction to Systems Engineering**	**8 HOURS**
History and definitions, mission of system, types of system, system and its environment, System as a product, Systems Engineering as a profession, System Engineering Process and Management, Life cycle Integration. **Further Reading:** Case studies - London Walkie-Scorchie Skyscraper, BRT system, garbage collection, Unmanned aerial vehicle, Washing machine etc.		
UNIT 4	**System Engineering Design**	**8 HOURS**
System development process - Systems engineering method, Systems testing through out development. Requirement Engineering - Inputs, requirement types, purpose, Requirement analysis, requirement outputs. Case studies – Unmanned Aerial System. Functional Analysis - Schematic, Functional block diagram. Design Synthesis - Process, Product realization, Product implementation, Product Integration, Product verification, product validation, product transition. **Further Reading:** Development approaches – Waterfall, incremental spiral, evolutionary acquisition.		
UNIT 5	**System Engineering Tools**	**8 HOURS**
Context diagrams, QFD (Quality function deployment), House of quality, Timeline analysis sheet and requirement allocation sheet, Functional flow diagrams, Design synthesis tools- Concept description sheet (CDS), Functional matrix diagram, Requirement break down structure, N2 diagrams, data flow diagrams, control flow diagrams, behavioral diagrams. **Further Reading:** Popular System life cycle models (DoDMIL STD 499B, IEEE 1220 SEP, EIA 632 SEP, ISO/IEC15288, Professional Engineering model, NASA model, software life cycle models).		
UNIT 6	**Partial Differential equations.**	**7 HOURS**
Verifying and validating the system, managing the configuration of the system, managing technical risk, project management, ILS (Integrated logistic support). **Further Reading:** Case studies - Aircraft system.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Community based causal mapping – Developing causal loop diagrams for health care using Vensim.		
PRACTICAL NO.02		**2 HOURS**
Developing stock-and-flow diagrams for health care system using Vensim.		
PRACTICAL NO.03		**2 HOURS**
(Any 02) 1. Unmanned aerial vehicle 2. Conduct some research into the London building known as the Walkie Scorchie. Identify what circumstances led to the building earning that unfortunate name and suggest which aspects of the systems engineering process may not have been followed correctly (at least as the issues have been reported in the media).The following links may assist in your investigations. http://www.dezeen.com/2013/09/06/we-made-a-lot-of-mistakes-with-this-building-says-walkie-scorchie- architect-vinoly/ http://www.ibtimes.co.uk/walkie-scorchie-talkie-building-sunlight-london-reflects-504342. 3. Examine in detail the BRT of New Delhi,Identify what circumstances led to the failure of the system. 4. Garbage collection 5. Washing machine		
PRACTICAL NO.04		**2 HOURS**
Determine the typical structure and contents of the system requirements specification (SyRS) for any one of the case study.		
PRACTICAL NO.05		**2 HOURS**
Choose an example related to your own discipline and then list and describe three detailed design tools to come up with a satisfactory design for anyone of the case study.		
PRACTICAL NO.06		**2 HOURS**
We want to modify our house (or from any one of the case studies) by for futuristic requirement to accommodate your children after marriage.Explain how accurate technical data on the house (as confirmed by PCA and FCA) supports this modification. Explain how the early design stages could have assisted with this modification if expandability/ future growth had been accounted for.		
PRACTICAL NO.07		**2 HOURS**
Mini project based on society, science and technology problem clubbed with Field visit and presentation (Define problem, data collection, requirement analysis,functional analysis.Design solution, progressive presentation of solution and final presentation). Note: The group of students should be from different program (Multidisciplinary group).		

PRACTICAL NO.08		2 HOURS
Watch the movie The Pentagon wars and write a two page report to assess what aspects System Engineering went wrong. (https://www.youtube.com/watch?v=iDYpRhoZqBY) .		
PRACTICAL NO.09		**2 HOURS**
Field visit / Industrial visit from system engineering point of view.		
PRACTICAL NO.10		**2 HOURS**
Working model case study of Quad copter/ aero modeling from system engineering point of view.		

TEXT BOOK

1. John D Sterman, "Business dynamics- Systems Thinking and modelling for a complex world", McGrawHill, ISBN: 007238915X.
2. Weinberg, G.M., An Introduction to General Systems Thinking, New York, NY: Dorset House Publishing, 2001, ISBN-13: 978-0932633491.
3. Alexander Kossiakoff, William N.Sweet, Systems Engineering: Principles and Practice, Wiley, 2009, ISBN-13: 978-8126524532.

TEXT BOOK

1. R. C. Dorf Dennis M Buede,The Engineering Design of systems, Wiley; 2nd edition, 2002, ISBN-13: 978-0070530393.
2. International Council of Systems Engineering, Systems Engineering Handbook, A guide for System Life Cycle Processes and Activities, version 3.2.1, January 2011.
3. Department of defense, systems engineering fundamentals, defense acquisition university press (Free e-book), https://www.scribd.com/document/321957824/SEFGuide-01-01.
4. Michael Ryschkewitsch, The Art and Science of Systems Engineering, (free e-book), https://www.nasa.gov/pdf/311198main-Art-and-Sci-of-SE-LONG-1-20-09.pdf
5. EIA 632 standard - www.psconsultech.com/yahoo-site-admin/assets/docs/EIA632.9212432.pdf
6. MIL standard - www.product-lifecycle-management.com/download/mil-std-499b-draft1993.pdf.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 – 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Data and File Structures
	COURSE CODE	CS201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	4	30	50	20	25	25	150

PRE-REQUISITE : 1. IT101 – Computer Programming

COURSE OBJECTIVES :

CS201.CEO.1:To illustrate fundamental data structures and their applications in programming and problem solving.
CS201.CEO.2:To build the ability to synthesize and analyze algorithms.
CS201.CEO.3:To identify appropriate data structure for the specified problem.
CS201.CEO.4:To analyze different sorting and searching algorithms.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS201.CO.1:Explain the concept of data structure.
CS201.CO.2:Develop efficient algorithm for a given problem.
CS201.CO.3:Choose effective data structures in approaching a problem solution.
CS201.CO.4:Make use of appropriate sorting and searching algorithm for a given application.

THEORY COURSE CONTENT		
UNIT 1	**Introduction To Data Structures**	**6 HOURS**

App/System/Case Study:

Social networking, Recommender system (Election Voting System, Slide puzzle game system)

Contents:

Introduction to Data Structures: Data object, Abstract Data Types (ADT), classification of data structure, time and space complexity, big-Oh notation, efficiency of algorithms, performance measures for data structures, Arrays: Representation of array, operations on arrays: Insertion, deletion, searching and traversing

Self-study: Fast transpose of sparse matrix

Further Reading: Array and database

UNIT 2	Linked Lists	7 HOURS

App/System/Case Study:

Process management in Linux, Polynomial and its operations (Account Management System, Shuffle and merging system for set of two integer sets)

Contents:

Linked lists: Representation of linked list, comparison of sequential and linked list organizations, singly linked lists and memory representation, operations of linked list (Insertion, Deletion, Concatenation, Copying, Traversing and Searching), doubly linked list, circular link list

Self-study: Garbage collection and link list

Further reading: Web indexing using linked list

UNIT 3	Stacks And Queues	5 HOURS

App/System/Case Study:

Expression conversion (infix, prefix, postfix), Expression evaluation, Josephus problem, CPU Scheduling, Queue simulation (Syntax checker system for matching braces, Maze solving system using Stack /Queue)

Contents:

Stacks: Stack as ADT, representation and implementation of stack using sequential and linked organization, operations on stack, recursion and stack Queues: Queue as ADT, representation and implementation of linear queue and circular queue using sequential and linked organization, double ended queue, multi queue and Priority queue.

Self-study: Role of stack in memory management

Further reading: Concurrent priority queues

UNIT 4	Trees	8 HOURS

App/System/Case Study:

Expression parsers and expression solvers, Data compression (Word frequency computation system, Players best scores system for online game)

Contents:

Trees: Introduction, representation of trees, operation on trees: creation, insertion, deletion, searching, traversal, searching. Transformation of trees into binary trees, Types of trees: Binary tree, complete binary tree, binary search tree, operations on binary search trees: creation, insertion, deletion. AVL trees, threaded binary trees, heap tree, B trees

Self-study: Optimal Binary Search Tree

Further reading: Optimal Binary Search Tree

UNIT 5	Graphs	5 HOURS

App/System/Case Study:

Communication networking, Road maps (Game path finding system, Web graph system)

Contents:

Graph: Introduction, types of graph, representation of graphs: adjacency matrix, adjacency list, BFS, DFS and traversal, spanning trees, shortest path algorithms, topological sorting

Self-study: Warshall's algorithm

Further reading: Page ranking

UNIT 6	Sorting, Searching And File Organization	8 HOURS

App/System/Case Study:

Lexical analyzer for numerical expressions (Merging two sorted files system, Employee leave management system, compression system for simple text files)

Contents:

Sorting (Quick sort, Heap sort), Searching: Linear Search, Binary Search, Comparison of sorting and searching,Hashing: hash function, hash table, collision resolution techniques Files: Introduction to file structures, file organizations: sequential, direct access, indexed sequential file organization and file processing operations.

Self-study: Selection sort

Further reading: Concurrent Hash Tables

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Design and implement a program that will help a salesperson to keep track of customer records		
PRACTICAL NO.02		**6 HOURS**
Design and develop a program for an institution having three departments Computer Engineering, Electronics and mechanical. The institute considers SSC, HSC and entry test marks for registering a student and calculate an aggregate based on a specific criteria. The program should find in which dept. a student should be registered, store its record and provide facility for adding other departments in the institute and changing admission criteria and provide a facility for retrieving a record of particular student.		
PRACTICAL NO.03		**6 HOURS**
Design and develop Snake ladder game using appropriate data structure		
PRACTICAL NO.04		**4 HOURS**
Design and implement a program to generate a computerized telephone directory for a cellular service consisting of name and cell phone number. Present the user with a menu that allows the user to search the directory for a specified record, insert a new record, delete an existing record, or print the entire phone list.		
PRACTICAL NO.05		**4 HOURS**
Design and develop a program for implementing SCET database using suitable data structure to store the database record. Each database record contains the name of the city and coordinates of the city expressed as integer X and Y co-ordinates. Your database should allow records to be inserted, deleted by name or co-ordinates and search by name or co-ordinate, another operation that should be supported is to print all records within given distance of specified point.		
PRACTICAL NO.06	**Mini Project**	**24 HOURS**
Mini project is to be carried out by providing facilities for insertion of new data, modification of data, deletion provision, provide facility for searching a particular data required by user using appropriate data structure.		

TEXT BOOK

1. E. Horowitz S. Sahani, D. Mehta, "Fundamentals of Data Structures in C++" , Seventh Edition, Universities Press ,2008, ISBN-13: 978-8173716065.
2. T. Cormen, C Leiserson, R. Rivest, C Stein, "Introduction to Algorithms", MIT press,2009, ISBN-13: 978- 0262533058
3. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structures and Algorithms in C++", John Wiley & Sons, ISBN-13: 978-0470383278

REFERENCE BOOK

1. Richard F. Gilberg, Behrouz A Forouzan, " Data structures- A pseudocode Approach with C++" Second edition , Cengagel earning, 2004, 9780534390808.
2. E. Horowitzs S. Sahani, S. Rajashekharan, "Fundametals of Computer Algorithm s", Universities Press, 2008,ISBN-13: 978-8 173716126
3. J. Tremblay, P. Sorenson, " An Introduction to data structures with applications", 2nd Edition, McGraw-Hill Edition, 1984, ISBN 9780070651579
4. A. Tharp, "File organization and processing", 2008, Willey India, ISBN: 9788126 518685
5. DebasisSamanta, " Classic Data Structures", Second Edition, TMH, 2009, ISBN-13: 978-8120337312

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 – 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Digital Electronics and Microprocessor
	COURSE CODE	CS202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EVALUATION SCHEME :**					
		THEORY			PRACTICAL	PRESENTATION/	TOTAL
LECT URE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	4	30	50	20	25	25	150

PRE-REQUISITE : 1. EX101 –Electrical and Electronics Engineering

COURSE OBJECTIVES :

CS202.CEO.1:To understand the functionality and design of Combinational and Sequential Circuits.
CS202.CEO.2:To understand and compare functionalities, properties and applicability of logic families
CS202.CEO.3:To learn the architecture and programmer‘s model of microprocessor 80386.
CS202.CEO.4:To acquaint the learner with instruction set and logic to build assembly language programs.
CS202.CEO.5:To acquaint the architecture and Programmer’s model of Microcontroller 8051.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

CS202.CO.1:Design Combinational digital circuits as per the specifications. (Apply)
CS202.CO.2:Design Sequential digital circuits as per the specifications. (Apply)
CS202.CO.3:Apply the knowledge to select the logic families IC packages as per the design specifications. (Apply)
CS202.CO.4:Explain the architecture of the microprocessor 80386. (Understand)
CS202.CO.5:Develop assembly language programs using 32/64 bit registers. (Apply)
CS202.CO.6:Explain the architecture of the Microcontroller 8051. (Understand).

THEORY COURSE CONTENTS		
UNIT 1	**Combinational Logic and Sequential logic**	**6 HOURS**

Application/ Case Study/ System:

Programmable Logic Devices, Field Programmable Gate Array

Contents:

Reduction techniques: K-Maps up to 4 variables and Quine-McClusky technique Flip- flop: SR, JK, D, T; Preset Clear, Master and Slave Flip Flops their truth tables and excitation tables, Shift Registers, Counters: Asynchronous counter (Ripple Counter), UP/DOWN Counters, Modulus of the counter, Synchronous counter Design

Self-Study: Asynchronous Sequential Circuits

Further Reading: Synchronous Sequential Circuit Design(Moore Machines and Mealy Machines)

UNIT 2	**Logic Families**	**4 HOURS**

Application/ Case Study/ System:

Mini Computers and Mainframe processor

Contents:

TTL, CMOS Logic, Interfacing CMOS and TTL

Self-study: RTL, DTL

Further Reading: DCTL

UNIT 3	**Basic Architecture Of 80386 Processor**	**8 HOURS**

Application/ Case Study/ System:

Future Generation Processors, Mobile Computers

Contents:

History of Microprocessor, 80386 Architecture,Memory Organization and Segmentation- Global Descriptor Table, Local Descriptor Table, Interrupt Descriptor Table, Data Types, Registers, Instruction Format, Operand Selection, Addressing modes

Self-study: Architecture of 80486

Further Reading: Architecture of Pentium processor

UNIT 4	**Assembly Language Programming**	**6 HOURS**

Application/ Case Study/ System:

Device Drivers, NASM

Contents:

Instruction Set- Data Movement Instructions, Binary Arithmetic Instructions, Decimal Arithmetic Instructions, Logical Instructions, Control Transfer Instructions, String Instructions, Flag Control Instructions, Segment Register Instructions

Self - Study: Assembly instruction for 80486

Further Reading: Use of assembly language instruction for embedded application.

UNIT 5	Memory Management, Protection And Multitasking In 80386 Processor	6 HOURS

Application/ Case Study/ System:

Pentium Processors: Memories

Contents:

Memory Management- Segment Translation, Page Translation, Combining Segment and Page Translation. Protection- Need of Protection, Overview of 80386DX Protection Mechanisms, Multitasking- Task State Segment, TSS Descriptor, Task Register, Task Gate Descriptor, Task Switching, Task Linking, Task Address Space

Self-Study: Memory organization of 80486.

Further reading: Memory organization and segmentation of Intel processor.

UNIT 6	Microcontroller	6 HOURS

Application/ Case Study/ System:

Obstacle Avoidance Robotic Vehicle Project, Patient health monitoring system with location details by GPS, Electronic Voting Machines and Digital Sensor based Temperature Control

Contents:

Microcontroller 8051: Features, architecture, Pin description, Programming model– Special Function Registers, addressing modes, instruction set, Timers and Counters, serial communication, Interrupts, Interfacing with ADC

Self-Study: Interfacing with DAC

Further reading: Applications of Microcontroller in Industries

PRACTICAL:		
Practical NO.01		**4 HOURS**
Design and Analysis of Digital Circuit using Logic Circuit Simulator.		
Practical NO.02		**4 HOURS**
Design and Analysis of logic circuits that carry out addition of binary digits.		
Practical NO.03		**4 HOURS**
Conversion of flip- flops.		
Practical NO.04		**4 HOURS**
Realization of Boolean expression using multiplexer.		
Practical NO.05		**4 HOURS**
Up-down counter using JK flip-flop.		
Practical NO.06		**4 HOURS**
Use of Data transfer and Arithmetic instructions in Assembly Language Programming		
Practical NO.07		**24 HOURS**
Mini Project: Identify Basic gates, Derived gates and Universal gates for given application. Design of combinational and sequential circuits. Use of Flip Flops in the design of registers and memories. Use of various simulator software's like CPUsim, Retro2, Logisim. Use of Microcontrollers and embedded system in real time application.		

TEXT BOOKS

1. R. P. Jain, "Modern Digital Electronics", 4th Edition, Tata McGraw-Hill, 2010.
2. M Morris Mano "Digital Logic and Computer Design" 1/e Pearson, June 2016.
3. Intel 80386 Programmer's Reference Manual 1986, Intel Corporation, Order no.: 231630-011, December 1995.
4. Barry B. Brey, "The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 ... - Architec- ture, Programming, and Interfacing".
5. Muhammas Mazidi, Janice Mazidi and Rolin McKinlay, "The 8051 Microcontroller and Em- bedded Systems using Assembly and C", Pearson Educatio, ISBN-13::9788131758991

REFERENCE BOOKS

1. John M. Yarbrough, "Digital Logic applications and Design" Thomson
2. William H. Gothmann, "Digital Electronics: An Introduction to Theory and Practice" 2nd Edition, PHI publication
3. Walter A. Triebel, "The 80386, 80486, and Pentium Microprocessor: Hardware, Software and Interfacing"
4. Nilesh Bahadure," The 8086/8088, 80186/80286, 80386/80486 and the Pentium Family" Kindle Edition
5. Scott Mackenzie, Raphael C.W. Phan, "The 8051 Microcontroller", Prentice Hall India, ISBN-13:978- 0130195623

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 – 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Prototyping
	COURSE CODE	ET206
	COURSE CREDITS	02
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	75	75

PRE-REQUISITE :

1. ME101 - Engineering Graphics
2. ME102 - Engineering Tools and Techniques
3. ME103 - Design Thinking
4. EX101 - Electrical and Electronics Engineering
5. CV101 - Applied Mechanics
6. IT101 - Computer Programming

COURSE OBJECTIVES :

ET206.CEO.1:Learn about materiality and techniques.

ET206.CEO.2:Justify the product development cycle through prototype project.

ET206.CEO.3:Inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.

ET206.CEO.4:Develop abilities to transmit technical information clearly and test the same by delivery of presentation based on the prototype Project.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET206.CO.1:Consolidate the techniques, skills and modern engineering tools.
ET206.CO.2:Apply acquired skills to the construction of a prototype project.
ET206.CO.3:Develop a prototype project by performing tasks in team.
ET206.CO.4:Demonstrate the work carried out in a team.

PRACTICAL:

Course Introduction:

This course is aiming at a Project Based Learning methodology. Through a series of projects, students will learn to design, build, and debug engineering prototype systems. They will cover multiple aspects of the prototyping process.

Students will complete four modules in rotational manner,

1.Mechanical Prototyping (MP)

2.Electronic Prototyping (EP)

3.Software Prototyping(SP)

4.Civil Prototyping(CP)

Each module will have on an average six laboratory sessions. The students will complete them in rotational manner. Every module will award for 75 marks.

Marks of all four course modules will be averaged and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

MODULE: 1/4	**Mechanical Prototyping (MP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to prototyping**	**02 HOURS**

1. Introduction to Prototyping, traditional prototyping vs. advance rapid Prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Suitable materials and their properties.
3. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.
4. Formation of a group of 5 students per project team.

PRACTICAL NO. 02	**Design of models**	**04 HOURS**

1.Introduction of CAD software and its interaction with prototype machine.

2.3D Modeling using CAD software package.

3.Identify physical constraints of prototyping

PRACTICAL NO. 03	Preprocessing of prototype	06 HOURS

1.Generating STL files from the 3D models & working on STL files.

2.Pre-Processing the 3D Model in KISslicer / Cuba software.

3.Suitable filament selection and its properties.

PRACTICAL NO. 04	Orientation and support generation	04 HOURS

1. Operate Repeater / Cuba software, Selection of Orientation, Supports generation.
2. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Assembly of model	08 HOURS

1. Complete machine setup.
2. Hands on experience of rapid prototype machine for part/object, assembly manufacturing.
3. Material selection, cost benefit analysis for prototyping, financial aspect.

PRACTICAL NO. 06	Project presentation	04 HOURS

1.Final Presentation and report submission (assessment).

REFERENCE BOOK

1. Rapid Prototyping: Principles and Applications in Manufacturing, Chua C K, Leong K F, Chu S L, World Scientific, ISBN-13: 978-9812778987.
2. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Gibson D W Rosen, Brent Stucker, Springer, ISBN: 978-1-4419-1119-3.
3. Rapid Prototyping: Principles and Applications in Manufacturing,Noorani R, John Wiley & Sons, ISBN: 978-0-471-73001-9.
4. Rapid Tooling: Technologies and Industrial Applications, Hilton P, Jacobs P F, CRC press. ISBN:978-0824787882
5. Rapid Prototyping and Engineering applications: A tool box for prototype development, Liou W L, Liou F W, CRC Press, ISBN: 978-0849334092.
6. Rapid Prototyping: Theory & practice, Kamrani A K, Nasr E A, Springer, ISBN: 978-0-387-23291-1.
7. Kenneth Cooper, Rapid Prototyping Technology: Selection and Application, Marcel Dekker, Inc. New York, ISBN: 082470261.

MODULE: 2/4	Electronic Prototyping (EP)	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to design and construction of electronic prototyping**	**02 HOURS**

1.Gain familiarity with basic stages; Conceptualization, Detailed Design and Implementation.

2.Acquire concepts of basic processes in electronic prototyping.

3.Form a group of students. (03 max)

4.Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span.

5.Develop a plan for construction of electronic proto from a concept.

PRACTICAL NO. 02	Basic electronic prototyping skills	02 HOURS

1.Soldering

- Demonstrate structure of solder wire, soldering temperature, soldering station and gun.
- Highlight Industrial safety norms, use of lead free solder, extractor fan etc.
- Use of flux, desoldering gun, desoldering techniques, removing components/wires.
- Fix Solder defects and inspect quality of solder joints.

2.Wiring

- Cleaning, stripping and tinning the wires.
- Connections and protections for wires.
- Using cable ties , heat shrink tubes, sleeves and other wire dressing techniques.

3.Breadboard

- Bending wires and making connections on breadboards.
- Placing components on breadboards.
- Testing circuits using breadboards.

4.Perfboards

- Wire connections and component assembly on perfborads.
- Debugging assembled circuit and increasing stability.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	04 HOURS

1.Gain familiarity with PCB Design software.

2.Draw schematics for PCB design.

3.Make PCB layout as per circuit diagram.

4.Learn PCB design standards.

5.Export PCB files like gerber (.gbr), .pdf etc.

PRACTICAL NO. 04	PCB fabrication	08 HOURS

1.Develop negative imprints of top and bottom sides and expose to PCB.

2.Perform etching process for PCB.

3.Perform cleaning and shearing for required size.

4.Check continuity of tracks.

5.Use drilling machine to make drills.

PRACTICAL NO. 05	Assembly and testing of electronic proto	08 HOURS

1.Make assembly of electronic prototype as per IPC 610 D.

2.Insert components, perform lead cutting with standard clearance.

3.Review mechanical fitment of PCB with component insertion.

4.Solder components and make wiring.

5.Test prototype for electrical functionality, to perform rework if required.

6.Assemble PCB with mechanical fitments and assemblies.

7.Analyze performance and compare with specifications.

PRACTICAL NO. 06	Final project presentation	04 HOURS

1.Demonstrate an electronic prototype in a team.

2.Write a report on implementation of prototype. (10-15 pages max)

3.Present prototype implementation in a team by Power Point presentation.

4.Enumerate proposed specifications of electronic prototype.

5.Highlight financial aspects including proposed cost and bill of material.

REFERENCE BOOK

1. Printed Circuit Boards: Design and Technology, Walter C. Bosshart, Tata McGraw-Hill Education, 1983, ISBN: 978-0074515495.
2. Electronic Assembly Fabrication, Charles A. Harper, 1st ed.,McGraw-Hill Education, 2002 ISBN: 978-0071378826.
3. Soldering in Electronics Assembly, Frank Riley, 1st ed., Springer, 2013, ISBN: 978-3-662-13163-3.
4. Electronic Techniques: Shop Practices and Construction, R. S. Villanucci, A. W. Avtgis, W.F. Megow, 6th ed., Practice-Hall, 1999. ISBN: 978-0130195661.
5. Printed Circuit Boards: Design, Fabrication, and Assembly, R. S. Khandpur, 1st ed. McGraw-Hill Education, 2005, ISBN: 978-0071464208.
6. Practical Electronics for Inventors, Paul Scherz , Simon Monk ,3rd Edition, McGraw-Hill Education, 2013, ISBN 978-0071771337 (Available on TAB edition, Kindle)
7. IPC-J-STD-001E-2010, Requirements for Soldered Electrical and Electronic Assemblies, IPC. , ISBN: 9781580986922.
8. IPC-A-610 D-2014, Acceptability of Electronic Assemblies, IPC. ISBN: 9781611931549.

MODULE: 3/4	**Software Prototyping (SP)**	**28 HOURS**
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to software engineering**	**04 HOURS**
Concepts, Software development life cycle (SDLC). Student need to use AEIOU Framework (Design Thinking) to decide the problem statement. Students will work in group of three on AEIOU framework		
PRACTICAL NO. 02	**Design UML Diagrams for given problem statement**	**04 HOURS**
Students have to work in group on Project Development canvas and then design following, 1. Creation of data Flow diagram 2. Creation of block diagram 3. Design a Activity Diagram		
PRACTICAL NO. 03	**Requirement analysis**	**04 HOURS**
1. Find the requirement specification of given problem statement and formulate the feasible solution. 2. Paper (low-fidelity) prototype: choose the interface intend to develop, giving the reasons (pros and cons) and describing it summarily - choose the similar interface, indicating its key characteristics.		

PRACTICAL NO. 04	Design analysis	06 HOURS

1. Make an Inspiration board.
2. Start an inspiration board by listing 5-10 words that relate to your design idea or point of view. These words can be anything – from similar designs to feelings that the idea evokes.
3. Once you've listed your words, come up with at least five inspirations, and share them by providing links or images within your assignment submission. For each inspiration, give a brief (1-2 sentences) and insightful explanation of why you chose it (What did you take away from it? What did you learn from it. In other words, why did it inspire you?). Each of these inspirations should offer a different perspective to the design you are working on.

PRACTICAL NO. 05	Design analysis	06 HOURS

1. Create Storyboards
2. A storyboard is a comic-strip-like set of drawings about what interface does and how it is used to accomplish tasks in a real usage scenario. A good storyboard should clearly demonstrate who the user is, the usage situation, and the user's motivations for using the interface. It should show what the user can accomplish with interface, but it needn't (and often shouldn't) show a specific user interface design. For a storyboard including an app screen, the details of the screen are not relevant, but what those screens enable you to accomplish is. Each storyboard should comprise 5-8 panels and will provide all details of end product.

PRACTICAL NO. 06	Presentation	04 HOURS

1. Each group will be given 10 min to present their work.

REFERENCE BOOK

1. Software Engineering A practitioner's Approach, Roger S, Pressman, 7th Edition, ISBN: 978–0–07–337597–7
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MODULE: 4/4	**Civil Prototyping (CP))**	**28 HOURS**
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**04 HOURS**
Introduction of bamboo as a construction material, its physical, mechanical properties, selection, seasoning and treatment, testing, joinery, case studies of bamboo buildings.		
PRACTICAL NO. 02	**Analysis of determinant trusses.**	**04 HOURS**
Study of different types of trusses, analysis of determinant trusses by method of joint and method of section		
PRACTICAL NO. 03	**Design bamboo trusses**	**04 HOURS**
Design of different bamboo trusses (span more than 3m), Hands on for different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo truss**	**08 HOURS**
Making of bamboo truss		
PRACTICAL NO. 05	**Testing bamboo truss**	**04 HOURS**
Testing of different bamboo truss		

PRACTICAL NO. 06	Final project presentation	04 HOURS
Comparative study of analytical and test results of forces in truss members, final project presentation.		

REFERENCE BOOK

1. Vector mechanics for Engineers: statics and dynamics by Beer Johnston 10th edition, McGraw Hill Education , ISBN: 978-0073398242
2. Bamboo Architecture Design (Architecture Materials), by Chris van Uffelen, , ISBN: 978-3037681824
3. Designing and Building with Bamboo ,Jules J.A. Janssen Technical University of Eindhoven Eindhoven, The Netherlands, ISBN 978-8186247464
4. Codes and standards

   ISO 1902:1993.Code of Practice for preservation of bamboo and cane for non-structural purposes.

   ISO 6874:1973 Methods of test for round bamboos

   ISO 7344:1974 Specification for bamboo tent bamboos.

   ISO 8242:1976 Methods of tests for split bamboos

   ISO 8295 (Part 1): 1976 Specification for bamboo chicks

   ISO 22157 Standard guidelines for tensile, compressive, shear and bending Strength Parallel to grain and Perpendicular to grain.

REFERENCE

1. Paris Agreement(http://unfccc.int/paris_agreement/items/9485.php)
2. Kyoto Protocol(http://unfccc.int/kyoto_protocol/items/2830.php)
3. Green Building Objectives Checklist, Auroville Bamboo Centre, Pudducherry, Tamil-nadu.(http://aurovillebamboocentre.org/)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Psychology
	COURSE CODE	HP201
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	NIL	20	40	15	NIL	NIL	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP201.CEO.1:To introduce the basic concept and scope of Organizational Behavior.
HP201.CEO.2:To teach the theory of personality and its implications in the organization.
HP201.CEO.3:To evince types and styles of Leadership and the impact of values on the same.
HP201.CEO.4:To guide learners through a decision making process.
HP201.CEO.5:To enhance participants skills when practicing team work concepts through business games.
HP201.CEO.6:To introduce the concept of Motivation and constructive ways of coping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP201.CO.1:Explain human behavior in the workplace from an individual, group, and Organizational perspective.
HP201.CO.2:Develop an ability to analyze ones own personality and that of others in Organizations.
HP201.CO.3:Compare different leadership styles with an understanding of how core values affect Leadership.
HP201.CO.4:Demonstrate decision making ability
HP201.CO.5:Identify the problems associated with organizing and managing teams.
HP201.CO.6:Comprehend the correlation amongst stress, motivation and personality.

THEORY		
UNIT 1	**Organizational Behaviour**	**6 HOURS**
Meaning of Psychology and Organizational Behaviour, Psychology in Organization: History of Organizational Psychology; Scope and Research in Organizational Behaviour, Structure of Organization, Organizational culture, Strong vs Weak culture, Culture vs Formalization.		
UNIT 2	**Perception and Decision Making**	**6 HOURS**
Meaning, process and determinants of Perception, Process of Decision Making, The link between Perception and Individual Decision Making, Influences on Decision Making: Individual Differences & Organizational constraints, Process and ethics of decision making.		
UNIT 3	**Personality, Values and Leadership**	**6 HOURS**
What is Personality, The Big Five Personality Model, The importance of values; values and ethical behavior, Leadership, Understanding Personality, values and Leadership, Emotional Intelligence-Personal and Social Competence.		
UNIT 4	**Understanding Team Work and Conflict Resolution**	**6 HOURS**
Difference between groups and teams, Types of teams, Turning Individuals into Team players, Team building and Team based work, Team dynamics, Types of conflict and conflict resolution.		
UNIT 5	**Motivation & Stress**	**4 HOURS**
Motivation and its types, Content and Process Theories of Motivation, Concept and reactions to stress, Potential effects of stress, Coping with and managing stress.		

TEXT BOOK

1.S. P. Robbins, Organizational Behavior Prentice-Hall India, 1995, ISBN-11:81-203-2875-2.

2.F. Luthans, Organizational Behavior. McGraw-Hill, 1995, ISBN-13: 0072873876.

3.U. Sekarn, Organizational Behavior: Text and Cases, Tata McGraw Hill, 1996, ISBN: 0074603663.

4.Furnham, The Psychology of Behavior at Work, Psychology Press, 1997, ISBN: 1841695041 .

REFERENCE BOOK

1.M. D. Dunnett, Handbook of Industrial-Organizational Psychology, Jaico Press, 1990, ISBN: 978089106-041-3.

2.M. A. - Ansari, Managing people at work: Leadership styles and influence strategies, Sage, 1990, ISBN: 0803996500.

3.J. B. P. Sinha, Work Culture in Indian Context, Sage, 1990, ISBN: 0019-5286.

4.D.M. Pestonjee, Stress and Coping: The Indian Experience, 2nd ed., Sage Publications, 1999, ISBN: 0761993126.

5.L. N. Jewell & M. Siegall, Contemporary Industrial/Organizational Psychology, West Publishing Company, 1990, ISBN: 0314715991.

6.D. Katz and-R. L. Kahn, The Social Psychology of Organizations, Wiley, 1966, ISBN: 978-0-471-023553.

7.M.L. Blum, and J.C. Naylor, Industrial Psychology, CBS Publishers & Distributors, 1984, ISBN: 8123908601.

8.K. H. Blanchard and P. Hersey, Management of Organizational Behavior: Utilizing Human Resources, Prentice-Hall India, 1993, ISBN: 0-13-5512868-9.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	30	20	150

PRE-REQUISITE : IT101 – Computer Programming, ME102 – Engineering Tools and Techniques

COURSE OBJECTIVES :

IT201.CEO.1:To introduce facts, concept and theory of an information system.
IT201.CEO.2:To understand evolution of an information system.
IT201.CEO.3:To explain an information life cycle.
IT201.CEO.4:To develop IoT based information system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT201.CO.1:Interpretation of Data, Information and Knowledge. [Apply]
IT201.CO.2:Make use of data acquisition techniques for an information system. [Apply]
IT201.CO.3:Categories different storage techniques. [Analyze]
IT201.CO.4:Develop dashboard for effective communication of information. [Apply]
IT201.CO.5:Determine components of Human computer interaction. [Evaluate]
IT201.CO.6:Design IoT based information system. [Analyze].

THEORY COURSE CONTENT		
UNIT 1	**Evolution Of Information**	**6 HOURS**
Data, Types of Data: Primary data, Secondary data, Meta data, Operational data and Derived data Information: Life Cycle, Semantics of information, Knowledge Data forms: Analog and Digital (Telephone and Stenography) ADC, DAC Evolution of Information- Man Machine Interaction Self-Study: Grade Sheet Generation system **Further Reading:** Railway reservation, Inventory machine		
UNIT 2	**Information Generation**	**6 HOURS**
Data Acquisition, Human interface, Hardware Interface: Input / Output devices Data Transformation: Rearranging, Classifying, Calculating, Summarizing; Self-Study: Weather forecasting System **Further Reading:** Data Acquisition Applications		
UNIT 3	**Information Storage And Transmission**	**4 HOURS**
Case Study: Dial up, Broadband Need of data storage, Types of storage: stand alone, centralized, distributed, and cloud. Encryption and decryption (define and need) Transmission Type, Synchronous, Asynchronous, Serial, Parallel, Satellite, radio **Self-Study:** Stand Alone and Disk storage **Further Reading:** Wireless–(Bluetooth, XBEE)		
UNIT 4	**Information Visualization**	**4 HOURS**
Representations: Graphs and Charts: Pi Chart, Scatter plot, Histogram, Heat map, Maps, Geo maps Case Study: Dynamic dashboard		
UNIT 5	**Human Computer Interface**	**4 HOURS**
Introduction of HCI, Types – mobile, stand-alone, computer etc, Interactive devices – touch screen, mic, keys, keyboard, scanner, camera etc., HCI design principles- standards, Usability principles –portability, scalability, GUI design and evaluation, Interactive Multimedia document search- image, audio, video, animation Case study: Ticket Generation Kiosk Self-Study: Web based systems interactivity **Further Reading:** Usable GUI Design		
UNIT 6	**Internet Of Things**	**4 HOURS**
IoT: Overview, Characteristics and Architecture Embedded Devices: Sensors, Actuators, Arduino and RaspberryPI IOT Ecosystem: Basic elements / building blocks of IOT application, Systematic method to design IOT application Applications: Asset management, Industrial automation, Smart cities **Self- Study:** IoT Essentials. **Further Reading:**IOT and big Data		

PRACTICAL		
PRACTICAL NO.01	**Data Acquisition , Storage and Retrieval Systems**	**8 HOURS**

In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow:

Identification of an interdependent elementary data items which have facts and figures

Data collection through sensors

Processing using Arduino

Data Storage using MySQL in an accessible form

Data visualization using graphs

PRACTICAL NO.02	**Dashboard Design**	**8 HOURS**

Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system.

Create a graph showing how revenue evolves throughout the year for each of the sales channels

Create an interactive chart that can be used to switch between different sales channels.

Create three different views of the data: monthly sales revenue, sales revenue by category, and revenue by the top five distributors..

PRACTICAL NO.03	**IoT Application**	**8 HOURS**

Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi. Identify the home appliances that require human interaction for its operations and state the need of automation.

Identify system component

Design circuit diagram

Assemble system components

Program the interface

System Testing

System Deployment

TEXT BOOK

1. Ralph M Stair, George W Reynolds, "Fundamentals of Information Systems", Course Technology Inc; 5th edition, 2008, ISBN 978-1423925811.
2. Benny Raphael, Ian F. C. Smith, "Engineering Informatics: Fundamentals of Computer-Aided Engineering", Wiley-Blackwell; 2nd Revised edition, 2013, ISBN-13: 978-1119953418.
3. Paul Mcfedries, "Excel Data Analysis: Your Visual Blueprint for Analyzing Data, Charts and Pivot Tables", Wiley; Fourth edition 2013, ISBN-13 978-8126544004

REFERENCE

1. Gerard Jounghyun Kim, "Human–Computer Interaction: Fundamentals and Practice", CRC Press, Auerbach Publications, 1 edition, 2015 ISBN 9781482233896
2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley, 2013 ISBN-13: 978-1118430620

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	50	20	Nil	25	125

PRE-REQUISITE : Physics, Chemistry

COURSE OBJECTIVES :

ME201.CEO.1:To select material for engineering application.
ME201.CEO.2:To classify the available materials.
ME201.CEO.3:To utilize available material for specified purpose.
ME201.CEO.4:To compare desired quality of materials from standard data.
ME201.CEO.5:To measure useful properties of materials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME201.CO.1:Select material for engineering application.
ME201.CO.2:Classify the available materials.
ME201.CO.3:Utilize available material for specified purpose.
ME201.CO.4:Compare desired quality of materials from standard data.
ME201.CO.5:Measure useful properties of materials.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**8 HOURS**
Classifications and specifications of steels and cast iron. Heat treatment of steels, Defects due to heat treatment and remedial measures. Classification of surface hardening treatments. Classification, Composition, Properties & applications of: Copper and Its alloys, Nickel and Its alloys, Aluminum and Its alloys. Specific alloys: soldering & brazing alloy, Precipitation hardening alloys. Bearing materials and their applications.		
UNIT 2	**Engineering Polymers, Ceramics and Glass**	**6 HOURS**
Classification of polymers, Polymer types-thermoplastics-thermoset-Elastomers, Polymer synthesis and processing-injection moulding-extrusion-blow moulding-calendaring, Degradation of polymers-chemical, thermal, -biological-mechanical. Polymer recycling methods Introduction to Advanced Ceramics-Barium Titanate, Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications, Introduction to Cermets and its application. HIGH PERFORMANCE POLYMERS:Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation		
UNIT 3	**Composite Materials**	**6 HOURS**
Need of composites. Particle-reinforced composites, large-particle composites, dispersion-strengthened composites. Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic-matrix composites, carbon–carbon composites, fiber-reinforced composites, structural composites, laminar composites.		
UNIT 4	**Electronic and Photonic materials**	**6 HOURS**
Electronic Materials: Intrinsic and extrinsic semiconductors-p-n junction, Bandgap diagrams for conductor, semiconductor and insulator, IR detectors, Hall effect Superconducting Materials: Normal and High temperature superconductivity, Applications. Photonic Materials: LED, LCD, Photo conducting materials, Photo detectors, Photonic crystals and applications. Advancements in electronic materials: Smart materials		
UNIT 5	**Testing of Engineering Materials**	**8 HOURS**
Need and Comparison of destructive and non-destructive tests, Study of destructive testing: Engineering stress-strain curve, true stress-strain curve, Jominy End Quench Test for hardenability, Izod and Charpy Impact Test. Vickers, Rockwell hardness tests. Non –Destructive Testing Non-Destructive testing: Principles & procedure, advantages, disadvantages and Industrial applications of NDT like Sonic & Ultrasonic testing and Radiography tests. Brief overview of another NDT test- Eddy current test, Magnetic Particle Test		
UNIT 6	**Nanomaterials.**	**6 HOURS**
Basic concepts of Nano science and Nanotechnology, Carbon nanotubes, Principle of SEM, TEM and AFM, X ray diffraction Fundamentals principles of SEM, SE and BSE imaging modes, Fracture mode analysis and failure analysis using SEM. Potential uses of nonmaterial's' in electronics, robotics, sports equipment, mobile electronic devices, Medical applications of nanomaterials-Cancer, AIDS treatment.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Jominy End Quench Test**	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO.02	**Izod / Charpy Impact Test**	**2 HOURS**
Izod / Charpy Impact Test.		
PRACTICAL NO.03	**Hardness Test**	**4 HOURS**
Vickers,/ Rockwell, Brinell/Durometers & Poldi Hardness Test.		
PRACTICAL NO.04	**Magnetic Particle & Dye Penetrant Test**	**4 HOURS**
Magnetic Particle & Dye Penetrant Test.		
PRACTICAL NO.05	**Ultra-sonic Test**	**4 HOURS**
Ultra sonic test for detection of flaws in materials.		
PRACTICAL NO.06	**Determination of Hall coefficient**	**4 HOURS**
Determination of Hall coefficient for a semiconducting material.		
PRACTICAL NO.07	**Soldering**	**4 HOURS**
Hard and Soft soldering using soldering materials.		
PRACTICAL NO.08	**Industrial Visit**	
Visit to advanced materials characterization laboratory.		

TEXT BOOK

1. Material Science & Metallurgy for Engineers, Dr. V.D. Kodgire & S. V. Kodgire, Everest Publications.31st Edition, ISBN No: 8186314008
2. Mechanical Behavior & Testing of Materials, A. K. Bhargava, C.P. Sharma P H I Learning Private Ltd. 2011 edition, ISBN No 13-9788120342507

REFERENCE BOOK

1. Engineering Metallurgy, Higgins R. A., Viva books Pvt. Ltd., 2004 ISBN No 13-9788176490276
2. Material Science & Engineering, Raghavan V., Prentice Hall of India, New Delhi. 2003 ISBN No 13-9788120324558
3. Introduction to Physical Metallurgy, Avner, S. H., Tata McGraw-Hill, 2014, ISBN 13-9780074630068
4. Materials Science & Engineering, W. Callister, Wiley Publications,2013, ISBN No 13-9788126521432
5. Physical Metallurgy for Engineers, Clarke D.S. & Varney W.R. Affiliated East-West Press, New Delhi ISBN No 13-978-8176710350

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Discrete Structures and Graph Theory
	COURSE CODE	CS211
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	30	20	150

PRE-REQUISITE : IT101 – Computer Programming

COURSE OBJECTIVES :

CS211.CEO.1:To learn logic and proof techniques to explore mathematical reasoning.

CS211.CEO.2:To formulate problems precisely, solve the problems, apply formal proof techniques, and explain their reasoning clearly

CS211.CEO.3:To use appropriate set, function, or relation models to analyze practical examples, interpret the associated operations and terminology in context

CS211.CEO.4:To explore number of logical possibilities and algebraic structures.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

CS211.CO.1:Develop the notion of mathematical thinking, mathematical proofs and reasoning in problem solving (Applying).

CS211.CO.2:Make use of set, function, relation models, associated operations and terminology in context(Applying).

CS211.CO.3:Demonstrate the use of algebraic structure, logical possibilities for algorithmic design.

CS211.CO.4:Model problems of computing using graphs and trees(Applying).

THEORY COURSE CONTENT		
UNIT 1	**Sets And Propositions**	**6 HOURS**

Application/System/Case Study:

Bank Management System, Online Shopping System: Specialization and Generalization

Contents:

Sets and Propositions: Sets, Combination of sets, Finite and Infinite sets, Principle of inclusion and exclusion, Propositions, Conditional Propositions, Logical Connectivity, Prepositional calculus, Universal and Existential Quantifiers, Rules of inference, methods of proofs, Mathematical Induction.

Self-Study: Multi-Sets, Use of Multi Sets

Further Reading: Applications of Mathematical Induction

UNIT 2	Relations And Functions	8 HOURS

App/System/Case Study:

Employee Management, Time-Table Scheduling, Job scheduling Problem: Relation between sets and associated functions.

Contents:

Relations and Functions: Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence relations and partitions, Partial ordering relations and lattices, Chains and Antichains. Functions, Composition of functions, Invertible functions, discrete numeric functions and generating functions. Recurrence relation.

Self-Study: Application Recurrence Relation for Analysis of Algorithm

Further Reading: Linear Recurrence Relations With constant Coefficients, Homogeneous Solutions.

UNIT 3	Counting And Mathematical Modelling	6 HOURS

App/System/Case Study:

Library Management System, Diet Planning System: Mathematical Representation of Computing System.

Contents:

Counting and Mathematical Modeling: Rule of sum and product, Permutations, Combinations, Pigeonhole Principle, Mathematical model, Elements of a mathematical model, Classifications: Linear vs. nonlinear, Static vs. dynamic, Explicit vs. implicit, Discrete vs. continuous, Deterministic vs. probabilistic (stochastic), Scope of the model, Applications

Self-Study: Algorithms for generation of Permutations and Combinations, Discrete Probability Theory,

Further Reading: Deterministic Finite Automata and Non-deterministic Finite Automata

UNIT 4	Groups And Rings	6 HOURS

App/System/Case Study:

Cryptography, Error Correction Systems: Number Theory

Contents:

Groups and Rings: Algebraic Systems, Groups, Semi-Groups, Monoids, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Ring, Integral Domain, Field, Cryptography, Number Theory, Modular Arithmetic and Euclidean algorithm.

Self-Study: Ring Homomorphism, Polynomial Rings, and Cyclic Codes

Further Reading: Cyclic Groups

UNIT 5	Graph Theory	8 HOURS

App/System/Case Study:

Traveling salesman problem, Map Coloring Problem: Graph Represen- tation

Contents:

Graph Theory: Basic terminology, representation of a graph in computer memory, multi- graphs and weighted graphs, Sub graphs, Isomorphic graphs, Complete, Regular and Bipartite graphs, operations on graph, Paths and Circuits, Hamiltonian and Euler paths and circuits, Shortest path in weighted graphs (Dijkstra's algorithm), and Graph Coloring

Self-Study: Self-Practice Problems on Graph Representation in Computer Memory

Further Reading: Factors of a graph, Planer graph

UNIT 6	Trees	8 HOURS

App/System/Case Study:

Compression Systems, Transport network: Tree Representations.

Contents:

Trees: Basic terminology and characterization of trees, Prefix codes and optimal prefix codes, binary search trees, Tree traversal, Spanning trees, Fundamental Trees and cut sets, Minimal Spanning trees, Kruskal's and Prim's algorithms for minimal spanning trees, The Max flow- Min-Cut Theorem.

Self-Study: Network Models

Further Reading: Decision Trees

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Write a program to implement the principle of inclusion and exclusion for deciding the eligibility of students for placement.		
PRACTICAL NO.02		**4 HOURS**
Design and implementation of inference engine using logical connectivity for given problem definition.		
PRACTICAL NO.03		**4 HOURS**
Write a program for discovering connectivity between cities using Warshall's Algorithm.		
PRACTICAL NO.04		**4 HOURS**
Write a program using linear recurrence relations for loan department.		
PRACTICAL NO.05		**4 HOURS**
Write a program for finding permutation and combination for a person who wants to join the gym and want to find the best diet plan according to calories and unit prize.		
PRACTICAL NO.06		**4 HOURS**
Design and implement a program that helps an on-call doctor to reach his patients in different parts of the city using Dijkstra's Algorithm.		
PRACTICAL NO.07	**Mini Project**	**12 HOURS**
1. Define data models, specializations, a generalization of selected computing real world problems using – sets and its operation. Draw Use Case and Object Diagram. 2. Define relation model on sets, types, and constraints of relations. Identify associated functions Draw Class Diagram. 3. Define Mathematical Model and objective function using mathematical notations. 4. Draw Deployment Diagram and System Architecture. 5. Identify data structures and Implement required functionality and objective function of the system. 6. Define outcome and output set with its properties. Mini Project Report.		

TEXT BOOK

1. R. Johnsonbaugh, "Discrete Mathematics", 5th Edition, Pearson Education, 2009, ISBN 81 – 7808 – 279 - 9.
2. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", SiE Edition, TataMcGraw-Hill, 2008, ISBN 10:0-07-066913-9.

REFERENCE BOOK

1. N. Biggs, "Discrete Mathematics", 3rd Edition, Oxford University Press, ISBN 0 –19 –850717–8.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 6th edition, McGraw-Hill, 2007. ISBN 978-0-07- 288008-3.
3. E. Goodaire and M. Parmenter, "Discrete Mathematics with Graph Theory", 2nd edition, Pearson Education, 2003 ISBN 81 – 7808 – 827 – 4 .
4. Semyour Lipschutz Marc Lipson, " Discrete Mathematics", McGraw-Hill, 3rd Special Indian Edition, ISBN-13 : 978-0-07-060174-1.
5. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9.
6. N. Deo, "Graph Theory with application to Engineering and Computer Science", Prentice Hall of India, 1990, 0 – 87692 – 145 – 4.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Database Management Systems
	COURSE CODE	CS212
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	30	20	150

PRE-REQUISITE :

CS201 – Data and File Structures

COURSE OBJECTIVES :

CS212.CEO.1:To define and summarize the basic concepts of database management system.
CS212.CEO.2:To understand basic operations with DBMS.
CS212.CEO.3:To apply various data models to describe the structure of the database.
CS212.CEO.4:To develop database design using normalization.
CS212.CEO.5:To understand concurrency control mechanism and query optimization.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

CS212.CO.1:Explain basic concepts of database management system.
CS212.CO.2:Perform basic operation with DBMS.
CS212.CO.3:Design and develop database application using ER diagram and normalization.
CS212.CO.4:Handle various concurrency and recovery issues.
CS212.CO.5:Optimize the performance of database.

THEORY		
UNIT 1	**Introduction**	**8 HOURS**
App/System/Case study: Banking system, Student Information system using traditional file processing system **Contents:** Database system – concept – architecture. Data models, Entity- relationships model. Mapping ER model to relational model. Case study ERD and Table design. **Self-study:** Database users and DBA **Further reading:** Modeling concept for object oriented and object relational database.		
UNIT 2	**Relational Model**	**6 HOURS**
App/System/Case study: Relational model for Banking system, University database **Contents:** Basic concept, Integrity concept. Relational Query Languages – Relational algebra,Tuple relational calculus. **Self-study:** Equivalence of relational calculus and relational algebra. **Further reading** Domain relational calculus		
UNIT 3	**SQL**	**8 HOURS**
App/System/Case study: SQL queries for Banking system, shop management system, Tiwtter data analysis **Contents:** SQL Queries – Nested queries – Aggregate operators – Null values, Views, Index, PL/ SQL block, exceptions, packages, looping, Concept of stored procedures, cursor, Triggers. **Self-study:** Transaction control language – commit, Rollback, save points. **Further Reading:** Recursive Queries		
UNIT 4	**Database design.**	**6 HOURS**
App/System/Case study: Student Information system, Employee database system **Contents:** Concept of Normalization, Functional dependencies. Decomposition – Armstrong's axioms, 1NF, 2NF, 3NF, BCNF. **Self-study:** Multi valued dependency, 4NF **Further Reading:** XML and web databases.		

UNIT 5	Transaction Management	6 HOURS
App/System/Case study: ATM system, Banking system **Contents:** Basic concept, ACID properties, Concept of schedule, Serializability: conflict and view, Recovery, Concurrency control. **Self-study:** Buffer management and remote backup **Further Reading:** ARIES Recovery		
UNIT 6	**Query Optimization**	**6 HOURS**
App/System/Case study: ATM system, Banking system **Contents:** Various techniques for query optimization, cost based optimization. Introduction to NOSQL database, Comparative study of SQL and NOSQL. **Self-study:** Security: Discretionary access control and Mandatory access control. **Further Reading:** Advanced query optimization techniques and plans.		

PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
Design and draw an ER/EER diagram using standard notations for given problem definition and convert this diagram into Database Tables. Be sure to underline all primary keys, include all necessary foreign keys and indicate referential integrity constraints.		
PRACTICAL NO.02		**8 HOURS**
For above example use SQL DML statement such as INSERT, UPDATE and DELETE to insert the data into tables and to update/delete the data inserted into/from tables. Write and execute SQL queries to extract information from the table.		
PRACTICAL NO.03		**4 HOURS**
Create and perform Database Operations using Oracle as Back End and Java as Front End. Use JDBC connectivity.		
PRACTICAL NO.04		**4 HOURS**
1. Create a PL/SQL Block which accepts a number below 10.If this number is less than 5.it computes sum of numbers from 1 to accepted number else it finds the product of numbers from 1 to accepted number and then inserts the result into temporary table. 2. Write a PL/SQL Block which use cursor FOR LOOP to select 5 highest earners from EMP table and write their details into Message Table. Practical		
PRACTICAL NO.05	**Transaction Management**	**4 HOURS**
For the following relational schema: Works(eid: integer, did: integer, pct time: integer) Emp(eid: integer, ename: string, age: integer, salary: real) Works(eid: integer, did: integer, pct time: integer) Dept(did: integer, dname: string, budget: real, managerid: integer) Write a stored procedure which will read the amount and department name updates the salary of each employee in that department by adding specified amount to his/her salary. Write a trigger on Emp table to ensure that the employee's salary does not exceed the Department Budget.		
PRACTICAL NO.06		**4 HOURS**
DBMS using connections (Client-Data server, 2 tier) Oracle (JDBC) SQL joins.		
PRACTICAL NO.07		**8 HOURS**
Mini Project: Database Project Life Cycle Design any database application and implement Database navigation operations (add, delete, edit etc.) using JDBC. Write a program to access stored procedure and functions using JDBC.		

TEXT BOOK

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", 6th Edition, McGraw Hill Publishers, 2006, ISBN 978-0-07-352332-3
2. Elmasri R., Navathe S., "Fundamentals of Database Systems", 4th Edition, Pearson, Education, 2003, ISBN 8129702282

REFERENCE BOOK

1. Rab P. Coronel C. "Database Systems Design, Implementation and Management", 5th Edition, Thomson Course Technology, 2002, ISBN 981-243-135-7
2. Connally T., Begg C., "Database Systems", 3rd Edition, Pearson Education, 2002, ISBN 81-7808- 861-4
3. Date C., "An Introduction to Database Systems", 7th Edition, Pearson Education, 2002,ISBN 81 -7808-23
4. H Garcia-Molina, JD Ullman and Widom, Database Systems: The Complete Book,2nd Ed., Prentice-Hall, 2008.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Minor Project
	COURSE CODE	CS213
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
—	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
—	4	–	–	–	–	75	75

PRE-REQUISITE :

1) ME102 – Engineering Tools and Techniques,
2) ME103 – Design Thinking,
3) ET206 – Prototyping

COURSE OBJECTIVES :

CS213.CEO.1:To identify and define a problem to be solved.
CS213.CEO.2:To develop a design for the solution of the problem using engineering tools available.
CS213.CEO.3:To prepare prototype/working model for solving the problem
CS213.CEO.4:To evaluate the model built for its functionality, reliability, sustainability, maintainability and affordability

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS213.CO.1:Define the problem to be solved.
CS213.CO.2:Apply knowledge of various engineering tools to develop the solution to the problem.
CS213.CO.3:Critically analyze the options available to solve the problem and select the one identified most effective.
CS213.CO.4:Justify the selection of the method to solve the problem is-a-vis other options considered.
CS213.CO.5::Build the working model of the solution to solve the problem.

PREAMBLE : It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

GUIDELINES:

1. Every student shall undertake the Minor Project in semester IV.
2. Every student shall work on an approved project, a group of 03 students (maximum) shall be allotted for each minor project.
3. The group members could be from different departments to support the interdisciplinary functioning.
4. The students have to identify the social problem by discussion with various stakeholders, site visits and expert-opinions
5. Collect the sufficient data to establish the criticality of the problem to be solved.
7. Define the actual problem.
8. Enumerate various approaches and solutions to solve the problem
9. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use
10. Develop prototype or model for its testing before implementation
11. The three-member committee of jury members will be appointed to monitor the progress and continuous evaluation of each project. One of the members will be the project guide. Assessment of the project for award of grade shall be done jointly by the guide and committee of jury members.

TIMELINES:

1. Project group formation: 1 Week.
2. Identification of the problem to be solved: 2 Weeks.
3. Data collection to prove the validity of the problem: 2 Weeks
4. Identification of the various approaches to solve the problem: 2 weeks.
5. Justification of the approach selected to solve the problem: 1 week
6. Building the solution to the problem using prototype or implementation: 6 Weeks
7. Report writing: 2Weeks

ASSESSMENT:

Presentation 1: Motivation and need for the selected problem to be solved
Presentation 2: To prove the validity of the problem to be solved using data collected
Presentation 3: Identified approaches to solve the problem and justification of approach selected
Presentation 4: Progress towards the prototyping or implementation of the solution to the problem
Presentation 5: Final demonstration

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Third Year

Bachelor of Technology in Computer Engineering

2016-2020

(With Effect from Academic Year: 2018-2019)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	RELEASE DATE	:	01/12/2017
	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	CS301	Operating System	3	2	4
2.	DC6	CS302	Computer Organization & Architecture	3	--	3
3.	DC7	CS303	Theory of Computation	3	--	3
4.	DC8	CS304	Computer Graphics & Gaming	--	4	2
5.	OE1	IT 311 CS311 CS312	Open Elective - Refer Annexure.	3	2	4
6.	HSS4	HP301	Project Management	1	2	2
7.	SDP5	CS30#	Skill Development Lab	--	4	2
TOTAL				**13**	**14**	**20**

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC9	CS321	Design and Analysis of Algorithm	3	2	4
2.	DC10	CS322	Compiler Design	3	2	4
3.	DC11	CS323	Computer Networks	3	2	4
4.	OE2	IT 331 CS331 CS332	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP302	Professional Skills	1	2	2
6.	HSS6	HP303	Basics of Entrepreneurship	--	2	1
7.	SDP6	CS324	Mini Project	--	4	2
TOTAL				**13**	**16**	**21**

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**A.Y.** 2018- 19
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Operating System
	COURSE CODE	CS301
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : 1. CS301-Data and File Structures

COURSE OBJECTIVES :

CS301.CEO.1:To describe the services of an operating system.
CS301.CEO.2:To introduce the concepts of a process, its life cycle and threads.
CS301.CEO.3:To explore inter process communication and CPU scheduling.
CS301.CEO.4:To understand memory management in operating system
CS301.CEO.5:To understand the deadlock handling methods
CS301.CEO.6:To discuss idea of file-system and its implementation

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS301.CO.1:State the basic principles of operating systems and its computational resources.
CS301.CO.2:Discuss various scheduling algorithm.
CS301.CO.3:Recognize deadlock to resolve the related issues.
CS301.CO.4:Solve or interpret problems regarding memory management.
CS301.CO.5:Analyze the efficiency of File System.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**8 HOURS**
App/System/Case study: Linux Booting and Login Process **Content:** Basics of Operating Systems, Linux vs Windows, Abstract View of computer System Components, Types of Operating Systems, Functions of Operating System ,System Calls and its types. Booting and Shutting Down, Bootstrapping, Booting PCs, GRUB: The GRand Unified Boot loader, Booting to single-user mode. Working with Startup scripts, Rebooting and Shutting down. **Self-Study:** Open Source Operating Systems-Fedora. **Further Reading:**Special Purpose Systems.		
UNIT 2	**Process and Threads**	**6 HOURS**
App/System/Case study : Multitasking In Mobile Systems. **Content:** Process: Concept, Operation, Scheduling, Thread Overview: Multicore Programming, Multithreading Models, Thread Libraries, and Implicit Threading. **Self-Study:** Threading Issues. **Further Reading:**Operating System Generation Debugging.		
UNIT 3	**CPU Scheduling and Inter-Process Communication**	**6 HOURS**
App/System/Case study : Multi process-Any Web Browser **Content:** Basic Concepts of CPU scheduling, Scheduling criteria, Scheduling Algorithm, Thread Scheduling, Multiple Processor Scheduling, Inter-process Communication, Shared-Memory Systems, Message-Passing Systems. **Self-Study:** Real Time Scheduling **Further Reading:**Examples of IPC Systems.		
UNIT 4	**Process Synchronization and Deadlock**	**8 HOURS**
App/System/Case study : Java Monitor. **Content:** Process Synchronization overview, The critical Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problem of synchronization, Monitors, Deadlock, Methods for Handling Deadlocks, Modified Deadlock. **Self-Study:**Synchronization examples **Further Reading:**Alternative Approaches.		
UNIT 5	**Memory Management**	**8 HOURS**
App/System/Case study : ARM architecture. **Content:** Main memory-Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of page table, Virtual Memory-Demand Paging, Page Replacement, Allocation of frames, Thrashing Memory Mapped Files, Allocating Kernel Memory. **Self-Study:** Linux memory management schemes. **Further Reading:**Examples of Intel 32 and 64 bit Architecture.		

UNIT 6	File and IO Management	8 HOURS

App/System/Case study : File locking in Java, Permission in UNIX.

Content: File Concepts, Access Methods, Directory and Disk Structure, File System Mounting, File Sharing, Protection. File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery, I/O Hardware, Application I/O Subsystem, Transforming I/O request to hardware operations.

Self-Study: WAFL File System.

Further Reading:NFS

PRACTICAL : Perform following experiments using Open source tools		
PRACTICAL NO.01		**4 HOURS**
Basic Shell Programming. (Basic System Calls and Shell Scripting)		
PRACTICAL NO.02		**4 HOURS**
Implement Process scheduling algorithm in C/C++/Java for following algorithm 1.FCFS,2.SJF,3.Round Robin, Priority based algorithm		
PRACTICAL NO.03		**4 HOURS**
Design a program using ordinary pipes in which one process sends a string message to a second process, and the second process reverses the case of each character in the message and sends it back to the first process. For example, if the first process sends the message Hello Friends, the second process will return hELLO fRIENDS.		
PRACTICAL NO.04		**4 HOURS**
In a real computer system, neither the resources available nor the demands of processes for resources are consistent over long periods (months). Resources break or are replaced, new processes come and go, and new resources are bought and added to the system. If deadlock is controlled by the banker's algorithm, which of the following changes can be made safely (without introducing the possibility of deadlock), and under what circumstances? a. Increase Available (new resources added). b. Decrease Available (resource permanently removed from system).		
PRACTICAL NO.05		**4 HOURS**
Implement Page Replacement for following algorithm 1.LRU, 2.FIFO, 3.Optimal		
PRACTICAL NO.06		**4 HOURS**
Write a LINUX/UNIX C++ program to simulate the following file organization techniques: a) Single level directory b) Two level directory c) Hierarchical.		
MINI PROJECT		**8 HOURS**
The Course Mini Project work will be started in Semester V. The work of the mini projects will be starting at beginning of term in alignment with laboratory assignments. It may be done by groups of 3 students. However if project is done in groups, each student will be given a responsibility for a distinct module and the progress of individual modules is independent of others and performance of individual modules will be tracked periodically. The final evaluation will be done at the end of term through presentation, project demonstration and report.		

TEXT BOOK

1. Silberschatz, Galvin, Gagne, Operating System Concepts: International Student Version, 9th Edition,Paperback: 992 pages Publisher: Wiley; Eighth edition (20 April 2009) Paperback – 20 Apr 2009, Language:English, ISBN-10: 8126520515, ISBN-13: 978-8126520510.
2. Tanenbaum,Modern Operating Systems, 4th Edition, Paperback: 1136 pages, Publisher: Pearson Education India; Fourth edition (31 August 2016), Language: English, ISBN-10: 9332575770, ISBN-13: 978-9332575776

REFERENCE BOOK

1. Gary Nutt, Operating Systems, 3rd Edition, Publisher: Pearson Education Singapore Pvt. Ltd (2004), ISBN-10: 8131723593, ISBN-13: 978-8131723593, ASIN: B007YTM00I.
2. Ann McHoes and Ida M. Flynn, Understanding Operating Systems, 6th edition, Mendel Rosenblum and John K. Ousterhout, Paperback: 590 pages, Publisher: Cengage; 6 edition (1 December 2013), Language: English, ISBN-10: 8131521567, ISBN-13: 978-8131521564.
3. Tanenbaum, Operating Systems Design and Implementation, Paperback: 1080 pages, Publisher: Pearson Education India; 3 edition (2015), Language: English, ISBN-10: 9332550514,ISBN-13: 978-9332550513.
4. Deitel, Operating System, 3rd Edition, Paperback: 1270 pages, Publisher: Pearson Education India; edition (2007), Language: English, ISBN-10: 8131712893, ISBN-13: 978-8131712894.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	A.Y. 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Computer Organization and Architecture
	COURSE CODE	CS302
	COURSE CREDITS	3
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA			
3	--	30	40	30	–	-	100

PRE-REQUISITE : 1. CS302: Digital Electronics and Microprocessors

COURSE OBJECTIVES :

CS302.CEO.1:To understand the fundamental structure of computer system.
CS302.CEO.2:To get familiar with the different components of the computer system.
CS302.CEO.3:To learn input-output organization of computer system.
CS302.CEO.4:To learn working of arithmetic unit of the computer system.
CS302.CEO.5:To Learn various techniques for high performance computing.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS302.CO.1:Identify the different components of the computer system.
CS302.CO.2:Illustrate different types of commercial processors.
CS302.CO.3:Explain the working of ALU of the processor.
CS302.CO.4:Explain the memory hierarchy in the computer system.
CS302.CO.5:Trace the flow of information from one component to another component of computer system.
CS302.CO.6:Implement parallel computing environment.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of computers**	**8 HOURS**
App/System/Case study:Computer types **Content:** Functional units, basic operation concepts, Bus structure, software, performance, multi-processors and multicomputer. Historical perspective, Machine Instructions and programs: numbers, arithmetic operations and characters, Memory locations and addresses, memory operations, Instructions and instruction sequencing, Addressing modes, Basic input/operations, Additional instructions. **Self-Study:** stack and queues **Further Reading:** Subroutines		
UNIT 2	**IA-32 Pentium processors and Input/output organization**	**8 HOURS**
App/System/Case study: Types of processors **Content:** IA-32 Pentium example: Registers and addressing , IA-32 instructions, Program flow control, Logic and shift rotate instructions, input-Output Organization: Accessing I/O devices, Interrupts, exceptions, processor examples, direct memory access. Buses. **Self-Study:** Interface Circuits. **Further Reading:**IA-64 Architecture		
UNIT 3	**The Memory System**	**8 HOURS**
App/System/Case study: Importance of computer memory **Content:** Basic concepts, semiconductor RAM memories, read-only memories, speed, size and cost, cache memories, performance considerations, virtual memories, memory management requirements, Secondary storage. **Self-Study:** Cache memory **Further Reading:**Pentium 4 cache memory.		
UNIT 4	**Computer Arithmetic**	**6 HOURS**
App/System/Case study: Integer Representation **Content:** The Arithmetic and Logic Unit (ALU), Integer Arithmetic, Floating-Point Representation, Floating-Point Arithmetic. **Self-Study:** Static arithmetic pipeline **Further Reading:**Multi functional arithmetic pipelining.		

UNIT 5	Parallel Processing	6 HOURS

App/System/Case study:
CUDA Architecture.
Content:
Multiple Processor organizations, Symmetric Multiprocessors,Cache Coherence and the MESI Protocol, Multithreading and Chip Multiprocessors , Clusters, Non uniform Memory Access, basic concepts of pipelining.
Self-Study: Superscalar operations.
Further Reading:GPU Architecture

UNIT 6	Multi-core Computers	6 HOURS

App/System/Case study:
Supercomputer Architecture
Content:
Hardware Performance issues, Software Performance Issues, Multicore Organization, Intel x86 Multicore Organization, programmer's view of shared memory and massage passing, performance considerations.
Self-Study: ARM11 MPCore.
Further Reading:AMD Accelerated Processing Unit

TEXT BOOK

1. W. Stallings, "Computer Organization and Architecture: Designing for performance", Pearson Education/ Prentice Hall of India, 2003, ISBN 978-93-325-1870-4, 7th Edition.
2. Zaky S, Hamacher, "Computer Organization", 5th Edition, McGraw-Hill Publications, 2001, ISBN- 978-1-25-900537-5, 5th Edition.

REFERENCE BOOK

1. Kauffmann, Computer System Architecture by M. Mano, 2001, Prentice-Hall ISBN 72157661505664197
2. John P Hays, "Computer Architecture and Organization", McGraw-Hill Publication, 1998, ISBN:9781259028564, 3rd Edition. .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Theory of Computation
	COURSE CODE	CS303
	COURSE CREDITS	3
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA			
3	--	30	40	30	–	-	100

PRE-REQUISITE : 1. CS303: Discrete Structure Graph Theory

COURSE OBJECTIVES :

CS303.CEO.1:To introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability

CS303.CEO.2:To enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.

CS303.CEO.3:To provide an understanding of the theoretical development of computer science, particularly for finite representations of languages and machines

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS303.CO.1:List the various types of languages, respective recognition machines, and various classes of problems.(L1)

CS303.CO.2:Differentiate between various types of languages, respective recognition machines, classes of problems. (L2)

CS303.CO.3:Apply the steps for the construction of various types of machines from language and vice versa. (L3)

CS303.CO.4:Analyze the type of machine to be used to recognize the particular language.(L3)

CS303.CO.5:Design the machine for the given specification of language(L4)

CS303.CO.6:Justify the complexity of the given class of problem.(L5)

THEORY COURSE CONTENT		
UNIT 1	**Foundation**	**3 HOURS**

App/System/Case study:
Shop arrangements/ Road system

Content:
Automata, Computability and complexity:- Complexity Theory, computability Theory Automata Theory Mathematical Notations Terminology:- -Sets, Sequences and Tuples-Functions Relations-Graphs, strings and languages-Boolean Logic-Summary of Mathematical Terms Definitions, Theorems Proofs:- Finding Proof, Types of proof- Proof by Construction, Proof by construction, Proof by Induction Abstract Machines and computation, Formal Languages and Grammars.

Self-Study: Proving theorems using induction

Further Reading: Types of proofs

UNIT 2	Finite Automata Theory	8 HOURS

App/System/Case study:
Working of Vending Machines

Content:
Regular Languages, Finite state Machines, Deterministic Non Deterministic Finite state Machines, Regular grammars, Regular Expressions, Equivalence of the three Models, Epsilon –NFA, FA with output: -Moore Mealy Machines- Definitions, Models Inter Conversion.

Self-Study: Latest Developments in the area of Automata Theory

Further Reading: Timed Automata

UNIT 3	Regular Expression	8 HOURS

App/System/Case study:
Form validation using Regular Expressions, grep utility of Linux

Content:
Operators of R.E, Building R.E, Precedence of Operators, Algebraic Laws for R.E, conversion of NFA to DFA, DFA to R.E Conversion, state loop elimination, Ardens Theorem, Properties of Regular languages, pumping lemma for Regular Languages.

Self-Study: Latest Developments in the area of Information Retrieval related to searching Techniques.

Further Reading: Application of regular expressions in Lexical Analysis

UNIT 4	Context Free Grammar	7 HOURS

App/System/Case study:
Design of Parser for Compilers or Interpreters/ Web crawler

Content:
Context Free Language Models, context free grammars, simplification of CFG, Chomsky normal form(CNF), Greibach normal form(GNF), Closure Properties, Application of CFG:- Parser, Mark up languages, XML Document Type Definition, Chomsky Hierarchy, Regular Grammar. Self -Study: Application of CFG in Parsers

UNIT 5	Push Down Automata	8 HOURS
App/System/Case study: Parser design for Compilers or Interpreters **Content:** Push Down Stack Memory Machine Formal Definition, PDA, DPDA, NPDA, PDA to CFG, CFG to PDA. **Self-Study:** Multi – Stack Push Down Automata **Further Reading:**Post Machines		
UNIT 6	**Turing Machines**	**8 HOURS**
App/System/Case study: Representation of a given algorithm into Turing Machine **Content:** Turing Machines Introduction, Definitions, Model, Comparison of T.M with other machines, Examples of T.M, Universal T.M, Recursive Sets, Churches T.M, Halting Problem, Incompleteness Un-Decidability, Semi solvability and Insolvability. **Self-Study:** Multi Tape Turing Machines **Further Reading:**Various decidable and Undecidable Problems		

TEXT BOOK

1. John E. Hopcoroft, Rajeev Motwani, Jeffrey D-Ullman, Introduction to Automata Theory Languages And Computation, LPE
2. K.L.P. Mishra Chandrashekharan, Theory Of Computer Science.
3. Michael Spicer, Introduction to Theory of Computation, Third Edition, Cengage Learning

REFERENCE BOOK

1."Theory of Computation", Vivek Kulkarni, Oxford University Press,(ISBN: 0-19-808458-7)

2."Introduction to Languages and Theory of Computation", John Martin McGraw-Hill, (ISBN:978-0-07-066048)

MIT Academy of Engineering (An Autonomous Institute) (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Computer Graphics and Gaming
	COURSE CODE	CS304
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		**EVALUATION SCHEME:**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
–	4	–	–	–	50	25	75

PRE-REQUISITE :

Applied Mathematics , Data and File Structures

COURSE OBJECTIVES :

CS304.CEO 1:To understand various algorithms for generating and rendering graphical figures.
CS304.CEO 2:To get familiar with mathematics behind graphical transformations.
CS304.CEO 3:To understand various techniques applied for projections.
CS304.CEO 4:To understand various methods of clipping.
CS304.CEO 5:To understand various techniques of animation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS304.CO.1:To apply mathematics to develop Computer graphics operations.
CS304.CO.2:To develop programs on 2D and 3D transformation and Hierarchical transformation.
CS304.CO.3:To apply various methods for projection.
CS304.CO.4:To demonstrate clipping algorithms.
CS304.CO.5:To develop animation and gaming application.

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Develop the programs for Rasterization Algorithms like DDA, Bresenham's for line drawing..		
PRACTICAL NO.02		**2 HOURS**
Develop program for circle using DDA and Bresenham's algorithm.		
PRACTICAL NO.03		**2 HOURS**
Develop a program to implement Cohen-Sutherland line clipping algorithm for given window.		
PRACTICAL NO.04		**2 HOURS**
Develop program to draw 2-D cube and perform the transformations on it using OpenGL.		
PRACTICAL NO.05		**2 HOURS**
Develop program to draw 3-D cube and perform following transformations on it using OpenGL. a) Scaling b)Translation c) Rotation about one axis..		
PRACTICAL NO.06		**2 HOURS**
Develop a program for 2D/3D texture mapping.		
PRACTICAL NO.07		**2 HOURS**
Write program to simulate any one of or similar scene- 1:Clock with pendulum . 2:National Flag hoisting. 3:Vehicle/boat locomotion. 4:Water drop falling into the water and generated waves after impact.		
PRACTICAL NO.08		**2 HOURS**
Develop a program for bouncing ball using animation tool like 3D Blender, Seamless 3D,cartoona etc.		
PRACTICAL NO.09		**8 HOURS**
Mini Project 1.Identify Different Graphics Objects. 2.Describe the different Graphics Primitives. 3.Make use of different Graphics primitives in mini project. 4.Apply different geometric transformation. 5.Create animation using any Design tool. NOTE: The journal prepared by the students should be hand-written for concepts, algorithm, flowcharts etc. related to the assignments. Documents in the print form must contain the implementation code and output of the assignment.		

TEXT BOOK

1. D. Hearn and M. Baker "Computer Graphics",2nd Edition, Pearson Education,2002,ISBN-7808-794-4
2. D.Hearn, Computer Graphics with OpenGL",4th Edition,ISBN-139780136053583
3. Dave Shreiner "OpenGL Programming Guide",7 th edition Addition Wesely,ISBN-13:978-032155264

REFERENCE BOOK

1. S. Harrington, Computer Graphics", 2nd Edition, McGraw-Hill Publications,1987,ISBN 0-07-100472-6
2. D. Rogers, "Procedural Elements for Computer Graphics",2nd Edition, Tata McGraw-Hill publication,2001,ISBN 0-07-047371-4
3. D. Rogers, J .Adams, "Mathematical Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill publication, 2002, ISBN 0-07-048677-8.
4. James D. Foley, Andries Van Dam, "Fundamentals of Interactive Computer Graphics", Addison-Wesley

MIT Academy of Engineering (An Autonomous Institute) (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 – 2019
THIRD YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Cryptography and System Security
	COURSE CODE	IT311
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	30	40	30	25	–	125

PRE-REQUISITE : IT203: Computer Network

COURSE OBJECTIVES :

IT311.CEO 1:To understand fundamentals of cryptography, authentication and emerging security standards.

IT311.CEO 2:Determine basics of network security protocols.

IT311.CEO 3:Identify the possible threats to each mechanism and ways to protect against these threats.

IT311.CEO 4:Understand cryptographic techniques that provide information and network security

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT311.CO.1:Explain symmetric cryptography, asymmetric cryptography, and digital signatures.

IT311.CO.2:Implement security algorithms in computer network.

IT311.CO.3:Identify the different security technology and devices.

IT311.CO.4:Outline the requirements and mechanisms for identification and authentication.

IT311.CO.5:List the security threats, and the security services and mechanisms to counter them.

IT311.CO.6:Comprehend security services and mechanisms in the network protocol stack.

THEORY:		
UNIT 1	**Basics of Security**	**8 HOURS**
Attacks on Computer and Computer Security: Introduction, The Need for Security, Security Approaches, Principles of Security, Types of Attacks Cryptography Techniques: Introduction, Plaintext and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography. **Self-Study:** Key Range and Key Size **Further Studies:** Possible Type of Attacks		
UNIT 2	**Symmetric Key Algorithms**	**8 HOURS**
Introduction, Algorithms types and modes, Overview of Symmetric key cryptography, Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA),RC5, Blowfish, Advanced Encryption Standard (AES). **Further Studies**: RC4		
UNIT 3	**Asymmetric Key Algorithms**	**8 HOURS**
Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm, Symmetric and Asymmetric key cryptography together, Digital Signatures. **Further Studies:** Knapsack Algorithm		
UNIT 4	**Digital Signature and Key Management**	**6 HOURS**
Introduction, Digital Signature, Digital certificates, Digital Envelop, classification of security measures with digital signature, digital certificate and digital envelop, private key management, the PKIX model, Public key cryptographic standards (PKCS). **Self-Study:** Key Management **Further Studies:** XML, PKI and Security		
UNIT 5	**Security Protocols and Tools**	**6 HOURS**
Introduction to security protocols, concept behind secure socket layer, Transport layer security, Secure Hypertext Transfer Protocol, Time stamping protocol, secure electronic transaction (SET). **Self-Study:** SSL vs SET **Further Studies:** E-mail Security		
UNIT 6	**User Authentication and Kerberos**	**6 HOURS**
The Kerberos Authentication Service, provides a trusted third-party authentication to verify users' identity Authentication basics, Passwords, Authentication Tokens, Certificate-based Authentication, Biometric Authentication, Kerberos, Key Distribution Center (KDC) , Security Handshake Pitfalls. **Self-Study:** Single Sign On (SSO) Approaches **Further Studies:** IP Security		

PRACTICAL: Perform following experiments using open source software.		
PRACTICAL NO.01		**4 HOURS**
Write a program to encrypt and decrypt the message using encryption decryption techniques.		
PRACTICAL NO.02		**4 HOURS**
Develop a program in C++/Java/Python on Extended Euclidean Algorithm .		
PRACTICAL NO.03		**6 HOURS**
Develop a program in C/C++/Java to implement RSA algorithm for key generation and cipher verification		
PRACTICAL NO.04		**4 HOURS**
Implement Diffie -Hellman key exchange algorithm using an open source language.		
PRACTICAL NO.05		**6 HOURS**
Cryptography Library (API): Write a program in C++/Java/Python to implement RSA algorithm using Libraries (API).		
PRACTICAL NO.06		**8 HOURS**
Security Tools : 1:Configure and demonstrate use of IDS tool such as snort standards. 2:Configure and demonstrate use of traffic monitoring tool such as wire shark with security perspective. 3:Configure and demonstrate use of vulnerability assessment tool such as NESSUS.		

TEXT BOOK

1. Atul Kahate, "Cryptography and Network Security", The McGraw Hill Publication Second Edition, ISBN – 13: 978-0-07-064823-4.
2. Eric Maiwald , "Network Security: A Beginners' Guide" , ISBN: 978-0-07-179571-5

REFERENCES:

1. William Stallings , "Cryptography and Network Security", Prentice Hall, Fourth Edition ISBN-13: 978-0-13- 187316-2
2. Bernard Menezes ," Network Security and Cryptography: Bernard Menezes ", CENGAGE Learning.
3. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security - Private Communication in a Public World", Pearson/PHI..
4. Stallings , "Cryptography and network Security", Third edition, PHI/Pearson.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**A.Y.** 2018 – 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Descriptive Analytics
	COURSE CODE	CS311
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA			
3	2	30	40	30	50	-	150

PRE-REQUISITE :

1. IT101: Computer Programming
2. CS212: Database Management System

COURSE OBJECTIVES :

CS311.CEO.1:To understand the data warehouse architecture.
CS311.CEO.2:To outline the various preprocessing operations on data warehouse.
CS311.CEO.3:To apply the various operations on OLAP cubes and schema modeling.
CS311.CEO.4:To elaborate the need of Data Science.
CS311.CEO.5:To apply regression methods for a given dataset.
CS311.CEO.6:To summarize the basic concepts frequent item sets.

COURSE OUTCOMES :

The students after completion of the course will be able to

CS311.CO.1: Outline the data warehouse architecture.
CS311.CO.2: Apply the various data preprocessing techniques for making data marts for a given application.
CS311.CO.3: Apply the various operations of OLAP cube.
CS311.CO.4: Apply regression and Correlation on real datasets
CS311.CO.5: Generate frequent item sets for given datasheet

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Data Warehouse**	**6 HOURS**

App/System/Case study:
Retail-Industry Case Study

Content:
Overview, need of its components, architecture, characteristics, goals, models, knowledge discovery, challenges, importance of meta data repositories. Introduction to Business Intelligence (BI), Significance of BI

Self-Study: Data Warehouse Security Measures : User access, Data load, Data movement, Query generation

Further Reading: Advancement Data Collection Security.

UNIT 2	Operations of Data Warehouse	6 HOURS

App/System/Case study:
Retail-Industry Case Study

Content:
Data preprocessing: data cleansing, data integration, data reduction, data transformation and discretization, concept hierarchy, data quality, data warehouse design process, distributed data warehouse, real time data warehouse architecture.

Self-Study: Outlier Analysis

Further Reading: Real Time ETL

UNIT 3	Data Warehouse Modeling	8 HOURS

App/System/Case study:
Retail-Industry Case Study

Content:
Data modeling, OLAP vs OLTP, MOLAP, ROLAP, HOLAP, Dimensions and facts and types, granularity of facts, measures and categorization of measures, Data mart, OLAP cubes , Cube operations, scheme modeling (star, snowflake, star constellation schema)

Self-Study: Analyze OLAP cube with Microsoft Excel, Cross Table Cube

Further Reading: Cubing Service Security, Multidimensional Data Analysis

UNIT 4	Introduction to Data Science and Statistical techniques.	6 HOURS

App/System/Case study:
Retail-Industry Case Study

Content:
Introduction to Data Science and Data Mining, Descriptive, Predictive and Prescriptive data analysis techniques, Descriptive Statistics, Probability Distributions, Inferential Statistics through hypothesis tests.

Self -Study: Permutation Randomization Test

UNIT 5	Regression and Correlation	8 HOURS

App/System/Case study:

Real Estate Case Study

Content:

Simple, Multiple regression, Linear-Logistic Regression, Poisson Regression, Non linear regression. Correlation coefficient, ANOVA, Measuring performance of a model, Accuracy, ROC curves, precision-recall curves.

Self-Study: Regression Models using Excel 2013

Further Reading: Correlation Mining for Massive data

UNIT 6	Frequent Item-set Mining	6 HOURS

App/System/Case study:

Retail-Industry Case Study

Content:

Market Basket Analysis, Support and Confidence, Frequent Item-sets, Closed Item-sets, and Association rules, Frequent Pattern Mining

Self-Study: Applications of Frequent Item-sets Mining.

Further Reading: Multilevel Association Rules Generation

PRACTICAL : Perform following experiments using prescribed tools		
PRACTICAL NO.01		**10 HOURS**

Data Preprocessing exercise using R

Suppose that the data for analysis includes the attribute age. The age values for the data tuples are (in increasing order) 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70.

(a) What is the mean of the data? What is the median?

(b) What is the mode of the data? Comment on the data's modality (i.e., bimodal, trimodal, etc.).

(c) What is the midrange of the data?

(d) Can you find (roughly) the first quartile (Q1) and the third quartile (Q3) of the data?

(e) Give the five-number summary of the data.

(f) Show a boxplot of the data.

(g) How is a quantile- quantile plot different from a quantile plot?

(a) Use smoothing by bin means to smooth the data, using a bin depth of 3.Illustrate your steps. Comment on the effect of this technique for the given data.

(b) How might you determine outliers in the data?

(c) What other methods are there for data smoothing? Plot an equal-width histogram of width 10.

(d) Sketch examples of each of the following sampling techniques: SRSWOR, SRSWR, cluster sampling, stratified sampling. Use samples of size 5 and the strata "youth,""middle-aged," and "senior." Suppose a group of 12 sales price records has been sorted as follows: 5, 10, 11, 13, 15, 35, 50, 55, 72, 92, 204, 215 Partition them into three bins by each of the following methods:

(a) equal-frequency (equidepth) partitioning

(b) equal-width partitioning

(c) clustering

OR

Demonstration of preprocessing operations on given dataset (Retail Big Bazar, Health System, Banking System, Sales, Fast Food Industry System).Using ETL tool like Talend /Pentaho/or any proprietary tool.

Note: The above assignment is for the reference, Similar level assignment can be taken lab.

PRACTICAL NO.02		12 HOURS

Dimensional Modeling, Data Mart, Cube Analysis

The Leisure Hotel chain is a small chain with properties throughout Pennsylvania, Arizona, Florida, and New York. They have a central database to store and track guest reservations. In 2008, they put cafes in many of their hotels, called "Café in the Hotel." They have an order-tracking system that relays customer orders from the wait staff to the kitchen.

Leisure Hotels would like to use the data they have collected to better understand the performance of their hotels and cafes. They also have access to a database from the online review site "Hotel Complainer.com." Your task is to design two dimensional data marts using data from those three databases. You will plan the star schema for each data mart by choosing the dimensions, facts, and attributes from the data contained in those databases. The relational schemas of those databases are on the following page.

The questions to be addressed by each data mart are listed in the table below. You should include only the data fields you need in each data mart, but the data marts can contain some of the same data (i.e., the same fields can appear in both data marts). To complete the exercise, you'll need to perform the following steps:

1) Identify the main business event for each data mart. This will be the fact.Ask yourself, "What is the basic business event that generates the performance metric (revenue)?"

2) Identify the attributes associated with the fact. Ask yourself, "How is the business event quantified (measured)?"

3) Identify the dimensions and their attributes. Ask yourself, "What data characterizes the various aspects of that business event?"

4) Either sketch the star schema or make a list of the dimensions and the fact and their attributes. You can use the examples in the slides as a guide.

Following Descriptive Analysis –Cube Analysis is expected from data mart

. During which month are the most rooms rented?

- Identify the "off season" (if any) for our hotels in Arizona, Florida,Pennsylvania, and New York.

. Which hotel generates the most (non-restaurant) revenue?

. What is the average length of stay in hotels with 4.5 or more stars?

. Do smokers stay longer than non-smokers?

. For a given hotel, how many customers come from out of state?

. Which hotel restaurant generates the most revenue?

. Do the best rated hotels generate more restaurant revenue?

. What is the most frequently ordered item in the Philadelphia metropolitan area?

Note: Above case study is just for reference any other Case study with similar level can be taken in lab.

PRACTICAL NO.03		8 HOURS

Project on Descriptive analytics (Data –preprocessing, Dimensional modeling, Cube Analysis) using R/ Cognos /Pentaho /Talend /Power BI.

TEXT BOOK

1. Jiawei Han, MichelineKamber, Jian Pei Professor, "Data Mining: Concepts and Techniques", The Morgan Kaufmann Series in Data Management Systems, ISBN 978-9380931913
2. Rick Sherman, Business Intelligence Guidebook: From Data Integration to Analytics, The Morgan Kaufmann Series in Data Management Systems, ISBN 012411461X

REFERENCE BOOK

1. Paulraj Ponniah,Data Warehousing: Fundamentals for IT Professionals, 2nd Edition, Paperback, McGraw Hill Publishers, 2006, ISBN 978-0-07-352332-3
2. Ralph Kimball, "Data Warehouse Lifecycle Toolkit", Willey, ISBN 0471200247
3. Maria Sueli Almeida, Missao Ishikawa, Joerg Reinschmidt, Torsten Roeber, Getting Started with Data Warehouse and Business Intelligence, IBM
4. Ramesh Sharda, Dursun Delen, Efraim Turban, "Business Intelligence, Analytics and Data Science: A Managerial Perspective", Pearson Publication, 4th Edition ISBN 0134633288
5. Grolemund, Garrett "R for Data Science", O'Reilly
6. Murrey R Spiegal, Larry Stifens, Statistics, 4th edition, Schaum's Series, McGraw Higher Ed ISBN: 9780070151536, 0070151539

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Artificial Intelligence and Neural Networks
	COURSE CODE	CS312
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	–	150

PRE-REQUISITE:

1.CS201 – Data and File Structures

COURSE OBJECTIVES :

CS312.CEO.1:Gain a historical perspective of AI and its foundations.

CS312.CEO.2:Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation and learning.

CS312.CEO.3:Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

CS312.CEO.4:Explore the current scope, potential, limitations and implications of intelligent system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS312.CO.1:Analyze the variations in agents and environments behavior and major functions implemented in a general agent.

CS312.CO.2:Evaluate agents using search algorithms such as uninformed search, informed search or local search.

CS312.CO.3:Illustrate adversarial search mechanism and game-playing agents.

CS312.CO.4:Identify capabilities of specific knowledge representation formalisms for specific tasks.

CS312.CO.5:Apply the methodology to transfer human knowledge into an expert system.

CS312.CO.6:Explain the learning and adaptation capability of neural systems.

THEORY :		
UNIT 1	**Introduction**	**7 HOURS**
App/System/Case study: Virtual Personal Assistants, Autonomous cruise control system. **Contents:** Introduction to Artificial Intelligence, The Foundations of Artificial Intelligence, Emergence of Intelligent Agents, PEAS Representation of Agents, Rationality, Environment, Problem Formulation. **Self Study:** Agent Oriented Design **Further reading:** A taxonomy of autonomous agents		
UNIT 2	**Search Strategies**	**7 HOURS**
App/System/Case study: GPS Navigation systems, Tile games. **Contents:** State space search, heuristic search, Uninformed Search Techniques- DFS, BFS, Iterative Deepening, Informed search Techniques- Greedy best first search, A* search. **Self Study:** Genetic Algorithms **Further reading:** Hill Climbing Search		
UNIT 3	**Constraint Satisfaction Problem**	**7 HOURS**
App/System/Case study: SICStus Prolog **Contents:** Constraint Satisfaction Problem, Backtracking search for CSPs, Adversarial search - Games, Optimal decisions in games, Mini Max Algorithm, Alpha-Beta pruning. **Self Study:** Deterministic games in practice **Further reading:** Map coloring problem		
UNIT 4	**Reasoning and Knowledge Representation**	**7 HOURS**
App/System/Case study: WebQR , Inquire an iPad app **Contents:** Introduction to Reasoning and Knowledge Representation, Knowledge-based reasoning-First- order Logic and theorem proving, Rules and rule-based reasoning, Knowledge representation –Production based system, Frame based system. **Self Study:** Propositional Logic **Further reading:** Uncertainty representation and management		
UNIT 5	**Expert Systems and Learning**	**7 HOURS**
App/System/Case study: MYCIN **Contents:** Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics, Expert systems shells. Learning from Observations, General Model of Learning Agents, Inductive learning. **Self Study:** Natural Language Processing **Further reading:** Statistical Learning		

UNIT 6	Neural Networks	7 HOURS
App/System/Case study: Architecture of Complex Pattern Recognition: ART/ART-1 **Contents:** Introduction to neural networks, Perceptrons, Single layered feed forward network, Applications of ANN, Neural Networks viewed as directed graphs, Feedback from neurons to ANN. **Self Study:** Multi-layered Feed- forward Networks. **Further reading:** Hebb's rule		

PRACTICAL:Perform 6 experiments (a or b) using python/specifted tools.		
PRACTICAL NO.01		**6 HOURS**
a) Elaborate uninformed search algorithm for any suitable real time application. b) Develop Vacuum Cleaner Agent Application.		
PRACTICAL NO.02		**6 HOURS**
a) Find the shortest path (by number of towns passed and by distance) for any particular source and destination using A* search. b) Elaborate hill climbing algorithm.		
PRACTICAL NO.03		**6 HOURS**
a) Develop 8-puzzle problem using appropriate search method. b) Develop 4 Queens or 8 Queens Problem using backtracking.		
PRACTICAL NO.04		**6 HOURS**
a) Design map coloring problem using backtracking. b) Make use of Natural Language Toolkit to count word frequency.		
PRACTICAL NO.05		**6 HOURS**
a) Develop game of tic-tac-toe using minimax algorithm. b) Build Fact, Rule, goal for family relationships and arithmetic operations using Prolog.		
PRACTICAL NO.06		**6 HOURS**
a) Design map coloring problem using backtracking. b) Make use of Natural Language Toolkit to count word frequency.		

TEXT BOOK

1. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", Third Edition, Pearson, ISBN-13: 978-0-13-604259-4.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw Hill, ISBN-13: 978-0-07-008770-5.
3. Simon Haykin, "Neural Networks and Learning Machines", Third Edition, Pearson, ISBN: 9789332570313.

REFERENCES

1. Nils Nilsson, "Artificial Intelligence: A New Synthesis ", Second Edition, Morgan Kaufmann Series, ISBN: 9780080948348.
2. Deepak Khemani, "A First course in Artificial Intelligence", First Edition, McGraw Hill Education, ISBN: 9781259029981.
3. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, ISBN:0201876868.
4. Yegna Narayanan, "Artificial Neural Networks", 8th Printing, PHI, ISBN: 9788120312531.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Management
	COURSE CODE	HP 301
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
1	2	15	25	10	NIL	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP301.CEO.1:To introduce the basic concept and scope of Project Management.
HP301.CEO.2:To teach the theory of project Initiation and its analysis with project vision.
HP301.CEO.3:To introduce the concept of risk analysis and different types of tools used in project planning.
HP301.CEO.4:To guide learners monitoring and controlling project progress.
HP301.CEO.5:To introduce the concept of System dynamics, project audit and reviews.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP301.CO.1:Explain the concept of project management.
HP301.CO.2:Develop an ability to analyze scope, objective and vision of project initiation.
HP301.CO.3:Able to analyze risk and different tools of project planning.
HP301.CO.4:Develop an ability to measure progress of project by monitoring and controlling
HP301.CO.5:Identify the problems associated with project and reviewing the same.

THEORY		
UNIT 1	**Introduction Project Management**	**5 HOURS**
Meaning of Project Management, Classifications of projects, The Triple Constraint, The PMBOK project management process framework, Standard project team roles and project organisation (Functional, matrix, projectised), System approach, Systems development, System analysis, Project feasibility, Product life cycle, Project appraisal, Project contracting, The phases of SDLC.		
UNIT 2	**Project Initiation**	**5 HOURS**
Determining the project business reason, creating a project charter (market and technical analysis), financial analysis evaluation of project proposals, risk analysis, sensitivity analysis and social cost benefits analysis, defining scope and objectives, define a project vision.		
UNIT 3	**Project Planning**	**6 HOURS**
Planning fundamentals, identifying the project team responsibilities, project master plan, work breakdown structure, and other tools of project planning, estimating the efforts and duration of tasks, Identifying and analyzing risks, PERT,CPM,GERT,SLAM,DPM and resource allocation.		
UNIT 4	**Project monitoring and controlling**	**4 HOURS**
Executingthe project on time, Measuring project progress, Identifying corrective actions, Internal & external project control, control process, variance limit, issues in project control.		
UNIT 5	**Project Learning**	**4 HOURS**
System dynamics, Project audit, Change management, Project reviews and reporting.		

PRACTICALS		
PRACTICAL NO.01	**SDLC**	**2 HOURS**
Preparing for managing and developing a perfect model of SDLC for a particular given problem.		
PRACTICAL NO.02	**PERT and CPM**	**2 HOURS**
Planning a project under PERT and CPM charts		
PRACTICAL NO.03	**GERT and SLAM**	**2 HOURS**
Planning a project under GERT and SLAM charts		
PRACTICAL NO.04	**DPM**	**2 HOURS**
Solving practical problems under DPM		
PRACTICAL NO.05	**Variance Limit**	**2 HOURS**
Project monitoring under variance and controlling according to the given situations.		
PRACTICAL NO.06	**System Dynamics**	**2 HOURS**
Understanding System dynamics by solving case studies		
PRACTICAL NO.07	**Change Management**	**2 HOURS**
Solving case studies for learning how change management works.		
PRACTICAL NO.08	**Project Reviewing**	**2 HOURS**
Solving many practical problems by reviewing projects as well as some case studies.		

TEXT BOOK

1. James P. Clements and Gido, Effective Project Management Cengage India 5th Edition , ISBN: 9781111824051
2. John Nicholas, Project Management for Business and Technology: Principles and Practice, PHI-Eastern economy 3rd Edition, ISBN: 0-7506-7824-0
3. Juana Clark Craig, Project Management Lite, 2nd Edition, ISBN-13: 9781478129226
4. Harold R. Kerzner, Project Management, 11th Edition, ISBN: 978-1-118-48322-0

REFERENCE BOOK

1. Erik Larson and Clifford Gray, Project Management: The Managerial Process, McGraw Hill ISBN-10: 0-07-340334-2
2. Enzo Frigneti, The Practice of Project Management, KOGAN PAGE INDIA PRIVATE LIMITED,ISBN: 9788175545397
3. Geogary M. Horine, Project Management, QUE 4th Edition, ISBN: 9780134653914
4. Cynthia Stackpole Snyder, A User manual to The PMBOK Guide, ISBN: 9781118546604
5. Brown, James T., The Handbook of Program Management: How to Facilitate Project Success with Optimal Program Management, Second Edition. The McGraw-Hill Companies, 2014, ISBN 978-0071837859
6. Frame, J. Davidson, Managing Projects in Organizations: How to Make the Best Use of Time, Techniques, and People, 3rd edition, Jossey-Bass, 2003, ISBN 0-787-96831-5
7. Kerzner, Harold, ProjectManagement: Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 10th edition, Wiley, 2009, ISBN 0-470-27870-6
8. Meredith, R. Jack and Mantel, Jr., Samuel J., Project Management: A Managerial Approach, 7th edition, Wiley, 2008, ISBN 0-470-22621-8
9. Stackpole, Cynthia Snyder, A Project Manager's Book of Forms: A Companion to the PMBOK Guide, Wiley, 2009, ISBN 978-0470389843
10. Weiss, Joseph and Wysocki, Robert, Five-phase Project Management: A Practical Planning And Implementation Guide, Basic Books, 1992, ISBN 0-201-56316-9

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Software Skill Development Lab
	COURSE CODE	CS305
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	REVISION NO	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
–	4	–	–	–	–	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS305.CEO.1:To recognize the importance of and possess the skills necessary for life-long learning

CS305.CEO.2:To enhance the capacity to express programming concepts and choose among alternative ways to express things.

CS305.CEO.3:To improve the background for choosing appropriate programming languages for certain classes of programming problems.

CS305.CEO.4:To construct software solutions by evaluating alternate architectural patterns.

CS305.CEO.5:To apply integrated tool and techniques for building enterprise applications.

CS305.CEO.6:To implement application using IDLE tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS305.CO.1:Acquire practical knowledge within the chosen area of technology for project development.

CS305.CO.2:Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach.

CS305.CO.3:Contribute as an individual or in a team in development of technical projects.

CS305.CO.4:Incorporate best practices for building applications.

CS305.CO.5:Test and validate developed prototype against the original requirements of the problem.

CS305.CO.6:Express technical ideas, strategies and methodologies in written form.

Guidelines for Laboratory Conduction :

The assignments to be framed by understanding the prerequisites, technological as- pects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, in- structor can assign one real life application in the form of a mini project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed. The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module :		
Module	**Python with Kali Linux**	**36 HOURS**

Prerequisite: Python Programming

Industry Expert: Mr. QaidJohar Jawadwala

Course Instructor: Mr. Santosh Warpe

Course Content

Kali linux, Installation, python programming, socket concept, variables, list, dictionaries, packet sniffer, IP spoofing, passive and active attacks, network attacks

Beneftts:

1. Mini Project implementation
2. Placement Opportunities

PRACTICAL List		
Practical No.01		**4 HOURS**
Write a socket program to scan host vulnerabilities.		
Practical No.02		**4 HOURS**
Write a program to scan network for host active status.		
Practical No.03		**4 HOURS**
Creating a UNIX Password Cracker with Python.		
Practical No.04		**4 HOURS**
Writing a Zip File Password Cracker with Python.		
Practical No.05		**4 HOURS**
Writing a Packet Sniffer for monitoring network traffic.		
Practical No.06		**4 HOURS**
Writing a Python code for full host TCP Port Scanner		
Practical No.07		**4 HOURS**
Writing a Python code for Jamming a Wireless Network.		
Practical No.08		**4 HOURS**
Writing a Python program for sending packets with unknown Source IP (IP Spoofing).		
Practical No.09		**4 HOURS**
Writing a Python program for performing Man-in-the-Middle attack on Network for credential Harvesting.		
Mini Project		

REFERENCE

1. TJ O'Connor," Violent Python: A Cookbook for Hackers, Forensic Analysts, Penetration Testers and Security Engineers", Syngress, 2012, ISBN 978-15974995761
2. Himanshu Sharma," Kali Linux - An Ethical Hacker's Cookbook", Packt Publishing Limited, 2017, ISBN 978-1787121829
3. Raphael Hertzog, Mati Aharoni," Kali Linux Revealed: Mastering the Penetration Testing Distribution", Offsec Press, 2017, ISBN 978-0997615609

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Software Skill Development Lab
	COURSE CODE	CS306
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		EVALUATION SCHEME :					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
–	4	–	–	–	–	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS306.CEO.1:To play role of Business Intelligent Analyst and Data Scientist in Data Analytics Life Cycle.
CS306.CEO.2:To acquire the skills of Analytics in R Programming.
CS306.CEO.3:To perform graphical analysis using Data Visualization tools and techniques.
CS306.CEO.4:To perform analytics for improvement of Business Process.
CS306.CEO.5:To implement application using IDLE tools..

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS306.CO1:Perform the analytics in R on real time data sets.
CS306.CO2:Analyze the real time data with graphical visualization.
CS306.CO3:Generate the different types of analytics reports.
CS306.CO4:Develop the models using analytics for BI Process.
CS306.CO5:Test and validate developed prototype against the original requirements of the problem.
CS306.CO6:Use Tableau Visualization effectively for Data Analytics..

Guidelines for Laboratory Conduction

The assignments to be framed by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, instructor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed. The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module: R Programming

Prerequisite: Database Management System

Industry Expert: Ms. Shobha Mourya

Course Instructor: Ms. Shobha Mourya Mr.Jayvant Devare

Course Content

Basics of R Programming: Installation, Reading and Getting Data into R, Constructing Data Objects, Data:Descriptive Statistics and Tabulation, Data: Distribution, Simple Hypothesis Testing, Introduction to Graphical Analysis, Formula Notation and Complex Statistics, Manipulating Data and Extracting Components, Regression model, Advanced Graphs, Writing your scripts in R, Introduction of data science, Visualization, Introduction to Tableau, Navigating Tableau, Advanced Data Mining With Tableau, Creating bins Visualizing distributions, Modeling.

Beneftts:

1. Dell EMC Certification (optional)
2. Placement Opportunities.

PRACTICAL List		
Practical No.01		**4 HOURS**
Installing and loading R packages, set/get working directory.		
Practical No.02		**4 HOURS**
Import datasets using readr package and explore datasets using dplyr functions.		
Practical No.03		**4 HOURS**
Creating subsets from datasets using filter conditions.		
Practical No.04		**4 HOURS**
Creating new variables using mutate.		
Practical No.05		**4 HOURS**
Analyzing factor variables using frequency and contingency table.		
Practical No.06		**4 HOURS**
Analyzing numeric variables using summary command.		
Practical No.07		**4 HOURS**
Visualization using ggplot2 package for Bivariate, Univariate and Multi-variate plots..		
Practical No.08		**4 HOURS**
Understanding ggplot layers for plotting graphs.		
Practical No.09		**4 HOURS**
Scatter plot, Histogram, Bar chart, Density Plot, Faceting and Scaling.		
Practical No.10		**4 HOURS**
Importing and exploring Titanic dataset.		
Practical No.11		**4 HOURS**
Data wrangling for Titanic case study.		
Practical No.12		**4 HOURS**
Feature engineering for Titanic case study.		
Mini Project :		**8 HOURS**
Note: Data sets should be real time data sets like heart disease, Airline, etc.		

REFERENCES

1. Mark Gardener, "Beginning R: The Statistical Programming Language", Wiley paperback edition 2013, ISBN: 978-1-118-16430-3.
2. Ohri, "R for Business Analytics", Springer, 2012, ISBN: 978-1-4614-4342-1.
3. Ashutosh Nandeshwar, "Tableau Data Visualization Codebook", Packt publishers, ISBN: 978-1-849-68-978-6.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Software Skill Development Lab
	COURSE CODE	CS307
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
--	4	--	--	--	--	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS307.CEO.1:Plan Extraction, transformation, scraping, joining and cleaning of large data sets

CS307.CEO.2:Analyse large data sets to bring out insights to solve business problems.

CS307.CEO.3:Make use of machine learning libraries and apply established machine learning algorithms classes of programming problems.

CS307.CEO.4:Utilize Machine learning concepts in Python using problem solving approach by working on real time cases and in class programming assignments.

CS307.CEO.5:Develop code in support of Machine learning solutions in Python.

CS307.CEO.6:Evaluate and debug various learning algorithms.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS307.CO.1: Apply python to build various machine learning application.

CS307.CO.2: Interpret the fundamental issues and challenges of machine learning: data, model selection, model complexity.

CS307.CO.3: Identify the strengths and weaknesses of many popular machine learning approaches.

CS307.CO.4: Analyze the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

CS307.CO.5: Design and implement various machine learning algorithms in a range of real-world applications.

Guidelines for Laboratory Conduction :

The assignments to be framed by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, instructor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed .The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module	Python and Machine Learning	36 HOURS

Prerequisite: Python

Course Content

Understanding Data Analytics, Importance of data in business, Data analytics ecosystem, Basis of Python programming, Basics of Python, Variables and Operators, Data types, Lists, Dictio- nary and Functions, Programming in Python, Introduction to Machine learning, python Libraries, Numpy, Scikit, Pandas, Matplotlib, Data Visualization, Supervised learning, Linear Regression, Logistic Regression, Decision Tree, Naive Bayes, K Nearest Neighbor, Random Forest, Dimension- ality Reduction, Gradient Boosting algorithms, Support Vector Machine, Unsupervised learning, Clustering techniques – K means clustering , Association Rule Learning, Natural Language Pro- cessing

Beneftts: 1.Placement Opportunities

PRACTICAL List		
Practical No.01		**4 HOURS**
Perform data processing and cleaning of dataset using Python.		
Practical No.02		**4 HOURS**
Create a machine learning model using Linear Regression (Example : Salary Prediction).		
Practical No.03		**4 HOURS**
Create a machine learning model using multiple linear regression (Example : Flight elay Data For July 2014.		
Practical No.04		**4 HOURS**
Create a machine learning model using Decision Tree (Example : Position of an Employee as per salary).		
Practical No.05		**4 HOURS**
Create a machine learning model using K Means Clustering Algorithm.		
Practical No.06		**4 HOURS**
Create a machine learning model using Market Basket analysis.		
Practical No.07		**4 HOURS**
Create a natural language processing model (Example : Customer purchasing).		
Mini Project		**8 HOURS**

Note: Data sets should be real time data sets like heart disease, Airline, etc.

REFERENCE

1. Daniel Nedal, "Python Machine Learning from Scratch", AI Sciences paperback edition 2016, ISBN-13: 9781720649496
2. Chris Albon, "Machine Learning with Python Codebook", O'REILLY Paperback, 2018, ISBN-13: 1491989388

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Design And Analysis of Algorithm
	COURSE CODE	CS321
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	30	20	150

PRE-REQUISITE :

1. CS201 Data Structure & Files
2. CS211 Discrete Structure & Graph Theory

COURSE OBJECTIVES :

CS321.CEO.1:To be able to carry out the analysis of various algorithms in terms of its computational complexity.

CS321.CEO.2:To identify appropriate algorithmic design strategies to optimize the performance of a given problem.

CS321.CEO.3:To design algorithm for a specified problem.

CS321.CEO.4:To distinguish between P and NP class of problems.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

CS321.CO.1: Analyze and compare complexity of different types of algorithm for different types of problems.

CS321.CO.2: Explain various problem solving strategies.

CS321.CO.3: Design efficient algorithm for a given problem using the strategies learned.

CS321.CO.4: Solve intractable problems using approximation algorithms.

THEORY		
UNIT 1	**Introduction**	**8 HOURS**
App/System/Case study: Packet switched network, Election voting system. **Contents:** Algorithm, performance analysis, Amortized analysis, Asymptotic Notation, Problem solving strategies Divide and Conquer: Basic method, Example: Binary Search, Recurrence: Substitution method, Master Theorem **Self-study:** Performance analysis of quick sort and Merge sort. **Further reading:** Strassen's Matrix multiplication algorithm.		
UNIT 2	**Greedy Method**	**6 HOURS**
App/System/Case study: Application of clipping algorithm in video games, Network Routing **Contents:** Greedy Algorithm: Basic Method, Example: Knapsack Problem, Job Sequencing with Deadline, Activity selection problem. Matroid and Greedy methods **Self-study:** Elements of greedy strategy **Further reading** Task scheduling problem as a matroid		
UNIT 3	**Dynamic Programming**	**8 HOURS**
App/System/Case study: Google Map, Google search engine **Contents:** Dynamic Programming: Basic Method, Example: 0/1 Knapsack, OBST, All pairs shortest path,Bellman Ford algorithm. **Self-study:** Elements of Dynamic programming. **Further Reading:** Coin Changing Problem.		
UNIT 4	**Backtracking and Branch**	**8 HOURS**
App/System/Case study: Parser, Crossword puzzle, Sudoku. **Contents:** Backtracking: Basic Method, Examples: Eight Queen Problem, Graph Coloring Problem.Branch and Bound: Basic Method, FIFO and LC approach, 0/1 knapsack problem (FIFO) Example: Travelling Salesperson problem **Self-study:** : 0/1 Knapsack problem with LC approach **Further Reading:** :15 puzzle problem		

UNIT 5	Complexity Theory	6 HOURS

App/System/Case study:
Airline crew scheduling

Contents:
Classifying Problems, Nondeterministic Deterministic problems, Reductions, Cook's Theorem, NP Complete problem, NP Hard problem, Approximation algorithm: vertex cover problem

Self-study: :Approximation algorithm for TSP

Further Reading: Clique Decision problem.

UNIT 6	Advanced Algorithms	6 HOURS

App/System/Case study:
Plagiarism detector, spell checker, web search engines

Contents:
Spam Filters, Intrusion Detection system, Search Engine, Plagiarism Detection, Randomized algorithm for patter matching, String matching algorithm: KMP, Boyer Moore Algorithm, Robin Karp Algorithm, Number theoretic algorithm.

Self-study: :string matching with finite automata

Further Reading: : Na¨ıve string matching algorithm.

PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
Design and implement Binary search algorithm using Divide and Conquer method for a given input. Determine the time required to search an element.		
PRACTICAL NO.02		**4 HOURS**
Design and implement Quick Sort algorithm using Divide and Conquer method for a given input. Determine the time required to search an element.		
PRACTICAL NO.03		**4 HOURS**
Using Divide and Conquer strategy find the element in a given sorted array that appears once.		
PRACTICAL NO.04		**4 HOURS**
Design Implement Activity Selection Problem using Greedy Approach. Also calculate the Time complexity for this algorithm		
PRACTICAL NO.05		**4 HOURS**
Implement 0/I knapsack using Greedy Approach. Calculate Time complexity for this algorithm		
PRACTICAL NO.06		**4 HOURS**
Design Implement Coin changing Problem using Dynamic Programming Approach. Also calculate the Time complexity for this algorithm		
PRACTICAL NO.07		**4 HOURS**
Design and implement a solution for a problem of placing eight chess queens on an 88 chessboard so that no two queens threaten each other. Thus, a solution requires that no two queens share the same row, column, or diagonal.		
MINI PROJECT		**8 HOURS**
Student s can form a group of 3 to 4 people and they have to apply various problem solving strategies to solve their problem. Also they have to justify in which category their project come P or NP.		

TEXT BOOK

1. E. Horowitz , S. Sahni, S. Rajasekaran "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press pvt Ltd 2008, ISBN 9788173716126
2. Elmasri R., Navathe S., "Fundamentals of Database Systems", 4th Edition, Pearson, Education, 2003, ISBN 8129702282
3. V. Aho , J.D. Ullman, "Design and Analysis of Computer Algorithms"1st Edition ,Pearson Education 2002, ISBN 8131702057

REFERENCE

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein", Introduction to Algorithm", 3rd Edition, PHI Learning Pvt Ltd, 2011, ISBN 978-81-203-40007-7
2. Parag H Dave, Himanshu B Dave, "Design and Analysis of Algorithms"1st Edition, Pearson Education, 2008, ISBN 81-7758-595-9

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Compiler Design
	COURSE CODE	CS322
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	30	20	150

PRE-REQUISITE :

1. CS303– Theory of Computation

COURSE OBJECTIVES :

CS322.CEO.1:To learn the design principles of a Compiler.
CS322.CEO.2:To study the various parsing techniques and different levels of translation.
CS322.CEO.3:To understand how to optimize and effectively generate machine codes
CS322.CEO.4:To acquire practical programming skills necessary for constructing compiler.

COURSE OUTCOMES: :

Students successfully completing the course will be able to,

CS322.CO.1:Use different compiler construction tools.
CS322.CO.2:Design a compiler following design principles of compiler.
CS322.CO.3:Implement a compiler with various phases.
CS322.CO.4:Apply code generation and optimization techniques
CS322.CO.5:Demonstrate Flex and Bison tools to create a lexical analyzer and parser.

THEORY		
UNIT 1	**Compiler Basics**	**6 HOURS**

App/System/Case study:
Turbo C++ Compiler, GCC

Contents:
Analysis of the Source Program, the Phases of a Compiler, Cousins of the Compiler, the Grouping of Phases,Compiler-Construction Tools,Translators-Compilation and Interpretation, simple one-pass compiler- Syntax Definition, Syntax Directed Translation, Parsing, Lexical Analysis

Self-study: Symbol Table

Further reading: Abstract Stack Machines.

UNIT 2	Lexical Analysis	8 HOURS

App/System/Case study:
JavaCC (generates lexical analyzers written in Java) and JFLex (lexical analyzer generator for Java)

Contents:
Need and Role of Lexical Analyzer, Input Buffering, Language for Specifying Lexical Analyzers , Expressing Tokensby Regular Expressions , converting Regular Expression to NFA, Optimization of DFA-based pattern matchers

Self-study: Specification of Tokens, Recognition of Tokens

Further reading LEX-Design of Lexical Analyzer generator for a sample Language

UNIT 3	Syntax Analysis	8 HOURS

App/System/Case study:
Lex (Lexical Analyzer) Yacc (Parser Generator)

Contents:
Need and role of the parser, Context Free Grammars, Top Down parsing, Bottom up Parsing, Recursive Descent Parser , Predictive Parser , FIRST and FOLLOW procedures ,LL(1) Parser , Operator precedence parsers, Shift Reduce Parser , LR Parser, LR(0) item, Construction of SLR Parsing table , Introduction to LALR Parser, YACC Design of a syntax analyzer for a sample language

Self-study: Canonical LR parsing

Further Reading: Look Ahead LR parsing in detail

UNIT 4	Translation and Type Checking	6 HOURS

App/System/Case study:
Meta compilers - META II and TREE-META

Contents:
Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S Attributed Definitions, LAttributed Definitions, Top down Translation, Bottom-Up Evaluation of Inherited Attributes, recursive evaluators,Analysis of syntax directed definitions.

Self-study: :Back patching type systems

Further Reading: OLAP cubes for advanced analytical Specification of a simple type checker

UNIT 5	Code Generation And Optimization	6 HOURS

App/System/Case study:

Loop optimizations , Code generator optimizations

Contents:

Issues in the design of code generator, The target machine, Runtime Storage management , Basic Blocks and Flow Graphs , Next-use Information , A simple Code generator, DAG representation of Basic Blocks, PeepholeOptimization, Principal sources of Optimization, optimization of basic blocks, loops in flow graphs.

Self-study: :Issues in design of a code generator

Further Reading: Loop Invariant Code Motion, Strength Reduction

UNIT 6	Run Time Environments	8 HOURS

App/System/Case study:

Just-in- time Compilation

Contents:

Global Data Flow Analysis, Runtime Environments, Source language issues, Storage organization, Storageallocation, Storage Allocation strategies , Access to non-local names, Parameter Passing Symbol tables-Dynamic storage allocation.

Self-study: :Efficient data flow algorithms

Further Reading: :Parallel and Distributed Compilers

PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
Write a program in C++ to demonstrate basic syntax of LEX specifications, built in functions and Variables.		
PRACTICAL NO.02		**4 HOURS**
Design and develop Lexical Analyzer for C++ language using LEX that should recognize identifiers, digits,operators, keywords, special symbols and white spaces and also supports error handling		
PRACTICAL NO.03		**4 HOURS**
Write a program in C++ to demonstrate basic syntax of YACC specifications, built in functions and Variables.		
PRACTICAL NO.04		**4 HOURS**
Write an ambiguous CFG to recognize an infix expression and implement a parser that recognizes the infix expression using YACC. Provide the details of all conflicting entries in the parser table generated by LEX and YACC and how they have been resolved Intermediate Code Generation		
PRACTICAL NO.05		**4 HOURS**
Design sample syntax Analyzer and implement the same for C++ language using YACC tool. Syntax Analyzer should recognize syntax errors like Missing parenthesis, Missing semicolons etc.		
PRACTICAL NO.06		**8 HOURS**
Write an attributed translation grammar to recognize declarations of simple variables, ”for”, assignment, if, if - else statements as per syntax of C++or Pascal and generate equivalent three address code for the given input made up of constructs mentioned above using LEX and YACC. Write a code to store the identifiers from the input in a symbol table and also to record other relevant information about the identifiers. Display all records stored in the symbol table.		
PRACTICAL NO.07		**4 Hours**
Design regular expression and implement sample regular expression for c language. Design Regular Expression like (a/b)*ba(a/b)* - Implement above Regular Expression such that it should accept all the strings belong to that Regular Expression.		
PRACTICAL NO. 8		**8 Hours**
Mini Compiler for C language [Compiler Construction Project] Design and implement a compiler for the programming language having the following specifications: a. Identifier Rules b. Data Types c. Expressions d. Statements e. Loops f. Comments		

TEXT BOOK

1. Alfred V. Aho, Ravi Sethi Jeffrey. D. Ullman,"Compilers Principles, Techniques Tools",Pearson Education,third edition, 2007,ISBN-13: 978-8173716065.
2. Cooper, K.D. and Torczon, L., "Engineering a Compiler", Morgan Kaufmann. 2004 ISBN 9780080472676
3. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press,2002 ISBN 9780521607643

REFERENCE

1.1. Dhamdhere D M, "Compiler Construction Principles and Practice", second edition, Macmillan India Ltd., New Delhi, 2001
2. PDick Grone, Henri E Bal, Ceriel J H Jacobs and Koen G Langendoen, Modern Compiler Design, John Wiley and Sons, USA, 2000. ISBN-10: 0-471-97697-0.
3. Allen I. Hollub, Compiler Design in C, PHI, 1990. ISBN: 978-0131550452
4. Andrew W. Appel, Modern Compiler Implementation in Java. Cambridge University Press, 1998 or 2002, ISBN 9780521820608
5. Thomas W. Parsons, Introduction to Compiler Construction. Computer Science Press,1992 http://lambda.uta.edu/cse5317/notes/notes.html www.cs.bilkent.edu.tr/

MIT Academy of Engineering (An Autonomous Institute) (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Computer Networks
	COURSE CODE	CS323
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EVALUATION SCHEME**						
		THEORY				PRESENTATION/ DEMONSTRATION		TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL			
3	2	30	40	30	30	20	-	150

PRE-REQUISITE: :

1. CS201 Data and File Structure.
2. CS211 Discrete Structure and Graph Theory

COURSE OBJECTIVES :

CS323.CEO.1:To comprehend the fundamental concepts of data communication and networking.
CS323.CEO.2:To identify how different coding techniques works.
CS323.CEO.3:To apply various techniques to solve real life problems.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

CS323.CO:1:Comprehend signals and communications types.
CS323.CO:2:Distinguish data communication system and its components.
CS323.CO:3:Elaborate different types of network topologies and protocols.
CS323.CO:4:Demonstrate various analog and digital modulation and demodulation techniques.
CS323.CO:5:Evaluate routing protocols for different real time systems.
CS323.CO:6:Design different application/systems related to networking.

THEORY		
UNIT 1	**Networking Basics**	**6 HOURS**
App/System/Case study: E-Mail System, Real time video conferencing **Contents:** Data Communications: Components, data representation, data flow, Networks: Distributed processing, network criterion, physical structures, network models, categories of networks, Internetwork **Self Study:** The Internet **Further reading:** Protocol and standards		
UNIT 2	**Network Models**	**6 HOURS**
App/System/Case study: Banking/Social/Educational Server **Contents:** Layered tasks: Sender, receiver and carrier, The OSI Model: Layered architecture, Peer to peer processes,encapsulation, Layers in the OSI model, TCP/IP protocol suite **Self-Study:** ATM , X.25 protocol **Further Reading:** IBM SNA		
UNIT 3	**Physical Layer and Media**	**8 HOURS**
App/System/Case study: Telephone Network, Digital Speedometer, Multi User Network Games **Contents:** Data and Signals: Analog and Digital, Periodic Analog, Periodic Non periodic Signals, Periodic analog signals, Transmission Impairments, Performance, Digital to Digital Conversion: Line Coding ,Line Coding Schemes, Transmission Modes: parallel and Serial Transmission, Analog Transmission: Digital to Analog conversion, Analog to Analog conversion, Multiplexing, Spread Spectrum **Self-study:** Guided Media **Further Reading:** Unguided Media		
UNIT 4	**Data Link Layer**	**8 HOURS**
App/System/Case study: WinRAR, WinZip **Contents:** Introduction, Block Coding: Error Detection and correction, Hamming codes ,Cyclic Redundancy Check, Framing: Fixed and Variable size , Flow and Error Control, Noiseless and Noisy Channels: Simplest Protocol, Stop and Wait Protocol, Stop and Wait ARQ ,Sliding Window Protocols: GO back N ARQ, Selective Repeat ARQ, HDLC , Random Access: CSMS,CSMA/CD,CSMA/CA **Self Study:** 802.3(Ethernet) **Further reading:** Bluetooth (IEEE 802.15 standard)		
UNIT 5	**Network Layer**	**7 HOURS**

App/System/Case study: Team viewer, Windows Remote Desktop Connection, Travelling Salesman Problem

Contents:

Design issues, Routing Algorithms: Distance Vector Routing, Link State Routing, Path Vector Routing, IP Protocol, IPv4 and IPv6 addressing schemes, Subnetting, NAT, CIDR, ICMP, , Routing in Internet: RIP ,OSPF, BGP

Self Study: Multicast Routing Protocols

Further reading: Routing in Internet

UNIT 6	Transport and Application Layer	7 HOURS

App/System/Case study: Moodle Server, FileZilla, IP messenger, WhatsApp, Hike.

Contents:

Process to Process Delivery, Transmission Control Protocol (TCP), User Datagram Protocol (UDP),Domain Name System (DNS), Hypertext Transport Protocol (HTTP), Simple Mail Transfer Protocol (SMTP), File Transfer Protocol (FTP), Dynamic Host Configuration Protocol (DHCP)

Self Study: Terminal Emulation (TELNET)

Further reading: Post Office Protocol 3 (POP3)

PRACTICAL:		
Practical No.1		**2 HOURS**
Setup a wired LAN using Layer 2 Switch and then IP switch of minimum four computers. It includes preparation of cable, testing of cable using line tester, configuration machine using IP addresses, testing using PING utility and demonstrate the PING packets captured traces using Wireshark Packet Analyzer Tool.		
Practical No.2		**2 HOURS**
Using Cisco Packet tracer to configure Switch and Router 1.Assign IP address of the switch 2.Set default gateway of the switch 3.Save configuration 4.Synchronize switch's status messages 5.Setting router name to R1 6.Set privileged mode password 7.Set privileged mode secret.		
Practical No.3		**2 HOURS**
Design and test different types of network topology using router, switch and nodes.(Packet tracer)		
Practical No.4		**2 HOURS**
Write a program to detect and correct single bit error using Hamming codes.		
Practical No.5		**2 HOURS**
Write a program to implement sliding window protocol.		
Practical No.6		**2 HOURS**
Write a program to implement simple communication between Client-Server using sockets utility and demonstrate the packets captured traces using Wireshark Packet Analyzer Tool.		
Practical No.7	**Mini Project**	**12 HOURS**
Guide Lines 1. Maximum 3 students allowed in each group. 2. Each group will work on design and Implementation. 3. Students should submit the report in soft copy and hard copy.		

TEXT BOOK

1.Behrouz A. Forouzan, ”Data Communications and Networking”, 4thedition, Tata McGraw-Hill Publications, 2006, ISBN 978-0-07-296775-3

REFERENCE BOOK

1. Andrew S. Tanenbaum, David J.Wetherall, ”Computer Networks”, 5thedition, Pearson Education India, 2013, ISBN 978-9332518742
2. Larry L. Peterson Bruce S. Davie, “Computer Networks”, 5thedition, Morgan Kaufmann Publisher, 2011, ISBN 978-0123850591.
3. William Stallings, ”Data and Computer Communications”, 9thedition, Pearson Education India, 2013, ISBN 978-9332518865.
4. Doulas E. Comer, ”Computer Networks and Internets, 6th edition, Pearson Education Limited,2015, ISBN 978-1292061177.
5. Alberto Leon-Garcia , Indra Widjaja, ”Communication Networks” ,2nd edition, McGraw-Hill Education,2003, 978-0072463521.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:**2018 – 2019
THIRD YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Cyber Security
	COURSE CODE	IT331
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EVALUATION SCHEME**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50		150

PRE-REQUISITE:E :

IT311:Network Security work

COURSE OBJECTIVES :

IT331.CEO1:To gain a fundamental knowledge of what Cyber Security is and how it applies to your daily work.

IT331.CEO2:To understanding of terms commonly used in Cyber Security such as “vulnerability”.

IT331.CEO3:To provide the fundamental skills and understanding needed to identify Cyber Security threats.

IT331.CEO4:To ascertain the usefulness of taught concepts of cyber forensics in their awareness.

COURSE OUTCOMES: :

IT331.CO.1:Use appropriate resources to stay abreast of the latest industry tools and techniques.

IT331.CO.2:Understand what a vulnerability is and how to address most common vulnerabilities.

IT331.CO.3:Possess a fundamental knowledge of Cyber Security.

IT331.CO.4:Outline the fundamental risk management principles as it relates to Cyber Security.

IT331.CO.5:Analyze and evaluate systems with respect to maintaining operations in the presence of risks and threats.

IT331.CO6:Apply web security principles and identify security attacks.

UNIT 1	Introduction to Cyber Crimes	10 HOURS
Introduction to Cyberspace, Definition of Cybercrime, Classification of Cybercrimes, E-mail Spoofing, Spamming, Cyberdefamation, Internet Time theft, Forgery, Web Jacking, Newsgroup spams, Industrial spying, Online frauds, Software Piracy, Computer Sabotage, E-mail Bombing, The Legal Perspective. **Self-Study:** Current and Fulltime Threats **Further Reading:** E-Mail and SPAM, Spoofing.		
UNIT 2	**Cyber Intrusions and offenses**	**10 HOURS**
Planning an attack, Cyberbullies, Social Engineering, Cyberstalking, Botnets, Security challenges posed by mobile devices, Attacks on mobile devices,Phishing, Recognizing Phishing trip, Identity theft, Tools and methods used in cybercrime. **Further Reading:** Cyber stalkers.		
UNIT 3	**Network and Application Security**	**8 HOURS**
Basic concepts of Network Security, Computer Infection Program:malware, Virus, Worm, Working principle of Trojan Horse, Network Attacks, Firewalls and VPNs, Case Study: E-mail System, Database and Operating System Security basics. **Self-Study:** Messaging Security **Further Reading:** E-Commerce Public Key Infrastructure		
UNIT 4	**Web Services and Privacy**	**6 HOURS**
Privacy on the Internet, Privacy consideration in Web Services, Privacy in Semantic Web, Privacy considerations in the Use of Context-Sensitive Technologies, Security and Privacy aspects of Service Oriented Architecture. Case Study: Shopping carts and Payment Gateways. **Self-Study:** browser/environment dependent attacks **Further Studies:** session related vulnerabilities		
UNIT 5	**Cyber Crimes and Cyber Security** A Legal Perspective	**6 HOURS**
Cybercrime and the legal Landscape around the world, Necessity of Cyber laws, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Various Consequences, Digital signatures and the Indian IT Act, Amendments, Cybercrime and Punishment, Cyber law, Technology and Students. **Self-Study:** Different type of attacks Interfacing with DAC **Further Studies:** dealing with Ransom ware		

PRACTICAL:Perform following experiments using Open source software		
Practical NO.01		**6 HOURS**
A. Study of the features of firewall in providing network security and to set B. Configure Security parameters in any one web browser C. Study of different types of vulnerabilities for hacking a websites / Web Applications		
Practical NO.02		**6 HOURS**
A. Study of different types of vulnerabilities for hacking a websites / Web Applications. B. With the help of an open source tool, hack a web site		
Practical NO.03		**6 HOURS**
A. Install Virtualbox or Wine and configure the same. B. Grab a banner with TELNET and perform the task using NETCAT C. Perform port scanning using NMAP.		
Practical NO.04		**2 HOURS**
Active and Passive fingerprinting using necessary open source tools.		
Practical NO.05		**2 HOURS**
Perform a packet sniffing for router traffic using any open source tool.		
Practical NO.06		**2 HOURS**
Analysis the security vulnerabilities of E-Mail Applications.		
Practical NO.07		**2 HOURS**
Using an security auditing tool,build reports about security configuration for a system		
Practical NO.08		**2 HOURS**
Perform an audit of Wireless router or Access Point and decrypt WEP and WPA.		

TEXT BOOK

1. CYBER SECURITY: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole, Sunit Belpure ISBN-13: 978-8126521791
2. Internet Security: A Jumpstart for Systems Administrators and IT managers by Tim Speed and Juanita Ellis ISBN: 9780080509075.
3. Web Hacking-Attacks and Defence by Stuart McClure, Saumil Shah, Shreeraj Shah ISBN-13: 978-0201761764.

REFERENCE BOOK

1. Security Architecture: Design, Deployment and Operations by Christopher King, Curtis Dalton, T.Ertem Osmanoglu ISBN-13: 978-0072133851.
2. Information Security: Principles and Practices by Mark Merkow, Jim Breithaupt ISBN: 9780133589412.
3. Information Systems Security by Nina Godbole ISBN-13: 978-8126516926.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Predictive Analytics
	COURSE CODE	CS331
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		**EVALUATION SCHEME :**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	EC E	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : CS 311: Descriptive Analytics

COURSE OBJECTIVES :

CS331.CEO.1:To implement Various Association algorithms.
CS331.CEO.2:To summarize the supervised learning methods.
CS331.CEO.3:To understand the advanced classification techniques
CS331.CEO.4:To explain the unsupervised learning methods.
CS331.CEO.5:To explain the supervised learning methods.
CS331.CEO.6:To explain the feature engineering and ensemble learning

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS331.CO.1:Analyze various Association Algorithms..
CS331.CO.2:Apply the classification and prediction techniques.
CS331.CO.3:Use the advanced classification techniques.
CS331.CO.4:Analyze the unsupervised learning methods.
CS331.CO.5:Analyze the different clustering methods
CS331.CO.6:Apply the feature engineering and ensemble learning.

THEORY		
UNIT 1	**Association**	**6 HOURS**
App/System/Case study: Retail Industry **Contents:** The Apriori Algorithm (Greedy): Improving the Efficiency of Apriori, Mining Frequent Itemsets Using Vertical Data Format, Mining Closed Frequent, FP growth(ARM approach). **Self Study:** Multilevel Association Rules Generation. **Further Reading:** Association Mining for Sequence Data		
UNIT 2	**Classiftcation and Prediction : supervised learning methods**	**8 HOURS**
App/System/Case study: House price prediction Case **Contents:** Basic learning/mining tasks, Inferring rudimentary rules: 1R algorithm, Decision trees, Covering rules, The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), Linear models, Rule-based classification, Navie Bay's Classification **Self Study:** Classification Assessment **Further Reading:** A fast Scalable Classifier for Data mining		
UNIT 3	**Classiftcation Techniques**	**6 HOURS**
App/System/Case study: Retail Industry **Contents:** Baysian Belief Network, KNN, Back-Propagation , SVM, Lazy Learners, Classification Techniques using Weka/R/Python **Self Study:** Linear Discriminant Analysis **Further Reading:**Kernel SVM		
UNIT 4	**Clustering -Unsupervised Machine Learning Method.**	**8 HOURS**
App/System/Case study: Grocery – shopping cart Case Study **Contents:** First conceptual clustering system: Cluster/2 , Partitioning methods: k-means, expectation maximization (EM) ,Hierarchical methods: distance-based agglomerative and divisible clustering **Self Study:** Density based Clustering **Further Reading**:Clustering Validation		
UNIT 5	**Clustering Techniques –Extended.**	**6 HOURS**
App/System/Case study: Online Shopping Case Study **Contents:** Conceptual Clustering: Cobweb , Agglomerative clustering Experiments with Weka - EM, Cobweb **Self Study:** Spectral Clustering **Further Reading**:Graph Clustering		
UNIT 6	**Feature Engineering and Ensemble Learning**	**6 HOURS**
App/System/Case study: Food Recommender Case Study **Contents:** Feature engineering and selection, Ensemble learning such as Random Forests and Ad-aBoost **Self Study:** Deep Learning **Further Reading:** Non Linear Featuring		

PRACTICAL NO.01	Planning store layout, promotions, and recommendations using stored transactions data	8 HOURS
Understanding grocery data, dimensions and problem statement Understanding the transaction dataset Calculating Support, Confidence and Lift on the Grocery data set Applying A priory Algorithm and calculating it Observing and inspecting the rules generated by the priory rule Interpreting the output of the Priory Algorithm of MBA Assignment - Preparing Travel planner using MBA		
PRACTICAL NO.02	**Sales/ Demand forecast using ARIMA in R**	**8 HOURS**
Differentiating time series and noise using Moving Averages (MA) and Autoregressive (AR) processes Combining AR and MA models to create ARMA models Converting ARMA to ARIMA to remove trend Using ARIMA Model to forecase next 12 months sale o Finding out trend and seasonality effect to decide between ARMA and ARIMA models o Checking stationarity assumption using Dickey Fuller Test o Identifying lags to finalize normal ARIMA/ Seasonal ARIMA model o Using ACFs and PACFs (Box Jenkins model) Validating Model to check if residuals are normally distributed with zero mean, are uncorrelated, and have minimum variance Forecasting next 12 months sale		
PRACTICAL NO.03	**Finding trains of similar characteristics (Indian Railways) - K-Means Clustering**	**8 HOURS**
Scaling and Standardizing Indian Railways data set - Finalizing K-means Clustering Determining/ calculating Initial Seeds for Railways data Calculating and using Calinski Value on Railways data Plotting Elbow chart on Railways data Performing k-means clustering on Railways data Finalizing clusters and inferring from the results		
PRACTICAL NO.04	**Random Forest Algorithm – Insurance Losses .**	**6 HOURS**
Standardizing Losses in Insurance data Calculating Distance in Losses of Insurance data Growing trees using Random Forest Plotting and using variable importance plot Finalizing results of the Random Forest Algorithm		

TEXT BOOK

1.. Jiawei Han, Micheline Kamber, Jian Pei Professor, "Data Mining: Concepts and Techniques", The Morgan Kaufmann Series in Data Management Systems, ISBN 978-9380931913

REFERENCE BOOK

1. Grolemund, Garrett "R for Data Science", O'Reilly ISBN: 9781491910382
2. Gupta G.K., "Introduction to Data Mining with Case Studies", PHI ISBN 13: 9788120350021

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Machine Learning
	COURSE CODE	CS332
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		**EVALUATION SCHEME :**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	EC E	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE:

CS 201: Data and File Structure, CS 312 : Artificial Intelligence and Neural Networks

COURSE OBJECTIVES :

CS332.CEO.1: To illustrate foundation and types of machine learning.
CS332.CEO.2: To summarize modern techniques in machine learning.
CS332.CEO.3: To explain the algorithms of machine learning.
CS332.CEO.4: To explain the unsupervised learning methods

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS332.CO.1: Explain supervised unsupervised learning.
CS332.CO.2:Make use of methods and techniques of machine learning
CS332.CO.3:Apply learning methods to solve real time examples.
CS332.CO.4:Analyze the various machine learning algorithms.
CS332.CO.5:Design the ML algorithms

THEORY		
UNIT 1	**Introduction to Machine Learning**	**7 HOURS**
App/System/Case study: Robotics,Gaming Analytics. Contents: Illustrate history foundation of ML, Supervised Learning , Unsupervised Learning, The Machine Learning CycleDefining the Process: Planning, Developing Testing, Reporting, Refining, Production, Data processing, Data storage, data privacy. Self-study: stock trading Further Reading: Medicine and Healthcare		
UNIT 2	**Bayesian Networks And Baye's Theorem**	**7 HOURS**
App/System/Case study: Medical test i.e detection of symptoms diseases Contents: Bayesian Networks: Introduction, illustrations: Pilots to Paperclips, A Little Graph Theory, A Little Probability Theory, Conditional Probability, Winning the Lottery, Bayes' Theorem :How Bayesian Networks Work, Maximum Likelihood Estimation, Evaluating an Estimator, The Bayes' Estimator. Self Study: Coin flips Example Further Reading: Naıve Baye's Classification		
UNIT 3	**Classiftcation Techniques**	**6 HOURS**
App/System/Case study: Travelling Salesman person problem, Bin picking problems (Knapsack problems) Contents: Decision Trees: Basics, Uses, Advantages, Limitations, Algorithm Types, Univariate Trees : classification tree, pruning, rule of extraction, Bayesian decision theory: classification utility theory, association rule Self Study: Tree search, planning examples Further Reading: Job-shop Scheduling example		
UNIT 4	**Clustering.**	**8 HOURS**
App/System/Case study: Face-book Like button Contents: Introduction, Illustrations: The Internet, Business and Retail ,Law Enforcement ,Computing, Linear and Non Linear Clustering, Clustering method : K-means clustering, hierarchical clustering, Gaussian clustering **S**elf Study: K-median clustering algorithm and applications Further Reading: Earth Quake studies		

UNIT 5	Association Rules	6 HOURS
App/System/Case study: Web Usage Mining(AMAZON/FLIPCARD product association),Soft drinks and Diapers marketing **C**ontents: How Association Rules Learning Works: Support, Confidence, Lift, Conviction, Defining the Process, Market Basket Analysis: Example, Frequent Item sets, Closed Item sets, Apriori Algorithm. Self-Study: FP-Growth. Further Reading: Context Based Association Rules.		
UNIT 6	**SVM.**	**7 HOURS**
App/System/Case study: Amazon product recommendation **C**ontents: FBasics of Support Vector Machine (SVM), SVM classification: Binary and multiclass, linear classifier, Nonlinear classifier, confidence, Maximizing and minimizing to find line, SVM base Recommendation systems, Recommendation algorithms. **S**elf Study: Face-book friend recommendation **Further Reading:** Credit Application		

PRACTICAL		
PRACTICAL NO.01		**6 HOURS**
A. Design an Naïve Bayesian Classifier to determine ,if an email is spam based only on its text. OR B. Implement Naïve Baye' s classification algorithm use data set for weather forecasting with Weka Tools/Python/Java		
PRACTICAL NO.02		**6 HOURS**
A. Analyze unsupervised data using K-means method with Weka tool. OR B. Analyze unsupervised data by using K-means clustering method in JAVA Or Python		
PRACTICAL NO.03		**6 HOURS**
A. Build a face book friend recommendation system. OR B. Build " Whom to follow" recommendation system from Twitter data.		
PRACTICAL NO.04		**6 HOURS**
A. Develop an application using association rule based Apriori algorithm use Weka tool. OR B. Develop an application using association rule based Apriori algorithm using Python Or Java		
PRACTICAL NO.05		**6 HOURS**
To Analyze graph for hacking twitter social graph data.(Use Python/Java/any Tool)		
PRACTICAL NO.06		**4 HOURS**

A .Case Study: optimization technique by attempting to break a simple letter cipher.

OR

B. Case Study : Pattern matching (Use Springer IEEE paper)

TEXT BOOK

1.. Machine Learning: Hands-On for Developers and Technical Professionals. Jason Bell Paperback: 404 pages, Publisher: Wiley (2014),Language: English,ISBN-10: 8126553375, ISBN-13: 978-8126553372

2.. Introduction to Machine Learning, 3rd Edition, Ethem Alpaydin, and Paperback: 612 pages Publisher: PHI LEARNING PVT. LTD-NEW DELHI (2015), Language: English, ISBN-10: 8120350782 ISBN-13: 978- 8120350786

3.. Data Mining: Concepts and Techniques,Jiawei Han, Micheline Kamber, Jian Pei, Hardcover: 744,Publisher: Morgan Kaufmann; 3 edition (25 July 2011), Language: English ISBN-10: 9380931913, ISBN-13: 978- 9380931913

REFERENCES:

1. Introduction to Machine Learning with Python: A Guide for Data Scientists, by Andreas Muller,Paperback: 392 pages,Publisher: Shroff/O'Reilly; First edition (2016),Language: English,ISBN-10: 9352134575,ISBN-13: 978-9352134571

2. Python Machine Learning Cookbook, Prateek Joshi,Paperback: 304 pages, Publisher: Packt Publishing Limited (23 June 2016), Language: English, ISBN-10: 1786464470 ISBN-13: 978-TMH, 2009, ISBN-13: 978-8120337312

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP 302
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
1	2	NIL	NIL	NIL	50	25	75

PRE-REQUISITE : Basic Communication Skills

COURSE OBJECTIVES :

HP302.CEO.1:To define the importance of professional skills in students life
HP302.CEO.2:To explain them necessary, specific professional skills
HP302.CEO.3:To appraise students for placements through acquisition of professional skills
HP302.CEO.4:To support them detect their present level in respect of each professional skill and show direction for improvement

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP302.CO.1:Relate the importance of professional skills(L2)
HP302.CO.2:Build necessary, specific professional skills (L3)
HP302.CO.3:Analyze the environment of employ-ability (L4)
HP302.CO.4:Develop various techniques of effective team building in their professional life(L6)

PRACTICALS: (SECTION A)		
PRACTICAL NO.01	**Self Awareness**	**2 HOURS**
Concept of Johari Window, Advantages and disadvantages of every quadrant, Identifying the proportion of each quadrant in respect of self, Using the tools of Feedback & Exposure for self-development		
PRACTICAL NO.02	**Personal Interviews**	**6 HOURS**
Preparing for Interviews, Typical expected questions & suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Parameters of assessment, Initiating the discussion, Effective listening, Own contribution, Paraphrasing, Arguing and counter-arguing, Giving direction to the discussion		
PRACTICAL NO.04	**Team building and Motivation**	**2 HOURS**
Hallmark of effective teams, Barriers to team work, Subjugation of Individual interests for achievement of teams goal, Leading & motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2 HOURS**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique, Collective and individual Brain Storming,		
PRACTICAL NO.06	**Decision Making**	**2 HOURS**
Levels of decisions, Process of decision-making, Types of criteria, Individual and collective decision-making, Barriers in decision making, Keys to sound decision-making		
SECTION B:	**Aptitude Training.**	
.		

REFERENCE BOOK

1. Stephen Covey: The Seven Habits of Highly Effective People, Simon and Schuster Ltd, ISBN: 0-671-71117-2
2. Krishna Mohan, Meera Banerji, Developing Communication Skills, Birla Institute of Technology and Science, ISBN: 033392-919-5
3. Charles Kepner and Benjamin Tregoe, The Rational Manager: A systematic Approach to Problem Solving and Decision Making , Tata McGraw-Hill Publishing Company Ltd., ISBN:13:978-0070341753
4. Priyadarshini Patnaik, Group Discussion and Interview Skills , Foundation Books, 1st Ed.- 2011, ISBN No.: 9788175967847, 8175967846.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Basic Entrepreneurship
	COURSE CODE	HP303
	COURSE CREDITS	1
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
--	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : WF Orientation Course

COURSE OBJECTIVES :

HP303.CEO.1:To understand the fit between you and your entrepreneurialambitions
HP303.CEO.2:To find a problem worthsolving
HP303.CEO.3:To identify yourcustomers
HP303.CEO.4:To develop a solution for your customers' problems and problemsolution
HP303.CEO.5:To build and demonstrate anMVP
HP303.CEO.6:To structure a business model around the problem, customer, and solution and present your Business ModelCanvas.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP303.CO.1:Why entrepreneurship requires
HP303.CO.2:Outline the Problems Worth Solving by using various techniques like DT, JTBD
HP303.CO.3:Identify the Customer Segments and Early Adopters
HP303.CO.4:Develop the solution demo for identify problem.
HP303.CO.5:Create Business Model Canvas and Minimum Viable Product

PRACTICALS:		
PRACTICAL NO.01	**GET STARTED - Discover Yourself**	**2 HOURS**
Find your flow, Effectuation, Case Study: Tristan Walker: The extroverted introvert, Identify your entrepreneurial style.		
PRACTICAL NO.02	**IDEA/PROBLEM - Identify Problems Worth Solving**	**4 HOURS**
What is a business opportunity and how to identify it. Find problems around you that are worth solving. Methods for finding and understanding problems - (Observation, Questioning, DT, Jobs to be done (JTBD) How to run problem interviews to understand the customer's worldview Introduction to Design Thinking - Process and Examples Generate ideas that are potential solutions to the problem identified - DISRUPT GOOTB: Run problem interviews with prospects Class Presentation: Present the problem you "love" Form teams		
PRACTICAL NO.03	**CUSTOMER**	**6 HOURS**
Identify Your Customer Segments and Early Adopters The difference between a consumer and a customer (decision maker); Market Types, Segmentation and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns. Identify the innovators and early adopters for your startup.Craft Your Value Proposition Come up with creative solutions for the identified problems Deep dive into Gains, Pains and Jobs-To-Be-Done (using Value Proposition Canvas, or VPC) Identify the UVP of your solution using the Value Proposition section of the VPC Outcome-Driven InnovationClass Presentation: Communicating the Value Proposition- 1 min Customer Pitch		
PRACTICAL NO.04	**BUSINESS MODEL**	**4 HOURS**
Get Started with Lean Canvas Basics of Lean Approach and Canvas; Types of Business Models (b2b; b2c)		
PRACTICAL NO.05	**VALIDATION**	**9 HOURS**
Develop the Solution Demo Build solution (mockups) demo, How to run solution interviews, GOOTB: Run Solution interviews. Does your solution solve the problem for your customers: The problem-solution test. Sizing the Opportunity Differences between a Startup venture and a small business; Industry Analysis Understanding what is Competition and it's role, Analyze competition Case study: Blue Ocean Strategy Building an MVP Identify an MVP and build it - I; Document and validate your assumptions Build-Measure-Learn feedback loop and the MVP/Javelin Board How to do MVP Interviews GOOTB: Run MVP interviews Is there a market for your product –The product-market fit test Class Presentation: Present your MVP		
PRACTICAL NO.06	**MONEY**	**5 HOURS**
Revenue Streams Basics of how companies make money. Understand income, costs, gross and net margins. Identify primary and secondary revenue streams. Pricing and Costs Value, price, and costs; Different pricing strategies. Understand product costs and operations costs; Basics of unit costing Financing Your New Venture How to finance business ideas, Various sources of funds available to an entrepreneur and pros and cons of each, What investors expect from you, Practice Pitching to Investors and Corporates.		

PRACTICAL NO.07	TEAM	2 HOURS
Team Building Shared Leadership Role of a good team in a venture's success; What to look for in a team; How do you ensure there is a good fit? Defining clear roles and responsibilities. How to pitch to candidates to join your startup Explore collaboration tools and techniques - Brainstorming, Mind mapping, Kanban Board, #Slack.		
PRACTICAL NO.08	**MARKETING & SALES**	**2 HOURS**
Positioning Understand the difference between product and brand and the link between them. Define the positioning statement for your product/service and how it should translate into what your customers should see about that brand in the marketplace. Channels & Strategy Building Digital Presence and leveraging Social media, Creating your company profile page, Measuring the effectiveness of selected channels, Budgeting and planning. Sales Planning Understanding why customers buy and how buying decisions are made; Listening. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale.		
PRACTICAL NO.09	**SUPPORT**	**2 HOURS**
Planning & Tracking Importance of project management to launch and track progress Understanding time management, workflow, and delegation of tasks Business Regulation Basics of business regulations of starting and operating a business; Importance of being compliant and keeping proper documentation How to find help to get started		
PRACTICAL NO.10	**Capstone Project: Present Your BMC (Optional - and MVP)**	**2 HOURS**
BMC: Business Model Canvas. / MVP: Minimum Viable Product.		

REFERENCES

1. Read Forbes article and do Group Discussionhttps://www.forbes.com/sites/chrismyers/2015/12/16/find-your-flow-and-success-will-follow/
2. https://necrophone.com/2014/01/20/effectuation-the-best-theory-of-entrepreneurship-you-actually-follow-whether-youve-heard-of-it-or-not/
3. Use your self awareness to find out what motivates and drives Entrepreneurial activity - Ted Talk "What is your Entrepreneurial style - EntrepreneurKnow
4. Prof. ClayChristensen"IdentifyingCustomerNeeds"https://www.youtube.com/watch?v=yVCZ-7xSsCw
5. Understand the customer problem by GOOTB":byGOOTB":https://www.youtube.com/watch?v=sEENIZgscDw
6. https://www.forbes.com/sites/danschawbel/2013/12/17/geoffrey-moore-why-crossing-the-chasm-is-still-relevant
7. Value Proposition: https://www.youtube.com/watch?v=jZN6CUieuOQ&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
8. Value Proposition & Customer Need:https://www.youtube.com/watch?v=6FnG8pJL8yM&index=3&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
9. https://strategyn.com/turn-customer-input-into-innovation/ CASE STUDIES in ODI: https://jobs-to- be-done.com/tagged/case-study
10. TheLeanBMC https://www.youtube.com/watch?v=FjBe7UO1hc
11. Ash Maurya -Capture your BMC in 20
12. minuteshttps://www.youtube.com/watch?v=7o8uYdUaFR4&t=462s
13. Ash Maurya - How to Prioritize Risks on Your BusinessModel https://www.youtube.com/watch?v=01z7EPXS42k
14. https://pt.slideshare.net/bmorelean/dan-lemberg-lean-pitch
15. https://startups.fb.com/en-in/categories/development/
16. Designing Experiments: https://www.youtube.com/watch?v=WiMZWCg1Hu8&t=111s
17. Customer Development Process:https://www.youtube.com/watch?v=lLEebbiYIkI
18. Beating the Competition: https://www.youtube.com/watch?v=46uP6vOj5G0
19. Q&A with Garr :https://www.youtube.com/watch?v=SmJjjOrusyI
20. Basic Accounting Lingo for Entrepreneurs:https://www.youtube.com/watch?v=Y7Pm1jEEKE
21. Vinod Khosla : How Leaders can BUILDhttps://www.youtube.com/watch?v=bRCoBgCn1Q
22. Vinod Khosla: https://www.youtube.com/watch?v=VIrNLzTs9cw
23. How to Pitch the way VC's think, so you can convince co-founders : https://www.youtube.com/watch?v=fTgU7THoKCw
24. Tony Buzan:http://www.tonybuzan.com/about/mind-mapping/
25. Google : Think branding:https://www.youtube.com/watch?v=1l2CUjkg0ug
26. Th
    0 Design rules-https://www.igorinternational.com/, Web design course:https://www.coursera.org/specializations/web-designStrikingly Free : https://www.strikingly.com/online-resume/linkedin
27. https://certification.hubspot.com/inbound-sales-certification-course
28. https://www.udemy.com/courses/business/sales/
29. https://www.accountingtools.com/articles/2017/5/17/sales-budget-sales-budget-example

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2018 – 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Mini Project
	COURSE CODE	CS324
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
–	4	–	–	–	–	75	75

PRE-REQUISITE :

1. ET206 Prototyping,
2. CS213 Minor project.

COURSE OBJECTIVES :

CS324.CEO.1:To understand the Product Development Cycle through Mini project.

CS324.CEO.2:To undertake execute a mini Project through a group of students

CS324.CEO.3:To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices, aesthetics and ergonomics.

CS324.CEO.4:To understand the role of professional and ethical practices, management principles,Technical documentation and communication skills in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS324.CO.1:Execute an idea in a team as well as within constraints.

CS324.CO.2:Acquire knowledge of the techniques, skills and modern engineering tools necessary for engineering practices.

CS324.CO.3:Use standard engineering tools and processes for design, simulation, testing,analysis in implementation and deployment of theoretical idea into practice.

CS324.CO.4:Use standard documentation and presentation tools for a professional report and presentation of the work.

PREAMBLE : The main objective of this course is to understand the Product Development Cycle through mini Project, Where students will undertake execute a project through a group of students. They will plan for various activities of the project and distribute the work amongst team members. The students will learn budgeting, planning for the project, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards, significance of aesthetics ergonomics while designing a product. This course will develop students.abilities to transmit technical information clearly and delivery of presentation based on the Mini Project. They will understand the importance of document design standards by compiling technical report on the mini Project work carried out in a team.

PRACTICAL		
Stage- 1	**Formation of group and Allocation of project adviser**	**Week 1**
. Project group formation and project advisor allocation by the department . Project group shall consist of Minimum 02 and maximum 03 students per group (For detailed process please check Annexure-1 Mini project guidelines) . Selection of finalized topic from approved project topics by the department. . The project design idea shall be based on refereed papers, white papers, product, patent, application notes,industry problem, academic, institute or societal requirement, funded research, innovative thought,modification/ development in existing idea etc. . Each student will maintain a logbook/project diary. This diary will be utilized to monitor project progress throughout		
Stage- 2	**Project Review -1 Internal review by project adviser**	**Week-2,3**
. The project group will work on , 1. Conceptualization of an Idea 2. Literature review 3. Market survey 4. Finalizing the Specifications . Presentation of work progress to project adviser and proceed to project approval.		
Stage- 3	**Project Review -2 Project Approval**	**Week-4**
. Presentation of concept to Department Review Committee (DRC) or Committee appointed by department. . Review of concept and feasibility of project and necessary suggestions for implementation by the committee . The project group will make corrections and continue their work.		
Stage- 4	**Project Review -3 Internal review by project adviser**	**Week-5,6,7,8,9**
. The project group will work on , 1. System Architecture and Design 2. Simulation /software development (As applicable) 3. Manufacturing of project 4. Assembly 5. Testing6. Troubleshooting. . Presentation of work progress to project adviser and proceed to final project progress review.		

Stage- 5	Project Review -4 Final Project progress review	Week-10,11

.The project group will work on ,

1. Result analysis against specifications 2. Enclosure/Aesthetic design (As applicable) 3. Technical report generation (Draft copy) 4. User's manual (As applicable) 5. Bill of material etc.

. The technical report may incorporate following points,

1) Title
2) Introduction and Concept
3) Literature Market survey
4) Theory and relevance
5) Block diagram
6) Drawings (As applicable)
7) Specifications
8) Project plan
9) Bill of material
10) Enclosure/aesthetic design (As applicable)
11) Results
12) Results analysis
13) Conclusion
14) References

. Presentation of project work, draft copy of technical report , Final presentation etc. to DRC or Committee appointed by department.

. Review of project progress and necessary suggestions by DRC or Committee appointed by department for final presentation.

. The project group will make corrections. After clearing all comments from DRC; project can be presented to final l examination.

. Project must be approved by department to appear for final examination.

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Practical- 6	Examination: Final Demonstration and presentation	Week-12

.Final examination will be divided in three parts a) Demonstration b) Presentation c) Project docu-Mentation, For the final examination project must be demonstrated in front of examiner panel.

For Industry sponsored projects or other installations examiner panel can visit

. All students must be physically present in front of examiner panel at the time of examination.

. Only demonstrated projects can be evaluated for presentation and documentation.

. Mini Project demonstration: Demo of project works and validation of project results to examiners Panel

. Mini Project presentation: Presentation of overall project work form project idea to implementation and deployment of project to examiners panel.

. Mini Project documentation: Presentation of technical documentary report to examiners panel

Assessment :

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1. Internal Assessment:
   a. Project Review -2 Project Approval -05 Marks
   b. Project Review -3 Internal review by project adviser- -05 Marks
   c. Project Review -4 Final Project progress review- 10 Marks
2. Examination: Final Demonstration and presentation
   a. Mini Project demonstration: 20 Marks
   b. Mini Project presentation: 20 Marks
   c. Mini Project documentation: 15 Marks

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MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Final Year

Bachelor of Technology in Computer Engineering

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	RELEASE DATE	:	01/12/2017
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 12	CS401	Software Engineering, Testing and Quality Assurance.	3	2	4
2.	DE 1	CS41#	Department (Program) elective - Ref er Annexure	3	0	3
3.	OE 3	CS42#	Open Elective – Refer Annexure	3	2	4
4.	HSS 6	HP402	Sociology	2	--	2
5.	HSS7/SDP7	HP403/CS40#	Business Strategies/ Advance skill development lab(Adv. Java/R Programming/Python with kali Linux)	---	2	1
6.	SDP 8	CS405	Project – I	--	8	4
7.	SDP9	CS406	Summer Internship	--	--	4
TOTAL				**11**	**14**	**22**

SEMESTER:VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 13	CS431	Human Computer Interaction	3	2	4
2.	DE 2	CS44#	Department (Program) elective - Ref er Annexure	3	0	3
3.	OE 4	CS45#	Open Elective – Refer Annexure	3	2	4
4.	HSS8	HP401	Engineering Economics	2	---	2
5.	SDP10	CS432	Project – II	---	8	4
TOTAL				**11**	**12**	**17**

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Software Engineering, Testing and Quality Assurance
	COURSE CODE	CS401
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	30	20	150

PRE-REQUISITE : ET206: Prototyping, ET201: System Engineering

COURSE OBJECTIVES :

CS401.CEO.1:To understand the basics of testing, test planning and design and test team organization
CS401.CEO.2:To study the various types of test in the life cycle of the software product.
CS401.CEO.3:To build design concepts for system testing and execution.
CS401.CEO.4:To learn the software quality assurance ,metrics, defect prevention techniques.
CS401.CEO.5:To learn the techniques for quality assurance and applying for applications.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS401.CO.1:To understand the basics of testing, test planning and design and test team organization.
CS401.CO.2:To study the various types of test in the life cycle of the software product.
CS401.CO.3:To build design concepts for system testing and execution.
CS401.CO.4:To learn the software quality assurance, metrics, defect prevention techniques.
CS401.CO.5:To learn the techniques for quality assurance and applying for applications.

THEORY COURSE CONTENT		
UNIT 1	**Basics Of Software Engineering**	**6 HOURS**

App/System/Case study:Learning Game Design and Software Engineering through a Game Prototyping Experience.

Content: Process Models - Waterfall Model, Prototyping, Incremental, Spiral, RAD. Software Requirement Specification: Requirement Process, SRS Components, Requirement Specifications with Use Cases Diagram, Requirements Validation. Software Project Planning: Project Planning objectives. Software Metrics: Size, Function Point, Staffing, Project Estimation Methods – Decomposition Techniques; Empirical Estimation Models – COCOMO Model.

Self-Study: The evolving role of software –characteristics, components and applications.

Further Reading: Software estimation techniques.

UNIT 2	**System Testing**	**6 HOURS**

App/System/Case study:

Manual Testing (Online Marketing Software Platform)

Content:

System Testing - System Integration, Techniques-Incremental, Top Down Bottom Up Sandwich and Big Bang, Software and Hardware Integration, Hardware Design Verification Tests, Hardware and Software Compatibility Matrix Test Plan for System Integration. Built-in Testing. Functional testing - Testing a Function in Context. Boundary Value Analysis, Decision Tables. acceptance testing - Selection of Acceptance Criteria, Acceptance Test Plan, Test Execution Test. software reliability - Fault and Failure, Factors Influencing Software, Reliability Models

Self-Study: Manual Testing Process Life Cycle.

Further Reading: Test Case Design and Execution

UNIT 3	**Automatic Testing**	**7 HOURS**

App/System/Case study:

Journey Boosts Revenue and Reduces Costs by Implementing TEST Co Software Test Automation Solutions

Content:

Introduction to Automation, Training of Application, Test Automation Process. Introduction to Selenium: Selenium IDE Interface, Replay Scripts, Locate the elements on a Web page, Shared UI Map, Functions in Web Driver, Configuration File, Synchronizing Web Driver scripts, Dynamic UI Objects, Reporting in Selenium.

Self-Study: Sample Naming Conventions, Coding Conventions.

Further Reading: Continuous Integration with Jenkins.

UNIT 4	Software Reliability Modeling	7 HOURS

App/System/Case study:

Software Reliability In Safety Critical Supervision And Control Of Nuclear Reactors

Content:

Historical Perspective and Implementation Exponential Failure Time Class of Model, Schneidewind's Model, Hyper exponential Model, Weibull and Gamma Failure Time Class of Models, Infinite Failure Category Models, Bayesian Model, Model Relationships.

Self-Study: Software Reliability Prediction in Early Phases of the Life Cycle.

Further Reading: Techniques for Prediction Analysis and Recalibration

UNIT 5	Software Quality Assurance	8 HOURS

App/System/Case study:

Successful Application of Software Reliability By Norman F. Chneidewind

Content:

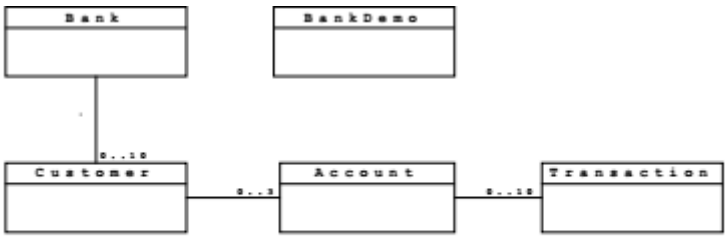
Quality concepts, Software quality assurance , SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and record keeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability ,The ISO 9000 Quality standards: The ISO approach to quality assurance systems, The ISO 9001 standard, Software Configuration Management.

Self-Study: Software Quality ISO Standards

Further Reading: ISO/IEC 9126 Software engineering

PRACTICAL		
PRACTICAL NO.01		**8 HOURS**

Perform following experiments using Open source tools. Note: Following are the reference case studies, can be changed with other appropriate examples with same level.



BankDemo

The BankDemo is the main class of the program. It has a main () method that will be used to test the functionality of the classes in the program.

Bank

A Bank has an array of Customers (maximum 10) and an addCustomer() method that adds a new Customer to the array.

Customer

A Customer has a name and an array of Accounts (maximum 3). Customer has an addAccount() method that adds a new Account to the array. Customer also has a printAccountsSummary() method that prints details of all of their Accounts.

Account

An Account has an accountNumber and a balance. It is possible to withdraw money from the Account using the withdraw() method and to deposit money using the deposit() method. An Account also has an array of Transactions (maximum 10). Each time a deposit or withdrawal is made, a new Transaction is created and added to the array. Note: For simplicity, only whole amounts of currency can be deposited or withdrawn.

Transaction

A Transaction has a numerical amount (negative or positive) and a description.

Exercise Steps

1. Start up a new project in Together and create the class diagram shown above. Add the specified attributes and methods to each class via the diagram.

Note 1: All attributes should be private. This means that you should supply public get. . . () methods for them.

Note 2: You will probably need to make the following Together configuration change to see the get. . . () methods you add. Go to Tools — Options — Project Level and a dialog box will appear. Expand the View Management item in the explorer view on the left and select the JavaBeans / C++ Properties item. In the panel on the right, make sure Recognize Java Beans is unchecked. Click OK to return to the project.

2. In the source code for Customer add a constructor that takes a name as a parameter. The constructor should set the Customer's name attribute and also create a new array of Accounts (with the maximum size as specified above). To create arrays of objects, use code like the following: Thing[] things = new Thing[200]; where Thing is the class name, things is the name you want to give the array and 200 is the size of the array.

3. In the source code for Account add a constructor that takes an account Number as a parameter. The constructor should set the Customer's account Number attribute, set the balance to zero and create a new array of Transactions (with the maximum size as specified above)

PRACTICAL NO.02		**8 HOURS**

Measure software cost and effort for a realistic project using COCOMO II tool.(Build small project and identify the cost of it)

PRACTICAL NO.03		**6 HOURS**

Test a program using manual testing :

1. Login a specific web page.
2. Update 10 student records into table into Excel file.
3. Total number of objects present / available on the page
4. Select the number of students who have scored more than 60 in any one subject (or all subjects).
5. To get the number of list items in a list /combo box and count number of check boxes on the page checked and unchecked count.

PRACTICAL NO.04		**8 HOURS**

Automate some Open Source CRM Software — Vtiger CRM and install locally and try automating few tests and Identify software quality by considering following test cases.

1. Data Quality and Conversion in CRM
2. Functionality of CRM
3. Reporting and Integration
4. Regression and User Acceptance Testing

TEXT BOOK

1. Roger Pressman, "Software Engineering: A Practitioner's Approach", McGraw-Hill Education; 8 edition ISBN 13: 9789339212087.
2. Srinivasan Desikan, "Software Testing Principals and practices", Pearson Publication ISBN-13 978-8-17-758295-6.

REFERENCE BOOK

1. Software Testing And Quality Assurance-Theory and Practice, Kshirasagar Nak, Priyadarshi Tripathy, John Wiley & Sons Inc,2008
2. Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement, Jeff Tian, John Wiley & Sons, Inc., Hoboken, New Jersey. 2005.
3. Software Quality Assurance - From Theory to Implementation, Daniel Galin, Pearson Education Ltd UK, 2004
4. Software Quality Assurance, Milind Limaye, TMH, New Delhi, 2011.
5. The Art of Software Testing, by Glenford J. Myers , Corey Sandler, Tom Badgett, 3rd Edition, Wiley; 3rd edition, ISBN-13: 978-1118031964.
6. Selenium Testing Tools Cookbook - Second Edition, Unmesh Gundecha , Publisher: Packt Publishing, ISBN:13 -9781784392512

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Operating System Design
	COURSE CODE	CS411
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	-	30	40	30	-	-	100

PRE-REQUISITE : CS301: Operating System

COURSE OBJECTIVES :

CS411.CEO.1:To explain the system concepts and kernel data structures.
CS411.CEO.2:To recall the system calls in files and internal data structures used by Unix
CS411.CEO.3:To learn the processes and inter process communication in Unix system
CS411.CEO.4:To identify memory management policies of Unix operating system
CS411.CEO.5:To analyze the design techniques with toy operating system
CS411.CEO.6:To model toy operating system

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS411.CO.1:Demonstrate the design and structure of Unix operating system
CS411.CO.2:Develop short system utilities and applications using system calls
CS411.CO.3:Choose the system calls to manipulate the process context and control its execution
CS411.CO.4:Compare memory management policies.
CS411.CO.5:Develop a toy operating system

THEORY COURSE CONTENT		
UNIT 1	**Introduction To Kernel**	**6 HOURS**
App/System/Case study: Reading and writing Disk Blocks **Content:** History, System structure, OS services, Architecture of UNIX OS, Introduction to system concepts, Kernel Data Structures, The Buffer Cache- Buffer Headers, structure of buffer pool. **Self Study:** Scenarios of retrieval of buffer **Further Reading:** Efficiency of Unix Buffer Cache		
UNIT 2	**Internal Representation Of Files**	**8 HOURS**
App/System/Case study: Case study on the System calls for the file system **Content:** Inodes, Structure of regular file, Directories, Inode assignment to new file, Allocation of disk blocks **Self Study:** System calls in windows **Further Reading:** Reading & Writing disk blocks		
UNIT 3	**The Structure Of Processes**	**6 HOURS**
App/System/Case study: Setting and retrieving kernel time, retrieving process execution time. **Content:** Process states & transitions , Layout of system memory, context of process, saving the context of process, process creation, signals, process termination , awaiting process termination, user ID of a process, the shell, system boot & init process, process scheduling **Self Study:** Process states **Further Reading:** System calls for time		

UNIT 4	Memory Management Policies & I-O Sub System	8 HOURS

App/System/Case study: Study of device drivers

Content:

Swapping: Allocation of swap space, Swapping processes out, Fork swap, Expansion swap, Swapping processes in, Demand Paging, I/O subsystem: Driver Interfaces, Disk drivers, Streams.

Self Study: Virtual memory in Unix

Further Reading: Page replacement algorithms

UNIT 5	Inter-process Communication	6 HOURS

App/System/Case study: Different forms of Inter process communication.

Content:

Process tracing, System V IPC, Network Communications, Sockets, Multiprocessor Systems : Problem of multiprocessor systems, solution with master & slave processors.

Self Study: Multiprocessor scheduling

Further Reading: Semaphore method that allows all processors to execute in kernel mode

UNIT 6	Design Techniques	8 HOURS

App/System/Case study: Case study on Toy Operating System.

Content:

Design Process, Design Problems, Two Level Implementations, Interface Design, Connection in Protocols, Interactive and Programming Interfaces, Decomposition Patterns.

Self Study: Design considerations for Distributed operating systems

Further Reading: Transparent distributed model without stub processors

TEXT BOOK

1. Maurice J. Bach, "The Design of the Unix Operating System", First Edition, Pearson Education, 2010
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", McGraw-Hill, ISBN13: 9780256151510

REFERENCE BOOK

1. Sumitabha Das, "Unix Concepts & Applications", Fourth Edition ,Tata McGraw Hill, ISBN:0- 07-063546-3
2. Stephen Prata, "Advanced Unix –A Programmer's Guide" ,BPB,ISBN: 81-7029-107-0
3. Bruce Molay, "Understanding Unix/Linux Programming" Prentice Hall, ISBN 0130083968

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Wireless and Mobile Networks
	COURSE CODE	CS412
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	-	30	40	30	-	-	100

PRE-REQUISITE : CS323 : Computer Networks

COURSE OBJECTIVES :

CS412.CEO.1:To build an understanding of wireless network.
CS412.CEO.2:To understand architecture and types of Wireless Networks.
CS412.CEO.3:To identify design issues of Wireless Network.
CS412.CEO.4:To know the challenges of Wireless Network.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS412.CO.1:Determine issues and challenges in Wireless Network.
CS412.CO.2:Categories different types of wireless networks.
CS412.CO.3:Determine issues and challenges of Mobile Ad-Hoc Networks
CS412.CO.4:Assessing the features of Mobile Ad-Hoc Networks.
CS412.CO.5:Design and implement Wireless Sensor Network.
CS412.CO.6:Apply different security algorithms in wireless sensor network.

THEORY COURSE CONTENT		
UNIT 1	**Basics Of Wireless Networks**	**7 HOURS**

App/System/Case study: Smart phones, Wi-Fi, Hotspot, MANET, VANET, Wireless Mouse and Keyboard etc.

Content:

Wireless Network Architecture, Classification, Wireless Switching Technology, Wireless Communication Problems with examples, Wireless Network Reference Model, Wireless Networking Issues, Wireless Networking Standards.

Self Study: Evolution of Wireless Networking.

Further Reading: Trends in Wireless Networking.

UNIT 2	Types Of Wireless Networks	7 HOURS

App/System/Case study: Bluetooth, SHARE it, Internet Service Providers, WLAN in Inventory control, Publicly Shared Data Networks Provided by ISP, Privately Owned Networks.

Content:

Introduction, Properties, Network Architecture, Network Components, Protocols, Technologies and Applications of following wireless networks

1) Wireless Body Area Network (WBAN)
2) Wireless Personal Area Network (WPAN)
3) Wireless Local Area Network (WLAN / Wi-Fi)
4) Wireless Metropolitan Area Network (WMAN / Wi-Max)
5) Wireless Wide Area Network (WWAN)

Self Study: IEEE Standards for WBAN, WPAN, WLAN, WMAN and WWAN.

Further Reading: 1) A review on Wireless Body Area Network for Medical Applications. 2) Wireless Personal Area Networks Architecture and protocols for Multimedia Applications

UNIT 3	Basics Of Mobile Ad-Hoc Networks	7 HOURS

App/System/Case study: Military Communication, Virtual Classrooms, Multi user Games etc.

Content: Wireless ad-hoc Network: Introduction, Features, Advantages, Applications, Ad-Hoc Mobility Models (Indoor and outdoor) MANET: Historical Development, Basics, Features, Challenges, Deployment Issues, Technologies, Applications, Protocols and their classification. MAC Protocols: Design issues, goals and classification, Contention based protocols- with reservation, scheduling algorithms, IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

Self Study: DUCHA – Dual Channel MAC Protocol.

Further Reading: Attacks and Challenges in MANET.

UNIT 4	Routing Protocols And Transport Layer Protocol In MANET	7 HOURS

App/System/Case study: Use of MANET in Military.

Content:

Routing Protocols: Design issues, goals and classification, Proactive, reactive and hybrid routing, Uni cast routing algorithms, Multi-cast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, Transport layer: Issues in designing, Transport layer classification, Ad-Hoc transport protocols.

Self Study: QoS aware routing.

Further Reading: ZRP – Zonal Routing Protocol, DYMO – Dynamic MANET on Demand.

UNIT 5	Wireless Sensor Network	7 HOURS

App/System/Case study: Military, Health Care, Disaster Management, Home Control, Industrial Automation etc.

Content:

Introduction, Network Architecture, Sensing and Communication Ranges, Design Issues, Challenges, Energy Consumption, Clustering of Sensors, Protocols and their Classification, Applications.

Self Study: Routing in Wireless Sensor.

Further Reading: Operating Systems for Wireless Sensor Network.

UNIT 6	Security In Wireless Network	7 HOURS

App/System/Case study: Attack in Wireless Networks.

Content:

Wireless LAN Security, Wireless Application Protocol (WAP) Overview, Wireless Transport Layer Security, WAP End-to-End Security.

Self Study: Wireless Datagram Protocol (WDM), Wireless Transaction Protocol (WTP)

Further Reading: Extensible Authentication Protocol (EAP)

TEXT BOOK

1. Dr. Sunil kumar S. Manvi, Mahabaleshwar S. Kakkasageri, "Wireless and Mobile Networks Concepts and Protocols", Wiley India Pvt. Ltd., 2010, ISBN: 978-81-265-2069-5.
2. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007.
3. Charles E. Perkins, Ad hoc Networking, Addison – Wesley,2000
4. KazemSohraby, Daniel Minoli, TaiebZanati, "Wireless Sensor Network Technology, Protocols and Applications", John & Wiley Sons INC., 2007, ISBN 978-0-471-74300-2. [Freely available on internet]
5. William Stallings, "Cryptography and Network Security – Principles and Practice", Fifth Edition, PEARSON Publication.

REFERENCE BOOK

1. Carlos de Morais Cordeiro, Dharma Prakash Agrawal, "AD HOC SENSOR NETWORKS", World Scientific Publishing Co. Pte. Ltd., 2006, ISBN : 13: 978-81-7596-792-2.
2. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad hoc networking, Wiley-IEEE press, 2004.
3. Mohammad Ilyas, " The handbook of adhoc wireless networks", CRC press, 2002
4. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobilead hoc networking, Wiley-IEEE press, 2004.
5. Mohammad Ilyas, The handbook of adhoc wireless networks, CRC press, 2002.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Information Retrieval
	COURSE CODE	IT413
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	-	30	40	30	-	-	100

PRE-REQUISITE :

1. CS201 Data and File Structure
2. CS321 Design and Analysis of Algorithms

COURSE OBJECTIVES :

IT413.CEO.1:Learn the information retrieval methods and models.
IT413.CEO.2:Be familiar with web search engine.
IT413.CEO.3:To Understand theoretical base behind standard IR models
IT413.CEO.4:Be exposed to evaluation analysis of IR models.
IT413.CEO.5:Introduce to modern IR methods.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT413.CO.1:Understand the process of representing, retrieving and analyzing IR models and advanced IR models.
IT413.CO.2:Understand structure of web and working of crawlers
IT413.CO.3:Develop IR models form standard IR models.
IT413.CO.4:Develop the standard methods for web indexing and evaluation
IT413.CO.5:To analyze optimization techniques various algorithms used in web search.

THEORY		
UNIT 1	**Introduction to Information Retrieval**	**6 HOURS**
App/System/Case study: logistic issues **Content:** Introduction: Information Retrieval, History of IR, Issues. Architecture of a Search Engine: Architecture, Basic Building Blocks, Components of building blocks: Text Acquisition, Text Transformation, Index Creation, User Interaction, Ranking, Evaluation **Self Study:** An example information retrieval problem **Further Reading:** The role of artificial intelligence (AI) in IR		
UNIT 2	**Web Crawlers**	**6 HOURS**
App/System/Case study: Web Crawlers **Content:** Deciding What to Search, Web structure , Crawling the Web, Web Search Architectures , Crawling Documents and Email, Document Feeds, The Conversion Problem, Storing the Documents, Meta Crawlers, Focused Crawling, Detecting Duplicates, Removing Noise **Self Study:** Google Bot, Bing Bot **Further Reading:** Open Source Web Crawlers		
UNIT 3	**Retrieval Models**	**8 HOURS**
App/System/Case study: Similarity Based IR Models **Content:** Processing Text: From Words to Terms, Text Statistics, Document Parsing, Document Structure and Markup, Boolean Model, Vector Space Model, Probabilistic Model. **Self Study:** Alternative Models **Further Reading:** learning-to-rank.		

UNIT 4	Indexing & Retrieval Evaluation	6 HOURS

App/System/Case study: Basic Indexing- Map Reduce

Content:

Indexing: Inverted Indexes, Compression, Index Construction, Retrieval Evaluation: Why Evaluate?, The Evaluation Corpus, Logging, Effectiveness Metrics, Efficiency Metrics, Training, Testing, and Statistics

Self Study: Query Processing

Further Reading: Query Interfaces

UNIT 5	Web-Search Optimization	6 HOURS

App/System/Case study: Google Search Engines

Content:

Web Search: History of Web, Indexing, Link Analysis (HITS, PageRank), Relevance Scoring and ranking for Web, Search Engine Optimization, On page Optimization, Off page optimization

Self Study: Personalized search, Handling "invisible" Web

Further Reading: Summarization, Question Answering, Reporting.

UNIT 6	Advanced Information Retrieval	8 HOURS

App/System/Case study: Information Retrieval of Images

Content:

Multimedia Information Retrieval, Parallel and Distributed IR, Meta-Ranking, Searching with Communities, Filtering and Recommending, Web data mining, Structure Revisited

Self Study: Economic, ethical, legal and political issues

Further Reading: Categorization algorithms

TEXT BOOK

1. W. Bruce Croft, Donald Metzler, Trevor Strohman, "Search Engines Information Retrieval in Practice" ☭W.B. Croft, D. Metzler, T. Strohman, 2015, Electronic Copy Freely Available
2. C. Manning, P. Raghavan, and H. Schütze, "Introduction to Information Retrieval" Cambridge University Press, 2008 ISBN – 978-1107666399.

REFERENCE BOOK

1. Ricardo Baeza -Yates and Berthier Ribeiro – Neto, "Modern Information Retrieval: The Concepts and Technology behind Search" 2nd Edition, ACM Press Books 2011 ISBN - 978-0136072249.
2. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, "Information Retrieval: Implementing and Evaluating Search Engines", The MIT Press, 2010 ISBN - 978-0262528870.
3. Ophir Frieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series", 2nd Edition, Springer, 2004 ISBN - 978-1402030031.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Ethical Hacking and Cyber Laws
	COURSE CODE	IT421
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	30	20	150

PRE-REQUISITE :

IT321: Cyber Security

COURSE OBJECTIVES :

IT421.CEO.1:Understand Various types of footprinting, footprinting tools, and countermeasures

IT421.CEO.2:AnalyzeNetwork scanning techniques and scanning countermeasures.

IT421.CEO.3:Enumeration techniques and enumeration countermeasures.

IT421.CEO.4:Working of viruses, virus analysis, computer worms, malwareanalysis procedure, and countermeasures.

COURSE OUTCOMES: :

The students after completion of the course will be able to

IT421.CEO.1:Identify and analyse the stages an ethical hacker requires to take in order to compromise a target system.

IT421.CEO.2:Identify tools and techniques to carry out a penetration testing.

IT421.CEO.3:Critically evaluate security techniques used to protect system and user data.

IT421.CEO.4:Demonstrate systematic understanding of the concepts of security at the level of policy and strategy in a computer system.

IT421.CEO.5:Classify different types of webserver attacks, attack methodology, and countermeasures.

IT421.CEO.6:Understand Wireless Encryption, wireless hacking methodology, wirelesshacking tools, and wi-fi security tools

THEORY		
UNIT 1	**Introduction to Ethical Hacking**	**6 HOURS**
Introduction, Legal and Illegal part in Hacking, Network Hacking, Network Vulnerability, Route Protocol Hacking,Firewall Scanning, Application Proxy Vulnerabilities		
UNIT 2	**Foot printing and Social Engineering**	**6 HOURS**
Footprinting Concepts, Internet Footprinting,Different types of scanning, Using DNS Zone transfers, Introduction to Social Engineering		
UNIT 3	**Web and Password Hacking**	**9 HOURS**
Web Server Hacking, Web Application Hacking, Hacking a web platform, Cracking a password, E-mail Hacking,SSL Fraud, Internet relay chat Hacking		
UNIT 4	**Software Hacking**	**9 HOURS**
Remote Control Insecurities, Virtual Network computing, Terminal Server and Citrix, Session Hijacking, Trojans,Secure Shell (SSH) Attacks, Subverting the system environment		
UNIT 5	**Attacking the Web**	**6 HOURS**
Web Authentication threats, Bypassing Authentication, Attacking the Web Authorization, Attacking ACLs, Attacking Tokens, Case Studies		
UNIT 6	**Cyber Crimes and Cyber Laws**	**6 HOURS**
Introduction to IT laws Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Pornography,Software Piracy, Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits, and Cyber Security		

PRACTICAL:Perform following experiments using Open source software.		
PRACTICAL NO.01		**6 HOURS**
Setting up The Lab, Installing Kali 2018 As a Virtual Machine Installing Metasploitable As a Virtual Machine		

PRACTICAL NO.02		**6 HOURS**
Network Penetration Testing Connecting a Wireless Adapter To Kali		

PRACTICAL NO.03		**6 HOURS**
Network Penetration Testing - Pre Connection Attacks: Packet Sniffing Basics Using Airodump-ng, Creating a Fake Access Point (Honeypot) – Practical		

PRACTICAL NO.04		**4 HOURS**
Kali linux Information gathering practical: Server Location Finder- Recon-ng		

PRACTICAL NO.05		**4 HOURS**
Kali linux vulnerability analysis practical: Golimero Practicalm lynis practical, nikto practical		

TEXT BOOK:

1.An Unofficial guide to ethical Hacking, 2nd edition, by Ankit Fadia, Macmillan publishers, ISBN 1403-92964-5

2.Hacking Web Applications Exposed, Second Edition by Joel Scambray, Mike Shema, Caleb Sima, TATA McGraw hill edition, ISBN 0-07-061980-8

3.Hacking Exposed, 4th Edition by Stuart McClure, Joel Scambray, George Kurtz, TATA McGraw hill edition,ISBN 0-07-059696-4

REFERENCE

1.CEH Certified Ethical Hacker All-in-One Exam Guide 1st Edition, byMatt WalkerISBN-13: 978-0071772297

2.“Gray Hat Hacking: The Ethical Hackers Handbook, 3rd Edition” by Allen Harper and Shon Harris

3.“The Unrevealed Secrets of Hacking and Cracking – Hack Before You Get Cracked” by Prateek-Shukla and NavneetMehra

4.“How to Unblock Everything on the Internet” by AnkitFadia

5.Ethical Hacking and Network Defence by Michale Simpson, Cengage Learning, ISBN 978-81-315-0748-3

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Big Data Analytics Framework
	COURSE CODE	CS421
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	-	25	125

PRE-REQUISITE : 1. CS331. Predictive Analytics

COURSE OBJECTIVES :

CS421.CEO.1:To optimize business decisions and create competitive advantage with Big Data analytics

CS421.CEO.2:To introduce Java concepts required for developing map reduce programs

CS421.CEO.3:To derive business benefit from unstructured data

CS421.CEO.4:To impart the architectural concepts of Hadoop and introducing map reduce paradigm

CS421.CEO.5:To introduce programming tools PIG HIVE in Hadoop echo system

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS421.CO.1:Prepare for data summarization, query, and analysis.

CS421.CO.2:Apply data modeling techniques to large data sets.

CS421.CO.3:Create applications for Big Data analytics.

CS421.CO.4:Build a complete business data analytic solution

THEORY COURSE CONTENT		
UNIT 1	**Introduction To Big Data And Hadoop**	**6 HOURS**

App/System/Case Study:
Library Management Case Study

Contents:
Types of Digital Data, Introduction to Big Data, Big Data Analytics, , Apache Hadoop Features , Hadoop Echo System, Hadoop 2.x core components , Analysing Data with Hadoop, Hadoop Streaming

Self-study: Security of Hadoop

Further Reading: Hadoop Security Architecture

UNIT 2	**HDFS(Hadoop Distributed File System)**	**8 HOURS**

App/System/Case Study:
Library Case Study

Contents:
The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

Self-study: Performance Evaluation in HDFS

Further reading: HDFS architecture in cloud computing

UNIT 3	**Map Reduce Framework**	**6 HOURS**

App/System/Case Study:
Library Case Study

Contents:
Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features. MapReduce Use Cases. Input Splits, Relation between Input Splits and HDFS Blocks Combiner Partitioner

Self-study: Map reduce for desktop Grid Computing

Further reading: Map reduce in Cloud Computing

UNIT 4	Hadoop Eco System – Pig	8 HOURS

App/System/Case Study:
Library Case Study

Contents:
Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, User Defined Functions, Data Processing operators, Pig Data Types , Shell and Utility Commands Pig Latin : Relational Operators, File Loaders, Group Operator, COGROUP Operator, Joins and COGROUP Union, Diagnostic Operators, Specialized joins in Pig , Built In Functions (Eval Function, Load and Store Functions, Math function, String Function, Date Function, Pig UDF, Piggybank, Parameter Substitution (PIG macros and Pig Parameter substitution) Aviation use case in PIG, Pig Demo on Healthcare Data set

Self-study: Data Analysis using Pig

Further reading: Crime Data Analysis using Pig

UNIT 5	Hive and HBase	6 HOURS

App/System/Case Study:
Library Case Study

Contents:
Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : Introduction to NoSQL Databases and HBase ,HBasics, Concepts, Clients, Example, Hbase Versus RDBMS, HBase Data Model, HBase Shell, HBase Client API

Self-study: Difference in Pig and Hive

Further reading: MapR Hadoop Hive

UNIT 6	Spark Framework and Scala	6 HOURS

App/System/Case Study:
Library Case Study

Contents:
Introduction, components of spark, Resilient distributed databases(RDD), Spark core programming concepts, compilation and execution of spark program. Introduction to Scala ,bAsic Programming Constructs of Scala , Running the Average Friends by Age Example, Filtering RDD's, and the Minimum Temperature by Location Example, Running the Minimum Temperature Example, and Modifying it for Maximum , Counting Word Occurrences using Flatmap() , Improving the Word Count Script with Regular Expressions, Sorting the Word Count Results

Self-study: Hadoop Mapreduce Vs Apache Spark

Further reading: Mobile big data analysis using Apache Spark

PRACTICAL		
PRACTICAL NO.01		**8 HOURS**
Install the Hadoop Distribution of Cloudera (http://www.cloudera.com/hadoop/) in Pseudo-Distributed Mode or use the VMWare Image provided by Cloudera to familiarize yourself with Hadoop, especially with the distributed file system HDFS and the implementation of MapReduce programs in Java. For the following tasks use the file 'twain.txt' as input which contains a collection of the works of Mark Twain. You will find the file on the course website. *a)* Implement a MapReduce program that outputs all words of the input in a sorted order. Your program should not distinguish between upper and lower case and duplicates should be preserved. Example: From *{*To be or not to be*}* into *{*be be not or to to*}* b) Extend your program from part (a) such that every word occurs only once in the output together with the corresponding frequency of the word. Your program should not distinguish between upper and lower case. Example: From To be or not to be to (be,2) (not,1) (or,1) (to,2) c) Extend your word count implementation from part (b) with an additional Combiner. Therefore you should familiarize yourself with the function of a Combiner and think about how to usefully integrate a Combiner into your implementation. Characterize advantages and disadvantages of a Combiner. d) Implement a MapReduce program that computes the inverted index for the given input, i.e. for every word in the input it should output a list of (byte) offsets. The offset should be the byte offset of the row that contains the word. However, typical stop words should not be part of the index. Stop words are frequently occuring words like 'and' that do not have a substantial relevance. You can find a list of typical english stop words in the file 'english.stop.txt' from the course website.		
PRACTICAL NO.02		**8 HOURS**
Pig Exercise: Using the census data (path), compute the number of records for each state.		
PRACTICAL NO.03		**6 HOURS**
HIVE DDL AND DML Description We will be creating several hive tables using different file formats, delimiters and partitioning strategy. Also we will be loading data into these hive tables Data Location HDFS – /public/retail_db Local – /data/retail_db To get data types visit mysql database retail_db using user retail_dba Problem Statement- Make sure you have 2 databases with your OS User name and then stage and final as suffix Example: ujjwal_stage, ujjwal_final ujjwal_stage – Create external tables in ujjwal_stage pointing to HDFS location /public/retail_db ujjwal_stage – Make sure at least one table point to different location and use load command to load data from local file system into the hive table ujjwal_final – Create all 6 tables in hive as managed tables, delimiter is vertical line. Also use gzip compression while storing the data. Also create 2 additional tables for orders and order_items where both tables are bucketed by order_id. Create another table for orders where data is partitioned by order_month.		

PRACTICAL NO.04		6 HOURS

Apache Spark Programming Exercise :Twitter Analysis using Spark
- Find all the tweets by user
- Find how many tweets each user has
- Find all the persons mentioned on tweets
- Count how many times each person is mentioned
- Find the 10 most mentioned persons
- Find all the hashtags mentioned on a tweet
- Count how many times each hashtag is mentioned
- Find the 10 most popular Hashtags

TEXT BOOK

1.Big Data, Black Book(covers Hadoop 2, Mapreduce, Hive, Yarn, Pig, R And Data Visualization), Black Book, Dreamtech Publication.

REFERENCE BOOK

1. Tom White, "Hadoop: The Definitive Guide", O'reilly Publication.
2. Alan Gates, "Programming Pig: Dataflow Scripting with Hadoop", O'reilly Publication.
3. Stefano Baghino, Andrea Bessi, Bertrand Bossy, "Scala and Spark for Big Data Analytics", Packt Publishing.
4. Bill Chambers, "Spark: The Definitive Guide: Big Data Processing Made Simple", O'reilly Publication.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2019 – 2023)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Deep Learning
	COURSE CODE	CS422
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	-	50	150

PRE-REQUISITE : CS 312 Artificial Intelligence and Neural Network, CS 332 Machine Learning .

COURSE OBJECTIVES :

CS422.CEO.1:To present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data.

CS422.CEO.2:To learn the fundamentals of deep learning, and the main research activities in this field.

CS422.CEO.3:To learn implementation, training, and validation of neural network.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS422.CO.1:Illustrate the fundamentals of deep learning neural network.

CS422.CO.2:Identify various strategies for deep neural network model.

CS422.CO.3:Classify different data set using convolutional neural network.

CS422.CO.4:Examine the sequence modelling using different algorithms.

CS422.CO.5:Interpret deep learning concepts in real time applications.

CS422.CO.6:Explain the working of deep reinforcement learning model

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**8 HOURS**
App/System/Case study: Classification of Dogs. **Content:** Linear Algebra, Probability and Information Theory, Numerical Computation, Machine Learning Basics, Basics of Deep learning, Trends in deep learning, Deep learning vs Machine learning.		
UNIT 2	**Designing & Optimizing Deep Neural Network Model**	**6 HOURS**
App/System/Case study: House Prediction **Content:** Distribution of data set, Error Analysis, Bias and Variance, Data Augmentation Modern Deep Networks, Regularization for Deep Learning, Optimization for Training Deep Models, Deep Feed forward Networks		
UNIT 3	**Convolutional Neural Network**	**8 HOURS**
App/System/Case study: Cancer Detection. **Content:** Introduction to CNNs, CNN architecture Variability models, Properties of CNN representation, Covariance / invariance, Kernel filter, Principles behind CNNs, Multiple Filters, CNN applications.		
UNIT 4	**Sequence Modelling**	**8 HOURS**
App/System/Case study: Speech Recognition **Content:** Introduction to Dynamical systems: RNNs, Unfolded RNNs, Recurrent Neural network, Bidirectional RNNs, Encoder Decoder Sequence to sequence architecture, Basics of Recursive neural network and Long Short-Term Memory Network(LSTM), RNN applications.		
UNIT 5	**Deep Learning applications**	**6 HOURS**
App/System/Case study: Generate Faces, Text summarization, classification of images and Activity detection. **Contents:** Image Processing, Natural Language Processing, Speech Recognition, Video Analytics Self Study: Healthcare Application		
UNIT 6	**Deep Reinforcement Learning**	**6 HOURS**
App/System/Case study: Quad copter to Fly, Game and Robotics **Content:** Introduction to Deep Reinforcement Learning, Domain Selection for Reinforcement Learning, State-Action Pairs Complex Probability Distributions of Reward, Neural Networks and Deep Reinforcement Learning, Hierarchical RL, Multi-agent RL, Relational RL.		

PRACTICAL:Perform following experiments using Open source tools		
PRACTICAL NO.1		**4 HOURS**
Implement back propagation algorithm to train a neural network in Python.(Gradient Descent)		
PRACTICAL NO.2		**6 HOURS**
Implement and train a deep convolutional neural network in Tensorflow.		
PRACTICAL NO.3		**6 HOURS**
Implement simple audio recognition using RNN(tensorflow)		
PRACTICAL NO.4		**6 HOURS**
Keras and Tensorflow–Implement Applications of deep Learning to NLP		
PRACTICAL NO.5		**6 HOURS**
Keras and Tensorflow - Implement Applications of Deep Learning with Computer Vision		
MINI PROJECT		**10 HOURS**
The Course Mini Project work will be started in Semester VII. The work of the mini projects will be starting at beginning of term in alignment with laboratory assignments. It may be done by a groups of 3 students. However if project is done in groups, each student will be given a responsibility for a distinct module and the progress of individual modules is independent of others and performance of individual modules will be tracked periodically. The final evaluation will be done at the end of term through presentation, project demonstration and report.		

TEXT BOOK

1. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MIT Press book in preparation. (2015).
2. Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends in Machine Learning 2.1 (2009): 1127.

REFERENCE BOOK

1. Sutskever, Ilya, OriolVinyals, and Quoc V. Le. "Sequence to sequence learning with neural networks." Advances in neural information processing systems. 2014.
2. Kalchbrenner, Nal, EdwardGrefenstette, and Phil Blunsom. "A convolutional neural network for modelling sentences." ACL(2014).

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Sociology
	COURSE CODE	HP402
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP402.CEO.1:The course focuses on the society in India with an attempt to acquaint students with sociology as a social science and the distinctiveness as a social science.

HP402.CEO.2:It displays the relevance and significance of sociology in understanding the society and in attempting to solve its problems.

HP402.CEO.3:Many of the Sociological Changes are an answer to the age-old social norms and practices giving rise to a solution which is critical to social issues and problems.

HP402.CEO.4:The course sensitizes students to the emerging social issues and enables them to acquire sociological understanding of these issues with an ability to answer the problems.

HP402.CEO.5:Projects in Sociology are tools that facilitate the construction of knowledge in imparting the right attitude towards social issues .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP402.CO.1:Get acquainted to sociology as a social science.

HP402.CO.2:Explain the significance of sociology in solving problems.

HP402.CO.3:Derive solutions to critical social issues.

HP402.CO.4:Change their attitude towards social issues.

THEORY		
UNIT 1	**Introduction to Sociology**	**6 HOURS**
The nature of Sociology, meaning of Sociology: Origin, Definition, Scope, Culture, meaning, components, beliefs, values, norms, technology, diversity, towards a global culture.		
UNIT 2	**Sociolization**	**5 HOURS**
Socialization, Agents of Socialization, Heredity and Environment, Group, Social structure, Status and role, family, school, peer group, media, adult socialization, resocialization, Role of Social moments, Illustrations: Women, Tribal & Dalit Movements . **Further Reading:**		
UNIT 3	**Nature and factors of Social Change**	**5 HOURS**
Change: Meaning. Nature and factors of Social Change: Biological Factors. Demographic Factors, Technological Factors, Economic Factors Cultural Factors, Info-tech factors, Meaning of Gender sensitization, Discrimination, violence and Abuse. **Further Reading:**		
UNIT 4	**Visions of Social Change in India**	**4 HOURS**
Idea of development planning and mixed economy, Constitution, law and social change, Education and **social change.** **Further Reading:**		
UNIT 5	**Works and Economic Life**	**4 HOURS**
Social organization of work in different types of society- slave society, feudal society, industrial /capitalist society. Formal and informal organization of work. Labour and society. **Further Reading:**		
UNIT 6	**Introduction to Applied sociology**	**4 HOURS**
The use of Sociology: Introduction to applied Sociology-Sociology and social problems, Ecology and Environment: Pollution, Global warming and Greenhouse effect. Impact of Industrialization and Urbanization on Environment.		

REFERENCE BOOKS

1. T.B. Bottomore, Sociology: A Guide to Problems and Literature, Blackie and Sons Publishers, 1978, ISBN:978-0043000267
2. Sociology: A guide to problems and literature. Bombay: George Allen and Unwin (India): Harlambos, M.1998. ISBN: 978-0043000267
3. Sociology: Themes and perspectives. New Delhi Oxford University Press.: Inkeles, Alex, 1987
4. What is Sociology, Madras: Macmillan, India: Johnson, Harry M. 1995.
5. Sociology: A Systematic Introduction. New Delhi, Allied Publishers. ISBN: 978-8170231370 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Bussiness Strategies
	COURSE CODE	HP403
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : HP303 : Basics of Entrepreneurship

COURSE OBJECTIVES :

HP403.CEO.1:To understand the importance of growth and to be able to chart a path towards growth.
HP403.CEO.2:To revisit your business model
HP403.CEO.3:To give a growth orientation your customer acquisition, operations, revenue and sales strategy
HP403.CEO.4:To list and comply with the requirements relating to regulatory compliance
HP403.CEO.5:To be able to effectively pitch your venture to potential stakeholders .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP403.CO.1:Rephrase business model and Identify additional customer segments
HP403.CO.2:Identify channels and strategy for budgeting and planning.
HP403.CO.3:Make use of Legal aspect, Mentors, Advisors, and Experts in startups
HP403.CO.4:Analyze the growing revenues, sales planning, strengthening sales, improving margins
HP403.CO.5:Estimate customer lifetime value, competitor and peer's financial models for venture growth
HP403.CO.6:Formulate the all procedure for new venture ; Product market fit and A Pitch Deck

PRACTICALS:		
PRACTICAL NO.01	**Orientation to Growth**	**3 HOURS**
Getting Ready for Growth Why growth stage is different compared to startup phase, Why Product-Market fit is not enough, Case study, To assess readiness for growth, To chart a growth path .		
PRACTICAL NO.02	**Customers**	**3 HOURS**
Expanding Customer Base Revisit your business model and develop few variants (more business model types). Identify additional customer segments that your solution can address. Evaluate business models for the new customer segments. Relook at the Problem Statement (can you expand the scope and scalability of your business by repositioning your problem statement?) Explore additional ways to monetize.		
PRACTICAL NO.03	**Traction**	**12 HOURS**
Scaling How to gain traction beyond early customers. Defining traction (in quantifiable terms) and identifying the most important metrics to measure traction. Calculate cost of new customer acquisition. Estimate your customer lifetime value (LTV). Identifying waste in your operations and focusing your team on what is important for traction. **Channels and Strategies** The Bulls eye framework, Identify Channels using Bulls Eye Framework, Measuring the effectiveness of selected channels, Budgeting and planning.		
PRACTICAL NO.04	**Money**	**20 HOURS**
Growing Revenues. Stabilizing key revenue streams. Developing additional revenue streams (licensing, franchising). Exploring new channels and partnerships. Sales Planning. Understanding why customers buy and how buying decisions are made; Listening skills. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale. Strengthening Sales. Building a professional sales team. Sales compensation and incentives. Sales planning, setting targets Improving Margins. Testing price elasticity. Optimizing costs and operational expenses. Advanced concepts of unit costing. Financial Modeling. Financial modeling of your venture's growth. Analyzing competitor and peer's financial models.		
PRACTICAL NO.05	**Support**	**5 HOURS**
Legal Overview of legal issues and their impact on entrepreneurs. Importance of getting professional help (legal and accounting). Importance of being compliant and keeping proper documentation. Patents and Intellectual property. Trademarks. Mentors, Advisors, and Experts. The importance of a Mentor and how to find one. Role of business advisors and experts for specific targets in your growth plan.		
PRACTICAL NO.06	**Capstone Project: Pitch Your Venture**	**2 HOURS**

REFERENCE BOOKS

1. Zero to One: Note on Start Ups, or How to Build the Future, Peter Thiel and Blake Masters, Virgin Books,ISBN: 9780753555194
2. 2.Tools of Titans: The Tactics, Routines, and Habits of Billionaires, Icons, and World-Class Per-
3. formers, Timothy Ferriss, Random House,ISBN: 9781785041273.
4. 3.Disrupted: My Misadventure in the Start-Up Bubble, Dan Lyons, Penguin Publishers, ISBN:
5. 9781786491022
5. Grit: The Power of Passion and Perseverance, Angela Duckworth, Vermilion Publishing,ISBN: 9781785040207
6. Big Magic: Creative Living 4BEyond Fear, Elizabeth Gillbert, Penguin Publishers,ISBN: 9781408886182
7. Pivot: The Only Move That Matters Is Your Next One, Jernny Blake, Random House,ISBN: 9780241975466
8. Financial Management; Text and Problems, 7th Ed., A Khan and P. K. Jain, TataMacGraw Hill, ISBN: 9789353162184
9. Financial Management; Theory and Practice, 4th Ed., Prasanna Chandra, TataMacGraw Hill, ISBN: 9789339222574
10. Kites in a Hurricane: Startups from Cradle to Fame, Rishi Kapal, SAGE Publishing, ISBN: 9789352807895
11. Wadhwani Foundation Advanced Course in Entrepreneurship

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Software Skill Development Lab
	COURSE CODE	CS402
	COURSE CREDITS	2
RELEASED DATE : 01/01/2019	REVISION NO	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
--	4	--	--	--	--	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS402.CEO.1: Plan Extraction, transformation, scraping, joining and cleaning of large data sets

CS402.CEO.2: Analyse large data sets to bring out insights to solve business problems.

CS402.CEO.3: Make use of machine learning libraries and apply established machine learning algorithms classes of programming problems.

CS402.CEO.4: Utilize Machine learning concepts in Python using problem solving approach by working on real time cases and in class programming assignments.

CS402.CEO.5: Develop code in support of Machine learning solutions in Python.

CS402.CEO.6: Evaluate and debug various learning algorithms.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS402.CO.1: Apply python to build various machine learning application.

CS402.CO.2: Interpret the fundamental issues and challenges of machine learning: data, model selection, model complexity.

CS402.CO.3: Identify the strengths and weaknesses of many popular machine learning approaches.

CS402.CO.4: Analyze the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

CS402.CO.5: Design and implement various machine learning algorithms in a range of real-world applications.

Guidelines for Laboratory Conduction :

The assignments to be framed by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, instructor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed .The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module	**Python and Machine Learning**	**36 HOURS**

Prerequisite: Python

Course Content

Understanding Data Analytics, Importance of data in business, Data analytics ecosystem, Basis of Python programming, Basics of Python, Variables and Operators, Data types, Lists, Dictio- nary and Functions, Programming in Python, Introduction to Machine learning, python Libraries, Numpy, Scikit, Pandas, Matplotlib, Data Visualization, Supervised learning, Linear Regression, Logistic Regression, Decision Tree, Naive Bayes, K Nearest Neighbor, Random Forest, Dimension- ality Reduction, Gradient Boosting algorithms, Support Vector Machine, Unsupervised learning, Clustering techniques – K means clustering , Association Rule Learning, Natural Language Processing

Benefits: 1.Placement Opportunities

PRACTICAL List		
Practical No.01		**4 HOURS**
Perform data processing and cleaning of dataset using Python.		
Practical No.02		**4 HOURS**
Create a machine learning model using Linear Regression (Example : Salary Prediction).		
Practical No.03		**4 HOURS**
Create a machine learning model using multiple linear regression (Example : Flight elay Data For July 2014.		
Practical No.04		**4 HOURS**
Create a machine learning model using Decision Tree (Example : Position of an Employee as per salary).		
Practical No.05		**4 HOURS**
Create a machine learning model using K Means Clustering Algorithm.		
Practical No.06		**4 HOURS**
Create a machine learning model using Market Basket analysis.		
Practical No.07		**4 HOURS**
Create a natural language processing model (Example : Customer purchasing). m		

Mini Project		**8 HOURS**
Note: Data sets should be real time data sets like heart disease, Airline, etc.		

REFERENCE

1. Daniel Nedal, "Python Machine Learning from Scratch", AI Sciences paperback edition 2016, ISBN-13: 9781720649496
2. Chris Albon, "Machine Learning with Python Codebook", O'REILLY Paperback, 2018, ISBN-13: 1491989388

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	AY: 2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Advanced Software Skill Development Lab
	COURSE CODE	CS403
	COURSE CREDITS	2
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME		**EVALUATION SCHEME :**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
–	4	–	–	–	–	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS403.CEO.1:To play role of Business Intelligent Analyst and Data Scientist in Data Analytics Life Cycle.
CS403.CEO.2:To acquire the skills of Analytics in R Programming.
CS403.CEO.3:To perform graphical analysis using Data Visualization tools and techniques.
CS403.CEO.4:To perform analytics for improvement of Business Process.
CS403.CEO.5:To implement application using IDLE tools..

COURSE OUTCOMES :

~~The students after completion of the course will be able to,~~

CS403.CO1:Perform the analytics in R on real time data sets.
CS403.CO2:Analyze the real time data with graphical visualization.
CS403.CO3:Generate the different types of analytics reports.
CS403.CO4:Develop the models using analytics for BI Process.
CS403.CO5:Test and validate developed prototype against the original requirements of the problem.
CS403.CO6:Use Tableau Visualization effectively for Data Analytics..

Guidelines for Laboratory Conduction

The assignments to be framed by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, instructor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed. The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module: R Programming

Prerequisite: Database Management System

Industry Expert: Ms. Shobha Mourya

Course Instructor: Ms. Shobha Mourya Mr.Jayvant Devare

Course Content

Basics of R Programming: Installation, Reading and Getting Data into R, Constructing Data Objects, Data: Descriptive Statistics and Tabulation, Data: Distribution, Simple Hypothesis Testing, Introduction to Graphical Analysis, Formula Notation and Complex Statistics, Manipulating Data and Extracting Components, Regression model, Advanced Graphs, Writing your scripts in R, Introduction of data science, Visualization, Introduction to Tableau, Navigating Tableau, Advanced Data Mining With Tableau, Creating bins Visualizing distributions, Modeling.

Beneftts:

1. Dell EMC Certification (optional)
2. Placement Opportunities.

PRACTICAL List		
Practical No.01		**4 HOURS**
Installing and loading R packages, set/get working directory.		
Practical No.02		**4 HOURS**
Import datasets using readr package and explore datasets using dplyr functions.		
Practical No.03		**4 HOURS**
Creating subsets from datasets using filter conditions.		
Practical No.04		**4 HOURS**
Creating new variables using mutate.		
Practical No.05		**4 HOURS**
Analyzing factor variables using frequency and contingency table.		
Practical No.06		**4 HOURS**
Analyzing numeric variables using summary command.		
Practical No.07		**4 HOURS**
Visualization using ggplot2 package for Bivariate, Univariate and Multi-variate plots..		
Practical No.08		**4 HOURS**
Understanding ggplot layers for plotting graphs.		
Practical No.09		**4 HOURS**
Scatter plot, Histogram, Bar chart, Density Plot, Faceting and Scaling.		
Practical No.10		**4 HOURS**
Importing and exploring Titanic dataset.		
Practical No.11		**4 HOURS**
Data wrangling for Titanic case study.		
Practical No.12		**4 HOURS**
Feature engineering for Titanic case study.		
Mini Project :		**8 HOURS**
Note: Data sets should be real time data sets like heart disease, Airline, etc.		

REFERENCES

1. Mark Gardener, "Beginning R: The Statistical Programming Language", Wiley paperback edition 2013, ISBN: 978-1-118-16430-3.
2. Ohri, "R for Business Analytics", Springer, 2012, ISBN: 978-1-4614-4342-1.
3. Ashutosh Nandeshwar, "Tableau Data Visualization Codebook", Packt publishers, ISBN : 978-1-849-68-978-6.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Advanced Software Skill Development Lab
	COURSE CODE	CS404
	COURSE CREDITS	2
RELEASED DATE : 01/01/2019	**REVISION NO**	1.0

TEACHING SCHEME		**EVALUATION SCHEME :**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
–	4	–	–	–	–	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges

COURSE OBJECTIVES :

CS404.CEO.1:To play role of Web developer.
CS404.CEO.2:To acquire the skills of Advanced Java.
CS404.CEO.3:To implement application using IDLE tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS404.CO1:Identify advance concepts of java programming Servlet and JSP.
CS404.CO2:Design and develop platform independent applications using a variety of component based frameworks
CS404.CO3:Able to implement the concepts of Hibernate EJB for building enterprise applications.

Guidelines for Laboratory Conduction

The assignments to be framed by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, instructor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed. The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module	**Advanced JAVA**	**36 HOURS**

Prerequisite: CPP

Industry Expert: Mr. TusharKute

Course Instructor: Mr. TusharKute

Course Content

Basics of Servlets: ServletRequest, Servlet Collaboration, ServletConfig, ServletContext, Attribute, Session Tracking, Event and Listener, Filter, ServletInputStream and ServletOutputStream, Annotation Servlet

Basics of JSP: Scripting elements, Implicit Objects, Directive Elements, Exception Handling, Action Elements, Expression Language, MVC in JSP, JSTL, Custom tags, JavaMail API,

Java Server Faces2.0 Introduction to JSF, JSF request processing Life cycle, JSF Expression Language, JSF Standard Component, JSF Facelets Tag, JSF Convertor Tag, JSF Validation Tag, JSF Event Handling and Database Access, JSF Libraries: PrimeFaces

Basics of Struts2: Core Components, Struts 2 Architecture, Struts2 Action, Struts2 Configuration, Interceptors, Struts 2 Validation, Hibernate with Struts2, Spring with Struts2

Introduction to JavaEE : Introduction to EJB3, Developing Session Beans, Using Dependency Injection, JMS, Message Driven Beans, Persistence Introduction to JPA

Benefits:

1. Placement Opportunities.
2. Project

PRACTICAL List		
Practical No.01		**4 HOURS**
Write a program using Servlet to display Visitor Count.		
Practical No.02		**4 HOURS**
Write a program for authentication, which validate the login-id and password by the servlet code.		
Practical No.03		**4 HOURS**
Write a program to read data send by the client (HTML page) using servlet.		
Practical No.04		**4 HOURS**
Write a program to read data send by a client (HTML page) using JSP		
Practical No.05		**4 HOURS**
Create an Enterprise application using Session Bean (Stateless) which convert the amount from Dollar to Rupees.		
Practical No.06		**4 HOURS**
Write a Entity bean to find a student record in student data base using primary key property.		
Practical No.07		**4 HOURS**
Write program to demonstrate Java Server Faces		
Practical No.08		**4 HOURS**
Write program to demonstrate Java Server Faces – event handling		
Practical No.09		**4 HOURS**
Write program to demonstrate EJB2		
Practical No.10		**4 HOURS**
Write program to demonstrate Struts2 and Spring		
Practical No.11		**4 HOURS**
Write a program to query record based on primary key using Hibernate.		
Practical No.12		**4 HOURS**
Write a program using Hibernate to develop classes and Hibernate configuration to persist an EventManager application. The classes in EventManager are		
Mini Project :		**8 HOURS**
Note: Mini Project Group of 2-3 students		

REFERENCES

1. Kogent Learning Solutions,"JAVA Server Programming JAVA EE7",DreamTech paperback edition 2014, ISBN: 978-1-118-16430-3.
2. Hans Bergsten, "Java Server Pages", Oreilly, 2012, ISBN: 978-1565927469.
3. Kahy Sierra, Bert Bates, "Head First EJB", Oreilly, Paperback 2017, ISBN : 978-8173665264

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Major Project - I
	COURSE CODE	CS405
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TERMWORK	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
-	8	–	–	–	100	50	150

PRE-REQUISITE :

1. CS213 : Minor Project
2. CS324 : Mini Project

COURSE OBJECTIVES :

CS405.CEO.1:To implement the idea/ real time industrial problem/ current application from engineering domain

CS405.CEO.2:To evaluate an alternative approaches and justify the use of selected tools and methods

CS405.CEO.3:To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.

CS405.CEO.4:To understand the roles and responsibility, accountability and learn team work ethics

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS405.CO1:Solve real life problems by applying the knowledge and problem solving ability.

CS405.CO2:Analyze alternative approaches, find feasible solution and apply most appropriate one.

CS405.CO3:Use standard engineering tools and processes for analysis, design, simulation, testing, Implementation and deployment of idea into practice.

CS405.CO4:Participate effectively in multidisciplinary and heterogeneous teams exhibiting team work, inter-personal Relationship, conflict management and leadership quality.

PREAMBLE:

objective of this Major Project-I course is to understand the Product Development through team work. The students will able to shoulder the roles and responsibility and activity distribution amongst them. The students will learn designing, budgeting, planning, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards while developing the application/ product. The students will deliver a presentation on the advancement in Technology pertaining to the selected project topic and able to understand importance of document design and professional ethics.

GUIDELINES:

Project work stage –I is an integral part of Project work. In this, the student shall complete the partial work of project, consist of problem statement, literature survey, Project specification and planning. The students expected to complete the project at least up to the design phase. As a part of project phase-I, candidate shall appear for two reviews and delivered the presentation on the advancement of selected project topic. The student shall submit the duly certified project report in standard format for satisfactory completion of work by the concern Advisor and Dean of the School.

The examinee will be assessed by panel of examiner of which one is necessarily as a external examiner. The assessment will be broadly based on work undergone, content delivery, presentation skills, documentation, question answer and report.

Preparation of the Literature survey paper and communicating and publishing in relevant publishing agency agency is recommended. Bonus 10 marks will be awarded.

Follow the guideline and formats as mentioned in guideline document Annexure-I.)

TIMELINE

1. Formation of Project Group: 2 Weeks (1st ,2nd week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (3rd, 4th week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (7th, 8th week)
4. Preparation of Project Progress Report – I (week 9th and 10th)
5. Project Phase-I Evaluation by external examiner (End Semester by 12th, 13th week)

ASSESSMENT

1. Internal Assessment (TW)

a. Project Review -1 Project Approval -30 Marks
b. Project Review -2 Analysis and Design- -30 Marks
c. Project Review -3 Project progress Report-I and Presentation - 40 Marks
d. Paper publication/IPR -10 marks (Bonus)

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks
b. Project design / execution / demonstration : 20 Marks
c. Project Report preparation and documentation: 15 Marks

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Human Computer Interactions
	COURSE CODE	CS431
	COURSE CREDITS	4
RELEASED DATE : 1/1/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	–	50	100

PRE-REQUISITE :

1.IT201 Engineering Informatics

2.CS301 Operating System

COURSE OBJECTIVES :

CS431.CEO.1:To apply the foundations of Human Computer Interaction.

CS431.CEO.2:To Understand the design technologies for individuals and persons with disabilities.

CS431.CEO.3:To apply the guidelines for user interface.

COURSE OUTCOMES :

The students after completion of the course will be able to

CS431.CO.1:Design effective dialog for HCI.

CS431.CO.2:Design effective HCI for individuals and persons with disabilities.

CS431.CO.3:Understand the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.

CS431.CO.4:Develop meaningful user interface.

THEORY COURSE CONTENT		
UNIT 1	**Foundation of HCI**	**8 HOURS**
App/System/Case study: Automatic syringe: setting the dose to 1372. The effect of one key slip before and after user involvement **Content**: Why Human Computer Interaction, What is HCI,Design focus:Human input output channels, Skill acquisition, Design Focus: Machine I/O Channels and Skill acquisition, limitations of interactive performance, models of interactions **Self-Study:** Psychology and the design of Interactive systems		
UNIT 2	**Framework and HCI**	**8 HOURS**
App/System/Case study: ATM machine **Content:** Ergonomics, Interaction Styles, Interactivity, Context of Interaction, HCI Paradigm: Time sharing, video display unit, programming tool kits, Personal computing, The metaphor, sensor based and context aware interfaces **Self-Study:** Ubiquitous Computing **Further Reading:** Agent based Interfaces		
UNIT 3	**Design Process**	**8 HOURS**
App/System/Case study: Product prototype development **Content:** What is Design, Process of Design, User focus, Scenarios, Navigation Design, Screen design and layout, HCI in software process: interactive systems and SDLC, Design rules: golden rules and Heuristics, HCI pattern **Self-Study:** Interactive design and Prototyping **Further Reading:** Design rationale		

UNIT 4	Evaluation and Support	8 HOURS

App/System/Case study:
application development for users with disabilities

Content:
Implementation Support, UI management system, Evaluation Techniques: Goals, evaluation through experts, model based evaluation, user participation in evaluation, universal design: design principles, multimodal interactions: sound, touch, handwriting, gesture,

Self-Study: Heuristic evaluation

Further Reading: User support

UNIT 5	Models and Theories	8 HOURS

App/System/Case study:
Mobile User Interfaces

Content:
Cognitive model: model theory, linguistic models, Physical and device models, Communication and Collaborative models: face to face model, Text based model

Self-Study: Computer Mediated Communication

Further Reading: Modeling Rich Interactions

PRACTICAL:: Perform following experiments using Open source tools

Note: Following are the reference case studies, can be changed with other appropriate examples with same level.

PRACTICAL NO.1	Mini Project	22 Hrs
	1. Students need to work on user requirements, UI requirements	**04**
	2. Work on ergonomics and context interaction	**04**
	3. Development of prototype	**10**
	4. Evaluation of all sort of interfaces used in the project	**04**

TEXT BOOK

1. Alan Dix, Janet Finlay" Human Computer Interaction" 3rd Edition, Pearson publication, ISBN 0130461091

REFERENCE BOOK

1. Kent Norman, JurekKirakowski "Handbook of Human Computer Interaction" Wiley Publication, ISBN 9781118976135
2. Helen Sharp, Jenifer Preece" Interaction Design beyond Human Computer Interaction" 5th Edition, ISBN 978-1119547259

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Distributed System
	COURSE CODE	CS 441
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EVALUATION SCHEME**						
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION		TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA				
3		30	40	30			-	100

PRE-REQUISITE: :

1. CS301- Operating System
2. CS323-Computer Network

COURSE OBJECTIVES :

CS441.CEO.1:To Understand design issues of distributed system.

CS441.CEO.2:To Analyze algorithm for communication, security and synchronization in distributed system.

CS441.CEO.3:To Provide an exposure to commercial distributed applications / tools / technologies.

COURSE OUTCOMES :

After completion of the course, the students will be able to,

CS441.CO1:Classify distributed system models and architectures.

CS441.CO2:Explain design issues of distributed system.

CS441.CO3:Design distributed applications using distributed communication models.

CS441.CO4:Analyze different algorithms for concurrency and synchronization of distributed system.

CS441.CO5:Analyze the performance of distributed system based on fault tolerance, security, scalability.

THEORY		
UNIT 1	**Introduction of Distributed System**	**5 HOURS**
Application/ Case Study/ System: Distributed Reddening in Gaming, Online Gaming **Contents:** Distributed System Definition, Goals, Types, System Architecture, Trends in Distributed Systems **Self-Study:** Amoeba **Further Reading:** CODA		
UNIT 2	**Communication**	**6 HOURS**
Application/ Case Study/ System: SunRPC **Contents:** MPI, Message Oriented Communication, Stream Oriented Communication, Multicast Communication **Self-Study:** JavaRMI **Further Reading:** IBM's Web sphere Message Passing		
UNIT 3	**Synchronization**	**8 HOURS**
Application/ Case Study/ System: Distributed Camera System **Contents:** Clock Synchronization-Physical Clock, Clock Synchronization Logical Clock- lamport, Vector, Mutual Exclusion, Election Algorithm, Consensus and Agreement Algorithm **Self-Study:** Trace Synchronization **Further Reading:** Paxos		
UNIT 4	**Consistency Replication**	**8 HOURS**
Application/ Case Study/ System: Amazon's Dynamo **Contents:** Need of Replication, Replication as scaling techniques, Data centre consistency model, Client centre consistency model, Consistency Protocol **Self-Study:** Replica Management **Further Reading:** View Stamped Replication.		
UNIT 5	Fault Tolerance	**7 HOURS**
Application/ Case Study/ System: Fault tolerance in RAFT, Zookeeper **Contents:** Faulty System, Failure Models, Failure Techniques, Reliable Client Server Communication, Reliable Group Communication, Distributed Communication, Recovery. **Self-Study:**Fault Tolerance in Spark **Further Reading:** Handling Byzantine Failure		

UNIT 6	Distributed System Security	6 HOURS

Application/ Case Study/ System: Kerberos

Contents:

Design issue of Distributed System, Secure Channels, Access Control, Firewall, Secure Mobile Code, DOS

Self-Study: Secure Management , JINI

Further Reading: Security in Block Chain

TEXT BOOK

1. Andrew.S.Tanenbaum, Maarten Van Steen, Distributed Systems –Principles and Paradigms, Third Edition, Prentice Hall -2016. ISBN-9788120322158.
2. Coulouris, J. Dollimore, and T. Kindberg, Distributed Systems: Concepts and Designs, Fifth Edition, Addison Wesley, 2012.ISBN- 9780132143011.

REFERENCES:

1. Mukesh Singal, Advanced Concepts in operating System, Mcgraw Hill, ISBN-9780070472686.
2. Pradeep K. Sinha," Distributed Operating Systems: Concepts and Design", Prentice Hall India Learning Private Limited , ISBN-978-8120313804.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Ubiquitous Computing
	COURSE CODE	CS442
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	—	30	40	30	–	–	100

PRE-REQUISITE : Human Computer Interaction

COURSE OBJECTIVES :

CS442.CEO.1:To introduce pervasive computing abilities

CS442.CEO.2:To introduce tools and techniques used while solving problems using pervasive computing.

CS442.CEO.3:To study the different application of pervasive computing

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS442.CO.1: Present a survey on pervasive computing building blocks.

CS442.CO.2: Create presentations using pervasive computing techniques and devices.

CS442.CO.3 Demonstrate small applications of pervasive computing

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Ubiquitous Computing**	**7 HOURS**
App/System/Case study: Energy, Healthcare **Content:** Definition, Advantage, Application and Scope., Mobile Computing, Pervasive Computing, Wearable Computing, Modeling the Key Ubiquitous/Pervasive Computing Properties, Mobile Adaptive Computing **Self-Study:** Mobility Management and Caching		
UNIT 2	**Ubiquitous Computing Devices**	**7 HOURS**
App/System/Case study: Healthcare System **Content:** Smart Environment: Users, Mobiles, Cards and Device Networks, Smart Devices: Application and Requirements, Device Technology and Connectivity. **Self-Study:** HCI Application		
UNIT 3	**Human Computer Interaction**	**6 HOURS**
App/System/Case study: Case study on Intensive Care Unit in Hospital **Content:** HCI, User Interface and Interaction for four hand-held widely used devices, Hidden UI via basic smart devices, Hidden UI via wearable and Implanted devices, user models **Self-Study:** Human centered design		

UNIT 4	Wearable Computing	7 HOURS
Content: Glass and Augmented Reality, Eye-Tracking, Digital Pen and Paper Mobile social networking crowd sensing, Event based social network		
UNIT 5	**Security in Ubiquitous Computing**	**6 HOURS**
Content: Energy constraints, Security and Privacy in Pervasive Networks, Experimental Comparison of Collaborative Defense Strategies for Network Security.		

UNIT 6	Challenges and Outlook	4 HOURS
Content: Overview of challenges, smart devices, Smart Interaction, Smart physical environment device interaction, Smart human-device interaction, Human Intelligence versus machine intelligence, social issues. Case Study- Wearable Computing/ Cyber Physical System.		

TEXT BOOK

1. Ubiquitous Computing Fundamentals, John Krumm, CRC Press, 2010
2. Stefan Poslad, Ubiquitous Computing, Smart devices, environment and interaction, Wiley.
3. Frank Adelstein, Sandeep Gupta, Golden Richard III, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, Tata McGraw Hills

REFERENCE BOOK

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Klaus Rindtor, Thomas Schaeck, Pervasive Computing, Pearson, Eighteenth Impression, 2014.
2. BoS Content: Books, Course Notes, Digital contents, Blogs developed by the BoS for bridging the gaps in the syllabus

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Cloud And Virtualization
	COURSE CODE	CS443
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME		**EVALUATION SCHEME :**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	–	30	40	30	–	-	100

PRE-REQUISITE :

1. CS323: Computer Networks
2. CS301: Operating System

COURSE OBJECTIVES :

CS443.CEO.1:To understand cloud computing concepts
CS443.CEO.2:To study various platforms for cloud computing
CS443.CEO.3:To explore the applications based on cloud computing

COURSE OUTCOMES :

The students after completion of the course will be able:

CS443.CO.1:To analyze as a service concept
CS443.CO.2:To use and examine different cloud computing services
CS443.CO.3:To describe importance of virtualization along with their technologies.

THEORY		
UNIT 1	**Fundamentals of Cloud Computing**	**8 HOURS**

App/System/Case study:
Amazon Web Services

Content:
Distinguishing Cloud Types, Deployment Models, Service Models, Scalability, Virtualization, Software as a service (SaaS): understanding multitenant nature, service oriented architecture, Platform as a service (PaaS): Benefits and disadvantages, Infrastructure as a service (IaaS): Improving Performance Through Load Balancing, System and Storage Redundancy, Utilizing Cloud-Based NAS Devices, Advantages of IaaS Solutions, Server Types Within an IaaS Solution

Self Study: Types of Cloud

Further Reading: Services provided by AWS.

UNIT 2	Data Storage in Cloud	8 HOURS

App/System/Case study:
Dropbox

Content:
Examining the Evolution of Network Storage, Understanding Cloud-Based Data Storage, Advantages and Disadvantages of Cloud-Based Data Storage, Getting Past the Fear of Cloud-Based Data, Cloud-Based Backup Systems, Understanding File Systems, Industry-Specific Cloud-Based Data Storage, Cloud-Based Database Solutions, Cloud-Based Block Storage.

Self Study: Amazon S3.

Further Reading: Object and File Storage.

UNIT 3	Collaboration in the cloud	6 HOURS

App/System/Case study:
Google Drive

Content: Collaborating in the Clouds: Questions to Ask About Collaborative Tools, Web-Based Collaboration Began with Web Mail, Instant Messaging, File Sharing, Editing Shared Files Within the Cloud, Collaborating via Web Logs (Blogs), Collaborative Meetings in the Cloud, Virtual Presentations and Lectures, Using Social Media for Collaboration, Using Cloud-Based Calendar Management, Using Streaming Video Content to Collaborate.

Self Study: Netflix

Further Reading: AWS Workdocs

UNIT 4	Virtualization in Cloud	6 HOURS

App/System/Case study:
Virtualbox

Content:
Understanding Virtualization, The History of Virtualization, Leveraging Blade Servers, Server Virtualization, Desktop Virtualization, Desktop Solutions on Demand, Virtual Networks, Data Storage Virtualization, Not All Applications Are Well Suited for Virtualization, Why Virtualize.

Self Study: VMWare Workstation or Player.

Further Reading: KVM.

UNIT 5	Cloud security fundamentals	6 HOURS

App/System/Case study:
CloudMapper

Content:
General Security Advantages of Cloud-Based Solutions, Introducing Business Continuity and Disaster Recovery: Understanding Data Storage Wiping, Understanding Distributed Denial-of-Service (DDoS) Attacks, Packet Sniffing, Man-in-the-Middle Attack, Monitoring Device Screens, Malicious Employees, Hypervisor Attack, Guest-Hopping Attack, SQL-Injection Attack, Physical Security.

Self Study: Snort

Further Reading: Cloud Security Products

UNIT 6	Service Oriented Architecture in Cloud Computing	6 HOURS

App/System/Case study:
RPC or SOAP

Content:
Understanding Service-Oriented Architecture, Web Services Are Not Web Pages, Many Companies Provide Web Services, Discovering Web Services, Understanding Web Service Performance, Web Service and Reuse, Scaling Web Services, Web Services and Loose Coupling, Treating a Web Service as a Black Box, Web Service Interoperability, Web Service Description Language, Governing Web Services.

Self Study: REST

Further Reading: Python Boto3

TEXT BOOK

1. Jamsa K, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More, Jones & Bartlett Publishers [ISBN: 9380853777]
2. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications [ISBN: 052176095X]
3. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach [ISBN: 0071626948]
4. Siani, Yee, George, Privacy and Security for Cloud Computing [ISBN: 9781447141891]
5. Adrian Mouat, Docker Security, O'Reilly [ISBN: 9781492042297]

REFERENCE BOOK

1. Greg Schulz 2011, Cloud and Virtual Data Storage Networking, Auerbach Publications [ISBN: 978-1439851739]
2. Tim Mather, SubraKumaraswamy, ShahedLatif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance [ISBN: 0596802765]
3. Ronald L. Krutz, Russell Dean Vines, Cloud Security [ISBN: 0470589876]

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Digital Forensics
	COURSE CODE	IT451
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**- REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	–	50	150

PRE-REQUISITE :

1.IT421: Cyber Security

COURSE OBJECTIVES :

IT451.CEO.1:To understand the importance of maintaining the integrity of digital evidence.

IT451.CEO.2:To encourage students to think beyond the available forensics solutions to cater new solutions.

IT451.CEO.3:To understand basics of forensic data acquisition and analysis using computer and network-based applications and utilities

IT451.CEO.4:To ascertain the usefulness of taught concepts of cyber forensics in their awareness.

COURSE OUTCOMES :

The students after completion of the course will be able to

IT451.CO.1:Illustrate the fundamentals of computer forensics and Information awareness.

IT451.CO.2:Classify the attributes of data recovery in file systems and storage media.

IT451.CO.3:Outline the techniques of cyber forensics and intelligence.

IT451.CO.4:Simplify the test cases in cyber forensics

IT451.CO.5:Analyze the digital evidence of different media.

IT451.CO.6:List the common type of digital evidence.

THEORY COURSE CONTENT		
UNIT 1	**Overview of Computer Forensics Technology**	**8 HOURS**

App/System/Case study:
Case study on cyber forensics

Content: Computer Forensics Fundamentals: Introduction to Computer Forensics, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources, Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps Taken by Computer Forensics Specialists, Types of Computer Forensics Technology, Types of Computer Forensics Systems

Further Reading: Agent based Interfaces

UNIT 2	**Computer Forensics Evidence and Capture**	**9 HOURS**

App/System/Case study:
Case study on cyber crime

Content:
Data Recovery :Data Recovery Defined, Data Backup and Recovery, The Role of Backup in Data Recovery, The Data-Recovery Solution, Hiding and Recovering Hidden Data, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody,

Further Reading: Reconstructing the Attack

UNIT 3	**Cyber Forensics Investigation**	**8 HOURS**

App/System/Case study:
Case study on cyber forensic investigation

Content:
Introduction to Cyber Forensic Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers, Recovering deleted evidences, Password Cracking

Further Reading: Recovering deleted evidences

UNIT 4	Foundation of Digital Forensics	8 HOURS

App/System/Case study:

Case study on cyber forensic investigation in Digital Evidence

Content:

Digital Evidence is Everywhere, Overview of Digital Forensics: Acquisition, Preservation, Analysis, Presentation, Digital forensics : Sub disciplines: Incident response, cell phone forensics, media device forensics, social media forensics, digital video and photo forensics, digital camera forensics, digital audio forensics, foundation of digital forensics and Best Practices, Overview of Digital Forensics Tools, difference between computer experts and digital forensic experts

Further Reading: Digital forensics and Best Practices

UNIT 5	Digital Evidence	9 HOURS

App/System/Case study:

Case study on cyber forensic investigation in Video and Audio

Content:

Discovery of Video, Audio, Social Media Evidence Common types of Digital Evidence: Hash Values The verification standard, Deleted Data, Internet History, Cellular System Evidence and Call Details Records, Email Evidence, Social Media, Cell Phone, Video and Photo Evidence

Further Reading: Cellular System Evidence and Call Details Records

PRACTICAL		
PRACTICAL NO 1		**28 HOURS**

1) Introduction to Digital Forensics Forensics Tools The Sleuth Kit Installation (4 HOURS)
2) Disk and File Analysis (4 HOURS)
3) Computer Forensics Incidence Investigation Process (4 HOURS)
4) Digital Acquisition and Analysis tool (4 HOURS)
5) Digital Evidence Protocol (4 HOURS)
6) Mini Project (8 HOURS)

TEXT BOOK

1.Computer Forensics computer crime scenes investigation , John Vacca, CHARLES RIVER MEDIA, INC, Second Edition, ISBN: 1-58450-389-0, ISBN-13: 978-1-58450-389-7

2.Digital Forensics for legal Professionals by Larry E Daniel, Elsevier, ISBN-978-1-59749-643-8

3.Digital Forensics with Open Source Tools. Cory Altheide and Harlan Carvey, ISBN:978-1-59749-586-8, Elsevier publication, April 2011

REFERENCE BOOK

1.Computer Forensics and Cyber Crime: An Introduction (3rdEdition)by Marjie T. Britz, 2013.

2.Network Forensics: Tracking Hackers Through Cyberspace, Sherri Davidoff, Jonathan am Pren-

3.Computer Forensics: Hard Disk and Operating Systems, EC Council, September 17, 2009

4.Computer Forensics Investigation Procedures and response, EC-Council Press, 2010

MIT | Academy of Engineering (An Autonomous Institute Affiliated to Savitribai Phule Pune University) **(An autonomous Institute Affiliated to SPPU)**	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Practitioner's Approach to Data analytics
	COURSE CODE	CS451
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	30	20	150

PRE-REQUISITE : CS421 : Big Data Analytics

COURSE OBJECTIVES :

CS451.CEO.1:To explain basic concepts of scala
CS451.CEO.2:To understand spark programming
CS451.CEO.3:To understand spark data frames
CS451.CEO.4:To implement data analytics with spark
CS451.CEO.5:To build an application using data bricks and streaming with spark
CS451.CEO.6:To understand the computation in big data analytics

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS451.CO.1:Apply the basic concepts of scala
CS451.CO.2:Implement spark programming
CS451.CO.3:Apply spark data frames
CS451.CO.4:Build an application using data analytics with spark
CS451.CO.5:Build an application using data bricks and streaming with spark
CS451.CO.6:Analyze the computation in big data analytics

THEORY :		
UNIT 1	**Introduction to Scala**	**8 HOURS**
Basic Concepts, Scala operators, Collections, Lists, Arrays, sets, maps, Flow Control, Loops, functions in Scala Self Study: Introduction to class and object in Scala **Further Reading:** Examples of class in scala		
UNIT 2	**Spark Programming**	**6 HOURS**
Introduction to Deleted File Recovery, Formatted Partition Recovery, Data Recovery Tools, Data Recovery Procedures and Ethics, PUse Broadcast Variables ,Accumulators , Item-Based Collaborative Filtering in Spark, cache(), and persist(),Cluster Manager Self Study: Advanced Spark Programmingreserve and safely handle original media, Document a ”Chain of Custody”, Complete time line analysis of computer files based on file creation, file modification and file access, Recover Internet Usage Data, Recover Swap Files/Temporary Files/Cache Files, Introduction to Encase Forensic Edition, Forensic Tool Kit (FTK) etc, Use computer forensics software tools to cross validate findings in computer evidence related cases. **Further Reading:** Example on advanced Spark Programming		
UNIT 3	**Spark Data Frames**	**6 HOURS**
Introduction to Spark Data Frames, Data Frames Overview, Spark Data Frame Operations, Group By and Aggregate Functions, Missing data, Date and Timestamps Self Study: Graph Frame **Further Reading:** Apache Spark Graph Frames		
UNIT 4	**Data Analytics with Spark**	**6 HOURS**
Introduction to Linear Regression, Introduction to Regression Section, Linear Regression, Documentation Example, Alternate Linear Regression Data CSV File, Classification Documentation Example, Clustering with Spark Self Study: Advanced Data Analytics **Further Reading:** Fast Data Analytics with Spark		
UNIT 5	**Data Bricks and Streaming with Spark**	**6 HOURS**
Online Shopping Case Study Content: Data bricks Overview, Introduction to Spark Recommendation Systems, Spark Recommender System Implementation, Spark Streaming, Structured Streaming Self Study: Advanced Spark Streaming with Spark **Further Reading:**Aggregations, Joins, Checkpoints		
UNIT 6	**Computations in Big Data Analytics**	**8 HOURS**
Food Recommender Case Study Bayesian approach to big data, block chain and policy, Search and optimization for big data, Parallel, accelerated, and distributed big data analytics, Value, and performance of big data analytics, Applications of BDA in cybercrime, e-commerce, e-health . Improving forecasting models using big data analytics, Security and privacy in big data era. Self Study: Security and Privacy Challenges in Big Data Analytics **Further Reading:**Security and Privacy Challenges in distributed Big Data Analytics		

PRACTICAL :		
PRACTICAL NO.01		**8 HOURS**
Find the ranking based on social media data using Spark's RDD basics		
PRACTICAL NO.02		**8 HOURS**
Find most popular movie from the tweeter using recommendation system		
PRACTICAL NO.03		**8 HOURS**
Visit social network data, load it into a DataFrame and analyze it with actual SQL queries		
PRACTICAL NO.04		**6 HOURS**
Set up a Twitter Developer Account, and Stream Tweets		

TEXT BOOK

1. Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering.
2. Big Data Analytics with BigR.
3. Tom White "Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
4. Seema Acharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015
5. Computer Forensics and Cyber Crime: An Introduction (3rdEdition)byMarjie T. Britz, 2013.

REFERENCE BOOK

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
4. AnandRajaraman and Jefrey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley sons, 2012.
6. Glen J. Myat, "Making Sense of Data", John Wiley Sons, 2007
7. Pete Warden, "Big Data Glossary", O'Reily, 2011.
8. Michael Mineli, Michele Chambers, AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
9. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Pattern Recognition
	COURSE CODE	CS452
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	30	20	150

PRE-REQUISITE :

1. CS 312: Artificial Intelligence and Neural Networks.
2. CS 332: Machine Learning and its applications.
3. CS 422: Deep Learning.

COURSE OBJECTIVES :

CS452.CEO.1:To study the fundamental and advance algorithms for pattern recognition.
CS452.CEO.2:To understand the various classification technique.
CS452.CEO.3:To learn the various structural pattern recognition and feature extraction techniques

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS452.CO.1:Interpret various advance algorithms for pattern recognition.
CS452.CO.2:Analyze the clustering concepts and algorithms.
CS452.CO.3:Apply structural pattern recognition and feature extraction techniques.
CS452.CO.4:Analyze the approach of the unsupervised learning in neural pattern recognition system.

THEORY		
UNIT 1	**INTRODUCTION**	**8 HOURS**

App/System/Case study:

Dog and cat classification

Content: Definition, applications, commercial machines, machine perception, examples: salmon, sea bass Problem Analysis: processing, feature extraction, classification, decision boundaries. Pattern Recognition Systems and Design cycle: Clustering and Classification, Data collection, Modeling, training.

Self -Study: Estimation/ Evaluation.

Further Reading: Special Purpose Systems.

UNIT 2	Pattern Recognition Models	6 HOURS

App/System/Case study:

Dice toss problems, Predicting the price of house

Contents:

Linear Model for Regression: Linear Basis function model, Bayesian decision theory, Bayesian model comparison and evidence approximation. Linear Model for Classification: Discriminate function, probabilistic generative models and discriminative models, Laplace approximation, Bayesian Logistic Regression. Graphical Model: Bayesian networks, conditional independence, Inferences. Mixture Model and EM: K-means clustering mixture of Gaussian.

-Study: Example of Gaussian clustering.

Further Reading: Alternative view of EM.

UNIT 3	Kernel And Sampling Methods	6 HOURS

App/System/Case study:

Junk mail filtering, Internet searching

Contents:

Kernel Method: Dual representation, Constructing Kernels, Radial Basis Function Networksand Gaussian Process. Sampling Method: Basic Sampling Algorithms, Markov Chain Monte Carlo, Gibbs Sampling, Slice Sampling.

Self-study: Hybrid Monte Carlo Algorithm.

Further Reading: Estimating the partition function.

UNIT 4	Applications Using Deep Neural Network	8 HOURS

App/System/Case study:

Character Recognition, Image compression, Stock Market Prediction.

Contents:

Introduction ,Neuron Physiology, Artificial Neurons, Feed-forward Neural Network, Vector and Matrix Notation ,Recurrent Neural Network, Elman Back propagation Neural Network, Hopfield Network, FFN Function, Network Training, Error Back propagation, Hessian Matrix, regularization in Neural Network,

Self- Study: Bayesian Neural Network.

Further Reading: Mixture Density Network.

UNIT 5	Digital Image Processing	8 HOURS

App/System/Case study: Face Recognition, Character Recognition.

Contents: Introduction Image Processing, Image as 2D signal and image enhancement techniques, filter design, Hidden Markov models for sequential pattern classification: Discrete hidden Markov models, Continuous density hidden Markov models, Dimension reduction methods: Fisher discriminant analysis, Principal component analysis.

Self- Study: HMM for Statistical pattern recognition.

Further Reading: HMM for Statistical pattern recognition.

UNIT 6	Recent Advances	8 HOURS

App/System/Case study:

Cancer diagnosis, junk mail filtering and internet searching.

Contents: Neural network structures for Pattern Recognition ,Neural network based Pattern associator, Unsupervised learning in neural Pattern Recognition ,Self-organizing, networks Fuzzy logic -Fuzzy pattern classifiers ,

Self -Study: Pattern classification using Genetic Algorithms

PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
Using R-language for pattern recognition 1. R tutorial 2. Using k-NN classifier for classification of selected UCI data sets.		
PRACTICAL NO.02		**4 HOURS**
Clustering -Application of various clustering schemes for clustering of UCI datasets: agglomerative clustering, kmeans, DBSCAN		
PRACTICAL NO.03		**4 HOURS**
1. Give perceptron for recognizing digits 0-9. Use Python/Matlab/Java/any Tool) OR 2. Implement back propagation (BP) on feed forward neural n/w (FFNN).		
PRACTICAL NO.04		**4 HOURS**
A. Implementation of cancer diagnosis system. (Use Python/Matlab/Java/any Tool) OR B. Design the search engine using pattern recognition technique.		
PRACTICAL NO.05		**6 HOURS**
Apply the Support vector machine for classification on a dataset obtained from UCI ML repository. For Example: Fruits Classification or Soil Classification or Leaf Disease Classification		
PRACTICAL NO.06		**2 HOURS**
A .Case Study: Finger Print recognition OR B. Case Study : Voice recognition ,Iris Recognition		

TEXT BOOK

1.C.M.Bishop, "Pattern Recognition and Machine Learning, Springer, 2006, ISBN 978-81-322-0906-5.

2.N.P Padhy, Artificial Intelligence and Intelligent System , Oxford University press ,2005, ISBN 13: 978-0-19- 567154-4.

3.R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, ISBN: 0-471-05669-3.

REFERENCE BOOK

1.S.Theodoridis and K.Koutroumbas,"Pattern Recognition", Academic Press, 4th Ed 2009, ISBN 978-15-974- 9272-0.

2.C.M Bishops, "Neural Networks for Pattern Recognition", Citation 23831,Oxford University Press ,1995 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP401
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP401.CEO.1:To enable the students to understand the basic concepts of Economics

HP401.CEO.2:To impart knowledge, with respect to practical applications of Economics .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP401.CO.1:The students would have understood the basic concepts of Economics.

HP401.CO.2:The students would have acquired knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions

HP401.CO.3:The course is designed to improve critical thinking, problem solving skills by using economic models and theories and predict economic relationships

HP401.CO.4:Students entering any profession in the workforce today must be able to utilize these basic economic principles. The course expected to develop critical understanding of current topics in economics and able to formulate their own opinions on economic issues

THEORY		
UNIT 1	**Introduction to Economics**	**6 HOURS**
Economic Issues and Concepts; How Economist Work ; Theory of Demand & Supply; Meaning, Determinants, Law of Demand and Supply, Equilibrium between Demand & Supply; Elasticity of demand, price elasticity, income elasticity, cross elasticity.		
UNIT 2	**Micro Economics**	**6 HOURS**
Revenue Concepts; Cost Concepts, Short run & Long run cost Concepts and curves, opportunity cost. Break even analysis; meaning, explanation, numerical. Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Competition , Oligopoly). **Further Reading:**		
UNIT 3	**Macro Economy**	**5 HOURS**
National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP,NDP, Personal income, disposal income. Inflation; meaning, types, causes, measures to control. **Further Reading:**		
UNIT 4	**Indian Economy**	**5 HOURS**
Characteristics of an Indian Economy; Human Development Index(HDI); Concepts of Foreign Trade, Goods and Services Tax(GST); Micro Small and Medium Enterprise(MSME) ; Foreign Direct Investment(FDI);Unemployment: meaning, types, causes, remedies. **Further Reading:**		
UNIT 5	**Introduction to Banking & Money Market**	**6 HOURS**
Banking; meaning, types, functions, Commercial Banks- Instruments in Operation of an Account, Central Bank- RBI; its functions, Concepts- CRR, Bank Rate, Repo Rate, Reverse Repo rate, SLR; Introduction to Money and Capital Market , Introduction to Fiscal policy- meaning and tools. **Further Reading:**		

REFERENCE BOOKS

1.R.Paneerselvam :Engineering Economics, , PHI publication ISBN : 978-81-203-5172-1

2.Robbins S.P. and Decenzo David A :Fundamentals of Management: Essential Concepts and Applications, Pearson Education, ISBN-13: 9780133499919

3.N Gregory Mankiw : Economics: Principles of Economics, Cengage Learning ISBN-10: 1305585127

4.L.M. Prasad: Principles and Practices of Management ISBN-10: 9351610500; ISBN-13: 978-9351610502

5.Tripathy and Reddy :Principles of Management ISBN, 1259050572, 9781259050572

6.Dr. K. K. Dewett & M. H. Navalur, S. Chand :Modern Economic Theory ISBN, : 9788121924634 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Major Project - II
	COURSE CODE	CS432
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE		MSE	ESE	IA	TERMWORK	DEMONSTRATION	
-	8	–	–	–	100	50	150

PRE-REQUISITE : CS405 Major Project – I

COURSE OBJECTIVES :

CS432.CEO.1:To follow the standard guideline to meet the objective for development of Project.
CS432.CEO.2:To test rigorously before deployment of Systems
CS432.CEO.3:To Verify and Validate the work Undertaken
CS432.CEO.4:To Consolidate the work and preparation of final report

COURSE OUTCOMES :

The students after completion of the course will be able to:

CS432.CO1:Show the evidence of independent evaluation.
CS432.CO2:Critically analyzed the result and their implementation methodology.
CS432.CO3:Validate the results with standard tools and techniques.
CS432.CO4:Understand the importance of documentation and report writing.

PREAMBLE:

objective of this Major Project-II to implement the full and final project and the report. After The remaining project work which consist of selection of approach / methodology / tools and techniques, Designing, installation, results and performance evaluation. Also includes the comparative analysis and validation of result. Should prepare the Project report as per format for satisfactory completion of work certified by concern project advisor and dean. .

It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded.:

Follow the guideline and formats as mentioned in guideline document.(Annexure-II):

GUIDELINE

In Project Work Stage-II, the student shall complete the remaining project work which consists of Selection of Methodology, Tools and Technology, Installations, Design, Implementations, testing, Results, performance analysis if applicable (discussions using data tables per parameter considered for the improvement with existing/known algorithms/systems) and comparative analysis and validation of results and conclusions. The student shall prepare and submit the report of Project work in standard format for satisfactory completion of the work that is the duly certified by the concerned advisor and Dean of the school.

It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded.

Follow the guideline and formats as mentioned in guideline document.(Annexure-II)

TIMELINE

1. Presentation of Project Review- 3 Project Progress Monitoring DRC review – (Week 5th)
2. Presentation of Project Review – 4 Project Progress Monitoring and Report Preparation –(Week-8th)
3. Internal Examination/ Project Expo: Project-2 Demonstration and presentation- (Week 10th)
4. External Examination: Project-2 Demonstration and Presentation- (End semester-Week 12th or 13th)

ASSESSMENT

1. Internal Assessment

a. Project Review -3 Progress Monitoring - 30 Marks

b. Project Review -4 Progress Monitoring and Report Preparation -30 Marks

c. Project Expo/ Examination- Evaluation Presentation and Demonstration- 30 Marks

d. Paper publication/presentation/IPR -10 Marks

2. Examination: Final Demonstration and presentation a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Final Year

Bachelor of Technology in

Computer Engineering

(Amendments for Semester Long Internship)

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering **(An Autonomous Institute Affiliated to SPPU)**	**SEMESTER LONG INTERNSHIP** **Rules and Regulations** **(2016 - 2020)**

1. ELIGIBILITY:

I. No live backlogs
II. CGPA of 8.50 and above
III. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student)

Only students satisfying the above criteria can be permitted for semester-long internship in any MNCs / R&D laboratories such as DRDO, NCL, NEERI, CDAC and Institutions like IITs/ NITs / International institutes of repute.

2. DEADLINES:

For the current batch, the applications must be submitted by 30, November 2019 by all students desired to go for the semester long internship.

3. APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including details of the organization along with the details of the project in brief, copy of their CV and copies of mark sheet to the respective school Corporate Relations (CR) coordinator. The application must be as per the format given below.

Application for Internship Program

Sr. No.	Particulars	
1	Name of the applicant (in bold letters)	
2	Gender	
3	School	
4	Date of Birth & Age (as on date)	
5	Roll Number & PRN	
6	Address for correspondence with mobile / telephone number and email-id	
7	Name & address of the Institute / Industry	
8	Core Domain of Institute / Industry	

9	Contact details Supervisor / HR Mobile / Telephone number and email-id	
10	Period of internship	24-26 weeks
11	Details of the Project proposed	

Signatures

Student	School Internship Coordinator
Approved by:	
No. of credits proposed	6 / 10
Dean – School of _____ Engineering	MIT AOE Seal
Date:	

4. RULES & CONDITIONS:

I. Sponsored project should be along the same track of the minor (Open Elective) chosen by the student. (desirable)

II. Semester long internship is applicable only in the 8th semester.

The distribution of credits for the VIII semester is as follows

DC	Department Core	4 Credits
DE	Department Elective	3 Credits
OE	Open Elective	4 Credits
HSS	Humanities & Social science	2 Credits
SDP	Skill development and Project	4 Credits

III. For a student who is going for a semester long internship, 10 credits (OE, HSS and SDP) will be awarded if OE is part of the internship otherwise 6 credits will be awarded.

IV. The equivalence courses for the DC, DE and OE must be floated by the Schools.

V. The credits of DC, DE and OE should be earned through MOOC courses.

VI. If a student is not able to successfully earn the credits of the DC / DE / OE within the stipulated time, they will not be eligible for the graduation in the same academic year.

5.1 ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel.

i) The Panel for the evaluation should be 3 members (if 3 credits) or 4 members (if 5 credits). The composition of the team would be as follows.

i. Dean, Respective School ii. CR Coordinator / Project Coordinator / Project Guide iii. Project Guide (Industry)

iv. The domain expert (In case of 5 credits, as per the minor specialization)

ii) Presentation I at the end of 45th day and presentation II at the end of 90th day from the start of the project combined to a total weightage of 5 credits ***(3 credits if OE is exempted).*** Itcan be possible to do through Skype, if acceptable to the panel. **In Grade card it will be mentioned as SLIP – Project Design.**

iii) Presentation at the end of the Internship Work and Final Internship Report after the completion of the Internship Work combined for a total weightage of 5 credits ***(3 credits if OE is exempted)*** and should be as per the template).**In Grade card it will be mentioned as SLIP – Project Implementation.**

5.2 ASSESSMENT METHOD FOR OTHER COURSES RUN THROUGH INSTITUTE LMS:

Credits for the courses run through Go-Webinar will be assessed using the following methods.

I. There will be SIX assignments (one per unit) to be submitted through the moodle. This will have a weightage of 30% of the total score. This contributes to the IA for the course.

II. There will be SIX quizzes (one per unit) to be conducted through moodle. This will have a weightage of 30% of the total score. This contributes to the ISE for the course.

III. One FINAL presentation to be done at the end and evaluated by a team of THREE members including the Course Champion, Instructor and any other nominated member by the respective School Dean. This will have a weightage of 40% of the total score. This contributed for the ESE of the course.

MIT | Academy of Engineering (An Autonomous Institute)	**CURRICULUM STRUCTURE (2016 - 2020)**		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**:**	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**RELEASE DATE**	**:**	01/06/2019
	REVISION NO.	**:**	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 12	CS401	Software Engineering, Testing and Quality Assurance.	3	2	4
2.	DE 1	CS41#	Department (Program) elective - Ref er Annexure	3	0	3
3.	OE 3	CS42#	Open Elective – Refer Annexure	3	2	4
4.	HSS 6	HP402	Sociology	2	--	2
5.	HSS7/S DP7	HP403/CS 40#	Business Strategies/ Advance skill development lab(Adv. Java/R Programming/Python with kali Linux)	---	2	1
6.	SDP 8	CS405	Project – I	--	8	4
7.	SDP9	CS406	Summer Internship	--	--	4
			TOTAL	11	14	22

SEMESTER: VIII (SLIP not inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 13	CS431	Human Computer Interaction @	4	-	4
2.	DE2	CS44#	Department Elective	3	-	3
3.	OE4	CS45#	Open Elective @	4	-	4
4.	SEMESTER LONG INTERNSHIP – Project Design			-	6	3
5.	SEMESTER LONG INTERNSHIP – Project Implementation			-	6	3
TOTAL				**11**	**12**	**17**

MIT | Academy of Engineering (An Autonomous Institute)	**CURRICULUM STRUCTURE (2016 - 2020)**		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**:**	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**RELEASE DATE**	**:**	01/06/2019
	REVISION NO.	**:**	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 12	CS401	Software Engineering, Testing and Quality Assurance.	3	2	4
2.	DE 1	CS41#	Department (Program) elective - Ref er Annexure	3	0	3
3.	OE 3	CS42#	Open Elective – Refer Annexure	3	2	4
4.	HSS 6	HP402	Sociology	2	--	2
5.	HSS7/SDP7	HP403/CS40#	Business Strategies/ Advance skill development lab(Adv. Java/R Programming/Python with kali Linux)	---	2	1
6.	SDP 8	CS405	Project – I	--	8	4
7.	SDP9	CS406	Summer Internship	--	--	4
			TOTAL	11	14	22

SEMESTER: VIII (SLIP inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC13	CS431	Human Computer Interactions @	4	-	4
2.	DE2	CS44#	Department Elective	3	-	3
4.	SEMESTER LONG INTERNSHIP – Project Design			-	10	5
5.	SEMESTER LONG INTERNSHIP – Project Implementation			-	10	5
	TOTAL			**7**	**20**	**17**

@ - Courses run through institute LMS.

DEPARTMENT ELECTIVE ON MOOCS PLATFORM			
SR. NO.	**COURSE DETAILS**	**MOOC DETAILS**	**NO. OF WEEKS**
1.	Distributed system (IIT)	NPTEL	8
2.	Introduction to industry 4.0 and industrial IOT (IIT)	NPTEL	12
3.	Virtual Reality Engineering (IIT)	NPTEL	12

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

Savitribai Phule Pune University

Curriculum for

Bachelor of Technology in

Electronics Engineering

(Choice Based Credit System)

2016-2020

BoS Chairman
Dean, School of
Electrical Engineering

Member Secretary
Academic Council
Dean Academics

Chairman
Academic Council
Director MITAOE

DEAN
School of Electrical Engineering
MIT Academy of Engineering
Alandi (D.), Pune-412 105.

School of Electrical Engineering

MIT Academy of Engineering

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (ELECTRONICS ENGINEERING)

The BTECH Program shall be based on the following type of courses

SL. NO.	TYPE OF COURSE	ABBREVIATION
1.	Natural Science	NSC
2.	Engineering Science	ESC
3.	Program Core	PC
4.	Discipline Core	DC
5.	Department Elective	DE
6.	Open Elective	OE
7.	Humanities and Social Science	HSS
8.	Skill Development and Project	SDP

The Course and Credit Distribution shall be as under,

SL. NO.	TYPE OF COURSE	NO. OF COURSES	TOTAL CREDITS	
			NO.	%
1.	Natural Science	**4**	**18**	**10.96**
2.	Engineering Science	**4**	**16**	**9.76**
3.	Program Core	**5**	**19**	**11.59**
4.	Discipline Core	**12**	**48**	**29.27**
5.	Department Elective	**2**	**6**	**3.66**
6.	Open Elective	**4**	**16**	**9.76**
7.	Humanities and Social Science	**8/9**	**17**	**10.37**
8.	Skill Development and Project	**10/9**	**24**	**14.63**
TOTAL		**49**	**164**	**100**

COURSE DISTRIBUTION : SEMESTER WISE										
SL. NO.	TYPE OF COURSE	NO. OF COURSES/SEMESTER								TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science	2	2							**4**
2.	Engineering Science	2	2							**4**
3.	Program Core			3	2					**5**
4.	Discipline Core			2	2	3	3	1	1	**12**
5.	Department Elective							1	1	**2**
6.	Open Elective					1	1	1	1	**4**
7.	Humanities & Social Science	1	1		1	2	1	1/2	1	**8/9**
8.	Skill Development & Project	1	1	1	1	1	1	3/2	1	**10/9**
TOTAL		**6**	**6**	**6**	**6**	**7**	**6**	**7**	**5**	**49**

CREDIT DISTRIBUTION : SEMESTER WISE										
1 Lecture hour = 1 Credit **2 Lab Hours = 1 Credit** **1 Tutorial Hour = 1 Credit**										
SL. NO.	TYPE OF COURSE	NO. OF CREDITS/SEMESTER								TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science	9	9							**18**
2.	Engineering Science	8	8							**16**
3.	Program Core			11	8					**19**
4.	Discipline Core			8	8	12	12	4	4	**48**
5.	Department Elective							3	3	**6**
6.	Open Elective					4	4	4	4	**16**
7.	Humanities & Social Science	2	2		3	3	2	3	2	**17**
8.	Skill Development & Project	2	2	2	2	2	2	8	4	**24**
TOTAL		**21**	**21**	**21**	**21**	**21**	**20**	**22**	**17**	**164**

MIT | Academy of Engineering (An Autonomous Institute)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	**2016-17**
DEPARTMENT OF ELECTRONICS ENGINEERING	**RELEASE DATE**	**:**	**1/06/2016**
FIRST YEAR BACHELOR OF TECHNOLOGY	**REVISION NO.**	**:**	**0.0**

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS101	Mathematics – 1	4	1	5
2.	NSC2	AS102 / AS103	Physics / Chemistry	3	2	4
3.	ESC1	EX101 / CV101	Electrical & Electronics Engg. / Applied Mechanics	3	2	4
4.	ESC2	ME101/ IT101	Engineering Graphics / Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – I	1	2	2
6.	SDP1	ME102 / ME103	Experimental Tools & Techniques / Design Thinking	-	4	2
TOTAL				**13**	**15**	**21**

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC3	AS104	Mathematics – 2	4	1	5
2.	NSC4	AS103 / AS102	Chemistry / Physics	3	2	4
3.	ESC3	CV101 / EX101	Applied Mechanics / Electrical & Electronics Engg.	3	2	4
4.	ESC4	ME101/ IT101	Engineering Graphics / Computer Programming	2	4	4
5.	HSS2	HP102	Language & Communication – II	1	2	2
6.	SDP2	ME103 / ME102	Design Thinking / Experimental Tools & Techniques	-	4	2
TOTAL				**13**	**15**	**21**

L: Lecture, P: Practical, T: Tutorial, *Applicable for FY BTECH

MIT | Academy of Engineering (An Autonomous Institute)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	**2017-18**
DEPARTMENT OF ELECTRONICS ENGINEERING	**RELEASE DATE**	**:**	**1/06/2017**
SECOND YEAR BACHELOR OF TECHNOLOGY	**REVISION NO.**	**:**	**0.0**

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS202	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	ET202	Analog Electronics	3	2	4
5.	DC2	EX202	Applied Digital Circuits	3	2	4
6.	SDP3	ET206	Prototyping	-	4	2
TOTAL				**14**	**14**	**21**

SEMESTER:IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	-	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	EX211	Analog and Digital Communication	3	2	4
5.	DC4	EX212	Circuit Theory	3	2	4
6.	SDP4	EX213	Minor Project	-	4	2
TOTAL				**15**	**12**	**21**

L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	**2018-19**
DEPARTMENT OF ELECTRONICS ENGINEERING	**RELEASE DATE**	**:**	**1/06/2018**
THIRD YEAR BACHELOR OF TECHNOLOGY	**REVISION NO.**	**:**	**0.0**

SEMESTER:V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	EX301	Embedded System Design	3	2	4
2.	DC6	ET301	Control Systems	3	2	4
3.	DC7	EX303	Computer Network	3	2	4
4.	OE1	EX31#	Open Elective - Refer Annexure	3	2	4
5.	HSS4	HP301	Project Management	1	2	2
6.	HSS6	HP303	Basics of Entrepreneurship	-	2	1
7.	SDP5	EX30#	Skill Development Lab - Refer Annexure	-	4	2
TOTAL				**13**	**16**	**21**

SEMESTER : VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	EX321	Real Time Operating System	3	2	4
2.	DC9	EX322	Digital Signal Processing	3	2	4
3.	DC10	EX323	Power Electronics & Application	3	2	4
4.	OE2	EX33#	Open Elective - Refer Annexure	3	2	4
5.	HSS5	HP302	Professional Skills	1	2	2
6.	SDP6	EX324	Mini Project	-	4	2
TOTAL				**13**	**14**	**20**

L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	**2019-20**
DEPARTMENT OF ELECTRONICS ENGINEERING	**RELEASE DATE**	**:**	**1/06/2019**
FINAL YEAR BACHELOR OF TECHNOLOGY	**REVISION NO.**	**:**	**0.0**

SEMESTER:VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ET401	VLSI Design	3	2	4
2.	DE1	EX41#	Department Elective - Refer Annexure	3	-	3
3.	OE3	EX42#	Open Elective - Refer Annexure	3	2	4
4.	HSS7	HP401	Engineering Economics	2	-	2
5.	HSS8 / SDP7	HP403 / ET403	Business Strategies / Programming in Java	-	2	1
6.	SDP8	EX402	Project – I	-	8	4
7.	SDP9	EX404	Summer Internship	-	-	4
TOTAL				**11**	**14**	**22**

SEMESTER:VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	EX431	Consumer Electronics	3	2	4
2.	DE2	EX44#	Department Elective - Refer Annexure	3	-	3
3.	OE4	EX45#	Open Elective - Refer Annexure	3	2	4
4.	HSS9	HP402	Sociology	2	-	2
5.	SDP10	EX432	Project – II	-	8	4
TOTAL				**11**	**12**	**17**

L: Lecture, P: Practical

CREDITS				
1 Lecture Hour = 1 Credit		**2 Lab Hours = 1 Credit**		**1 Tutorial Hour = 1 Credit**
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	21	21	**42**
2.	Second Year	21	21	**42**
3.	Third Year	21	20	**41**
4.	Final Year	22	17	**39**
TOTAL				**164**

CONTACT HOURS				
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	28	28	**56**
2.	Second Year	28	27	**55**
3.	Third Year	29	27	**56**
4.	Final Year	25	23	**48**
TOTAL				**215**

ANNEXURE

Natural Science (NSC) : 4 Courses		
1.	AS101	Mathematics – 1
2.	AS102	Mathematics – 2
3.	AS103	Physics
4.	AS104	Chemistry

Engineering Science (ESC) : 6 Courses		
1.	EX101	Electrical and Electronic Engineering
2.	CV101	Applied Mechanics
3.	ME101	Engineering Graphics
4.	IT101	Computer Programming
5.	ME104	Science of Nature orModel Making
6.	CS101	Logic Design

Program Core (PC) : 5 Courses		
1.	CH201	Environmental Science
2.	AS202	Applied Mathematics
3.	ET201	System Engineering
4.	IT201	Engineering Informatics
5.	ME201	Material Engineering

Discipline Core (DC) : 12 Courses		
1.	ET202	Analog Electronics
2.	EX202	Applied Digital Circuits
3.	EX211	Analog and Digital Communication
4.	EX212	Circuit Theory
5.	EX301	Embedded System Design
6.	ET301	Control Systems
7.	EX303	Computer Network
8.	EX321	Real Time Operating System
9.	ET322	Digital Signal Processing
10.	EX323	Power Electronics & Application
11.	ET401	VLSI Design
12.	EX431	Consumer Electronics

Department Elective (DE) : 2 Courses		
1.	ET411	Digital Image Processing
	ET412	Microwave Engineering
	EX413	Electronic Drives and Applications
	ET414	Machine Learning
2.	EX441	Biomedical Engineering
	ET442	Artificial Intelligence
	ET443	Wireless Sensor Network
	ET444	Speech Signal Processing

Open Elective (OE) : 4 Courses		
Sl. No.	**Course Code**	**Course**
1	ET311	Embedded System Programming (ESP)
2	ET331	Embedded Processor
3	ET421	Low-Power SoC Architecture & Applications
4	ET451	Real Time Embedded System
5	ET312	IoT Architecture and Sensors
6	ET332	IoT Network & Protocols
7	ET422	Privacy and Security in IoT
8	ET452	Energy Management for IoT Device
9	EX311	Fundamentals of Robotics
10	EX331	Kinematics and Dynamics of Robotics
11	EX421	Robotics Vision
12	EX451	Intelligent and High Performance Robotics

Open Elective (OE) :Term - I (List of courses for Academic Year 2018-19)		
Chemical		
1	CH311	Process Modeling and Simulation.
2	CH312	Piping Engineering
Civil		
3	CV311	Construction Planning & Management
Computer		
4	CS311	Descriptive Analytics
5	CS312	Artificial Intelligence
Electronics		
6	EX311	Fundamentals of Robotics
E & TC		
7	ET311	Embedded System Programming (ESP)
8	ET312	IoT Architecture and Sensors
IT		
9	IT311	Cryptography & System Security
Mechanical		
10	ME311	Geometric Modeling & Design
11	ME312	Fundamentals of Robotics
12	ME313	Work Process Assessment

Open Elective (OE) :Term - II (List of courses for Academic Year 2018-19)		
Chemical		
1	CH331	Process Engineering.
2	CH332	Piping Layout
Civil		
3	CV331	Operation Research
Computer		
4	CS331	Predictive Analysis
5	CS332	Machine Learning
Electronics		
6	EX331	Kinematics and Dynamics of Robotics
E & TC		
7	ET331	Embedded Processor
8	ET332	IoTNetwork & Protocols
IT		
9	IT331	Cyber Security
Mechanical		
10	ME331	Finite Element Analysis
11	ME332	Kinematics & Dynamics of Robots
12	ME333	Facility Planning & Design

Open Elective (OE) :Term - I (List of courses for Academic Year 2019-20)		
Chemical		
1	CH421	Process Optimization
2	CH422	Piping Design & Engineering
Civil		
3	CV421	Financial Management
Computer		
4	CS421	Big Data Analytics
5	CS422	Deep Learning
Electronics		
6	EX421	Robotics Vision
E & TC		
7	ET421	Low-Power SoC Architecture & Applications (SoC&A)
8	ET422	Privacy and Security in IoT
IT		
9	IT421	Ethical Hacking & Cyber Laws
Mechanical		
10	ME421	Computational Fluid Dynamics
11	ME422	Robotics Vision and Control
12	ME423	Operations Management

Open Elective (OE) :Term - II (List of courses for Academic Year 2019-20)		
Chemical		
1	CH451	Process Intensification & Integration
2	CH452	Pipeline Engineering
Civil		
3	CV451	Visualization and Information Exchange
Computer		
4	CS451	Practitioner's approach for Data analytics
5	CS452	Pattern Recognition
Electronics		
6	EX451	Intelligent and High Performance Robotics
E & TC		
7	ET451	Real-Time Embedded System (RES)
8	ET452	Energy Management for IoT Devices
IT		
9	IT451	Cyber Forensics
Mechanical		
10	ME451	Advanced Analysis
11	ME452	Intelligent and High Performance Robotics
12	ME453	Supply Chain Management

Humanities and Social Science (HSS) : 9 Courses		
Sl. No.	**Course**	
1.	HP101	Language & Communication – I
2.	HP102	Language & Communication – II
3.	HP201	Psychology
4.	HP301	Project Management
5.	HP302	Professional Skills
6.	HP303	Basics of Entrepreneurship
7.	HP401	Engineering Economics
8	HP402	Sociology
9	HP403	Business Strategies

Skill Development and Project (SDP) : 10 Courses		
Sl. No.	**Course**	
1.	ME102	Engineering Tools and Techniques
2.	ME103	Design Thinking
3.	ET206	Prototyping
4.	EX213	Minor Project
5.	ET304	Graphical Programming Lab
	ET305	MATLAB
	EX304	Embedded Linux
6.	EX324	Mini Project
7.	ET403	Programming in Java
8.	EX402	Project – I
9.	EX404	Summer Internship
10.	EX432	Project – II

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

First Year

Bachelor of Technology

2016-2020

(With Effect from Academic Year: 2016-2017)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2016-2017
FIRST YEAR BACHELOR OF TECHNOLOGY	RELEASE DATE	:	1/06/2016
	REVISION NO.	:	1.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS 101	Mathematics -1	4	1	5
2.	NSC2	AS 102/ AS 103	Physics/Chemistry	3	2	4
3.	ESC1	EX 101/ CV 101	Electrical & Electronics Engg/Applied Mechanics	3	2	4
4.	ESC2	ME 101/ IT 101	Engineering Graphics/Computer programming.	2	4	4
5.	HSS1	HP 101	Language &Communication -1	1	2	2
6.	SDP1	ME 102/ ME 103	Experimental Tools &Techniques/Design Thinking	--	4	2
TOTAL				13	15	21

SEMESTER:II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC3	AS 104	Mathematics -2	4	1	5
2.	NSC4	AS 103/ AS 102	Chemistry/ Physics	3	2	4
3.	ESC3	CV 101/ EX 101	Applied Mechanics/ Electrical & Electronics Engg	3	2	4
4.	ESC4	IT 101/ ME 101	Computer programming/ Engineering Graphics	2	4	4
5.	HSS2	HP 102	Language &Communication -2	1	2	2
6.	SDP2	ME 103/ ME 102	Design Thinking/ Experimental Tools &Techniques	--	4	2
TOTAL				13	15	21

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics I
	COURSE CODE	AS101
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII

COURSE OBJECTIVES :

AS101.CEO.1: To recall and apply the methods of solving system of equations using matrices.
AS101.CEO.2: To find nth derivative and expansion of different functions.
AS101.CEO.3: To classify and solve first order ordinary differential equations.
AS101.CEO.4: To categorize and inspect the applications of first order differential equations.
AS101.CEO.5: To apply the concepts of partial differentiation.
AS101.CEO.6: To demonstrate an understanding towards the applications of partial differentiation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS101.CO.1: Inspect system of equations using matrices. [L4]
AS101.CO.2: Illustrate problems based on nth derivative and expansion of functions. [L2]
AS101.CO.3: Solve first order ordinary differential equations. [L3]
AS101.CO.4: Analyze simple real world phenomenon governed by first order ordinary differential equations. [L4]
AS101.CO.5: Infer the problems based on properties of partial differentiation. [L2]
AS101.CO.6: Examine the applications of partial differentiation. [L4]

THEORY		
UNIT 1	**Matrices**	**12 HOURS**
Rank, Solutions of system of linear equations: Homogeneous and Non Homogeneous systems,Linear dependence and independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem		
UNIT 2	**Successive Differentiation**	**8 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative, Taylors and Maclaurins theorem for expansion of functions .		
UNIT 3	**First order ordinary differential equations**	**10 HOURS**
Exact differential equations, Differential equations reducible to exact by finding integrating factors, linear differential equations, Differential equations reducible to linear form .		
UNIT 4	**Applications of first order ordinary differential equation**	**10 HOURS**
Newtons law of cooling, Electrical circuits, rectilinear motion, one dimensional heat conduction, Chemical applications- Mixing problems .		
UNIT 5	**Partial Differentiation**	**8 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative and differential, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 6	**Applications of Partial Differentiation**	**8 HOURS**
Jacobian, properties of Jacobian, Jacobian of Implicit functions, Finding partial derivative using Jacobians, Functional dependence, maxima and minima of functions of two variables.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Rank, System of Linear equations: Homogeneous and Non Homogeneous systems.		
TUTORIAL NO.02		**1 HOURS**
Linear Dependence and Independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem.		
TUTORIAL NO.03		**1 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative.		
TUTORIAL NO.04		**1 HOURS**
Expansion of functions using Taylors and Maclaurins theorems.		

TUTORIAL NO.05		**1 HOURS**
Finding solutions to exact differential equations, Differential equations reducible to exact by finding integrating factors		
TUTORIAL NO.06		**1 HOURS**
Linear differential equations,Differential equations reducible to linear.		
TUTORIAL NO.07		**1 HOURS**
Newtons law of cooling, Kirchoffs law of electrical circuits, rectilinear motion		
TUTORIAL NO.08		**1 HOURS**
One dimensional heat conduction, Chemical applications Mixing Problems		
TUTORIAL NO.09		**1 HOURS**
Examples on Partial Differentiation and Chain rule,Total derivative and differential		
TUTORIAL NO.10		**1 HOURS**
Examples on Eulers Theorem, Differentiation of an implicit function		
TUTORIAL NO.11		**1 HOURS**
Examples on Jacobian, properties of Jacobian, Functional dependence		
TUTORIAL NO.12		**1 HOURS**
Examples on Functional dependence,Maxima and minima of functions of two variables		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Thomas Calculus by G.B. Thomas, Maurice D. Weir, Joel R. Hass (ISBN:9789332519091, Pearson Education, 12th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig(ISBN-13: 9788126554232, Wiley Eastern Ltd., 10th edition)
3. Advanced Engineering Mathematics by R.K. Jain& S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Physics
	COURSE CODE	AS102
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS102.CEO.1: To make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.(L3).

AS102.CEO.2: To analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.(L4).

AS102.CEO.3: To apply the concept of behavior of light and understand the polarization phenomena.(L3) .

AS102.CEO.4: To classify and understand the difference of classical mechanics and quantum mechanics.(L2).

AS102.CEO.5: To derive the basic laws governing the motion of quantum particles.(L4).

AS102.CEO.6: To apply the concept of quantum mechanics to different applications and supplement the reasoning vis--vis understanding of different branches of Physics.(L3).

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS102.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.(L5).

AS102.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.(L3).

AS102.CO.3: Apply that light is transverse in nature. (L3) .

AS102.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.(L2).

AS102.CO.5: Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.(L5) .

AS102.CO.6: Apply the concepts of Quantum Physics in different branches of engineering.(L3) .

THEORY

UNIT 1	**Measurement and importance of span (order) of physical quantities**	**7 HOURS**

Concept of (i)significant numbers, (ii) accuracy versus precision (iii)error versus uncertainty (iv)systematic error versus random error (v) quantifying the uncertainty. Least-count of an apparatus, Methods to measure least-count with specific examples of vernier-calipers, screw-gauge, travelling microscope and spectrometer. Span (orders of magnitude) of prominent physical parameters with specific examples of Gravitational constant(G), Speed of light(c),Planks constant(h), Boltzmann constant(k) and wavelengths of electromagnetic spectrum. Importance of the orders of G, c, h and k alongwith hypothetical picture of world in case of their order becomes unity (1). Length-scale and time-scale of specific physical phenomenon.

UNIT 2	**Optics (Interference and diffraction of Light)**	**7 HOURS**

Particle nature and wave-nature with examples of wave and particle behavior of light, Introduction to wave nature, Concept of thin film, Stokes law of phase-change on reflection from a thin film, Thin film interference, Coating of lenses as an application of thin film interference, Interference in films of uniform and non-uniform thickness (with derivation), Applications of thin-film interference, Newton Ring Experiment and its applications, Diffraction as a particular case of interference.

UNIT 3	**Polarization of Light**	**6 HOURS**

Polarization of light, Production and analysis of polarized light (Brewsters law, Law of Malus), Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.

UNIT 4	**Quantum Mechanics-I .**	**8 HOURS**

Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Plancks quantum law of blackbody radiation, Matter-waves, De-Broglies concept of matter waves, Heisenbergs Uncertainty Principle, Operators, Eigen values and Eigen functions, Expectation Values, Wave-function, Physical significance of wave function.

UNIT 5	Quantum Mechanics-II .	8 HOURS
Schrodingers equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohrs atomic model.		

UNIT 6	Applications of Quantum Mechanics-LASER .	6 HOURS
Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einsteins coefficients), Principle and working of LASER with example, Application of LASER in optical fibre communication.		

PRACTICALS		
PRACTICAL NO.01		**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02		**2 HOURS**
Determination of the refractive index of a given liquid using Newton Rings Experiment.		
PRACTICAL NO.03		**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04		**2 HOURS**
Determination of the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05		**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06		**2 HOURS**
Verification of Bohrs atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07		**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08		**2 HOURS**
Determination of wavelength of a laser beam using Lloyds mirror arrangement.		

PRACTICAL NO.09		2 HOURS
Determination of Radius of Curvature of a given planoconvex lens using Newtons Rings apparatus.		
PRACTICAL NO.10		**2 HOURS**
Determination of wavelength of different colours present in a white light.		

TEXT BOOK

1. The Feynman Lectures on Physics: Volume-1-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-82-8.(Narosa Publisher)
2. The Feynman Lectures on Physics: Volume-3-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-84-2. (Narosa Publisher)

REFERENCE BOOK

1. Measurement and Instrumentation Principles: Alan S Morris, Butterworth Heinemann, ISBN 07506508184
2. AjoyGhatak ,Optics, Tata Mc Graw Hill Publishing Company. Ltd., 2nd Edition, ISBN- 0-07058583-0
3. Jenkins White, Fundamentals of Optics, Mc Graw Hill Science, ISBN-0070853460.
4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-, Mc Graw Hill Education (India) Pvt. Ltd., 6th Edition, ISBN-10- 0070151555,
5. L. I. Schiff ,Quantum Mechanics, Tata Mc Graw Hill Education (India) Pvt. Ltd., 3rd Edition, ISBN-10- 0070856435, ISBN- 13- 9780070856431.
6. PAM Dirac,Principles of Quantum Mechanics Cbs publishers and Distributors, ISBN-10-0195671074, ISBN- 13- 978019567107
7. D J Griffiths, Introduction to Quantum Mechanics, Pearson Prentice Hall Publishers.
8. Serway and Jewett, University Physics for Scientists and Engineers, Cengage Learning Publishers.
9. K. Thyagarajan and AjoyGhatak, Lasers: Fundamentals and applications, Springer, ISBN 9781441964410.
10. Worsnop and Flint; Advanced Practical Physics, Little Hampton book service Ltd., ISBN-10: 0423738909, ISBN-13: 978-0423738902.
11. Robert Eisberg and Robert Resnick; Quantum Mechanics: Of Atoms, Molecules, Solids, Nuclei and Particles; Wiley

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Chemistry
	COURSE CODE	AS103
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : Basic Chemistry of XI and XII

COURSE OBJECTIVES :

AS103.CEO.1: To summarize the basic chemistry and classic methods of analysis, which includes solution, concentrations and indicators.

AS103.CEO.2: To outline the technology involved in improving quality of water for its industrial use.

AS103.CEO.3: To illustrate the basic concepts of analytical techniques that facilitates rapid and reliable measurements.

AS103.CEO.4: To demonstrate the use of ultra violet visible spectroscopy as invaluable tools in synthetic chemistry.

AS103.CEO.5: To list and explain the principle & techniques of separation methods.

AS103.CEO.6: To define the basic aspects of advanced materials & their applications.

COURSE OUTCOMES :

On successful completion of the course the student will be able to

AS103.CO.1: Relate classic methods of analysis by preparing solutions of desired concentrations & carrying out quantitative analysis by volumetric methods. (L1)

AS103.CO.2: :Identify different methodologies for water quality analysis for industrial application. (L3)

AS103.CO.3: Apply basic concepts of electro-analytical techniques for analysis of various chemical compounds and solutions. (L3)

AS103.CO.4: Extend the knowledge of calculating wavelength of absorption of various chemical compounds using UV-Visible spectroscopy. (L2)

AS103.CO.5: Outline the different methods for separation of mixtures of various chemical compounds.(L2)

AS103.CO.6: Categorize the different engineering materials and to solve engineering problems.(L4)

THEORY

UNIT 1	**Instrumental volumetric analysis**	**7 HOURS**

Introduction, methods of expressing concentrations (Self-study), primary and secondary standard solutions. Instrumental & non instrumental analysis principles & types; Types of Titrations based on reaction, AcidBase titrations: Indicatorstheory of indicators, acid base indicators, mixed and universal indicators; Titration curve for Strong acidStrong base type, Introduction to Weak acidStrong base, Strong acid-Weak base titration, Precipitation titration, Applications in quantitative analysis.

UNIT 2	**Water treatment and effluent management**	**7 HOURS**

Introduction to conventional water treatment: Complexometric titrations: Principle, EDTA titrations, choice of indicators, Hardness of water & Alkalinity of water, causes, types, numerical, internal methods of water softening, Advanced wastewater & water Treatment: i) filtration method: Carbon adsorption ii) ion-exchange method iii) membrane techniques: reverse osmosis and electro-dialysis & their applications in water purification.

UNIT 3	**Electroanalytical Techniques**	**7 HOURS**

Introduction to electrodes, pH metry: Standardization of pH meter, titration curve for the mixture of acids Vs strong base, differential plots, Conductometry: Introduction, Kohlrauschs law, measurement of conductance, Application of conductometer in Acid-Base titrations & Precipitation titrations. Potentiometry: Introduction, application in redox titrations example of Fe/Ce titration.

UNIT 4	Ultra Violet Spectroscopy	7 HOURS
Introduction, nature of UV, Beers law, absorption of UV radiation by organic molecule leading to different excitation, Terms used in UV Spectroscopy- Chromophore, Auxochrome, Bathochromic shift(Red shift), hypsochromic shift(Blue shift), hyperchromic and hypochromic effect. Instrumentation,Effect of conjugation on position of UV band. Calculation of max by Woodward and Fisher rules for dienes and enone systems, Applications of UV Spectroscopy- Determination of structure, Determination of stereo chemistry (Cis and trans)		

UNIT 5	: Chromatography	6 HOURS
Introduction and classification of chromatographic methods, Theory, Principle, technique and applications of-Column Chromatography, Thin layer Chromatography, Paper Chromatography, Gas Chromatography. Applications of chromatographic techniques		

UNIT 6	: Engineering Materials.	8 HOURS
Introduction to Material Sciences, Polymers: Introduction, Specialty polymers, Applications in electronic gadgets, housing & construction, automobiles etc. Biomaterials: Introduction, characteristics, examples, challenges, Carbon nano materials: Introduction, types & applications. Smart materials: Introduction, types, examples like piezo materials, shape memory, thermo responsive etc..		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Preparation and Standardization of solutions		
PRACTICAL NO.02		**2 HOURS**
Estimation of ions from given solution by Redox titration		
PRACTICAL NO.03		**2 HOURS**
Determination of the total hardness of a given water sample by EDTA method		
PRACTICAL NO.04		**2 HOURS**
Adsorption: Removal of organic dyes by activated charcoal		
PRACTICAL NO.05		**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.06		**2 HOURS**
Conduct metric titrations		
PRACTICAL NO.07		**2 HOURS**
Verification of Beers law & colorimetric estimation		

PRACTICAL NO.08		**2 HOURS**
Determination of max of organic/ inorganic compound using UV-visible spectrophotometer		
PRACTICAL NO.09		**2 HOURS**
Separation of mixture of two organic compounds by Thin Layer Chromatography		
PRACTICAL NO.10		**2 HOURS**
Separation of two cations by paper chromatography		
PRACTICAL NO.11		**2 HOURS**
Separation & purification of chemical compounds by Gas chromatography		

TEXT BOOK

1. Jain & Jain, Engineering Chemistry, 15th Edition, Dhanpat Rai Publications company
2. S.M. Khopkar , Basic Concept of Analytical Chemistry,2nd edition, New Age Science Ltd ISBN-10: 1906574006 ISBN-13: 978- 1906574000
3. Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, Laxmi Publications Pvt. Ltd.

REFERENCE BOOK

1. V.M.Parikh , Absorption Spectroscopy of Organic Molecules, Addison Wesley Longman Publishing Co, ISBN 10: 0201057085,ISBN 13: 9780201057089.
2. Skoog, Fundamentals of Analytical Chemistry, Cengage Learning, ISBN-13: 978-0495558286, ISBN-10: 0495558281
3. Willard, Merritt, Dean and Settle, Instrumental Methods of chemical analysis, 6th edition, Wadsworth Publishing Co. ISBN-10: 0534081428, ISBN-13: 978-0534081423.
4. Donald R. Askeland, Pradeep Fulay, W. J. Wright, The Science & Engineering of Materials, 6th Edition, Cengage Learning, 2010
5. O. P. Virmani & A. K. Narula , Applied Chemistry: Theory and Practice , New Age International Pvt. Ltd. Publishers, ISBN-10: 8122408141, ISBN-13: 978-8122408140

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical & Electronics Engineering
	COURSE CODE	EX101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE :

COURSE OBJECTIVES :

EX101.CEO.1: To impart knowledge of energy scenario and use of renewable energy systems.
EX101.CEO.2: To explain the fundamentals of single-phase and three-phase systems.
EX101.CEO.3: To explain power supply components, electronic devices.
EX101.CEO.4: To summarize various Digital systems and application.
EX101.CEO.5: To build the knowledge of measuring system and signal conditioning circuits.
EX101.CEO.6: To get acquainted with different electrical machines.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX101.CO.1: Develop the Renewable energy system (PV) as per given specifications [L3]
EX101.CO.2: Illustrate behavior of single phase A.C. circuits and three phase A.C. circuits. [L2]
EX101.CO.3: Analyze analog circuit applications.[L3]
EX101.CO.4: Design Digital applications.[L5]
EX101.CO.5: the use of Instrumentation system in various fields.[L2]
EX101.CO.6: Identify electrical machines used in typical domestic and industrial sector based on application. [L2]

THEORY

UNIT 1	Energy Resources & Technology	6 HOURS

Energy Scenario, Energy Resources, Basic concepts about thermal, hydro and nuclear power stations (block diagram approach only).Energy conversion from thermal and mechanical energy, Energy Conservation, Use of Energy Efficient Technologies, Application of Renewable Energy Systems, Battery technology, Introduction to power quality: Definition, causes, effects, Introduction to energy audit.

UNIT 2	A.C. Circuits	7 HOURS

A.C. fundamentals, RMS and average value, R-L,R-C,RLC series parallel circuits, phasor diagram, power and power factor. Three phase voltage generation and their waveforms, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, Difference between neutral and ground conductors.

UNIT 3	Power Supply and Electronics Devices	7 HOURS

Rectifiers and Power Supplies, Elements of IC Regulated Power Supply. BJT - structure and operation, CE, CB, CC configurations, Transistor as a switch and Amplifier. MOSFET- structure (enhancement), operation and application as a switch. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.

UNIT 4	Digital Systems	7 HOURS

Digital: Logic gates, Boolean algebra, SOP representation, Combinational circuit Design: Half Adder, Full Adder, MUX, DMUX, Comparator, Code converter, Decoder Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor based systems, Embedded systems

UNIT 5	Measuring System	6 HOURS

Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, IR, Speed & LVDT. Op-Amp IC 741 pin configuration, Op-amp parameters, Inverting, Non- Inverting & Differential configuration Applications: Summing & Difference amplifier, Comparator, Voltage follower.

UNIT 6	Electrical Machines	7 HOURS

Construction of Transformer, principle of operation, EMF equation. Construction, principle of operation and types of three-phase Induction motor and DC motor, PMDC, BLDC, servo motor, stepper motor, Universal motor, Application of Electrical Motors in domestic and Industrial sector.

PRACTICALS : Total 8 Experiments from two groups.		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test it.		
PRACTICAL NO.02	**Single Phase Energy (Watt-hour) measurement.**	**2 HOURS**
To measure energy and power factor. To examine improvement in the power factor. To estimate and compare energy consumption with energy meter.		
PRACTICAL NO.03	**R-L-C series A.C. circuit**	**2 HOURS**
To calculate exact values of R, L and C for lagging and leading power factor To find power losses in R, L and C.		
PRACTICAL NO.04	**Verification of relation between Line and Phase quantities in Star and Delta circuits**	**2 HOURS**
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation. To connect Bulb load in Delta connection and verify the relation.		
PRACTICAL NO.05	**Open circuit & Short circuit test on a Single Phase transformer**	**2 HOURS**
To find iron loss and no load current To find full load copper loss and winding parameters To determine efficiency and regulation of transformer		
PRACTICAL NO.06	**Load test on D.C. Shunt Motor.**	**2 HOURS**
To find the torque and output power of motor To calculate the efficiency of motor.		
PRACTICAL NO.07	**Step angle control of Stepper motor.**	**2 HOURS**
To gain familiarity with the properties of stepper motors. To calculate the step angle of motor.		
PRACTICAL NO.08	**Speed control of BLDC/PMDC Motor.**	**2 HOURS**
To find the relation between voltage and speed of motor To develop any small application.		
PRACTICAL NO.09	**Electronics Components and Measuring instruments:**	**2 HOURS**
To study Passive components Resistors, Capacitors & Inductor. To test semiconducting components Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		
PRACTICAL NO.10	**DC Regulated Power Supply:**	**2 HOURS**
To design 12V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	**BJT as a switch and Amplifier.**	**2 HOURS**
To adapt BJT as a switch On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		

PRACTICAL NO.12	Combinational Digital Circuits:	2 HOURS
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	**Sequential Digital Circuits:**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	**OP-AMP Applications**	**2 HOURS**
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OPAMP as summing and difference amplifier. To verify the application of OPAMP as voltage follower.		
PRACTICAL NO.15	**Sensors and Transducer**	**2 HOURS**
To study and verify operation of LVDT. To study and verify the operation of Temperature sensors. (PT100, LM35)		
PRACTICAL NO.16	**Design and Simulate using MULTISIM(Minimum 2)**	**2 HOURS**
To design a counter to display 2-digit Decimal Number (00 to 99) on 7-Segment Display. To design a Flashing LED Display for a specific Pattern using MUX. To design of Inverting/Non-Inverting Amplifier using Op-Amp IC-741 for a specific gain.		

TEXT BOOK

1. B. H. Khan,Non-Conventional Energy Resources, Tata McGraw Hill, 2nd Edition, 2009, 978-0070142763.
2. Edward Hughes, Electrical and Electronic Technology Pearson India, 10th Edition, 2011, ISBN-978-8131733660
3. Neil Storey, Electronics A Systems Approach, Pearson Education Asia, 5th Edition,2013, ISBN-978-0273773276

REFERENCE BOOK

1. 1. V. N. Mittle and ArvindMittal, Basic Electrical Engineering, McGraw Hill Education, 2ndEdition,2005,ISBN- 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, McGraw Hill, 4th Edition, 2010, 978-0070699670.
3. Thomas L. Floyd, Electronics Devices & Circuits, Pearson Education India, 5th Edition, 1998, 978-0136491385.
4. Paul Horowitz, Winfield Hill, The Art of Electronics, Cambridge University press, 3rd Edition, 978-0521809269.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE : Physics and Mathematics of XI & XII

COURSE OBJECTIVES :

CV101.CEO.1: To classify force systems and explain the conditions of equilibrium.
CV101.CEO.2: To illustrate laws of friction.
CV101.CEO.3: To demonstrate the concepts of centroid and moment of inertia.
CV101.CEO.4: To describe kinematic parameters of motion.
CV101.CEO.5: To make use of laws of motion for kinetics.
CV101.CEO.6: To explain energy and momentum methods.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV101.CO.1: Determine the resultant and support reactions.(L5)
CV101.CO.2: Analyze bodies involving frictional forces. (L4)
CV101.CO.3: Evaluate centroids of bodies and moment of inertia of sections. (L5)
CV101.CO.4: Identify the type of motion and its kinematic parameters. (L3)
CV101.CO.5: Analyze the motion under action of constant and variable forces. (L4)
CV101.CO.6: Apply energy and momentum methods for kinetics. (L3)

THEORY		
UNIT 1	**Fundamentals of statics**	**8 HOURS**
Basic concepts and fundamental principles, force, moment of a force, couple, resolution and composition of forces, Free body diagrams, equations of equilibrium, equilibrium of coplanar and non-coplanar force system, applications to jib crane, beams, and cables.		
UNIT 2	**Friction**	**6 HOURS**
Introduction, types of friction, laws of friction, angle of friction, angle of repose, cone of friction, engineering applications - blocks and wedges, ladder friction, screw jack, pulley and belt drives, band brakes.		
UNIT 3	**Properties of surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity, centroids of composite 1D and 2D objects. Introduction to moment of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, MI of composite objects. Distributed loading, fluid pressure-application to dams and gates.		
UNIT 4	**Kinematics**	**8 HOURS**
Basic concepts in kinematics, Motion with uniform and variable acceleration, Motion curves, Curvilinear Motion in Rectangular coordinates, path coordinates, polar coordinates. Kinematic Link and Kinematic Pair, Kinematic Chain, Mechanisms and its inversions, instantaneous centre of rotation, Kennedy's Theorem, Applications- slider and crank mechanism, Railway engine and its supporting flywheel motions, Linkage mechanism of excavator and its system.		
UNIT 5	**Kinetics**	**6 HOURS**
Kinetics of rectilinear and circular motion of a particle acted upon by a constant and variable force system, Newtons second laws of Motion, Equations of motion, concept of dynamic equilibrium, and motion of connected bodies. Basic principles of vehicle dynamics, Forces acting on a vehicle, tire mechanics, Dynamics of linear and lateral motion.		
UNIT 6	**Energy and Momentum**	**8 HOURS**
Work, power and energy, Principles of work and Energy,Motion under a ConservativeCentral Force. Application to Space Mechanics. Impulse, momentum, Principle of Impulse and Momentum, Collisions-elastic and plastic, Direct central impact, coefficients of restitution.Applications-vehicle collisions, sports viz. cricket, tennis, billiard.		

PRACTICALS		
PRACTICAL NO.01	**Group 1] Basic principles/laws**	**2 HOURS**
1. To verify triangle law/ Lami's theorem 2. To verify polygon law of forces. 3. To verify law of moments. 4. To verify equilibrium of parallel forces. (Beam Reactions) 5. To verify equilibrium of concurrent forces in space.		
PRACTICAL NO.02	**Group 2] Friction**	**2 HOURS**
1.To verify laws of friction. 2. To determine angle of repose for a given block and surface. 3. To determine static coefficient of friction for a block on horizontal plane. 4. To determine static coefficient of friction for a block on inclined plane. 5. To determine static coefficient of friction for flat belt and drum.		
PRACTICAL NO.03	**Group 3] Centroid/centre of gravity**	**2 HOURS**
1. To determine centroid of irregular triangular lamina. 2. To determine centroid of polygonal lamina. 3. To determine centre of gravity of a wire bend. 4. To determine centroid of a composite lamina. 5. To find the shift of centroid after cutting some part of lamina.		
PRACTICAL NO.04	**Group 4] Motion(Dynamics)**	**2 HOURS**
1. To study curvilinear motion of a particle. 2. To verify value of g using compound pendulum. 3. To determine coefficient of restitution. 4. To determine mass moment of inertia of a fly wheel. 5. To verify law of conservation of momentum.		
PRACTICAL NO.05	**Group 5] Graphical Exercises**	**2 HOURS**
1. To determine resultant of concurrent forces. 2. To determine resultant of parallel/general forces. 3. To determine reactions for a simple beam. 4. To draw motion curves for given kinematics problem. 5. To determine relative velocity by graphical method. Part B] Students will have to complete a task/activity after each practical which will be based on the theme of that group. (10 Hrs)		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", Tata McGraw-Hill Education, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics", Pearson Education, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II", Tata Mc-Graw, ISBN: 978-0077402327
2. Ferdinand Singer, Harper and Row "Engineering Mechanics Statics and Dynamics", ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics", Cengage Learning, ISBN:8131509907

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	40	50	10	50	Nil	150

PRE-REQUISITE :

COURSE OBJECTIVES :

ME101.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME101.CEO.2: To develop & apply visualization skill to simple Objects.
ME101.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME101.CO.1: Recall fundamentals of projections (L1)
ME101.CO.2: Interpret engineering drawings (L2)
ME101.CO.3: Apply visualization skill to draw various views of object (L3)
ME101.CO.4: Analyzeengineeringdrawings (L4)
ME101.CO.5: Decide annotations for two dimensional drawings (L5)
ME101.CO.6: Develop and/or comprehend a simple engineeringdrawing in both First and Third angle orthographic projections(L4)

THEORY		
UNIT 1	**Visual Thinking & Solid Geometry**	**5 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections & Sectional Views**	**5 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views.		
UNIT 3	**Isometric Projections**	**5 HOURS**
Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of isometric View of Pyramid, Cone, Sphere.		
UNIT 4	**Interpretation of given view/ missing view**	**5 HOURS**
Identification of lines/ edges and surfaces, visualization of given orthographic views, adding missing/ third view, adding a sectional view, to convert a given view into sectional view.		
UNIT 5	**Auxiliary Projections**	**4 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View.		
UNIT 6	**Freehand Sketching & Technical Drawing**	**4 HOURS**
Free hand sketching- FV & TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles.		

PRACTICALS : Each Assignment contains 2 questions.		
PRACTICAL NO.01		**10 HOURS**
Projection of Lines, Plane, Solids		
PRACTICAL NO.02		**8 HOURS**
Orthographic Projections, Missing Views		
PRACTICAL NO.03		**6 HOURS**
Isometric Projections		
PRACTICAL NO.04		**4 HOURS**
Auxiliary View		

PRACTICALS : Assignments to be drawn on modeling software package.		
PRACTICAL NO.05		**4 HOURS**
Absolute and Incremental drawing.		
PRACTICAL NO.06		**6 HOURS**
Draw commands, Modify commands, Array, fillet, offset commands		
PRACTICAL NO.07		**2 HOURS**
Project drafting		
PRACTICAL NO.08		**12 HOURS**
Sketching, Solid Modeling, Assembly		
PRACTICAL NO.09		**4 HOURS**
Project modeling		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to Auto CAD, TMH Publishing co Ltd, 5th Edition, 2012, (ISBN 13: 9780070648371)
2. Basant Agarwal and C M Agarwal, Engineering Drawing, TMH Publishing co Ltd, 2nd Edition 2013, (ISBN13: 978-1-259-06288-9)
3. K C John, Engineering Graphics for Degree, PHI learning pvt. Ltd. New Delhi,2009, (ISBN: 97881-203-3788-6)
4. R. K. Dhavan, A Text Book of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

1. Luzadder, Warren J., Duff, John M, Fundamentals of Engineering, Prentice Hall of India,11th Edition, 2010, (ISBN: 978-81-203-0885-5)
2. Basudev Bhattacharya, Machine Drawing includes Autocad Supplements, Oxford University Press India, First Edition, 2011, (ISBN 13: 9780198070771)
3. K. Venugopal, Prabhu Raja V., Engineering Drawing and Graphics, New age Publications, First Edition, 2008, (ISBN: 978-81-224-2457-7)
4. N B Shaha and B C Rana, Engineering Drawing, Pearson Education, 2012, (ISBN: 9788131798058)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Computer Programming
	COURSE CODE	IT101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	4	40	50	10	25	NIL	125

PRE-REQUISITE : Knowledge of computer system.

COURSE OBJECTIVES :

IT101.CEO.1: To define and summarize the basic terminologies used in computer programming.
IT101.CEO.2: To develop and demonstrate logic for a given problem using algorithms and Flowcharts.
IT101.CEO.3: To evaluate solutions for the given problem using problem solving tools.
IT101.CEO.4: To identify and analyze different control structures.
IT101.CEO.5: To understand and use of simple data structures using Python.
IT101.CEO.6: To demonstrate and understand different computer applications in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT101.CO.1: Analyze a problem and identify and define the computing requirements appropriate to its solution[L3][L4].
IT101.CO.2: Apply the knowledge and strategies for structuring code, dividing problems up into pieces that can be solved independently, then integrating the pieces into a whole to solve a large problem [L3].
IT101.CO.3: Analyze when to select the different types of data structures such as arrays and lists as a framework for solving a problem [L4].
IT101.CO.4: Design, correctly implement and document solutions to problems using Python [L6].
IT101.CO.5: Analyze and compare alternative solutions to computing problems [L2][L4]
IT101.CO.6: Adapt to new developments in the field of computer science [L6].

THEORY		
UNIT 1	**Problem Solving Concepts**	**6 HOURS**
General Problem Solving Concepts-types of problems, problem solving with computers, difficulties with problem solving, Problem solving concepts for the computer: Constants, Variables, Data types, operators, Expressions, Equations, Problem solving tools.Programming structure-Modules and their functions, Cohesion and Coupling, Local and Global Variables, Parameters, return values		
UNIT 2	**Problem solving and Logic structure**	**8 HOURS**
Logic structures, Problem solving with sequential logic structure - The sequential logic structure, solution development. Problem Solving with Decisions decision logic structure, multiple Decision instructions, straight-through logic, positive logic, negative logic, logic conversion, Problem solving with loops and case logic structures.		
UNIT 3	**Arrays, Strings and File Processing**	**8 HOURS**
One dimensional, multidimensional array,finding maximum number in a set, Partitioning of array, finding smallest element, searching an array for a range. String Handling Operations: Concatenation, Copy, Substring, Compare, Length, Case Change, and Reverse. File handling and file handling operations, File Handling Modes.		
UNIT 4	**Programming Applications**	**6 HOURS**
Programming applications, Predictive analysis with examples, Graphics and animation, working with matrices, Graphics & Visualization, Differential Equation: Linear Differential Equations, Digital Signal Processing: Plotting different waveforms.		

PRACTICALS		
PRACTICAL NO.01		**6 HOURS**
1. Find the result of allthe arithmetic operations (Addition,Subtraction,Multiply, Division and modulo) in Python. 2. Show the distance in miles per gallon with respect user defined value in Python. 3. Find the kinetic energy of an object.		
PRACTICAL NO.02		**6 HOURS**
1. Write a Python program for printing result of five subjects for five students. 2. Choose any value and find whether the number is even or odd. 3. Identify whether the number entered by user is prime or not.		

PRACTICAL NO.03		6 HOURS
1. Solve the Fibonacci sequence using recursive function in Python. 2. Illustrate factorial of non-negative numbers in Python. 3. Build asterisk (*) graph in Python		
PRACTICAL NO.04		**6 HOURS**
Electric circuits, Chemical applications- Mixing problems.		
PRACTICAL NO.05		**6 HOURS**
1. Select the number from the entered list and find its position in Python (use Linear Search). 2. Select the number and find its position of in Python (use Binary search). 3. Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain)		
PRACTICAL NO.06		**6 HOURS**
1. Select a text file and count number of words, repeated words in a file. 2. Choose the words from the file, store in the list and sort the list is ascending order. 3. Create duplicate the file from an original file.		
PRACTICAL NO.07		**6 HOURS**
1. Predict whether the entered string is palindrome or not. 2. Compare two strings and convert in opposite case in Python. 3. Select any two words and perform concatenation operation		
PRACTICAL NO.08		**14 HOURS**
1. Create a simple picture in python using graphics package. 2. Construct 2D and 3D plotting the Objects. 3. Create Sine waveform, Cosine waveform, Square waveform, Saw-tooth waveform, using MATLAB and discrete the same. 4. Solve the matrix operations (Addition, Multiplication, and Transverse) in MATLAB. 5. Design an application to display student result using predictive analysis		

TEXT BOOK

1. 1. Problem Solving and Programming Concepts ,Maureen Sprankle , Pearson Publication, Seventh Edition, ISBN 81-317-0711-3.
2. How to think like a Computer Scientist, Learning with Python Allen Downey, Jeffrey Elkner, Chris Meyers, Green Tea Press ISBN: 0-9716775-0-6.

REFERENCE BOOK

1. 1. Learning Python Mark Lutz Oreilly Publication 5th Edition ISBN-13: 978-1449355739.
2. A MATLAB Exercise Book LudmilaKuncheva, Cameron Gray, Perfect-bound Paperback, ISBN 9781291784794.
3. How to solve it by Computer, R.G.Dromey, First Edition, Pearson Publication, ISBN 978-81-315-0562-9.
4. Introduction To Computation And Programming Using Python "Guttag John V, PHI(2014), ISBN-13 : 978-8120348660.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 1
	COURSE CODE	HP101
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level

COURSE OBJECTIVES :

HP101.CEO.1: To introduce a variety of English texts to the students.
HP101.CEO.2: To teach basic English grammar.
HP101.CEO.3: To guide the students to write in English coherently and formally.
HP101.CEO.4: To improve the students overall communicative competence in English through activities like group discussions and debates.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP101.CO.1: Interpret texts written in English. [L2, L5]
HP101.CO.2: Apply English grammar rules correctly. [L3]
HP101.CO.3: Develop sentences and texts in English coherently and formally. [L3, L6]
HP101.CO.4: Demonstrate overall improvement in communication skills. [L 2]

THEORY		
UNIT 1	**Functional Grammar**	**4 HOURS**
Use of tenses in day to day communication and academic writing, Direct and Indirect Speeches, Active and Passive voices, Degrees of comparison, Use of the parts of speech in sentence composition, Verb forms and Modal auxiliaries		
UNIT 2	**Communication**	**8 HOURS**
Concept of communication, Types-verbal and non-verbal, principles of effective communication, barriers to communication, cross-cultural communication		
UNIT 3	**Academic Writing**	**6 HOURS**
Essentials of good writing, Review writing, Letter writing, Report writing, Prcis writing, and Essay writing		

PRACTICALS		
PRACTICAL NO.01	**Common Errors in Communicative English**	**6 HOURS**
A task of identifying and correcting the common errors in general as well as academic English by using audios and relevant academic texts; tips on punctuation.		
PRACTICAL NO.02	**Debate**	**4 HOURS**
Concept, Dos & Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos & Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.04	**Role Play**	**4 HOURS**
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation		
PRACTICAL NO.05	**Review and Letter Writing**	**4 HOURS**
How to write a review, characteristics and essentials of a good review, writing a review on a book or short story, types of letters- formal, informal; layout of business letters		

PRACTICAL NO.06	Report Writing and Prcis Writing	4 HOURS
Types of reports, format and writing a report, What is prcis writing? Rules of prcis writing		
PRACTICAL NO.07	**Essay Writing**	**2 HOURS**
What is an essay? Tips to write a good essay, Types of essays		

REFERENCE BOOK

1. 1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Raymund Murphy: Essential Grammar in Use, Cambridge, 3rd Edition, ISBN-13: 9780521133890
3. William Sanborn Pfeiffer: Technical Communication A Practical Approach, 6th Edition, Pearson Education, ISBN-13: 978-8131700884
4. Dutt et.al. : A Course in Communication Skills, Foundation, 1st Edition
5. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
6. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
7. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
8. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques- I
	COURSE CODE	ME102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	30	-	20	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME102.CEO.1: To introduce different tools and study the various measurement techniques.
ME102.CEO.2: To study different parts of the system along with its functions and applications.
ME102.CEO.3: To list various tools used for the said application.
ME102.CEO.4: To identify the function of various parts of system.
ME102.CEO.5: To impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME102.CEO.6: To apply the knowledge to find the solutions for basic engineering problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME102.CO.1: Recall the tools required for measurements. (L1)
ME102.CO.2: Summarize the applications of various engineering tools used. (L2)
ME102.CO.3: Identify the right tool for selected purpose. (L3)
ME102.CO.4: Inspect various parts of the system .(L4)
ME102.CO.5: Justify the most appropriate technique which can be compatible with the existing environment. (L5)
ME102.CO.6: Develop the system which will give appropriate solution to the identified problem. (L6)

PRACTICALS		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Study and analysis of various components on the motherboard of a standard desktop computer.
2. Installation of various components like hard disk drive on the motherboard and check the system setup for verification.
3. Formatting the hard disk drive and installation of Windows and Linux operating system making the system dual boot
4. Study of various network components like switch, Router and configure the devices.
5. Crimping of Unshielded Twisted Pair cable. (Cat-6) 6. Study of TCP/IP Stack, and configure as well as develop a Local Area Network.
7. Configuration of Network Monitoring tool and checking the results
8. Installation of DHCP server and checking the results.
9. Installation of web server and checking the results.
10. Configuration of MS Access and Deploying Access 2007 Runtime-Based Solutions
11. Study and usage of Google Tools (creating Forms, Blog).
12. Using the Google form with add on, create a PDF file of the form.
13. Designing a static HTML page
14. Uploading the pages using FTP server on a web site
15. Deploy a simple web site using LAMP server creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Basic electronics component and switches
2. PCB and Soldering Tools And Technique
3. Relay and application
4. Manufacturing of extension board/Spike Guard
5. Series and parallel connection of Electrical Load
6. Actuators and application (Electrical and Mechanical).
7. PCB Wizard
8. Proteus
9. Virtual Instrumentation.
10. Cathode Ray Oscilloscope
11. Power Supply

PRACTICAL NO.03	Mechanical Engineering Laboratories (Minimum 6practicals from the following	12 HOURS

1. Linear and angular measurements.
2. Types of mechanism and making any one mechanism containing four links using card board.
3. Open a household component and explain it with free hand sketches.
4. Draw the outline of the problem identified for project on software package.
5. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
6. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
7. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
8. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
9. Measurement of Relative humidity of air in the lab.
10. Measurement of hardness of Steel and Aluminum.
11. Measurement of stiffness of helical spring (compression or tension). Open IT
12. Mixer or kitchen machine/ Printer.
13. Refrigerator/ Window Air Conditioner.
14. Boiler and accessories / thermal power plant (Mini).
15. Two stroke or four stroke engine.
16. Assembly and Disassembly of parts in any software package.
17. Introduction to threaded fasteners and joints using threaded fasteners.

PRACTICAL NO.04	Chemical Engineering (Minimum 3 practicals from the following	06 HOURS

1. Determination of specific gravity of liquid
2. Study of molecular diffusion
3. Liquid liquid extraction: Separation of one liquid component from the solution.
4. Solid-liquid separation from filtration
5. Membrane Separation process
6. Fuel from Plastic
7. Demonstration of mechanical operation models.
8. Production of Biodiesel
9. Open and Study Heat Exchangers.
10. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Mimimum 3 Practicals from the following)	06 HOURS

1. To find the area and included angle of given plot and fix boundary from given plan.
2. To determine the level difference between 5 points with level tube and determine height of tower with trigonometry.
3. To draw the plan of given housing to a given scale.
4. To draw line diagram of household water supply line and sewage line with list of materials used.
5. To draw line diagram of rain water harvesting unit with all details and its importance.
6. To make report on daily water requirement in public building and its waste water disposal, and reuse.
7. To identify and make report on the earthquake resisting structural members of building and its role.
8. To demonstrate the lifesaving dos and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

TEXT BOOK

1. Bruce Hallberg, Networking A Beginners Guide , 4th edition, Tata McGraw-Hill,2005, ISBN 0-07-060791-5
2. R.S. Khandpur, Printed Circuit Boards Design, Fabrication, Assembly and Testing, Tata McGraw-Hill Education, 2005, ISBN 0070588147, 9780070588141.
3. S R Dara, Engineering Chemistry, 5th edition, S.Chand , ISBN 81-219-0359-9

REFERENCE BOOK

1. Mackenzie L. Davis, Water and Wastewater Engineering, 13th edition, Tata McGraw- Hill, ISBN 978-1-25-906483-8
2. R. S. Khurmi, J. K. Gupta, Theory of Machines, 14th edition, S. Chand, ISBN 81-219-2524-X
3. Philip Wankat, Seperation Process Engineering , 3rd edition, Pearson, ISBN 978-93-325-2484-2
4. N.V. Ragvendra, L. Krishnamurthy, Engineering Metrology and Measurements, Oxford University Press, ISBN 978-0-19-808549-2.
5. Dr. Vinod Hosur, Earthquake- Resistant Design of Building Structures, Wiley, ISBN 978-81265-3859-1
6. M. S. Shetty, Concrete Technology, S. Chand, 2008, ISBN 9788121900034.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME103
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	25	-	25	50

PRE-REQUISITE : -

COURSE OBJECTIVES :

ME103.CEO.1: Disseminate the philosophy of design thinking.
ME103.CEO.2: Impart the information regarding User centric approach.
ME103.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME103.CEO.4: Enhancethinking in order to inspect diverse solutions.
ME103.CEO.5: Sensitize about the feasibility, desirability and viability criterias for selection of appropriate solution.
ME103.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME103.CO.1: Recall fundamental principles of design thinking (L1)
ME103.CO.2: Explain all the dimensions of user and his needs using design thinking approach (L2)
ME103.CO.3: Identify user centric problem by using information gathering techniques (L3)
ME103.CO.4: Compare multiple solutions through ideation process (L4)
ME103.CO.5: Justify most appropriate solution for defined user centric problem (L5)
ME103.CO.6: Develop the most optimum solution (L6)

SESSION		
SESSION 1		**2 HOURS**
Design thinking Methodology General Problem Statement, Random check list, mind mapping, Categorization of random check list.		
SESSION 2		**2 HOURS**
Brainstorming of problem areas, Research Methodology Information gathering Primary, Secondary Sources, data presentation, Preparation of survey forms		
SESSION 3		**2 HOURS**
SWOT analysis, drawing inferences, translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of cuboids, cylinders, simple form products (Isometric views) Ideation sketches, Ergonomic and aesthetic consideration in design		
SESSION 4		**2 HOURS**
Concept validation, evaluation and detailing, prototyping		

PROJECT		
PHASE NO.01		**4 HOURS**
General Problem Statement and problem background		
PHASE NO.02		**4 HOURS**
Research methodology		
PHASE NO.03		**4 HOURS**
Design Brief		
PHASE NO.04		**8 HOURS**
Ideation		
PHASE NO.05		**4 HOURS**
Concept Evaluation, Validation and Concept detailing		
PHASE NO.06		**8 HOURS**
Prototyping		
PHASE NO.07		**8 HOURS**
Report Writing		

TEXT BOOK

1. Engineering Design Process, Second Edition Yousef Haik and Tamer ShahinPublisher, Global Engineering. Cengage Learning. ISBN-13: 978-0-495-66814-5.
2. Product Design and Development, Kevin Otto and Kristin Wood, Product Design: Techniques in Reverse Engineering and New Product Development, Pearson Education Inc. ISBN-10: 0130212717.
3. Product Lifecycle Management, Grieves, Michael, McGraw-Hill, 2006. ISBN 0071452303.
4. Lateral Thinking: Creativity Step by Step Harper Perennial; Reissue edition (24 February 2015) (Perennial Library) Six Thinking Hats by Edward de Bono Paperback ISBN-10: 0060903252.
5. Design Methods, John Chris Jones., John Wiley & Sons, David Fulton Publishers, London, ISBN 0-471-28496-3.

Web references

1. www.designcouncil.org.uk
2. www.surveymonkey.com
3. http://en.red-dot.org

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics II
	COURSE CODE	AS104
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII, Mathematics I

COURSE OBJECTIVES :

AS104.CEO.1: To identify different methods to evaluate integrals.
AS104.CEO.2: To classify and solve linear differential equations of higher order
AS104.CEO.3: To demonstrate an understanding towards evaluating multiple integrals.
AS104.CEO.4: To relate and examine the applications of multiple integrals.
AS104.CEO.5: Analyse different probability distribution functions.
AS104.CEO.6: To study different statistical methods for solving problems

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS104.CO.1: Distnguish different methods to evaluate integrals.(L4)
AS104.CO.2: Conclude solutions for higher order lineardifferential equations(L4)
AS104.CO.3: Evaluate the multiple integrals(L5)
AS104.CO.4: Apply the knowledge of multiple integrals wherever required(L3)
AS104.CO.5: Solve the probability distribution problems(L3)
AS104.CO.6: Assess statistical problems(L5)

THEORY COURSE CONTENT		
UNIT 1	**Integral Calculus**	**8 HOURS**
Reduction Formulae , Beta - Gamma functions and Differentiation under integral sign.		
UNIT 2	**Linear Differential Equations of higher order**	**8 HOURS**
General solution of Linear Differential equations with constant coefficients, Method of Variation of parameters, Equations reducible to Linear Differential equation with constant coefficients: Cauchy&Legendres linear differential equations		
UNIT 3	**Multiple Integrals**	**8 HOURS**
Tracing ofCurves: Cartesian curves, Polar curves, Parametric curves ,Double Integration, Evaluation of Double Integration, Change of order of integration, Integration by transforming Cartesian to Polar Coordinate system, Triple integration, Integration by transforming to spherical and cylindrical polar coordinates		
UNIT 4	**Applications of Multiple Integrals**	**8 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		
UNIT 5	**Probability**	**8 HOURS**
Probability, probability density function, probability distribution:Binomial, Poisson, Normal .		
UNIT 6	**Statistics**	**8 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Examples on Reduction Formulae, Beta and Gamma functions. Examples on Differentiation under integral sign		
TUTORIAL NO.02		**1 HOURS**
General solution of Linear Differential equations with constant coefficients , Method of Variation of parameters.		
TUTORIAL NO.03		**1 HOURS**
Equations reducible to Linear Differential equation with constant coefficients: Cauchy- Euler equations		

TUTORIAL NO.04		**1 HOURS**
Tracing of Cartesian curves .Tracing of Polar and Parametric curves .Double Integration, Evaluation of Double Integration, Change the order of integration.		
TUTORIAL NO.05		**1 HOURS**
Integration by transforming Cartesian to Polar Coordinate system, Triple integration,Integration by transforming to spherical and cylindrical polar coordinates.Applications of multiple integrals:To find Area, Volume		
TUTORIAL NO.06		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.07		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		
TUTORIAL NO.08		**1 HOURS**
Probability, probability density function, Probability distribution:Binomial		
TUTORIAL NO.09		**1 HOURS**
Probabilitydistribution :Poisson, Normal. Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.10		**1 HOURS**
Moments, skewness and kurtosis,correlation and regression.		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Calculus by G.B. Thomas &R.L.Finney (ISBN:81-7758-325-5, Pearson Education, 9th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig, Volume I & II (ISBN-10: 8126543132, ISBN-13: 978-8126543137, Wiley Eastern Ltd.)
3. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

5. Advanced Engineering Mathematics by Dennis G. Zill& Warren S. Wright; Jones and Bartlett Publishers, 4th edition, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.

6. Higher Engineering Mathematics by B.S. Grewal (ISBN:81-7409-195-5,Khanna Publications,39 th edition)

7. Applied statistics and probability for engineers fourth edition by Douglas C. montgomery , George C runger(ISBN No:978-81-265-2315-3 wiley)

8. Miller& Freunds Probability and statistics for engineers by richard A johnson, irwin-miller,johnfreund(ISBN no:978-93325-5041-4,Pearson)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 2
	COURSE CODE	HP102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level; Language and Communication- 1

COURSE OBJECTIVES :

HP102.CEO.1: To familarise the students with sounds in English and introduce phonemic transcription.

HP102.CEO.2: CEO.2: To enrich the vocabulary of the students with AWL and NAWL.

HP102.CEO.3: To acquaint the students with public speaking, presentation and interview skills in English.

HP102.CEO.4: To develop the students reading and listening skills with the use of written audio and video texts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP102.CO.1: Recognise and reproduce the sounds in English effectively. [L1]

HP102.CO.2: Choose and employ appropriate words from AWL and NAWL in communication. [L1, L3]

HP102.CO.3: Express their ideas effectively and demonstrate skills in interpersonal communication. [L2, L3]

HP102.CO.4: Analyse and infer from written, audio and video texts. [L 2, L4]

THEORY		
UNIT 1	**Phonetics and Vocabulary**	**3 HOURS**
Phonemes in English and phonemic transcription; Essential academic vocabulary (Academic Word List and New Academic Word List); Dictionary Skills; Phrasal verbs and collocations		
UNIT 2	**Oral Communication**	**4 HOURS**
Public Speaking; Presentation Skills; Interview Skills and telephonic communication; Meetings (types, agenda and minutes)		
UNIT 3	**Active Listening and Reading with Comprehension**	**5 HOURS**
Concept and types of listening; Steps in listening with comprehension; Essentials of good listening; Concept and types of reading; Guidelines for reading with comprehension; Analytical reading		

PRACTICALS		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**2 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Vocabulary Enrichment**	**2 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills		
PRACTICAL NO.03	**Phrasal Verbs and Collocations**	**2 HOURS**
Use of phrasal verbs and collocations; reading literary pieces, essays to identify phrasal verbs in context; story-telling		
PRACTICAL NO.04	**Public Speaking**	**2 HOURS**
Attributes of a good public speaker; prepared and extemporaneous speech; Listening to and Reading famous speeches		
PRACTICAL NO.05	**: Presentations**	**2 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.06	**Interview Skills and Telephonic Communication**	**2 HOURS**
Etiquettes of attending interviews; Preparation; Telephonic communication; Mock Interviews		

PRACTICAL NO.07	**Mock Meetings**	**2 HOURS**
Importance of effective interpersonal communication; working in teams; Mock Meetings		
PRACTICAL NO.08	**Active Listening**	**6 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		
PRACTICAL NO.09	**Reading with Comprehension**	**4 HOURS**
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
3. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
4. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
5. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
6. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
7. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Second Year

Bachelor of Technology in Electronics Engineering

2016-2020

(With Effect from Academic Year: 2017-2018)

MIT | Academy of Engineering (An Autonomous Institute)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	2017-18
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**RELEASE DATE**	**:**	1/06/2017
	REVISION NO.	**:**	0.0

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS202	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	ET202	Analog Electronics	3	2	4
5.	DC2	EX202	Applied Digital Circuits	3	2	4
6.	SDP3	ET206	Prototyping	---	4	2
TOTAL				**14**	**14**	**21**

SEMESTER:IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	---	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	EX211	Analog and Digital Communication	3	2	4
5.	DC4	EX212	Circuit Theory	3	2	4
6.	SDP4	EX213	Minor Project	---	4	2
TOTAL				**15**	**12**	**21**

Note: L: Lecture, P: Practical

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2016 - 2017
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Environmental Science
	COURSE CODE	CH201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	15	-	50	125

PRE-REQUISITE : AS103: Chemistry

COURSE OBJECTIVES :

CH201.CEO.1: Give an overview of exploitation of various natural resources and its impact on the environment.
CH201.CEO.2: Understand the ecosystem and biodiversity.
CH201.CEO.3: Understand the importance of environment and its conservation.
CH201.CEO.4: Learn about the environmental pollution sources, effects and control measures.
CH201.CEO.5: Make aware of the national and international issue for the environment.
CH201.CEO.6: Make aware about the social and environmental responsibility.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH201.CO.1: Identify the various human activities adversely affecting the natural resources and the balance ecosystem.
CH201.CO.2: Observe the various aspects of ecosystems and suggest ways to protect them.
CH201.CO.3: Experiment the pollution of given locality and suggest steps to mitigate pollution.
CH201.CO.4: Record the sources of pollution and their controls.
CH201.CO.5: Compare laws and standards for pollution.
CH201.CO.6: Categorize the social and professional responsibility towards environment.

THEORY COURSE CONTENT		
UNIT 1	**Environment**	**5 HOURS**
Importance of environment, Biosphere, Structure and function of an ecosystem, ecological pyramids, effects of population growth on environment. Natural cycles: hydrologic, carbon, nitrogen, phosphorus and Sulphur cycle. Understanding carbon foot prints, Role of the environmental engineer. Need of environmental legislations and environmental Acts in India. Functions of central and state pollution control boards. **Further Reading:**		
UNIT 2	**Resources**	**4 HOURS**
Natural, conventional and non-conventional, Natural and manmade disasters on environment. Case studies on use and Impact of overutilization of natural resources: Food, forest, water, energy, land. **Further Reading:**		
UNIT 3	**Pollution**	**4 HOURS**
Structure and composition of atmosphere, Pollution, types of pollution, causes of pollution effects, control and prevention. Air, solid and water waste management Pollution prevention and control act. **Further Reading:**		
UNIT 4	**Pollution Impact**	**5 HOURS**
Case study on Nuclear Accidents; floods; land slid; climate change; air pollution in cities, water pollution; noise pollution. Case study on drought situation in Vidarbha-Marathwada. **Further Reading:**		
UNIT 5	**Social Issues**	**5 HOURS**
Case study on Plastic waste management, domestic waste issue, food problem in India & globally. Modernization of agriculture, traffic and pollution, e-waste disposal. **Further Reading:**		
UNIT 6	**Sustainable Development**	**5 HOURS**
Concept of sustainable development. Utilization and conservation of natural resources. Rainwater harvesting & Water management techniques. Role of an individual in environment protection. Energy audit, disaster management. **Further Reading:**		

PRACTICAL		
PRACTICAL NO.01	**Title: Fukushima Japan Nuclear Accident**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.02	**Title: Malin Land Slide**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.03	**Title: Drought Situation in Vidarbha & Marathwada**	**2 HOURS**
Details of the drought situation will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of situations.		
PRACTICAL NO.04	**Title: River water pollution case study**	**2 HOURS**
Details of the River pollution of Ganga, Indrayani etc. will be discussed with the students. Students are supposed to write a case study report on the various causes of river pollution, preventive measures to avoid this & water treatment methodologies forriver water treatment.		
PRACTICAL NO.05	**Title: Project**	**16 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		

TEXT BOOKS

1. Rao C.S. Environmental Pollution Control Engineering, Wiley Eastern Publications. ISBN: 9780470217634.
2. Kamaraj. P & Arthanareeswari .M, Environmental Science Challenges and Changes, 4th Edition, Sudhandhira Publications, 2010.
3. Sharma. B.K. and Kaur, Environmental Chemistry, Goel Publishing House, Meerut, 1994 ISBN:8182830125.
4. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. ISBN-10: 1111988935 ISBN: 9781111988937
5. Metcalf Eddy Wastewater engineering: Treatment and reuse, McGraw Hill, ISBN: 007041878.

REFERENCE BOOKS

1. Garg, S.K and Garg, R., Ecological and Environmental Studies, Khanna Publishers, Delhi, 2006.ISBN: 9788174092182.
2. H. S. Peavy, D. R. Rowe, G. Tchobanoglous, Environmental Engineering, McGraw Hill, ISBN: 8428204470.
3. Helen Kavitha. P Principles of Environmental Science, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
4. Henry J.G. and Heinke G.W., Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
5. Masters G.M., Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall of India, New Delhi, 2004. ISBN: 0131481932 ISBN: 9780131481930.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS202.CEO.1: To find the Laplace transform of continuous time signals (functions).
AS202.CEO.2: To determine the Fourier constants and construct the Fourier series.
AS202.CEO.3: To construct the integral representation of functions using Fourier transform.
AS202.CEO.4: To find the Z transform of discrete time signals (functions).
AS202.CEO.5: To apply numerical methods for constructing functions and solving Differential Equations.
AS202.CEO.6: To write and execute the program on problems of Laplace, Fourier and numerical methods using MATLAB.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS202.CO.1: Analyze the output response of given linear system using Laplace Transform.
AS202.CO.2: Analyze the frequency response of the system using appropriate Fourier transform.
AS202.CO.3: Determine the stability of discrete system and the solution of difference equation using Z-Transform .
AS202.CO.4: Justify the selection of appropriate transform for a given system.
AS202.CO.5: Determine the solution of ordinary differential equations using Eulers, Runge-Kutta 4th order and the interpolation using Newtons and Lagranges interpolating methods.
AS202.CO.6: Implement Laplace Transform, Fourier transform and Numerical methods to find the solution of given problem using MATLAB.

THEORY

UNIT 1	Laplace Transform I	6 HOURS

Introduction of Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication by t, Division by t. Laplace Transform of derivatives, integration, Unit Step function, Impulse Function and Periodic Functions.

UNIT 2	Laplace Transform II	6 HOURS

Introduction of Inverse Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication bys, Division bys. Inverse Laplace Transform of elementary functions, Derivatives, Integration. Use of partial fractions to find Inverse Laplace Transform. Solution and analysis of linear differential equation to linear system.

UNIT 3	Fourier Series	6 HOURS

Periodic functions, Fourier series, Dirichlets conditions, determination of Fourier constants, Half ranges series, Even function series, odd function series, arbitrary period functions series.

UNIT 4	Fourier Transform	6 HOURS

Introduction of Fourier Transform, Complex exponential form of Fourier series, Fourier Integral Theorem (without proof), Fourier transform and its properties, Fourier Sine Transform, Fourier Cosine Transform, and Inverse Fourier transforms, Fourier Transform of derivatives of a function, Analysis of frequency response.

UNIT 5	Z- Transform and Inverse Z-Transform	6 HOURS

Z-transform: Introduction, Definition, Z-transform of standard functions, Properties of Z- transform: Linearity, change of scale, shifting, multiplication by k, division by k. One sided Z-transform, Pole-zero plot and stability of a system. Inverse Z- transform: Introduction, Basic results, Partial fraction method, Inversion integral method, Solution to the difference equation.

UNIT 6	Numerical Methods	6 HOURS

Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method and Ordinary differential equations by Eulers, Modified Eulers, Runge-Kutta 4th order methods.

PRACTICAL: Any 10 practicals are performed as per the requirement of a branch.		
PRACTICAL NO.01		**2 HOURS**
Introduction to MATLAB: Syntax, keywords, matrices, polynomials, loops.		
PRACTICAL NO.02		**2 HOURS**
Introduction to MATLAB: In-built functions, 2D/3D plots, creating simple programs.		
PRACTICAL NO.03		**2 HOURS**
Finding Laplace transforms of functions, solution of differential equations using Laplace transforms.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms.		
PRACTICAL NO.05		**2 HOURS**
Numerical Integration: Trapezoidal, Simpsons 1/3rd and Simpsons 3/8th rule.		
PRACTICAL NO.06		**2 HOURS**
Interpolation techniques: Lagranges Interpolation.		
PRACTICAL NO.07		**2 HOURS**
Interpolation techniques: Newtons Interpolation.		
PRACTICAL NO.08		**2 HOURS**
Solution of differential equation by modified Eulers method.		
PRACTICAL NO.09		**2 HOURS**
Solution of differential equation by Runge-Kutta method.		
PRACTICAL NO.10		**2 HOURS**
Curve Fitting: Linear, Quadratic.		
PRACTICAL NO.11		**2 HOURS**
Solution of algebraic equations: Newton- Raphson method.		
PRACTICAL NO.12		**2 HOURS**
Solution of algebraic equations: Bisection method.		
PRACTICAL NO.13		**2 HOURS**
Curve Fitting: Cubic, Exponential.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2003, ISBN-13: 9788126537204, 8126537205.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	System Engineering
	COURSE CODE	ET201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	NIL	25	125

PRE-REQUISITE :

1: ME102 Engineering Tools and Techniques
2: ME103 Design Thinking

COURSE OBJECTIVES :

ET201.CEO.1: To describe the rationale for using systems thinking for complex adaptive systems
ET201.CEO.2: To prioritize with stakeholders in a participatory way for research study
ET201.CEO.3: To design system engineering frame work
ET201.CEO.4: To apply system engineering tools
ET201.CEO.5: To evaluate the system

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET201.CO.1: Explain the rationale for using systems thinking for complex adaptive systems.
ET201.CO.2: Analyze interaction with stakeholders in a participatory way for research study.
ET201.CO.3: Design System Engineering framework.
ET201.CO.4: Apply system engineering tools.
ET201.CO.5: Evaluate the system.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Systems Thinking**	**4 HOURS**
Introduction to Systems Thinking and Understanding simple systems, Complex and Complex Adaptive Systems, Stakeholders and their engagement. **Further Reading : Case studies - Public health system, transportation system, solid waste management system.**		
UNIT 2	**System Dynamics Simulation**	**6 HOURS**
Standard test system conceptualization and mapping: an introduction to causal loop diagrams (Systems Thinking Diagrams; Influence Diagrams), principles of stock-and-flow diagrams, Application of stock and flow diagrams to engineering problems, Analysis using agent-based models, Application of systems thinking to policy decision making. **Further Reading : Case studies - Understand how to use Vensim PLE / Netlogo (Free academic version) to develop causal loop diagrams. Application of Stock and Flow Diagrams to Public Health.**		
UNIT 3	**Introduction to Systems Engineering**	**8 HOURS**
History and definitions, mission of system, types of system, system and its environment, System as a product, Systems Engineering as a profession, System Engineering Process and Management, Life cycle Integration. **Further Reading: Case studies - London Walkie-Scorchie Skyscraper, BRT system, garbage collection, Unmanned aerial vehicle, Washing machine etc.**		
UNIT 4	**System Engineering Design**	**8 HOURS**
System development process - Systems engineering method, Systems testing through out development. Requirement Engineering - Inputs, requirement types, purpose, Requirement analysis, requirement outputs. Case studies – Unmanned Aerial System. Functional Analysis - Schematic, Functional block diagram. Design Synthesis - Process, Product realization, Product implementation, Product Integration, Product verification, product validation, product transition. **Further Reading: Development approaches – Waterfall, incremental spiral, evolutionary acquisition.**		
UNIT 5	**System Engineering Tools**	**8 HOURS**
Context diagrams, QFD (Quality function deployment), House of quality, Timeline analysis sheet and requirement allocation sheet, Functional flow diagrams, Design synthesis tools- Concept description sheet (CDS), Functional matrix diagram, Requirement break down structure, N2 diagrams, data flow diagrams, control flow diagrams, behavioral diagrams. **Further Reading: Popular System life cycle models (DoDMIL STD 499B, IEEE 1220 SEP, EIA 632 SEP, ISO/IEC15288, Professional Engineering model, NASA model, software life cycle models).**		
UNIT 6	**Partial Differential equations.**	**7 HOURS**
Verifying and validating the system, managing the configuration of the system, managing technical risk, project management, ILS (Integrated logistic support). **Further Reading: Case studies - Aircraft system.**		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Community based causal mapping – Developing causal loop diagrams for health care using Vensim.		
PRACTICAL NO.02		**2 HOURS**
Developing stock-and-flow diagrams for health care system using Vensim.		
PRACTICAL NO.03		**2 HOURS**
(Any 02) 1. Unmanned aerial vehicle 2. Conduct some research into the London building known as the Walkie Scorchie. Identify what circumstances led to the building earning that unfortunate name and suggest which aspects of the systems engineering process may not have been followed correctly (at least as the issues have been reported in the media).The following links may assist in your investigations. http://www.dezeen.com/2013/09/06/we-made-a-lot-of-mistakes-with-this-building-says-walkie-scorchie- architect-vinoly/ http://www.ibtimes.co.uk/walkie-scorchie-talkie-building-sunlight-london-reflects-504342. 3. Examine in detail the BRT of New Delhi,Identify what circumstances led to the failure of the system. 4. Garbage collection 5. Washing machine		
PRACTICAL NO.04		**2 HOURS**
Determine the typical structure and contents of the system requirements specification (SyRS) for any one of the case study.		
PRACTICAL NO.05		**2 HOURS**
Choose an example related to your own discipline and then list and describe three detailed design tools to come up with a satisfactory design for anyone of the case study.		
PRACTICAL NO.06		**2 HOURS**
We want to modify our house (or from any one of the case studies) by for futuristic requirement to accommodate your children after marriage.Explain how accurate technical data on the house (as confirmed by PCA and FCA) supports this modification. Explain how the early design stages could have assisted with this modification if expandability/ future growth had been accounted for.		
PRACTICAL NO.07		**2 HOURS**
Mini project based on society, science and technology problem clubbed with Field visit and presentation (Define problem, data collection, requirement analysis,functional analysis.Design solution, progressive presentation of solution and final presentation). Note: The group of students should be from different program (Multidisciplinary group).		

PRACTICAL NO.08		2 HOURS
Watch the movie The Pentagon wars and write a two page report to assess what aspects System Engineering went wrong. (https://www.youtube.com/watch?v=iDYpRhoZqBY) .		
PRACTICAL NO.09		**2 HOURS**
Field visit / Industrial visit from system engineering point of view.		
PRACTICAL NO.10		**2 HOURS**
Working model case study of Quad copter/ aero modeling from system engineering point of view.		

TEXT BOOK

1. John D Sterman, "Business dynamics- Systems Thinking and modelling for a complex world", McGrawHill, ISBN: 007238915X.
2. Weinberg, G.M., An Introduction to General Systems Thinking, New York, NY: Dorset House Publishing, 2001, ISBN-13: 978-0932633491.
3. Alexander Kossiakoff, William N.Sweet, Systems Engineering: Principles and Practice, Wiley, 2009, ISBN-13: 978-8126524532.

TEXT BOOK

1. R. C. Dorf Dennis M Buede,The Engineering Design of systems, Wiley; 2nd edition, 2002, ISBN-13: 978-0070530393.
2. International Council of Systems Engineering, Systems Engineering Handbook, A guide for System Life Cycle Processes and Activities, version 3.2.1, January 2011.
3. Department of defense, systems engineering fundamentals, defense acquisition university press (Free e-book), https://www.scribd.com/document/321957824/SEFGuide-01-01.
4. Michael Ryschkewitsch, The Art and Science of Systems Engineering, (free e-book), https://www.nasa.gov/pdf/311198main-Art-and-Sci-of-SE-LONG-1-20-09.pdf
5. EIA 632 standard - www.psconsultech.com/yahoo-site-admin/assets/docs/EIA632.9212432.pdf
6. MIL standard - www.product-lifecycle-management.com/download/mil-std-499b-draft1993.pdf.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Analog Electronics
	COURSE CODE	ET202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	25	25	150

PRE-REQUISITE : EX101 Electrical and Electronics Engineering

COURSE OBJECTIVES :

ET202.CEO.1: Realize some of the basic electronic circuits using diodes, transistors, OP-AMP.

ET202.CEO.2: Analyze the analog electronic circuits, both discrete and integrated, required of an electronics engineer.

ET202.CEO.3: Familiarize with the circuit design techniques involving discrete devices as well as the integrated circuits.

ET202.CEO.4: Comprehend frequency response, feedback and stability of an amplifier.

ET202.CEO.5: Analyze and model the transistors at low and high frequencies.

COURSE OUTCOMES :

The students after completion of the course will be able to

ET202.CO.1: Identify and correctly utilize the external lead structure and basic electrical characteristics of common semiconductor devices (PN junctions, MOSFETs, and BJTs).

ET202.CO.2: Illustrate the feedback mechanism in the design of electronic circuits.

ET202.CO.3: Scrutinize and project electronic circuits for various signals at low and high frequencies.

ET202.CO.4: Analyze performance parameters of various electronics circuits.

ET202.CO.5: Compile component ideas into electronic circuits.

THEORY :

UNIT 1	Semiconductor Devices	6 HOURS

Diode circuits, Biasing circuits of BJT, Bias stability, Thermal runway, Thermal stability, Introduction to MOSFETs, Non ideal voltage current characteristics of EMOS, Protection circuits, Introduction to BICMOS technology .

UNIT 2	BJT and FET Amplifiers	6 HOURS

BJT small signal amplifier, Hybrid model of BJT, Approximate and exact analysis of BJT, MOSFET DC Analysis, Small signal model of MOSFET, High frequency model of MOSFET, Frequency response of amplifiers, Multistage amplifiers. .

UNIT 3	Feedback Amplifiers and Oscillators	8 HOURS

Concept of negative feedback, Effects of negative feedback on gain, bandwidth and impedances, Topologies of negative feedback viz. series and shunt, Types of amplifiers, Concept of positive feedback, Barkhausen criteria, RC Phase shift, Wien bridge Oscillator Hartley and Colpitts Oscillators, Clapp Oscillator Oscillators inFM transmitter circuit

UNIT 4	Operational Amplifiers	6 HOURS

Differential amplifier circuit and its configurations, level shifter circuits, current mirror circuits, performance parameters of OP-AMP viz. input bias current, offset current, offset voltage, Slew Rate and CMRR.

UNIT 5	Operational Amplifiers Applications - I	6 HOURS

Integrator, Frequency response of ideal and practical integrator, Differentiator, Frequency response of ideal and practical differentiator, Isolation amplifier, Requirements of Instrumentation amplifier, 3 OP-AMP Instrumentation amplifier, OP-AMP Integrator as ADC.

UNIT 6	Operational Amplifiers Applications II	6 HOURS

Comparators, Applications of Comparator, Schmitt Trigger(symmetrical/asymmetrical), Need of precision rectifier, Half wave , Full wave precision rectifiers, Square wave and Triangular wave generator,Sample and hold circuit , Converters using OP-AMP

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Limiter circuits in FM transmitter circuit.		
PRACTICAL NO.02		**4 HOURS**
Small signal amplifier for Public Address (PA) system.		
PRACTICAL NO.03		**2 HOURS**
Frequency response of the amplifier		
PRACTICAL NO.04		**4 HOURS**
Tuned circuit in FM transreceiver		
PRACTICAL NO.05		**2 HOURS**
OP-AMP parameters.		
PRACTICAL NO.06		**2 HOURS**
Low Pass and High Pass filter using OP-AMP.		
PRACTICAL NO.07		**2 HOURS**
Precision rectification in peak detector circuit.		
PRACTICAL NO.08		**4 HOURS**
Level detector using OPAMP.		

TEXT BOOKS:

1. Millman & Halkias, Integrated Electronics, Tata McGraw-Hill (TMH) Education, 2001, ISBN: 9780074622452
2. Donald A. Neamen, Electronic Circuit Analysis and Design, TMH Publishing Company Limited, 3rd Edition, ISBN:9780070634336
3. Boylestad & Louis Nashelsky, Electronic Devices & Circuit theory, Pearson New International Edition, 11th Edition, ISBN: 9780133109047

REFERENCES:

1. Millman & Halkias, Microelectronics, Tata McGraw-Hill (TMH) Education, 2001,ISBN: 9780074637364
2. Thomas L. Floyd, David L. Buchla, Electronics Fundamentals: Circuits, Devices and Applications, 8th Edition, Pearson Education Limited 2014, ISBN: 978-1292025681
3. David A. Bell, Operational Amplifiers and Linear ICs, Prentice Hall of India, 2nd Edition ISBN: 8120323599
4. Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits , TMH, 2002,3rd Edition, ISBN: 9780070530447

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Applied Digital Circuits
	COURSE CODE	EX202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : EX101: Electrical & Electronics Engineering

COURSE OBJECTIVES :

EX202.CEO.1: Study Fundamental of combinational and sequential digital systems.
EX202.CEO.2: Use the hardware description language (VHDL) for digital circuit design.
EX202.CEO.3: Verify, synthesize and implement a design written in VHDL.
EX202.CEO.4: Describe the structure of some typical programmable logic devices.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX202.CO.1: Implement common VHDL constructs.
EX202.CO.2: Implement behavioral and structural coding styles.
EX202.CO.3: Develop VHDL test bench and identify the simulation only constructs.
EX202.CO.4: Design FSM for counters and other sequential applications.
EX202.CO.5: Develop the algorithmic state machine for digital systems using MSI building blocks.
EX202.CO.6: Illustrate the various architectures and device technologies of FPGA.

THEORY COURSE CONTENT		
UNIT 1	**Combinational circuit design using VHDL**	**6 HOURS**
Need, Scope, Use and History of VLSI, Introduction to Chip Design Process, Description of Hardware Description Languages, levels of abstraction, Design Methodology: Top Down, Bottom Up, elements of HDL, Introduction to modeling styles, Data flow modeling, concurrent statements: when else, with select statements.		
UNIT 2	**Structural and behavioral modeling**	**6 HOURS**
Structural modeling: component instantiation, generic map, port map, generate statement: if generate, for generate; behavioral modeling: Process Keywords, Conditional Statements: If else statement, Case statement, Loops in VHDL, Sequential Circuits in Behavioral Modeling, Flip-flops, Counters, Combinational Circuits in Behavioral Modeling Decoder, Encoder, Multiplexer, comparison of case with if and when statements. Case study: 4-bit ALU design, RAM, ROM design.		
UNIT 3	**Advanced VHDL elements**	**6 HOURS**
Functions and Procedure, NULL Statement, NEXT Statement, EXIT Statement, synthesis and simulation concepts, functional and timing simulation, test bench development, delay models in HDL. Case study: clock divider.		
UNIT 4	**Finite state machine design**	**8 HOURS**
Synchronous or clocked sequential circuits, clock skew, Moore circuit, Melay circuits, basic design steps, state diagram, state table, state reduction, state assignment, design with unused states, lockout condition, state encoding techniques, sequence generator, sequence detector. Case study: serial adder.		
UNIT 5	**Algorithmic state machines**	**6 HOURS**
Introduction, ASM symbols and notations, ASM charts for Data path and control unit design. Case study: Data path and control unit design of Microprocessor.		
UNIT 6	**Design with programmable logic devices**	**6 HOURS**
Introduction to the PLDs like PAL, PLA, study of architecture of Complex Programmable Logic Devices, study of architecture of Field Programmable Gate Arrays.		

PRACTICAL: Develop the VHDL program for the following tasks using Xilinix 14.1.		
PRACTICAL NO.01		**2 HOURS**
To perform 8:1 Mux, 2:4 decoder, full adder in all the three modeling styles		
PRACTICAL NO.02		**2 HOURS**
To design and simulate the 4 bit comparator		
PRACTICAL NO.03		**2 HOURS**
To design and simulate a 2 bit ALU containing arithmetic & logical operations		
PRACTICAL NO.04		**2 HOURS**
To simulate behavior model of BCD-to-Seven Segment Decoder.		
PRACTICAL NO.05		**2 HOURS**
To design and simulate 4 Bit Ripple Carry Adder VHDL Code.		
PRACTICAL NO.06		**2 HOURS**
To simulate the operation of synchronous and asynchronous reset flip flops.		
PRACTICAL NO.07		**2 HOURS**
To design and simulate a 4 bit loadable binary Up-Down counter with asynchronous reset.		
PRACTICAL NO.08		**2 HOURS**
To design and simulate Synchronous 8-bit Johnson Counter.		
PRACTICAL NO.09		**2 HOURS**
To design and simulate the shift register for serial to parallel transfer of 4 bit binary number and parallel to serial transfer of 4 bit binary number.		
PRACTICAL NO.10		**2 HOURS**
To generate the sequence detectors with overlapping and non overlapping patterns.		
PRACTICAL NO.11		**2 HOURS**
To design and simulate the Mealy finite state machine for traffic light controller.		
PRACTICAL NO.12		**2 HOURS**
To design and simulate the Bi-directional Buffer.		

TEXT BOOK

1. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic Design, 2^{nd} or 3^{rd} edition, McGraw-Hill Education, ISBN-10: 1259025977 ISBN-13: 978-1259025976.
2. Charles Rothl, Digital System Design using VHDL, 2^{nd} edition, PWS Publishing Company, ISBN-10: 0495244708, ISBN-13: 978-0495244707.

REFERENCE BOOK

1. Douglas Perry, VHDL: programming by examples, Tata McGraw Hill, ISBN-10: 0070499446, ISBN-13: 978-0070499447.
2. Gothman William, Digital Electronics-An introduction to theory and practice, 2^{nd} edition, Prentice Hall India Learning Private Limited,ISBN-10: 8120303482, ISBN-13: 978- 8120303485.
3. Ashenden Peter J., Digital Design an Embedded System Approach using VHDL, Morgan Kaufmann Publishers, ISBN: 978-81-312-1663-7.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Prototyping
	COURSE CODE	ET206
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	75	75

PRE-REQUISITE : ME101 - Engineering Graphics, ME102 - Engineering Tools and Techniques, ME103 - Design Thinking, EX101 - Electrical and Electronics Engineering, CV101 - Applied Mechanics, IT101 - Computer Programming

COURSE OBJECTIVES :

ET206.CEO.1: Learn about materiality and techniques.
ET206.CEO.2: Justify the product development cycle through prototype project.
ET206.CEO.3: Inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET206.CEO.4: Develop abilities to transmit technical information clearly and test the same by delivery of presentation based on the prototype Project.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET206.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET206.CO.2: Apply acquired skills to the construction of a prototype project.
ET206.CO.3: Develop a prototype project by performing tasks in team.
ET206.CO.4: Demonstrate the work carried out in a team.

PRACTICAL

Course Introduction:

This course is aiming at a Project Based Learning methodology. Through a series of projects, students will learn to design, build, and debug engineering prototype systems. They will cover multiple aspects of the prototyping process.

Students will complete four modules in rotational manner,

1. Mechanical Prototyping (MP)
2. Electronic Prototyping (EP)
3. Software Prototyping(SP)
4. Civil Prototyping(CP)

Each module will have on an average six laboratory sessions. The students will complete them in rotational manner. Every module will award for 75 marks.

Marks of all four course modules will be averaged and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

MODULE: 1/4	**Mechanical Prototyping (MP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to prototyping**	**02 HOURS**

1. Introduction to Prototyping, traditional prototyping vs. advance rapid Prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Suitable materials and their properties.
3. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.
4. Formation of a group of 5 students per project team.

PRACTICAL NO. 02	**Design of models**	**04 HOURS**

1. Introduction of CAD software and its interaction with prototype machine.
2. 3D Modeling using CAD software package.
3. Identify physical constraints of prototyping

PRACTICAL NO. 03	Preprocessing of prototype	06 HOURS

1. Generating STL files from the 3D models & working on STL files.
2. Pre-Processing the 3D Model in KISslicer / Cuba software.
3. Suitable filament selection and its properties.

PRACTICAL NO. 04	Orientation and support generation	04 HOURS

1. Operate Repeater / Cuba software, Selection of Orientation, Supports generation.
2. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Assembly of model	08 HOURS

1. Complete machine setup.
2. Hands on experience of rapid prototype machine for part/object, assembly manufacturing.
3. Material selection, cost benefit analysis for prototyping, financial aspect.

PRACTICAL NO. 06	Project presentation	04 HOURS

1. Final Presentation and report submission (assessment).

REFERENCE BOOK

1. Rapid Prototyping: Principles and Applications in Manufacturing, Chua C K, Leong K F, Chu S L, World Scientific, ISBN-13: 978-9812778987.
2. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Gibson D W Rosen, Brent Stucker, Springer, ISBN: 978-1-4419-1119-3.
3. Rapid Prototyping: Principles and Applications in Manufacturing,Noorani R, John Wiley & Sons, ISBN: 978-0-471-73001-9.
4. Rapid Tooling: Technologies and Industrial Applications, Hilton P, Jacobs P F, CRC press. ISBN:978-0824787882
5. Rapid Prototyping and Engineering applications: A tool box for prototype development, Liou W L, Liou F W, CRC Press, ISBN: 978-0849334092.
6. Rapid Prototyping: Theory & practice, Kamrani A K, Nasr E A, Springer, ISBN: 978-0-387-23291-1.
7. Kenneth Cooper, Rapid Prototyping Technology: Selection and Application, Marcel Dekker, Inc. New York, ISBN: 082470261.

MODULE: 2/4	Electronic Prototyping (EP)	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to design and construction of electronic prototyping**	**02 HOURS**

1. Gain familiarity with basic stages; Conceptualization, Detailed Design and Implementation.
2. Acquire concepts of basic processes in electronic prototyping.
3. Form a group of students. (03 max)
4. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span.
5. Develop a plan for construction of electronic proto from a concept.

PRACTICAL NO. 02	Basic electronic prototyping skills	02 HOURS

1. Soldering
   - Demonstrate structure of solder wire, soldering temperature, soldering station and gun.
   - Highlight Industrial safety norms, use of lead free solder, extractor fan etc.
   - Use of flux, desoldering gun, desoldering techniques, removing components/wires.
   - Fix Solder defects and inspect quality of solder joints.
2. Wiring
   - Cleaning, stripping and tinning the wires.
   - Connections and protections for wires.
   - Using cable ties , heat shrink tubes, sleeves and other wire dressing techniques.
3. Breadboard
   - Bending wires and making connections on breadboards.
   - Placing components on breadboards.
   - Testing circuits using breadboards.
4. Perfboards
   - Wire connections and component assembly on perfborads.
   - Debugging assembled circuit and increasing stability.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	04 HOURS

1. Gain familiarity with PCB Design software.
2. Draw schematics for PCB design.
3. Make PCB layout as per circuit diagram.
4. Learn PCB design standards.
5. Export PCB files like gerber (.gbr), .pdf etc.

PRACTICAL NO. 04	PCB fabrication	08 HOURS

1. Develop negative imprints of top and bottom sides and expose to PCB.
2. Perform etching process for PCB.
3. Perform cleaning and shearing for required size.
4. Check continuity of tracks.
5. Use drilling machine to make drills.

PRACTICAL NO. 05	Assembly and testing of electronic proto	08 HOURS

1. Make assembly of electronic prototype as per IPC 610 D.
2. Insert components, perform lead cutting with standard clearance.
3. Review mechanical fitment of PCB with component insertion.
4. Solder components and make wiring.
5. Test prototype for electrical functionality, to perform rework if required.
6. Assemble PCB with mechanical fitments and assemblies.
7. Analyze performance and compare with specifications.

PRACTICAL NO. 06	Final project presentation	04 HOURS

1. Demonstrate an electronic prototype in a team.
2. Write a report on implementation of prototype. (10-15 pages max)
3. Present prototype implementation in a team by Power Point presentation.
4. Enumerate proposed specifications of electronic prototype.
5. Highlight financial aspects including proposed cost and bill of material.

REFERENCE BOOK

1. Printed Circuit Boards: Design and Technology, Walter C. Bosshart, Tata McGraw-Hill Education, 1983, ISBN: 978-0074515495.
2. Electronic Assembly Fabrication, Charles A. Harper, 1st ed.,McGraw-Hill Education, 2002 ISBN: 978-0071378826.
3. Soldering in Electronics Assembly, Frank Riley, 1st ed., Springer, 2013, ISBN: 978-3-662-13163-3.
4. Electronic Techniques: Shop Practices and Construction, R. S. Villanucci, A. W. Avtgis, W.F. Megow, 6th ed., Practice-Hall, 1999. ISBN: 978-0130195661.
5. Printed Circuit Boards: Design, Fabrication, and Assembly, R. S. Khandpur, 1st ed. McGraw-Hill Education, 2005, ISBN: 978-0071464208.
6. Practical Electronics for Inventors, Paul Scherz , Simon Monk ,3rd Edition, McGraw-Hill Education, 2013, ISBN 978-0071771337 (Available on TAB edition, Kindle)
7. IPC-J-STD-001E-2010, Requirements for Soldered Electrical and Electronic Assemblies, IPC. , ISBN: 9781580986922.
8. IPC-A-610 D-2014, Acceptability of Electronic Assemblies, IPC. ISBN: 9781611931549.

MODULE: 3/4	**Software Prototyping (SP)**	**28 HOURS**

PRACTICAL

PRACTICAL NO. 01	**Introduction to software engineering**	**04 HOURS**

Concepts, Software development life cycle (SDLC). Student need to use AEIOU Framework (Design Thinking) to decide the problem statement. Students will work in group of three on AEIOU framework

PRACTICAL NO. 02	**Design UML Diagrams for given problem statement**	**04 HOURS**

Students have to work in group on Project Development canvas and then design following,

1. Creation of data Flow diagram
2. Creation of block diagram
3. Design a Activity Diagram

PRACTICAL NO. 03	**Requirement analysis**	**04 HOURS**

1. Find the requirement specification of given problem statement and formulate the feasible solution.
2. Paper (low-fidelity) prototype: choose the interface intend to develop, giving the reasons (pros and cons) and describing it summarily - choose the similar interface, indicating its key characteristics.

PRACTICAL NO. 04	Design analysis	06 HOURS

1. Make an Inspiration board.
2. Start an inspiration board by listing 5-10 words that relate to your design idea or point of view. These words can be anything – from similar designs to feelings that the idea evokes.
3. Once youve listed your words, come up with at least five inspirations, and share them by providing links or images within your assignment submission. For each inspiration, give a brief (1-2 sentences) and insightful explanation of why you chose it (What did you take away from it? What did you learn from it. In other words, why did it inspire you?). Each of these inspirations should offer a different perspective to the design you are working on.

PRACTICAL NO. 05	Design analysis	06 HOURS

1. Create Storyboards
2. A storyboard is a comic-strip-like set of drawings about what interface does and how it is used to accomplish tasks in a real usage scenario. A good storyboard should clearly demonstrate who the user is, the usage situation, and the user's motivations for using the interface. It should show what the user can accomplish with interface, but it needn't (and often shouldn't) show a specific user interface design. For a storyboard including an app screen, the details of the screen are not relevant, but what those screens enable you to accomplish is. Each storyboard should comprise 5-8 panels and will provide all details of end product.

PRACTICAL NO. 06	Presentation	04 HOURS

1. Each group will be given 10 min to present their work.

REFERENCE BOOK

1. Software Engineering A practitioners Approach, Roger S, Pressman, 7th Edition, ISBN: 9780073375977
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.

REFERENCE BOOK

6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MODULE: 4/4	**Civil Prototyping (CP))**	**28 HOURS**
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**04 HOURS**
Introduction of bamboo as a construction material, its physical, mechanical properties, selection, seasoning and treatment, testing, joinery, case studies of bamboo buildings.		
PRACTICAL NO. 02	**Analysis of determinant trusses.**	**04 HOURS**
Study of different types of trusses, analysis of determinant trusses by method of joint and method of section		
PRACTICAL NO. 03	**Design bamboo trusses**	**04 HOURS**
Design of different bamboo trusses (span more than 3m), Hands on for different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo truss**	**08 HOURS**
Making of bamboo truss		
PRACTICAL NO. 05	**Testing bamboo truss**	**04 HOURS**
Testing of different bamboo truss		
PRACTICAL NO. 06	**Final project presentation**	**04 HOURS**
Comparative study of analytical and test results of forces in truss members, final project presentation.		

REFERENCE BOOK

1. Vector mechanics for Engineers: statics and dynamics by Beer & Johnston 10th edition, McGraw Hill Education , ISBN: 978-0073398242
2. Bamboo Architecture & Design (Architecture & Materials), by Chris van Uffelen, , ISBN: 978-3037681824
3. Designing and Building with Bamboo ,Jules J.A. Janssen Technical University of Eindhoven Eindhoven, The Netherlands, ISBN 978-8186247464
4. Codes and standards:
   IS 1902:1993.Code of Practice for preservation of bamboo and cane for non-structural purposes.
   IS 6874:1973 Methods of test for round bamboos
   IS 7344:1974 Specification for bamboo tent bamboos.
   IS 8242:1976 Methods of tests for split bamboos
   IS 8295 (Part 1): 1976 Specification for bamboo chicks
   ISO 22157 Standard guidelines for tensile, compressive, shear and bending Strength Parallel to grain and Perpendicular to grain.

REFERENCE

1. Paris Agreement http://unfccc.int/paris_agreement/items/9485.php
2. Kyoto Protocol(http://unfccc.int/kyoto_protocol/items/2830.php)
3. Green Building Objectives & Checklist, Auroville Bamboo Centre, Pudducherry, Tamilnadu.(http://aurovillebamboocentre.org/)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Psychology
	COURSE CODE	HP201
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	NIL	20	40	15	NIL	NIL	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP201.CEO.1: To introduce the basic concept and scope of Organizational Behavior.
HP201.CEO.2: To teach the theory of personality and its implications in the organization.
HP201.CEO.3: To evince types and styles of Leadership and the impact of values on the same.
HP201.CEO.4: To guide learners through a decision making process.
HP201.CEO.5: To enhance participants skills when practicing team work concepts through business games.
HP201.CEO.6: To introduce the concept of Motivation and constructive ways of coping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP201.CO.1: Explain human behavior in the workplace from an individual, group, and Organizational perspective.
HP201.CO.2: Develop an ability to analyze ones own personality and that of others in Organizations.
HP201.CO.3: Compare different leadership styles with an understanding of how core values affect Leadership.
HP201.CO.4: Demonstrate decision making ability
HP201.CO.5: Identify the problems associated with organizing and managing teams.
HP201.CO.6: Comprehend the correlation amongst stress, motivation and personality.

THEORY

UNIT 1	Organizational Behaviour	6 HOURS

Meaning of Psychology and Organizational Behaviour, Psychology in Organization: History of Organizational Psychology; Scope and Research in Organizational Behaviour, Structure of Organization, Organizational culture, Strong vs Weak culture, Culture vs Formalization.

UNIT 2	Perception and Decision Making	6 HOURS

Meaning, process and determinants of Perception, Process of Decision Making, The link between Perception and Individual Decision Making, Influences on Decision Making: Individual Differences & Organizational constraints, Process and ethics of decision making.

UNIT 3	Personality, Values and Leadership	6 HOURS

What is Personality, The Big Five Personality Model, The importance of values; values and ethical behavior, Leadership, Understanding Personality, values and Leadership, Emotional Intelligence-Personal and Social Competence.

UNIT 4	Understanding Team Work and Conflict Resolution	6 HOURS

Difference between groups and teams, Types of teams, Turning Individuals into Team players, Team building and Team based work, Team dynamics, Types of conflict and conflict resolution.

UNIT 5	Motivation & Stress	4 HOURS

Motivation and its types, Content and Process Theories of Motivation, Concept and reactions to stress, Potential effects of stress, Coping with and managing stress.

TEXT BOOK

1. S. P. Robbins, Organizational Behavior Prentice-Hall India, 1995, ISBN-11:81-203-2875-2.
2. F. Luthans, Organizational Behavior. McGraw-Hill, 1995, ISBN-13: 0072873876.
3. U. Sekarn, Organizational Behavior: Text and Cases, Tata McGraw Hill, 1996, ISBN: 0074603663.
4. Furnham, The Psychology of Behavior at Work, Psychology Press, 1997, ISBN: 1841695041 .

REFERENCE BOOK

1. M. D. Dunnett, Handbook of Industrial-Organizational Psychology, Jaico Press, 1990, ISBN: 978089106-041-3.
2. M. A. - Ansari, Managing people at work: Leadership styles and influence strategies, Sage, 1990, ISBN: 0803996500.
3. J. B. P. Sinha, Work Culture in Indian Context, Sage, 1990, ISBN: 0019-5286.
4. D.M. Pestonjee, Stress and Coping: The Indian Experience, 2nd ed., Sage Publications, 1999, ISBN: 0761993126.
5. L. N. Jewell & M. Siegall, Contemporary Industrial/Organizational Psychology, West Publishing Company, 1990, ISBN: 0314715991.
6. D. Katz and-R. L. Kahn, The Social Psychology of Organizations, Wiley, 1966, ISBN: 978-0-471-023553.
7. M.L. Blum, and J.C. Naylor, Industrial Psychology, CBS Publishers & Distributors, 1984, ISBN: 8123908601.
8. K. H. Blanchard and P. Hersey, Management of Organizational Behavior: Utilizing Human Resources, Prentice-Hall India, 1993, ISBN: 0-13-5512868-9.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	-	25	125

PRE-REQUISITE : IT101 - Computer Programming, ME102 - Engineering Tools and Techniques

COURSE OBJECTIVES :

IT201.CEO.1: To introduce facts, concept and theory of an information system.
IT201.CEO.2: To understand evolution of an information system.
IT201.CEO.3: To explain an information life cycle.
IT201.CEO.4: To develop IoT based information system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT201.CO.1: Interpret Data, Information and Knowledge. [Understanding]
IT201.CO.2: Make use of data acquisition techniques for an information system. [Apply]
IT201.CO.3: Categories different storage techniques. [Analyze]
IT201.CO.4: Build dashboard for effective communication of information. [Apply]
IT201.CO.5: Determine components of Human computer interaction. [Evaluate]
IT201.CO.6: Examine IoT based information system. [Analyze]

THEORY :

UNIT 1	Evolution of Information	6 HOURS

Data, Types of Data: Primary data, Secondary data, Meta data, Operational data and Derived data
Information: Life Cycle, Semantics of information, Knowledge
Data forms: Analog and Digital (Telephone and Stenography) ADC, DAC
Evolution of Information- Man Machine Interaction
Self-Study: Grade Sheet Generation system
Further Reading: Railway reservation, Inventory machine

UNIT 2	Information Generation	6 HOURS

Data Acquisition, Human interface, Hardware Interface: Input / Output devices
Data Transformation: Rearranging, Classifying, Calculating, Summarizing;
Self-Study: Weather forecasting System
Further Reading: Example on advanced Spark Programming

UNIT 3	Information Storage and Transmission	6 HOURS

Need of data storage, Types of storage: stand alone, centralized, distributed, and cloud.
Encryption and decryption (define and need)
Transmission Type, Synchronous, Asynchronous, Serial, Parallel, Satellite, radio
Case Study: Dial up, Broadband
Self-Study: Stand Alone and Disk storage
Further Reading: Wireless (Bluetooth, XBEE)

UNIT 4	Information Visualization	6 HOURS

Representations: Graphs and Charts: Pi Chart, Scatter plot, Histogram, Heat map, Maps, Geo maps
Case Study: Dynamic dashboard

UNIT 5	Human Computer Interface	6 HOURS

Introduction of HCI, Types mobile, stand-alone, computer etc, Interactive devices touch screen, mic, keys, keyboard, scanner, camera etc., HCI design principles- standards, Usability principles portability, scalability, GUI design and evaluation, Interactive Multimedia document search- image, audio, video, animation
Case study: Ticket Generation Kiosk
Self-Study: Web based systems interactivity
Further Reading: Usable GUI Design

UNIT 6	Internet of things	6 HOURS

IoT: Overview, Characteristics and Architecture
Embedded Devices: Sensors, Actuators, Arduino and RaspberryPI
IOT Ecosystem: Basic elements / building blocks of IOT application, Systematic method to design IOT application
Applications: Asset management, Industrial automation, Smart cities
Self-Study: IoT Essentials
Further Reading:IOT and big Data

PRACTICAL :		
PRACTICAL NO.01		**8 HOURS**
In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow: Identification of an interdependent elementary data items which have facts and figures Data collection through sensors Processing using Arduino Data Storage using MySQL in an accessible form Data visualization using graphs		
PRACTICAL NO.02		**8 HOURS**
Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system. Create a graph showing how revenue evolves throughout the year for each of the sales channels Create an interactive chart that can be used to switch between different sales channels. Create three different views of the data: monthly sales revenue, sales revenue by category, and revenue by the top five distributors.		
PRACTICAL NO.03		**8 HOURS**
Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi. Identify the home appliances that require human interaction for its operations and state the need of automation. Identify system component Design circuit diagram Assemble system components Program the interface System Testing System Deployment		

TEXT BOOK

1. Ralph M Stair, George W Reynolds, "Fundamentals of Information Systems", Course Technology Inc; 5th edition, 2008, ISBN 978-1423925811.
2. Benny Raphael, Ian F. C. Smith, "Engineering Informatics: Fundamentals of Computer-Aided Engineering", Wiley-Blackwell; 2nd Revised edition, 2013, ISBN-13: 978-1119953418.
3. Paul Mcfedries, Excel Data Analysis: Your Visual Blueprint for Analyzing Data, Charts and Pivot Tables, Wiley; Fourth edition 2013, ISBN-13 978-8126544004

REFERENCE BOOK

1. Gerard Jounghyun Kim, HumanComputer Interaction: Fundamentals and Practice, CRC Press, Auerbach Publications, 1 edition, 2015 ISBN 9781482233896
2. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, 2013 ISBN-13: 978-1118430620

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	Nil	25	125

PRE-REQUISITE : Physics, Chemistry

COURSE OBJECTIVES :

ME201.CEO.1: To select material for engineering application.
ME201.CEO.2: To classify the available materials.
ME201.CEO.3: To utilize available material for specified purpose.
ME201.CEO.4: To compare desired quality of materials from standard data.
ME201.CEO.5: To measure useful properties of materials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME201.CO.1: Select material for engineering application.
ME201.CO.2: Classify the available materials.
ME201.CO.3: Utilize available material for specified purpose.
ME201.CO.4: Compare desired quality of materials from standard data.
ME201.CO.5: Measure useful properties of materials.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**8 HOURS**
Classifications and specifications of steels and cast iron. Heat treatment of steels, Defects due to heat treatment and remedial measures. Classification of surface hardening treatments. Classification, Composition, Properties & applications of: Copper and Its alloys, Nickel and Its alloys, Aluminum and Its alloys. Specific alloys: soldering & brazing alloy, Precipitation hardening alloys. Bearing materials and their applications.		
UNIT 2	**Engineering Polymers, Ceramics and Glass**	**6 HOURS**
Classification of polymers, Polymer types-thermoplastics-thermoset-Elastomers, Polymer synthesis and processing-injection moulding-extrusion-blow moulding-calendaring, Degradation of polymers-chemical, thermal, -biological-mechanical. Polymer recycling methods Introduction to Advanced Ceramics-Barium Titanate, Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications, Introduction to Cermets and its application. HIGH PERFORMANCE POLYMERS:Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation		
UNIT 3	**Composite Materials**	**6 HOURS**
Need of composites. Particle-reinforced composites, large-particle composites, dispersion-strengthened composites. Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic-matrix composites, carbon–carbon composites, fiber-reinforced composites, structural composites, laminar composites.		
UNIT 4	**Electronic and Photonic materials**	**6 HOURS**
Electronic Materials: Intrinsic and extrinsic semiconductors-p-n junction, Bandgap diagrams for conductor, semiconductor and insulator, IR detectors, Hall effect Superconducting Materials: Normal and High temperature superconductivity, Applications. Photonic Materials: LED, LCD, Photo conducting materials, Photo detectors, Photonic crystals and applications. Advancements in electronic materials: Smart materials		
UNIT 5	**Testing of Engineering Materials**	**8 HOURS**
Need and Comparison of destructive and non-destructive tests, Study of destructive testing: Engineering stress-strain curve, true stress-strain curve, Jominy End Quench Test for hardenability, Izod and Charpy Impact Test. Vickers, Rockwell hardness tests. Non –Destructive Testing Non-Destructive testing: Principles & procedure, advantages, disadvantages and Industrial applications of NDT like Sonic & Ultrasonic testing and Radiography tests. Brief overview of another NDT test- Eddy current test, Magnetic Particle Test		
UNIT 6	**Nanomaterials.**	**6 HOURS**
Basic concepts of Nano science and Nanotechnology, Carbon nanotubes, Principle of SEM, TEM and AFM, X ray diffraction Fundamentals principles of SEM, SE and BSE imaging modes, Fracture mode analysis and failure analysis using SEM. Potential uses of nonmaterial's' in electronics, robotics, sports equipment, mobile electronic devices, Medical applications of nanomaterials-Cancer, AIDS treatment.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Jominy End Quench Test**	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO.02	**Izod / Charpy Impact Test**	**2 HOURS**
Izod / Charpy Impact Test.		
PRACTICAL NO.03	**Hardness Test**	**4 HOURS**
Vickers,/ Rockwell, Brinell/Durometers & Poldi Hardness Test.		
PRACTICAL NO.04	**Magnetic Particle & Dye Penetrant Test**	**4 HOURS**
Magnetic Particle & Dye Penetrant Test.		
PRACTICAL NO.05	**Ultra-sonic Test**	**4 HOURS**
Ultra sonic test for detection of flaws in materials.		
PRACTICAL NO.06	**Determination of Hall coefficient**	**4 HOURS**
Determination of Hall coefficient for a semiconducting material.		
PRACTICAL NO.07	**Soldering**	**4 HOURS**
Hard and Soft soldering using soldering materials.		
PRACTICAL NO.08	**Industrial Visit**	
Visit to advanced materials characterization laboratory.		

TEXT BOOK

1. Material Science & Metallurgy for Engineers, Dr. V.D. Kodgire & S. V. Kodgire, Everest Publications.31st Edition, ISBN No: 8186314008
2. Mechanical Behavior & Testing of Materials, A. K. Bhargava, C.P. Sharma P H I Learning Private Ltd. 2011 edition, ISBN No 13-9788120342507

REFERENCE BOOK

1. Engineering Metallurgy, Higgins R. A., Viva books Pvt. Ltd., 2004 ISBN No 13-9788176490276
2. Material Science & Engineering, Raghavan V., Prentice Hall of India, New Delhi. 2003 ISBN No 13-9788120324558
3. Introduction to Physical Metallurgy, Avner, S. H., Tata McGraw-Hill, 2014, ISBN 13-9780074630068
4. Materials Science & Engineering, W. Callister, Wiley Publications,2013, ISBN No 13-9788126521432
5. Physical Metallurgy for Engineers, Clarke D.S. & Varney W.R. Affiliated East-West Press, New Delhi ISBN No 13-978-8176710350

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Analog and Digital Communication
	COURSE CODE	EX211
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : AS102 - Physics

COURSE OBJECTIVES :

EX211.CEO.1: Explain of the fundamental concepts of analog and digital communication
EX211.CEO.2: Apply baseband and band pass coding methods and analyze their effects.
EX211.CEO.3: Explain the mechanism behind different multiuser communication systems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX211.CO.1: Describe the fundamental concepts and apply them for communication systems.
EX211.CO.2: Illustrate and criticize the use of different coding schemes.
EX211.CO.3: Compare and criticize different multiple access mechanisms

THEORY COURSE CONTENT		
UNIT 1	**Signal and noise**	**4 HOURS**
probability, random variables, cumulative distribution function (CDF) , probability density function (PDF) , random processes , correlation and power spectral density, noise white noise thermal noise, shot noise, flicker or low frequency noise , high frequency noise.		
UNIT 2	**Analog communication**	**8 HOURS**
Overview of signal and noise , basic block diagram of communication system , need of modulation, types of modulation AM, PM, FM, AM and FM receivers , pulse analog modulation- sampling theorem **Self study:** Radio broadcasting system		
UNIT 3	**Baseband signaling**	**8 HOURS**
PCM, PWM, DPCM, ADM,DM, basic line codes, multilevel line codes, digital baseband signal receivers , probability of error , Error probability of matched filter, ISI, post processing techniques **Case study:** Channel vocoder using DM		
UNIT 4	**Digital communication**	**8 HOURS**
Data transmission fundamentals , digital signal transformation, digital modulation schemes ASK, PSK,FSK,QPSK,OQPSK,QAM schemes and error probabilities , m-ary signaling, OFDM **Case study:** Wi-Fi as an application of QPSK		
UNIT 5	**Error control codes and information theory**	**6 HOURS**
Linear block codes, hamming code, CRC, Convolution codes, viterbi algorithm , error control systems, Information rate, entropy, mutual information, orthogonal signals, Entropy coding Huffman coding, Shannon-Fano coding, code efficiency, channel through put, overview of BSC.		
UNIT 6	**Multiple access techniques**	**6 HOURS**
Introduction to Multiple Access Techniques TDMA, FDMA, CDMA Spread spectrum techniques DSSS and FHSS, introduction to orthogonal codes and their properties; suitable example of orthogonal code and its autocorrelation, random access, Pure and slotted ALOHA, Media access control protocol (CSMA) **Case study:** SDH and DWDM networks		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
AM(DSB-FC) generation by using class C single tuned amplifier and envelope detection		
PRACTICAL NO.02		**2 HOURS**
AM Transmitter - measurement of total power for different modulating signals using spectrum analyzer.		
PRACTICAL NO.03		**2 HOURS**
FM generation - modulation index measurement & demodulation by PLL.		

PRACTICAL NO.04		**2 HOURS**
Measurement of performance characteristics of superhet receiver selectivity, sensitivity & fidelity.		
PRACTICAL NO.05		**2 HOURS**
Sampling theorem and reconstruction.		
PRACTICAL NO.06		**2 HOURS**
Basic line coding and decoding.		
PRACTICAL NO.07		**2 HOURS**
ASK, PSK, FSK and its demodulation		
PRACTICAL NO.08		**2 HOURS**
Spread spectrum systems (DSSS).		
PRACTICAL NO.09		**2 HOURS**
QPSK and OQPSK modulation and demodulation		
PRACTICAL NO.10		**2 HOURS**
Error probability of Matched filter receiver		
PRACTICAL NO.11		**2 HOURS**
Software assignment - Implementation of linear block code		
PRACTICAL NO.12		**2 HOURS**
Software assignment - Implementation of Shannon Fano and Huffman codes		

TEXT BOOK

1. Bernard Sklar, Digital Communication,2/E, Pearson Education India, 2009, ISBN - 9788131720929.
2. Leon W. Couch II, Digital and Analog Communication Systems,6/E, Pearson Education Asia,2002, ISBN 0-13-081223-4

REFERENCE BOOK

1. William Stallings, Data and Computer Communications, 8/E, Pearson, 2007, ISBN: 0-13-243310-9.
2. Behrouz A. Forouzan, Data Communications and Networking, 4/E, McGraw-Hill, 2006, ISBN 0-07-232204-7,Publishing Company, 2001,ISBN-8129704552.
3. Taub Schilling, Principals of Communication Systems, 2/E, Tata McGrawHill,2004, ISBN 13: 9780074624562

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Circuit Theory
	COURSE CODE	EX212
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : EX101: Electrical & Electronics Engineering, ET202: Analog Electronics

COURSE OBJECTIVES :

EX212.CEO.1: Understand the network theorems and functions.
EX212.CEO.2: Sketch & interpret two port networks.
EX212.CEO.3: Explain the RC, RL and RLC network using Laplace transform.
EX212.CEO.4: Describe the network functions
EX212.CEO.5: Test the network stability and resonance.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX212.CO.1: Explain the concept of network in circuit theory.
EX212.CO.2: Simplify the complexity of the network using network theorems.
EX212.CO.3: Synthesize the two port network.
EX212.CO.4: describe the given network using Laplace transform.
EX212.CO.5: Analyze the network functions to find the behavior of network
EX212.CO.6: Evaluate stability of given network.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Network Analysis**	**6 HOURS**
Loop and Nodal analysis, Concept of super node and super mesh, Concept of duality and dual networks. Types of Networks: Lumped and Distributed, Linear and Nonlinear, Bilateral and Unilateral, Time-variant and Time-invariant. Independent and Dependent (controlled) voltage and current sources. Concept of voltage and current divider, Source transformation and shifting.		
UNIT 2	**Network Simplification Techniques**	**6 HOURS**
Introduction, Need of network simplification, Superposition, Thevenin, Norton, Maximum Power Transfer Theorem, Reciprocity, Millman theorems applied to electrical networks with all types of sources.		
UNIT 3	**Two Port Network**	**6 HOURS**
Introduction, Z, Y, H and transmission parameters, Interrelations between parameters, two generator equivalent circuit for above parameters, Parallel, series & cascading of two port networks.		
UNIT 4	**Resonance & Its Mathematical Analysis**	**8 HOURS**
Introduction, Variation of impedance with frequency, Q factor of Series & Parallel resonance circuit, reactance curve, Basic Properties of Laplace Transform, Laplace Transform of Basic R, L and C components, Solutions of differential equations and network equations using Laplace transform method for R- L, R-C and R-L-C circuits (series and parallel), step voltage & step current response of RL, RC, RLC circuit.		
UNIT 5	**Network Functions**	**8 HOURS**
Poles and Zeros, terminal pairs or ports, network functions for the one port and two ports, the calculation of network functions, general networks. Poles and zeros of network functions, Restrictions on poles and zeros locations for transfer functions and driving point function, Time domain behavior from the pole and zero plot. Stability of active network		
UNIT 6	**Filters & Attenuators**	**6 HOURS**
Introduction, Characteristics of LPF, HPF, BPF & BRF, Constant K type filter, M Derived filter, Concept of Attenuators, L type, T type, TT type, Lattice attenuators		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
To Verify different Theorems (Superposition, Thevenin, Reciprocity, Milman).		
PRACTICAL NO.02		**2 HOURS**
To verify Maximum Transfer Power Theorem.		
PRACTICAL NO.03		**2 HOURS**
Determination of time response of R-C circuit to a step D.C. voltage input.		

PRACTICAL NO.04		**2 HOURS**
Determination of time response of R-L-C series circuit to a step D.C. voltage input (Study using Virtual Labs).		
PRACTICAL NO.05		**2 HOURS**
To study Z & Y parameter of Two Port Network.		
PRACTICAL NO.06		**2 HOURS**
To study Two Port networks.		
PRACTICAL NO.07		**2 HOURS**
To measure BW & Q factor of Series & Parallel Resonance Circuit.		
PRACTICAL NO.08		**2 HOURS**
To build and test Constant K- LPF, HPF filter and plot the frequency response		
PRACTICAL NO.09		**2 HOURS**
To build and test T, TT attenuators and measure the attenuation.		

TEXT BOOK

1. P. Ramesh babu, Electrical Circuit Analysis, 2nd Edition, Scitech Publication India Pvt Ltd., ISBN- 8183711596.
2. M. E. Van Valkenburg, Network Analysis, Third Edition, Prentice Hall of India Private Limited. ISBN-978-81-203-0156-6.
3. N. C. Jagan, C. Lakshminarayana, Network Theory, Second Edition, BSP Publication. ISBN-13: 978-1-904798-40-8.

REFERENCE BOOK

1. Alexander & Sadiku, Introduction to Electric Circuits, McGraw Hill, ISBN- 0137371640 .

2. William H. Hayt, Jr. Jack E. Kemmerly, Engineering Circuit Analysis, McGraw Hill Publication, ISBN-0073529575.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Minor Project
	COURSE CODE	EX213
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	50	NIL	25	75

PRE-REQUISITE : ME103: Design Thinking, ET206: Prototyping

COURSE OBJECTIVES :

EX213.CEO.1: Learn to identify and define a problem to be solved.
EX213.CEO.2: Develop design for the solution of the problem using engineering tools available.
EX213.CEO.3: Design working model for the solution of the problem.
EX213.CEO.4: Evaluate the model built for its correctness, reliability and sustainability.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX213.CO.1: Illustrate how to define the problem to be solved.
EX213.CO.2: Apply knowledge of various engineering tools to develop the solution to the problem.
EX213.CO.3: Analyze various options available to solve the problem and select the appropriate one.
EX213.CO.4: Justify the selection of the method to solve the problem.
EX213.CO.5: Build the working model of the solution to solve the problem.

PREAMBLE:

It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

GUIDELINES:

1. Every student shall undertake the Minor Project in semester IV
2. Every student shall work on an approved project, a group of 03 students (maximum) shall be allotted for each minor project
3. The group members could be from different departments to support the interdisciplinary functioning
4. The students have to identify the social problem by through discussion with people, site visits, etc.
5. Once the problem is identified, students have to collect the sufficient data to prove the importance of the problem to be solved
6. By analyzing the collected data, students have to define the actual problem
7. Once the problem is defined, the students have to enumerate various approaches and solutions to solve the problem
8. The students have to select and justify one of the solutions identified based on the feasibility, affordability and ease of use
9. The solution of the selected approached has to be developed using some prototype or model or implementation
10. The three-member committee of jury members will be appointed to monitor the progress and continuous evaluation of each project. One of the members will be the project guide. Assessment of the project for award of grade shall be done jointly by the guide and committee of jury members

TIMELINE:

1. Project group formation: 1 Week
2. Identification of the problem to be solved: 2 Weeks
3. Data collection to prove the validity of the problem: 2 Weeks
4. Identification of the various approaches to solve the problem: 2 weeks
5. Justification of the approach selected to solve the problem: 1 week
6. Building the solution to the problem using prototype or implementation: 6 Weeks
7. Report writing: 2 Weeks

ASSESSMENT:

Presentation 1: Motivation and need for the selected problem to be solved

Presentation 2: To prove the validity of the problem to be solved using data collected

Presentation 3: Identified approaches to solve the problem and justification of approach selected

Presentation 4: Progress towards the prototyping or implementation of the solution to the problem

Presentation 5: Final demonstration

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Third Year

Bachelor of Technology in Electronics Engineering

2016-2020

(With Effect from Academic Year: 2018-2019)

MIT | Academy of Engineering (An Autonomous Institute)	**CURRICULUM STRUCTURE (2016 - 2020)**		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**RELEASE DATE**	**:**	01/06/2018
	REVISION NO.	**:**	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	EX301	Embedded System Design	3	2	4
2.	DC6	ET301	Control Systems	3	2	4
3.	DC7	EX303	Computer Network	3	2	4
4.	OE1	ET31#	Open Elective - Refer Annexure.	3	2	4
5.	HSS4	HP301	Project Management	1	2	2
6	HSS6	HP303	Basics of Entrepreneurship	---	2	1
7.	SDP5	ET304	Graphical Programming Lab	---	4	2
		ET305	MATLAB			
		EX304	Embedded Linux			
TOTAL				**13**	**16**	**21**

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	EX321	Real Time Operating System	3	2	4
2.	DC9	EX322	Digital Signal Processing	3	2	4
3.	DC10	EX323	Power Electronics & Application	3	2	4
4.	OE2	ET33#	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP302	Professional Skills	1	2	2
6.	SDP6	EX324	Mini Project	---	4	2
TOTAL				**13**	**14**	**20**

Note: L: Lecture, P: Practical

OPEN ELECTIVE (OE) DETAILS

1) Any one course to be selected for Semester V & VI each.
2) The corresponding course to be chosen from same domain.

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	DOMAIN	COURSE	TEACHING SCHEME		
					L	P	CREDIT
1.	OE1.1	ET311	Embedded System	Embedded System Programming	3	2	4
2.	OE1.2	ET312	Internet of Things (IoT)	IoT Architecture and Sensors	3	2	4
3.	OE1.3	EX311	Robotics & Automation	Fundamentals of Robotics	3	2	4

SEMESTER: VI

SL. No.	COURSE TYPE	COURSE CODE	DOMAIN	COURSE	TEACHING SCHEME		
					L	P	CREDIT
1.	OE2.1	ET331	Embedded System	Embedded Processor	3	2	4
2.	OE2.2	ET332	Internet of Things (IoT)	IoT Network & Protocols	3	2	4
3.	OE2.3	EX331	Robotics & Automation	Kinematics and Dynamics	3	2	4

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Embedded System Design
	COURSE CODE	EX301
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : IT201 - Engineering Informatics, EX202 - Advanced Digital Circuits

COURSE OBJECTIVES :

EX301.CEO.1: To explain microcontroller, hardware and software tools for embedded system application

EX301.CEO.2: To describe architecture and features of PIC 18Fxxx Microcontroller

EX301.CEO.3: To learn the Assembly language and Embedded C programming for PIC 18Fxxx Microcontrollers

EX301.CEO.4: To implement interfacing of real world input and output devices with PIC 18Fxxx microcontroller

EX301.CEO.5: To design real time applications based on microcontroller and peripherals

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX301.CO.1: Select appropriate microcontroller, hardware and software tools for embedded system application

EX301.CO.2: Illustrate microcontroller architecture and features

EX301.CO.3: Construct the Assembly language and Embedded C programming for PIC 18Fxxx Microcontrollers

EX301.CO.4: Apply hardware and software tools for implementation of real time applications

EX301.CO.5: Analyze real time applications based on microcontroller and peripherals

THEORY COURSE CONTENT		
UNIT 1	**Embedded System Introduction**	**6 HOURS**
Introduction to Embedded system, Memory and Processor architectures, types and selection of microcontrollers. Study of Software and hardware tools for development of microcontroller based. **Application:** Select Microcontroller for Temperature control system. **Self-study:** Compare features of PIC 16 and PIC 18 series		
UNIT 2	**PIC Architecture**	**6 HOURS**
PIC microcontroller architecture, addressing modes and instruction set. Hardware Connection and ROM Loader: PIC 18F 4520Pin Diagram, Configuration register. **Application:** Select Microcontroller features, Pins, registers required for Temperature control system		
UNIT 3	**Assembly Language programming**	**8 HOURS**
Assembly programming: To generate delay and wave form generation, I/O programming, LEDs, 7segment LEDs, LCD. **Application:** Implement temperature detector using PIC, Buzzer, LED		
UNIT 4	**PIC Programming in Embedded C**	**8 HOURS**
Data type and time delay, I/O programming, Logic operations, Data conversion programs, Data serialization, Timer / Counter Programming, Interrupt. **Application:** Generate interrupt when temperature exceed above 300C in temperature control system.		
UNIT 5	**Application Programming - I**	**7 HOURS**
LED, Switch, relay, buzzer, 7 segment display, LCD, Keypad, ADC, sensor interfacing, UART, All programs in embedded C. **Application:** Initialize set point through user for temperature control system.		
UNIT 6	**Application Programming - II**	**7 HOURS**
MSSP structure, SPI, I2C, Comparators, RTC with I2C and EEPROM with SPI. Design of DAS system. **Application:** Store temperature reading in EEPROM memory and transmit readings to PC. **Self-Study:** MSP430		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
To study assembler, compiler, ID, Emulators, debugger, programmer, development board, DSO, Logic Analyzer		
PRACTICAL NO.02		**2 HOURS**
Design and implement event counter using switch, Buzzer and 7segment Display.		
PRACTICAL NO.03		**2 HOURS**
Display scrolling note for student on LCD without using any standard library function and create your own library functions for LCD		
PRACTICAL NO.04		**2 HOURS**
Password Security system implementation using 4X4 keypad and LCD and create KEYPAD Library functions		
PRACTICAL NO.05		**2 HOURS**
Generate a clock of 1Hz on RB7 pin using timer with interrupt and create Delay library function.		
PRACTICAL NO.06		**2 HOURS**
Design and implement a system to read temperature of a lab using internal ADC function of PIC18Fxx and display value on LCD and create ADC Library functions		
PRACTICAL NO.07		**2 HOURS**
Generation of PWM signal for DC Motor control and create PWM Library functions		
PRACTICAL NO.08		**2 HOURS**
Implement PC and PIC 18F Serial communication and create Library functions		
PRACTICAL NO.09		**2 HOURS**
Mini Project based on the above practicals (Capstone Project) **Example:** 1. The microcontroller reads temperature values from a temperature sensor on a regular interval basis and stores them into its internal EEPROM memory. The recorded temperatures can be later transferred to a PC through serial interface. 2. Design Calculator using 4 x 4 keypad. 3. Design EVM (Electronic Voting Machine) machine		

TEXT BOOKS

1. Mazidi, RolinMcKinlay and Danny Causey, PIC Microcontroller and Embedded Systems using Assembly and C for PIC18, Pearson Prentice Hall, 2008, ISBN: 9780131194045
2. M.Bates, PIC Microcontrollers, Newnes Publication, 2011, ISBN: 9780080969114
3. PIC18Fxxx reference manual- www.microchip.com/downloads/en/DeviceDoc/39500a.pdf
4. MSP 430 manual by TI- http://www.ti.com/lit/ug/slau144j/slau144j.pdf

REFERENCE BOOK

1. Chuck Hellebuyck, Programming PIC microcontrollers with PIC basic, later printing, 1st Edition, 2002, ISBN: 9781589950016
2. Milan verle, PIC microcontrollers-programming in basic, mikroElektronika, 1st edition, 2008, ISBN: 978-86-84417-15-4
3. I2C, EEPROM, RTC data sheets from www.ti.com
4. John H Davies, MSP430 Microcontroller Basics, Newnes Publication, 2008, ISBN: 9780080951577

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Control Systems
	COURSE CODE	ET301
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	50	-	150

PRE-REQUISITE : Applied Mathematics, Network Analysis Techniques, Signals and Systems

COURSE OBJECTIVES :

ET301.CEO.1: Learn the mathematical model and transfer function of LTI systems.
ET301.CEO.2: Study time-domain and frequency-domain analysis of LTI systems.
ET301.CEO.3: Understand concept of stability and methods for inferring stability of a systems.
ET301.CEO.4: Study state variable modeling and its analysis for SISO and MIMO systems.
ET301.CEO.5: Understand the concept of motion control using PID.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET301.CO.1: Determine the transfer function of varied systems by different techniques.
ET301.CO.2: Model SISO and MIMO systems using state space techniques.
ET301.CO.3: Analyze the performance of LTI systems using time-domain and frequency domain techniques.
ET301.CO.4: Infer stability of a system by different analytical and graphical methods.
ET301.CO.5: Explain a closed loop motion control system with an application.

THEORY COURSE CONTENT		
UNIT 1	**Modeling in Frequency Domain**	**8 HOURS**
Introduction to Feedback Control System, Types of Control Systems, Modeling of Simple Electrical and Mechanical Systems, Block Diagram Algebra, Signal Flow Graph.		
UNIT 2	**Modeling in Time Domain**	**8 HOURS**
State-space representations, Eigen values and Eigen vectors, Transfer function from state model, Solution of state equations, Controllability and Observability.		
UNIT 3	**Time Domain Analysis**	**8 HOURS**
Time-domain analysis, Second-order systems, Stability Characteristic-equation and roots, Routh-Hurwitz criteria, Root Locus technique.		
UNIT 4	**Frequency Domain Analysis**	**8 HOURS**
Concept of frequency response, Correlation between time and frequency response, Frequency domain specifications, Bode plot, Polar plots, Nyquist Stability Criterion.		
UNIT 5	**Motion Control**	**8 HOURS**
Concept, Block Schematic, Sensors for motion control, Principle, Modeling and Analysis of Servomotors, Basic algorithm: PID and State feedback control, Design Case Study.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Analysis of a Systems.		
PRACTICAL NO.02		**2 HOURS**
Performance Analysis of Closed Loop Systems.		
PRACTICAL NO.03		**2 HOURS**
Time Domain Analysis using Root Locus.		
PRACTICAL NO.04		**2 HOURS**
Frequency Response Analysis.		
PRACTICAL NO.05		**2 HOURS**
Compensator Design.		

PRACTICAL NO.06		**2 HOURS**
PID control of a System.		
PRACTICAL NO.07		**6 HOURS**
System Identification and Analysis of a DC Motor.		

TEXT BOOK

1. Katsuhiko Ogata, Modern Control Engineering, 5 th edition, PHI, 2010, ISBN: 978-0136156734.
2. Benjamin C. Kuo and Farid Golnaraghi, Automatic Control Systems, 8 th edition, Wiley-India, 2009, ISBN: 978-8126513710.
3. Norman S. Nise, Control Systems Engineering, Wiley India Edition, 2018, ISBN: 978-8126571833.

REFERENCE BOOK

1. R. C. Dorf and R. H. Bishop, Modern Control Systems, 11 th Edition, Pearson, 2009, ISBN: 978-0132067102.
2. William S. Levine (Ed), The Control Handbook, Vol. I, CRC-IEEE Press, 1999, ISBN: 978-1420073669.
3. Slobodan N. Vukosavic, Digital Control of Electrical Drives, Springer, 2007, ISBN: 978-0387259857.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Computer Network
	COURSE CODE	EX303
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	30	40	30	50	-	150

PRE-REQUISITE : Analog and Digital Communication

COURSE OBJECTIVES :

EX303.CEO.1: Familiarize the student with the basic taxonomy and terminology of the computer networking area

EX303.CEO.2: Introduce the student to advanced networking concepts

EX303.CEO.3: Acquire the required skill to design simple computer networks.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX303.CO.1: Interpret basic computer network technology.

EX303.CO.2: Make use of types of network devices in a network.

EX303.CO.3: Analyze the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

THEORY COURSE CONTENT		
UNIT 1	**Basics of Computer Network.**	**8 HOURS**

Introduction, Data communications: components, data representation (ASCII, ISO etc.), direction of data flow (simplex, half duplex, full duplex); Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN, WAN).
Internet: brief history, internet today; Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.
Application: Communication between two computers.
Self-Study: ISDN services & ATM

UNIT 2	**Physical Layer.**	**8 HOURS**

Overview of data (analog & digital), signal (analog & digital), transmission (analog & digital)& transmission media (guided & non-guided); TDM, FDM, WDM; Circuit switching: time division & space division switch, TDM bus; Telephone network.
Application: Voice signal transmission over Public Switched Telephone network.
Self-Study: DSL technology, Cable modem.

UNIT 3	**Data Link Layer.**	**6 HOURS**

Types of errors, framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC.
MAC Sub layer: Point to point protocol, LCP, NCP, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols: CSMA, CSMA/CA, CSMA/CD, FDMA, TDMA, CDMA; Traditional Ethernet, fast Ethernet.
Application: Wi-Fi Carrier sense
Self-Study: Wireless LAN: IEEE 802.11

UNIT 4	**Network Layer.**	**6 HOURS**

Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing: Internet address, classful address, sub netting; Routing: techniques, static vs. dynamic routing, routing table for classful address; Routing algorithms: distance vector routing, link state routing; Protocols: OSPF,RIP, IP, IPV6; Unicast and multicast routing protocols.
Application: Application:Simplify routing with subnetting

UNIT 5	**Transport Layer.**	**6 HOURS**

Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve QoS.
Application: Performance analysis of high speed congestion control protocol
Self-Study: Introduction to blue-tooth, VLANs.

UNIT 6	Application Layer.	6 HOURS
DNS, SMTP, ICMP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls. **Application:**Finding your own IP address. **Self-Study:** Cellular telephony & Satellite network.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Network commands and IP address configurations.		
PRACTICAL NO.02		**2 HOURS**
Fault detection of Cable tester for of UTP-CAT5 Cross and Straight LAN cable.		
PRACTICAL NO.03		**2 HOURS**
Implementation of LAN using star topology and connectivity between two computers using cross over UTP CAT5 cable.		
PRACTICAL NO.04		**2 HOURS**
Installation and configuration of Web Server and hosting web page using HTML programming.		
PRACTICAL NO.05		**2 HOURS**
Configure network topology using packet tracer.		
PRACTICAL NO.06		**2 HOURS**
Configure network using Application layer protocols (DNS, HTTP, DHCP)		
PRACTICAL NO.07		**2 HOURS**
Configuration of TELNET using packet tracer.		
PRACTICAL NO.08		**2 HOURS**
Configure network using Distance Vector Routing Protocol.		
PRACTICAL NO.09		**2 HOURS**
Configure network using Link State vector routing protocol.		

TEXT BOOK

1. Behrouz A. Forouzan, Data Communications and Networking, 4 th edition, Tata McGraw Hill, ISBN: 978-0-07-063414-5
2. Andrew Tanenbaum, Computer Networks, 4 th edition, Pearson Education, ISBN: 978-01-3066102-9
3. Kurose & Ross, Computer Networking: A top Down Approach featuring the Internet, 3 rd edition, Pearson Education, ISBN: 978-81-3179054-0

REFERENCE BOOK

1. Behrouz A. Forouzan, TCP/IP protocol Suit, 3 rd edition, TATA McGraw Hill, ISBN: 9780070706522
2. Wayne Tomasi ,Introduction to Data Communication & Networking , 1 st edition , Pearson Education ,ISBN: 9788131709306

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Embedded System Programming
	COURSE CODE	ET311
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Electrical & Electronics Engineering, Computer Programming

COURSE OBJECTIVES :

ET311.CEO.1: Develop comprehensive skills in designing assembler

ET311.CEO.2: Comprehend the importance of linkers, loaders and software tools in embedded system programming

ET311.CEO.3: Grasp the embedded system programming concepts and fundamentals of an operating system

ET311.CEO.4: Implement various process scheduling and synchronization techniques in an operating system

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET311.CO.1: Explore various embedded system software such as compilers, linkers, load and assemblers

ET311.CO.2: Distinguish the basic linkers, loaders and software tools for program development

ET311.CO.3: Master various process management concepts including scheduling, synchronization

ET311.CO.4: Utilize the GNU Development tools to build embedded applications in Linux environment

THEORY COURSE CONTENT		
UNIT 1	**Programming Embedded System**	**8 HOURS**
Embedded Program for PIC 18F, Role of Infinite loop, Compiling, Linking and locating, downloading and debugging using Flash Magic and IDE tool		
UNIT 2	**Introduction to 16-bit processor**	**8 HOURS**
Architecture of 16 bit processor, Instruction set, Assembler: Assembly language programming, simple assembly scheme, Pass structure of assembler		
UNIT 3	**Embedded Tool chain 8 Hours**	**8 HOURS**
Compilers: Basic compilers function, Phases of compilation, code optimization techniques, interpreters, loaders and linkers: basic loader functions, its types		
UNIT 4	**Fundamentals of Embedded Operating System**	**8 HOURS**
Overview of operating systems, Process Management - Process and threads, Scheduling algorithms - Non pre-emptive and pre-emptive scheduling, Inter Process Communication Semaphores		
UNIT 5	**Linux Fundamentals**	**8 HOURS**
Introduction to Linux, Basic Linux commands and concepts, Basic text editing, Linux File System, Shell programming, Processes and threads in Linux, GNU Development tools, gdb, GNU, makefile		

PRACTICAL (any 8)		
PRACTICAL NO.01		**2 HOURS**
Handling of the String and File library functions		
PRACTICAL NO.02		**2 HOURS**
Assembly Language Programming (ALP) in 8051 using Assembler ASM51 and Emulator 8051		
PRACTICAL NO.03		**2 HOURS**
Assembly Language Programming (ALP) in 8086 using Microsoft Assembler MASM 6.11		
PRACTICAL NO.04	**ADC Interface**	**2 HOURS**
Interactive Shell Scripting in Linux with Decision Making and Loop controls		
PRACTICAL NO.05		**2 HOURS**
C programs in Linux using GNU Compiler Collection (GCC) and Debugging the programs using gdb utility		

PRACTICAL NO.06		**2 HOURS**
System Calls to handle Processes and files		
PRACTICAL NO.07	**Serial Communication**	**2 HOURS**
Inter-process communication using semaphore		
PRACTICAL NO.08		**2 HOURS**
Design of Pass-I of Two-pass Assembler for pseudo machine code - 8086. Generate any one table viz. Mnemonics, Symbol, Literal, Pool. Implementation of scheduling algorithm		

TEXT BOOK

1. John J. Donovan, Systems Programming, 2nd Edition, McGraw Hill, 2010, ISBN: 9780074604823
2. Michael Barr and Anthony M, Programming Embedded Systems with C & GNU Development Tools, 2nd Edition, Oreilly, 2006, ISBN: 9788184042627

REFERENCE BOOK

1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Operating System Concepts, 8th Edition, Wiley, 2009, ISBN: 9788126520510
2. A. S. Tanenbaum, Modern Operating Systems, 3rd Edition, PHI, 2009, ISBN: 9788120339040
3. Alfred Aho, Ravi Sethi & Jeffrey D. Ullman, Compilers Principles, techniques and tools, Pearson education, ISBN: 0-321-48681-1
4. Leland L. Beck, System Software, Pearson Editions, ISBN: 9788177585551

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	IoT Architecture and Sensors
	COURSE CODE	ET312
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Electrical & Electronics Engineering, Computer Programming

COURSE OBJECTIVES :

ET312.CEO.1: Understand the fundamentals of Internet of Things.
ET312.CEO.2: Make use of devices, gateways and data management in IoT.
ET312.CEO.3: Explain IoT reference model and its architecture.
ET312.CEO.4: Identify sensors, actuators for IoT Application.
ET312.CEO.5: Explain basic need of security and privacy in IoT.
ET312.CEO.6: Analyze real world IoT design constraints in IoT Application.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET312.CO.1: Explain the fundamentals IoT Mechanisms.
ET312.CO.2: Analyze data and knowledge management in IoT technology.
ET312.CO.3: Explain IoT reference model and its architecture.
ET312.CO.4: Develop IoT applications using sensors, actuators and Network devices.
ET312.CO.5: Explain the needs of security and privacy in IoT.
ET312.CO.6: Analyze IoT platform design methodology and its design constraints.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Internet of Things**	**8 HOURS**
Introduction : Definition and Characteristics of IoT, History and Evolution of IoT, Physical and logical Design of IoT, Fundamental IoT Mechanisms and IoT enabled Technologies, IoT Levels and Templates, Domain Specific Applications of IoTs.		
UNIT 2	**IoT and M2M**	**7 HOURS**
Introduction to M2M, Difference between IoT and M2M, M2M and IoT Technology Fundamentals: Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a service (XaaS), M2M and IoT analytic, Knowledge management.		
UNIT 3	**IoT Architecture**	**7 HOURS**
Architecture reference model: Introduction, Reference model and architecture, IoT Reference model, M2M to IoT-an architectural overview: Building architecture, Main design principles and needed capabilities, State of the art, Standards considerations.		
UNIT 4	**Sensors and Actuators**	**6 HOURS**
Sensors & Transducers: Introduction to Sensors, Classification, Different Types, Properties and Working Principles of Sensors , Introduction to Actuators and its Types.		
UNIT 5	**Security, Privacy and Governance in IoT**	**6 HOURS**
Elements of Internet of Things security, Privacy In IoT Networks : Secure Data Aggregation, Privacy In Beacons, Overview on Governance in IoT		
UNIT 6	**IOT Platform Design Methodology**	**6 HOURS**
Introduction to IoT Platform Design Methodology and Case Studies Illustrating IoT Design: Home Automation and Smart City.		

PRACTICAL		
PRACTICAL NO.01	**Introduction to IoT Programming**	**6 HOURS**
Introduction to C programming: Data Types, Conditional Statements: if & else if, Iterative statements : for, while & do while, Function : Call by Value.		
PRACTICAL NO.02	**Interfacing of Sensors and actuators with ESP 8266 and Bluetooth module**	**4 HOURS**
Sensor : DHT 11/22, LM 35, Ultrasonic sensor/ IR sensor, Pressure sensor, Motor : Servo, Stepper, DC, LCD & Seven Segment Display .		

PRACTICAL NO.03	IoT System- Logical Design using Python	6 HOURS
Python Data Types, Data Structures, Control Flow and Function and Introduction of basic Linux commands and Python Installation.		
PRACTICAL NO.04	**IoT Physical Devices and Endpoints**	**4 HOURS**
Interfacing of Sensors and actuators with raspberry pi.		
PRACTICAL NO.05	**Presentation**	**2 HOURS**
Present the build application in a team.		

TEXT BOOK

1. Arshdeep Bahga, Vijay Madisetti, Internet of Things, A Hands -on Approach, 1 st edition, University Press, 2015, ISBN: 978-81-7371- 954-7
2. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, StamatisKarnouskos, Stefan Avesand & David Boyle , From Machine-to-Machine to the Internet of Things, Elsevier, 2014, ISBN: 978-0-12-407684-6

REFERENCE BOOK

1. Daniel Minoli, Building the Internet of Things with IPv6 and MIPv6 : The Evolving World of M2M Communications, Willy Publication, ISBN: 978-1-118-47347-4.
2. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, 2014, ISBN: 978-1-118-43062-0.
3. Parikshit N. Mahalle & Poonam N. Railkar, Identity Management for Internet of Things, River Publishers, ISBN: 978-87-93102-90-3.
4. Rajkumar Buyya, Amir Vahid Dastjerdi, Internet of Things Principles and Paradigm, Elsevier, 2016, ISBN: 978-0-12-805395-9.
5. H. S. Kalsi, Electronic Instrumentation, 3 rd edition, Mcgraw Higher Ed, 2010, ISBN: 9780070702066.
6. Ramon Pallas-Areny, John G. Webster , Sensors and Signal Conditioning, 2 nd edition, Wiley, 2012, ISBN: 9780470054574.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Fundamental of Robotics
	COURSE CODE	EX311
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : EX101: Electrical and Electronics Engineering, IT101: Computer Programming, ME103: Design Thinking

COURSE OBJECTIVES :

EX311.CEO.1: To understand the basics of robotics and classification.
EX311.CEO.2: To describe different types of sensors.
EX311.CEO.3: To study and analyze different transmission system used in robot.
EX311.CEO.4: To illustrate use of virtual instrumentation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX311.CO.1: Memorize history, concepts and key components of robotics technology.
EX311.CO.2: Summarize classification, kinematics, sensors and actuators of industrial robots.
EX311.CO.3: Analyze various issues in designing of manipulator,end effectors.
EX311.CO.4: Design and implement algorithm in LabVIEW for navigating machine.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**
Introduction, History, Specifications of Robots, Usage Of Robots,Classifications of robots by Application, by Coordinate system, By Actuation system, By Programming Method ,Work envelope, Flexible automation versus Robotic technology .		
UNIT 2	**Sensors and Actuators**	**6 HOURS**
Sensor classification, Internal Sensors, External Sensors, Sensor Selections. , Actuators , Pneumatic, hydraulic, electric , servomotor stepper motor, Selection of motors.		
UNIT 3	**Power Transmission System**	**6 HOURS**
Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Rotary to Rotary motion conversion, Rotary to Linear motion conversion, Rack and Pinion drives, Applications.		
UNIT 4	**Manipulators**	**6 HOURS**
Construction of Manipulators, Manipulator Kinematics , translation and rotational matrix , Homogeneous transformation matrix , Electronic and Pneumatic manipulators.		
UNIT 5	**Robot End Effectors**	**6 HOURS**
Classification of End effectors , Tools as end effectors. Drive system for grippers Mechanical adhesive vacuum magnetic grippers , Hooks and scoops,Gripper force analysis and gripper design. Active and passive grippers.		
UNIT 6	**Virtual Instrumentation**	**6 HOURS**
Historical perspectives, advantages, block diagram and architecture of a virtual instrument, data flow techniques, graphical programming in data flow, comparison with conventional programming.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Study of different types of robots and component requirement analysis of particular robot.		
PRACTICAL NO.02		**4 HOURS**
Study of different types of sensors using Electronics trainer kit.		
PRACTICAL NO.03		**4 HOURS**
Design and selection of transmission system required for particular mechanism.		
PRACTICAL NO.04		**4 HOURS**
Study of Pneumatic , hydraulic , electric actuators using mechatronics trainer kit.		

PRACTICAL NO.05		**4 HOURS**
Design and simulate actuator to pick and place objects of different shape.		
PRACTICAL NO.06		**2 HOURS**
Design and simulate DAS using LabView.		
PRACTICAL NO.07		**10 HOURS**
Capstone Project - Building a Robotic System.		

TEXT BOOK

1. Mikell P. Groover ,Industrial Robots Technology , Programming and applications , McGraw Hill , New York , 2014 , ISBN :978-0070249899
2. Deb S. R. and Deb S, Robotics Technology and Flexible Automation, Tata McGraw Hill Education Pvt. Ltd, 2010. ISBN :978-0070077911
3. John J.Craig ,Introduction to Robotics, Pearson, 2009 ,2nd edition , ISBN : 978-0201543612

REFERENCE BOOK

1. S.K.Saha,Introduction to robotics, Tata-McGraw-Hill Publication,ISBN: 978-0070140011
2. Richard Klafter,Robotic Engineering: An Integrated Approach, Prentice Hall,ISBN: 978-8121926164.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Management
	COURSE CODE	HP301
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	15	25	10	NIL	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP301.CEO.1: To introduce the basic concept and scope of Project Management.
HP301.CEO.2: To teach the theory of project Initiation and its analysis with project vision.
HP301.CEO.3: To introduce the concept of risk analysis and different types of tools used in project planning.
HP301.CEO.4: To guide learners monitoring and controlling project progress.
HP301.CEO.5: To introduce the concept of System dynamics, project audit and reviews.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP301.CO.1: Explain the concept of project management.
HP301.CO.2: Develop an ability to analyze scope, objective and vision of project initiation.
HP301.CO.3: Able to analyze risk and different tools of project planning.
HP301.CO.4: Develop an ability to measure progress of project by monitoring and controlling
HP301.CO.5: Identify the problems associated with project and reviewing the same.

THEORY		
UNIT 1	**Introduction Project Management**	**5 HOURS**
Meaning of Project Management, Classifications of projects, The Triple Constraint, The PMBOK project management process framework, Standard project team roles and project organisation (Functional, matrix, projectised), System approach, Systems development, System analysis, Project feasibility, Product life cycle, Project appraisal, Project contracting, The phases of SDLC.		
UNIT 2	**Project Initiation**	**5 HOURS**
Determining the project business reason, creating a project charter (market and technical analysis), financial analysis evaluation of project proposals, risk analysis, sensitivity analysis and social cost benefits analysis, defining scope and objectives, define a project vision.		
UNIT 3	**Project Planning**	**6 HOURS**
Planning fundamentals, identifying the project team responsibilities, project master plan, work breakdown structure, and other tools of project planning, estimating the efforts and duration of tasks, Identifying and analyzing risks, PERT,CPM,GERT,SLAM,DPM and resource allocation.		
UNIT 4	**Project monitoring and controlling**	**4 HOURS**
Executingthe project on time, Measuring project progress, Identifying corrective actions, Internal & external project control, control process, variance limit, issues in project control.		
UNIT 5	**Project Learning**	**4 HOURS**
System dynamics, Project audit, Change management, Project reviews and reporting.		

PRACTICALS		
PRACTICAL NO.01	**SDLC**	**2 HOURS**
Preparing for managing and developing a perfect model of SDLC for a particular given problem.		
PRACTICAL NO.02	**PERT and CPM**	**2 HOURS**
Planning a project under PERT and CPM charts		
PRACTICAL NO.03	**GERT and SLAM**	**2 HOURS**
Planning a project under GERT and SLAM charts		
PRACTICAL NO.04	**DPM**	**2 HOURS**
Solving practical problems under DPM		

PRACTICAL NO.05	**Variance Limit**	**2 HOURS**
Project monitoring under variance and controlling according to the given situations.		
PRACTICAL NO.06	**System Dynamics**	**2 HOURS**
Understanding System dynamics by solving case studies		
PRACTICAL NO.07	**Change Management**	**2 HOURS**
Solving case studies for learning how change management works.		
PRACTICAL NO.08	**Project Reviewing**	**2 HOURS**
Solving many practical problems by reviewing projects as well as some case studies.		

TEXT BOOK

1. James P. Clements and Gido, Effective Project Management Cengage India 5th Edition , ISBN: 9781111824051
2. John Nicholas, Project Management for Business and Technology: Principles and Practice, PHI-Eastern economy 3rd Edition, ISBN: 0-7506-7824-0
3. Juana Clark Craig, Project Management Lite, 2nd Edition, ISBN-13: 9781478129226
4. Harold R. Kerzner, Project Management, 11th Edition, ISBN: 978-1-118-48322-0

REFERENCE BOOK

1. Erik Larson and Clifford Gray, Project Management: The Managerial Process, McGraw Hill ISBN-10: 0-07-340334-2
2. Enzo Frigneti, The Practice of Project Management, KOGAN PAGE INDIA PRIVATE LIMITED,ISBN: 9788175545397
3. Geogary M. Horine, Project Management, QUE 4th Edition, ISBN: 9780134653914
4. Cynthia Stackpole Snyder, A User manual to The PMBOK Guide, ISBN: 9781118546604
5. Brown, James T., The Handbook of Program Management: How to Facilitate Project Success with Optimal Program Management, Second Edition. The McGraw-Hill Companies, 2014, ISBN 978-0071837859
6. Frame, J. Davidson, Managing Projects in Organizations: How to Make the Best Use of Time, Techniques, and People, 3rd edition, Jossey-Bass, 2003, ISBN 0-787-96831-5
7. Kerzner, Harold, ProjectManagement: Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 10th edition, Wiley, 2009, ISBN 0-470-27870-6
8. Meredith, R. Jack and Mantel, Jr., Samuel J., Project Management: A Managerial Approach, 7th edition, Wiley, 2008, ISBN 0-470-22621-8
9. Stackpole, Cynthia Snyder, A Project Manager's Book of Forms: A Companion to the PMBOK Guide, Wiley, 2009, ISBN 978-0470389843
10. Weiss, Joseph and Wysocki, Robert, Five-phase Project Management: A Practical Planning And Implementation Guide, Basic Books, 1992, ISBN 0-201-56316-9

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Basic Entrepreneurship
	COURSE CODE	HP303
	COURSE CREDITS	1
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA			
-	2	-	-	25	-	25	50

PRE-REQUISITE : WF Orientation Course

COURSE OBJECTIVES :

HP303.CEO.1: To understand the fit between you and your entrepreneurialambitions
HP303.CEO.2: To find a problem worthsolving
HP303.CEO.3: To identify yourcustomers
HP303.CEO.4: To develop a solution for your customers' problems and problemsolution
HP303.CEO.5: To build and demonstrate anMVP
HP303.CEO.6: To structure a business model around the problem, customer, and solution and present your Business ModelCanvas.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP303.CO.1: Why entrepreneurship requires
HP303.CO.2: Outline the Problems Worth Solving by using various techniques like DT, JTBD
HP303.CO.3: Identify the Customer Segments and Early Adopters
HP303.CO.4: Develop the solution demo for identify problem.
HP303.CO.5: Create Business Model Canvas and Minimum Viable Product

PRACTICALS:		
PRACTICAL NO.01	**GET STARTED - Discover Yourself**	**2 HOURS**
Find your flow, Effectuation, Case Study: Tristan Walker: The extroverted introvert, Identify your entrepreneurial style.		
PRACTICAL NO.02	**IDEA/PROBLEM - Identify Problems Worth Solving**	**4 HOURS**
What is a business opportunity and how to identify it. Find problems around you that are worth solving. Methods for finding and understanding problems - (Observation, Questioning, DT, Jobs to be done (JTBD) How to run problem interviews to understand the customer's worldview Introduction to Design Thinking - Process and Examples Generate ideas that are potential solutions to the problem identified - DISRUPT GOOTB: Run problem interviews with prospects Class Presentation: Present the problem you "love" Form teams		
PRACTICAL NO.03	**CUSTOMER**	**6 HOURS**
Identify Your Customer Segments and Early Adopters The difference between a consumer and a customer (decision maker); Market Types, Segmentation and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns. Identify the innovators and early adopters for your startup.Craft Your Value Proposition Come up with creative solutions for the identified problems Deep dive into Gains, Pains and Jobs-To-Be-Done (using Value Proposition Canvas, or VPC) Identify the UVP of your solution using the Value Proposition section of the VPC Outcome-Driven InnovationClass Presentation: Communicating the Value Proposition- 1 min Customer Pitch		
PRACTICAL NO.04	**BUSINESS MODEL**	**4 HOURS**
Get Started with Lean Canvas Basics of Lean Approach and Canvas; Types of Business Models (b2b; b2c)		
PRACTICAL NO.05	**VALIDATION**	**9 HOURS**
Develop the Solution Demo Build solution (mockups) demo, How to run solution interviews, GOOTB: Run Solution interviews. Does your solution solve the problem for your customers: The problem-solution test. Sizing the Opportunity Differences between a Startup venture and a small business; Industry Analysis Understanding what is Competition and it's role, Analyze competition Case study: Blue Ocean Strategy Building an MVP Identify an MVP and build it - I; Document and validate your assumptions Build-Measure-Learn feedback loop and the MVP/Javelin Board How to do MVP Interviews GOOTB: Run MVP interviews Is there a market for your product –The product-market fit test Class Presentation: Present your MVP		
PRACTICAL NO.06	**MONEY**	**5 HOURS**
Revenue Streams Basics of how companies make money. Understand income, costs, gross and net margins. Identify primary and secondary revenue streams. Pricing and Costs Value, price, and costs; Different pricing strategies. Understand product costs and operations costs; Basics of unit costing Financing Your New Venture How to finance business ideas, Various sources of funds available to an entrepreneur and pros and cons of each, What investors expect from you, Practice Pitching to Investors and Corporates.		

PRACTICAL NO.07	TEAM	2 HOURS
Team Building Shared Leadership Role of a good team in a venture's success; What to look for in a team; How do you ensure there is a good fit? Defining clear roles and responsibilities. How to pitch to candidates to join your startup Explore collaboration tools and techniques - Brainstorming, Mind mapping, Kanban Board, #Slack.		
PRACTICAL NO.08	**MARKETING & SALES**	**2 HOURS**
Positioning Understand the difference between product and brand and the link between them. Define the positioning statement for your product/service and how it should translate into what your customers should see about that brand in the marketplace. Channels & Strategy Building Digital Presence and leveraging Social media, Creating your company profile page, Measuring the effectiveness of selected channels, Budgeting and planning. Sales Planning Understanding why customers buy and how buying decisions are made; Listening. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale.		
PRACTICAL NO.09	**SUPPORT**	**2 HOURS**
Planning & Tracking Importance of project management to launch and track progress Understanding time management, workflow, and delegation of tasks Business Regulation Basics of business regulations of starting and operating a business; Importance of being compliant and keeping proper documentation How to find help to get started		
PRACTICAL NO.10	**Capstone Project: Present Your BMC (Optional - and MVP)**	**2 HOURS**
BMC: Business Model Canvas. / MVP: Minimum Viable Product.		

REFERENCES

1. Read Forbes article and do Group Discussionhttps://www.forbes.com/sites/chrismyers/2015/12/16/find-your-flow-and-success-will-follow/
2. https://necrophone.com/2014/01/20/effectuation-the-best-theory-of-entrepreneurship-you-actually-follow-whether-youve-heard-of-it-or-not/
3. Use your self awareness to find out what motivates and drives Entrepreneurial activity - Ted Talk "What is your Entrepreneurial style - EntrepreneurKnow
4. Prof. Clay Christensen "IdentifyingCustomerNeeds" https://www.youtube.com/watch?v=yVCZ-7xSsCw
5. Understand the customer problem by GOOTB":by GOOTB":https://www.youtube.com/watch?v=sEENIZgscDw
6. https://www.forbes.com/sites/danschawbel/2013/12/17/geoffrey-moore-why-crossing-the-chasm-is-still-relevant
7. Value Proposition: https://www.youtube.com/watch?v=jZN6CUieuOQ&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
8. Value Proposition & Customer Need:https://www.youtube.com/watch?v=6FnG8pJL8yM&index=3&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
9. https://strategyn.com/turn-customer-input-into-innovation/ CASE STUDIES in ODI: https://jobs-to- be-done.com/tagged/case-study
10. TheLeanBMC https://www.youtube.com/watch?v=FjBe7UO1hc
11. Ash Maurya -Capture your BMC in 20
12. minuteshttps://www.youtube.com/watch?v=7o8uYdUaFR4&t=462s
13. Ash Maurya - How to Prioritize Risks on Your BusinessModel https://www.youtube.com/watch?v=01z7EPXS42k
14. https://pt.slideshare.net/bmorelean/dan-lemberg-lean-pitch
15. https://startups.fb.com/en-in/categories/development/
16. Designing Experiments: https://www.youtube.com/watch?v=WiMZWCg1Hu8&t=111s
17. Customer Development Process:https://www.youtube.com/watch?v=lLEebbiYIkI
18. Beating the Competition: https://www.youtube.com/watch?v=46uP6vOj5G0
19. Q&A with Garr :https://www.youtube.com/watch?v=SmJjjOrusyI
20. Basic Accounting Lingo for Entrepreneurs:https://www.youtube.com/watch?v=Y7Pm1jEEKE
21. Vinod Khosla : How Leaders can BUILDhttps://www.youtube.com/watch?v=bRCoBgCn1Q
22. Vinod Khosla: https://www.youtube.com/watch?v=VIrNLzTs9cw
23. How to Pitch the way VC's think, so you can convince co-founders : https://www.youtube.com/watch?v=fTgU7THoKCw
24. Tony Buzan:http://www.tonybuzan.com/about/mind-mapping/
25. Google : Think branding:https://www.youtube.com/watch?v=1l2CUjkg0ug
26. The Battle for your mind using Positioning:https://www.youtube.com/watch?v=jQrY8xRx-0 Design rules-https://www.igorinternational.com/, Web design course:https://www.coursera.org/specializations/web-designStrikingly Free : https://www.strikingly.com/online-resume/linkedin
27. https://certification.hubspot.com/inbound-sales-certification-course
28. https://www.udemy.com/courses/business/sales/
29. https://www.accountingtools.com/articles/2017/5/17/sales-budget-sales-budget-example

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Graphical Programming Lab
	COURSE CODE	ET304
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : IT101: Computer Programming, ET206: Prototyping

COURSE OBJECTIVES :

ET304.CEO.1: Understand the concept of virtual instrumentation and graphical programming
ET304.CEO.2: Explore the computing tool of LabVIEW for development of basic algorithms
ET304.CEO.3: Learn how to develop basic applications in the LabVIEW graphical programming Environment
ET304.CEO.4: Develop the skill set in industry relevant platform of LabVIEW

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET304.CO.1: Build, simulate and solve diverse problems using LabVIEW
ET304.CO.2: Make a use of the programming structures and data types that exist in LabVIEW
ET304.CO.3: Create user interface with charts, graph and buttons
ET304.CO.4: Make a use of LABVIEW to create data acquisition, analysis and display operations
ET304.CO.5: Construct remote instruments which can run independent of operating system

PRACTICAL		
PRACTICAL NO.01	**LabVIEW and Automation**	**4 HOURS**

- The origin of NI-LabVIEW
- Dataflow and Graphical Programming Language
- NI Example Finder
- Assignment 1.1

PRACTICAL NO.02	LabVIEW under the Hood	4 HOURS

- The LabVIEW Environment Front Panels, Block Diagram, Projects, SubVIs, Icon and Connectors
- Assignment 2.1 - Getting Started The first LabVIEW Program (General)
- Alignment grid, Pull-Down Menus, Floating Palettes
- Placing Items on Front Panel and Block Diagram
- Labeling, Changing font, style, size and color of text
- Assignment 2.2 - Master the Basic LabVIEW Skills (Front Panel and Block Diagram Basics)

PRACTICAL NO.03	Controlling Program Flow	4 HOURS

- Looping (For, While, Shift Registers, Uninitialized Shift Registers)
- Assignment 3.1 - Counting the loops
- Assignment 3.2 - Shift Register - Example
- While Loop + Case Structure Combination
- Assignment 3.3 - Equations/Calculator

PRACTICAL NO.04	LabVIEW Data Types	4 HOURS

- Numeric Types, Strings, Arrays
- Clusters
- Data type conversion
- Assignment 4.1
- Assignment 4.2
- Assignment 4.3

PRACTICAL NO.05	LabVIEW Charts	4 HOURS

- Waveform Charts Chart update modes, single and multiple plot charts
- Clearing charts
- Stacked and Overlaid Plots
- Assignment 5.1

PRACTICAL NO.06	LabVIEW Graphs	2 HOURS

- Single and Multiple Plot Waveform Graphs
- XY Graph
- Using Graph Palette
- Assignment 6.1

PRACTICAL NO.07	Exploring String	4 HOURS

- Using String Functions
- Parsing Functions
- Assignment 7.1 - String Construction
- Assignment 7.2 - More String Parsing

PRACTICAL NO.08	File I/O	2 HOURS

- How they work
- Express Writing and Reading of Measurement Files
- Assignment 8.1 - Writing to a Spreadsheet Files
- Assignment 8.2 - Reading from a Spreadsheet File

PRACTICAL NO.09	Signal Measurement and Generation	2 HOURS

- Introduction to Data Acquisition - DAQ and other Acronyms
- Selecting DAQ Measurement Hardware

PRACTICAL NO.10	Building an Application* and Documentation	8 HOURS

- Define the problem
- Specify the I/O Hardware
- First Design and then write Program
- VI and Control Description
- Printing LabVIEW Panels and Diagrams

PRACTICAL NO.11	Presentation	4 HOURS

- Prepare an users and a programmers manual for build application (template to be given)
- Present the build application in a team

***Building an Application:** Using LabVIEW, create a VI program that controls an experiment consisting of at least three instruments. (Fewer Instruments can be used if MANY functions are controlled by the VI.) The VI should include:

- Plotting of data on the screen
- Saving of data to a file. Saved data must be readable by a spreadsheet program (like Excel).
- At least 3 sub-VIs and at least 1 sub-VI embedded within another sub-VI (Student written).
- User-friendly instructions and controls
- At least one imported graphic and at least three different fonts and colors on the user interface window
- Adequate annotations within the block diagram window of all VIs and sub-Vis.

Note: Points will also be awarded for creativity and difficulty level of the projects.

TEXT BOOK

1. Jeffrey Travis, Jim Kring, LabVIEW for Everyone, Pearson Education, 3rd edition (ISBN: 978-81-317-2649-5)
2. Gary W. Johnson, Richard Jennings, LabVIEW Graphical Programming, McGraw Hill Education, 4th edition (ISBN: 978-1-25-900533-6)

REFERENCE BOOK

1. Jerome Jovitha, Virtual Instrumentation using LabVIEW, PHI, 1st edition (ISBN: 978-8120340305)
2. Rick Bitter, TaqiMohiuddin, Matt Nawrocki, LabVIEW Advanced Programming Techniques, CRC Press, 2nd edition (ISBN: 978-08-493-3325-5)
3. National Instruments LabVIEW User Guide

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	MATLAB
	COURSE CODE	ET305
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : AS202-Applied mathematics

COURSE OBJECTIVES :

ET305.CEO.1: Introduce the MATLAB and SIMULINK environment.
ET305.CEO.2: Analyze and model a given system using MATLAB programming
ET305.CEO.3: Get explore to Graphical User Interface

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET305.CO.1: Use MATLAB and Simulink for Problem Solving
ET305.CO.2: Construct a Mathematical model of a given system
ET305.CO.3: Build a GUI for a given application

PRACTICAL		
PRACTICAL NO.01	**Overview of MATLAB and Scilab**	**10 HOURS**
• Matrix multiplication without using inbuilt MATLAB function • MATLAB program to sort n numbers contained in an array • Introduction to Scilab • To Differentitation between MATLAB and Scilab • Programming in Scilab		
PRACTICAL NO.02	**Advanced MATLAB functions**	**08 HOURS**
• Function call, User defined functions and examples • Advanced MATLAB functions • Conditional and nested conditional statements		
PRACTICAL NO.03	**Simulink and Simscape**	**08 HOURS**
• Link .m file and .mdl file • Modelling in Simulink as well as in Simscape • Multi domain system modelling using Simscape		
PRACTICAL NO.04	**Graphical User Interface**	**08 HOURS**
• Introduction of GUI • Creating visual aspects of GUI • Example : Temperature conversion		
PRACTICAL NO.05	**Statistics and Searching**	**08 HOURS**
• Statistical functions • Set operations • Indexing into vectors of structures • Sequential and binary search		

PRACTICAL NO.06	Toolboxes	08 HOURS

- Signal Processing Toolbox
- Image Processing Toolbox

PRACTICAL NO.07	Project	06 HOURS

- Identify domain for particular application
- Use above toolbox
- Build a software project based on the selected application (GUI is must)

PRACTICAL NO.08	Presentation	04 HOURS

- Present the application in group

TEXT BOOKS

1. Stephan J. Chapman, MATLAB Programming for engineers, 5th edition, Cengage Learning, ISBN 9781111576721
2. Amos Giliat, MATLAB : An introduction with applications, New Delhi, Wiley Publications, 4th edition, ISBN:9788126537204

REFERENCE BOOK

1. Patrick Marchand, Graphics and GUIs with MATLAB, CRC Web site, 3rd edition, ISBN-13: 978-1584883203

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Embedded Linux
	COURSE CODE	EX304
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : EX202 - Applied Digital Circuits, IT201 - Engineering Informatics

COURSE OBJECTIVES :

EX304.CEO.1: To configure and implement Linux Kernel for embedded hardware
EX304.CEO.2: To design program for Embedded application using open source Linux platform

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX304.CO.1: Explore the features of Linux through command line and shell programming
EX304.CO.2: Demonstrate the usage of file system in Linux
EX304.CO.3: Implement Linux scheduling algorithms
EX304.CO.4: Configure and use toolchain in the embedded Linux environment
EX304.CO.5: Design the various device drivers for embedded application

PREAMBLE :

Linux has been adopted for embedded products in the worldwide public switched telephone network, global data networks, and wireless cellular handsets, as well as radio node controllers and backhaul infrastructure that operate these networks. Linux has enjoyed success in automobile applications, consumer products such as games and PDAs, printers, enterprise switches and routers, and many other products.

Linux supports a vast variety of hardware architectures, platforms, and devices. Linux supports a huge variety of applications and networking protocols. Linux is scalable. Linux can be deployed without the royalties required by traditional proprietary embedded operating systems.

An increasing number of hardware and software vendors now support Linux. Embedded Linux has won the race. Indeed, you probably have embedded Linux in your car or home. The reasons for the rapid growth in Embedded Linux:

- Adoption of Linux among developers and manufacturers of embedded products continues to accelerate
- Use of Linux in embedded devices continues to grow at an exciting pace
- Many factors are driving the growth of Linux in the embedded market
- Several standards and relevant organizations are influencing embedded Linux

PRACTICAL : Perform following Practical on any Linux Distribution		
PRACTICAL NO.01	**Title**	**2 HOURS**
• Basic Linux Commands and Linux File System		
PRACTICAL NO.02	**Title**	**2 HOURS**
• Basic C Programming in Linux using GCC		
PRACTICAL NO.03	**Title**	**4 HOURS**
• Configure, Compile and deploy the Linux Kernel on ARM9 based Embedded Board		
PRACTICAL NO.04	**Title**	**2 HOURS**
• Building the experimental setup for the Embedded Linux Development on ARM9 Target Board		

PRACTICAL NO.05	Title	4 HOURS
• Build and execute simple applications in Embedded Linux Environment viz. Single Thread, Thread communication and synchronization		
PRACTICAL NO.06	**Title**	**2 HOURS**
• Implementation of Kernel Loadable Device Driver Module in Embedded Linux Environment		
PRACTICAL NO.07	**Title**	**2 HOURS**
• Handling of an External Interrupt in Embedded Linux Environment		
PRACTICAL NO.08	**Title**	**8 HOURS**
• Capstone Project		

TEXT BOOKS

1. Daniel P. Bovet, Understanding the Linux Kernel, 3rd Edition, O'Reilly Publication, ISBN-13: 978-0596005658
2. Karim Yaghmour, Jon Masters, Gilad Ben-Yossef, & Philippe Gerum, Building Embedded Linux systems", 2nd Edition, O'Reilly Publication, ISBN-13: 978-0596529680
3. Alessandro Rubini & Jonath Corbet, Linux Device Drivers", 3rd Edition, O'Reilly Publication, ISBN: 978-0-596-00590-0

REFERENCE BOOK

1. Chris Simmonds Mastering Embedded Linux Programming, 2nd revised Edition (30 June 2017), Packt Publishing Limited; ISBN-13: 978-1787283282
2. Gene Sally, Pro Linux Embedded System, Apress; 1st ed. edition (28 December 2009), ISBN-13: 978-1430272274
3. Christopher Hallinan, Embedded Linux Primer: A Practical Real-World Approach, 2nd Edition, Prentice Hall Publications, ISBN-13: 978-0137017836
4. The Atmel ARM926EJ-S ARM Thumb Processor - based Microcontroller AT91SAM9260 manual
5. Linux Standard Base Project, http://www.linuxfoundation.org/collaborate/workgroups/lsb

Capstone Projects

Building applications on ARM9 based Embedded Development boards deployed with Embedded Linux The following problems are suggested by Industry experts

A **Design of Device Driver Character Device Driver**

1. Write a device driver to interface LCD
2. Write a device driver to interface Matrix Key Board
3. Write a device driver to interface UART Based Devices like GSM Modem, RFID, Thermal Printer, Finger print module
4. Write a device driver to interface EEPROM based on I2C Peripheral

B **Applications on Embedded Linux**

1. Build an application for attendance systems using Finger print, LCD, Keyboard
2. Build an application for attendance systems using RFID Card, LCD, Keyboard
3. Build an application for Billing systems using Thermal Printer, LCD, Keyboard, EEPROM
4. Build an application for billing systems using Finger Print, LCD, Keyboard
5. Build an application for communication based display solutions using GSM Modem, LCD, Keyboard

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Real Time Operating System
	COURSE CODE	EX321
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Applied Digital Circuits, Embedded System Design

COURSE OBJECTIVES :

EX321.CEO.1: Develop necessary Software skill required for RTOS development.
EX321.CEO.2: Provide practical knowledge and exploration of real time kernel.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX321.CO.1: Implement Fundamental Programs for ARM CORTEX M3.
EX321.CO.2: Analyze the Importance of OS and RTOS.
EX321.CO.3: Interpret the MicroC-OS Structure.
EX321.CO.4: Execute Programmed Multitask systems.
EX321.CO.5: Implement Task Synchronize for Different Application.
EX321.CO.6: Implement Communicate Between Different Application Tasks

THEORY COURSE CONTENT		
UNIT 1	**ARM Processor**	**6 HOURS**
Introduction to ARM family, Architecture, ARM7TDMI, Operational mode, ARM pipeline. ARM cortex: Features, Pin diagram, I/O Programming in Embedded C. **Further Reading: Hardware configuration of lift management system.**		
UNIT 2	**Fundamentals of OS and RTOS**	**6 HOURS**
Basic Principles - Operating System structures System Calls Files Processes Design and Implementation of processes Communication between processes. RTOS Task and Task state Multithreaded Preemptive scheduler- Process Synchronization-Message queues Mail boxes -pipes Critical section Semaphores Classical synchronization problem Deadlocks. **Further Reading: Overall software structure design for lift management system.**		
UNIT 3	**RTOS Structure**	**6 HOURS**
Kernel Structure: Tasks, Task States, TCB, Ready List, Task Scheduling, Task Level Context Switching, Locking and unlocking of scheduler, Idle Task, Statistics Task, Interrupts, Clock Tick, Initialization, Starting the OS. **Further Reading: Identification of the services to lift management system.**		
UNIT 4	**Scheduling in RTX**	**6 HOURS**
Task Management: Creating/ Deleting and Suspending/ Resuming Tasks, Task Stacks and checking, Changing Task Priority. Time Management: Delaying/Resuming Task, System Time. Event Control Blocks. **Further Reading: Finalizing the task behavior and designing it for lift management system.**		
UNIT 5	**Synchronization in RTX**	**6 HOURS**
Semaphore Management: Creation/Deletion, Pending /Posting / Acceptance / Query. Mutual Exclusion Semaphores: Creation/Deletion, Pending /Posting /Acceptance / Query Event Flag Management: Internals, Creation/Deletion of Event Flag groups, Waiting / Setting / Clearing. **Further Reading: Identify need of synchronization and imbibe in lift management system.**		
UNIT 6	**Inter task Communication in RTX**	**6 HOURS**
Message Mailbox Management: Creating / Deleting a Mailbox, Waiting / Sending / Getting without waiting a Message from Mailbox, Status of Mailbox, Alternate uses of Mailbox, Message Queue Management: Creating / Deleting / Flushing a Message Queue, Waiting / Sending / Getting without waiting a Message from Queue **Further Reading: Software integration of lift management system.**		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Create your own library for LCD and indicators required for specified Application.		
PRACTICAL NO.02		**2 HOURS**
Identify the Different task and do the task management for specified Application using RTX Kernel.		
PRACTICAL NO.03		**2 HOURS**
Implement the Time delay and internal services into the Application using RTX kernel.		
PRACTICAL NO.04		**2 HOURS**
Explore Different Scheduling algorithm in RTX kernel.		
PRACTICAL NO.05		**2 HOURS**
Identify use of semaphore in Application and Implement it using RTX Kernel.		
PRACTICAL NO.06		**2 HOURS**
Identify use of Mutex in Application and Implement it using RTX Kernel.		
PRACTICAL NO.07		**2 HOURS**
Identify use of Message Queue in Application and Implement it using RTX Kernel.		
PRACTICAL NO.08		**2 HOURS**
Identify use of Mailbox in Application and Implement it using RTX Kernel.		
PRACTICAL NO.09		**4 HOURS**
Integration of Real Time Application services implemented using RTX.		

TEXT BOOK

1. Jean Labrosse, MicroC/OS-II The Real Time Kernel, 2 nd Edition , CMP Books, 2017, ISBN: 978-1-57-820103-7
2. Rajib Mall, Real-Time Systems: Theory and Practice, 2 nd edition, Pearson Publications, 2008

REFERENCE BOOK

1. Dr. K V K Prasad, Embedded Real time Systems: Concept, design and programming, 3 rd edition, Dream tech press, 2003, ISBN: 9788177224610
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. Jonathan Valvano , Embedded Systems: Real-Time Operating Systems for the Arm Cortex-M3, 4 th edition, 2012, ISBN: 9781466468863

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Digital Signal Processing
	COURSE CODE	EX322
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	30	40	30	50	-	150

PRE-REQUISITE : AS202: Applied Mathematics

COURSE OBJECTIVES :

EX322.CEO.1: Understand signals, classification and operation on signals.
EX322.CEO.2: Understand systems, classification, properties and analysis using Fourier transforms.
EX322.CEO.3: Study and understand DSP components and the role of sampling and aliasing in time domain.
EX322.CEO.4: Study and understand the concept of filtering through convolution and implementation of various IIR and FIR filters.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX322.CO.1: Classify the signals and systems based on their properties.
EX322.CO.2: Analyze the time domain response of Discrete LTI systems
EX322.CO.3: Analyze the system behavior using convolution.
EX322.CO.4: Determine the response of a system using Discrete Fourier Transform.
EX322.CO.5: Determine the response of discrete time systems using Z transform.
EX322.CO.6: Design the FIR and IIR filters

THEORY COURSE CONTENT		
UNIT 1	**Classification of signals and systems**	**6 HOURS**
Definition of signals and systems, communication and control systems as examples, Classification of signals and systems: linear and non linear, time variant and invariant, causal and non-causal, static and dynamic, stable and unstable, invertible, advantages of digital over analog, discrete time signals, sampling of continuous time signal, advantages of discrete time signals over analog signals. Applications: Pressing the Piano buttons and listening the sounds after certain period of time and analyzing the effect.		
UNIT 2	**Characterization of LTI DT System**	**6 HOURS**
Basic elements of DSP, advantages and disadvantages of DSP systems over ASP systems, applications of DSP, Periodic sampling, A to D conversion process, Time domain analysis of DT system. Applications: Analyze the system of piano. **Further Reading:**		
UNIT 3	**Operations on LTI system**	**7 HOURS**
Representation of discrete time signals as summation of impulses, response of LTI discrete time systems using discrete convolution, properties of linear convolution, interconnections of discrete time systems, methods of performing linear convolution; circular representation and circular shift of discrete time signals, circular symmetry, Linear convolution via circular convolution, Sectioned convolution, correlation, auto correlation cross correlation. Applications: Impulse response of speech signal, sesmic signals		
UNIT 4	**Z Domain Analysis of Discrete time systems**	**7 HOURS**
Region of convergence, Analytical properties of Z domain, Poles and zeros of rational function of Z, analysis LTI discrete time system using Z transform. Applications: Projectile Motion analysis		
UNIT 5	**Discrete Fourier Transform**	**6 HOURS**
DTFT, Definition, Frequency domain sampling , DFT, Properties of DFT, analysis of LTI discrete time systems using DTFT, applications of DFT, Computation of DFT using FFT. Applications: DTMF generation and detection		
UNIT 6	**Digital filter design**	**7 HOURS**
Characteristics of Digital filters, Design of Digital IIR filters, filter design, Ideal filter requirements, Gibbs phenomenon, windowing techniques, and Design of Digital FIR filters with various methods. Application: Spectrogram analysis of music concert, Hearing aid systems		

PRACTICAL: Perform following experiments using MATLAB or Open source software		
PRACTICAL NO.01		**6 HOURS**
To generate samples of the standard signals, the audio signals and regenerate or play back.		
PRACTICAL NO.02		**2 HOURS**
To obtain the impulse response/step response of a system described by the given difference equation.		
PRACTICAL NO.03		**2 HOURS**
To generate discrete time sequence / samples of linear convolution and circular of two given input sequences and implement the same using MATLAB.		
PRACTICAL NO.04		**2 HOURS**
To compute the DFT of the given sequence and verify the properties and to get back the original sequence using IDFT function by developing the hard coding.		
PRACTICAL NO.05		**2 HOURS**
To plot the spectrums of DTMF signal using FFT.		
PRACTICAL NO.06		**2 HOURS**
To analyze the spectrogram of speech Signals.		
PRACTICAL NO.07		**2 HOURS**
To design and implement a FIR filter for given specifications and to generate a single or fixed number of multiple echoes (FIR).		
PRACTICAL NO.08		**2 HOURS**
To design the IIR filter using bilinear transformation and check its response and To design and simulate the natural sounding Reverberator.		
PRACTICAL NO.09		**2 HOURS**
Based on the practical, the mini projects like below will be floated 1. To filter an ECG signal that has high-frequency noise and remove the noise by low-pass filtering. 2. To analyze the spectrogram of speech Signals. 3. To design and simulate the all-pass Reverberator. 4. To design and simulate the natural sounding Reverberator. 5. To generate single or fixed number of multiple echoes (FIR). 6. To model the digital music synthesis. 7. To evaluate the Fourier series for periodic signals and to synthesize audio signals from Fourier series coefficients.		

TEXT BOOK

1. Nagoor Kani, Digital Signal Processing , 2nd Edition, Tata Mcgraw Hill (TMH Publication),ISBN : 0070086656
2. Simon Haykins and Barry Van Veen, Signals and Systems, 2nd Edition, Wiley India, ISBN: 9788126512652
3. John G.Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall, 1997, ISBN: 002396815-X.

REFERENCE BOOK

1. M.J.Roberts, Signals and Systems: Analysis of Signals through Linear Systems, McGraw-Hill Higher Education; Edition (2003), ISBN-13: 978-0072930443
2. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, Prentice-Hall, 1989, ISBN 0-13-214635-5
3. Ifaeachor E.C, , Jervis B. W., Digital Signal processing : Practical approach,2nd edition, Pearson publication, ISBN-13: 978-0201596199
4. L.R.Rabiner and B. Gold, Theory and Application of Digital Signal Processing, Prentice Hall, 1992, ISBN 0-13-914101-4
5. Rudra Pratap, "Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers", Oxford, Edition 2010, ISBN-13: 978-0198069195

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Power Electronics and Application
	COURSE CODE	EX323
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	–	150

PRE-REQUISITE : EX101 - Electrical and Electronics Engineering

COURSE OBJECTIVES :

EX323.CEO.1: To understand working and analysis of controlled converters.
EX323.CEO.2: To understand the working of 1 and 3 inverters.
EX323.CEO.3: To study and analyze applications like UPS, electronic ballast, HVDC transmission.
EX323.CEO.4: To study use of power electronics for renewable energy sources.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX323.CO.1: Design and implement a triggering / gate drive circuit for power converters.
EX323.CO.2: Design and analyze different power electronic converters.
EX323.CO.3: Analyze various power quality issues and their remedies.
EX323.CO.4: Analyze applications of power electronics.

THEORY COURSE CONTENT		
UNIT 1	**AC-DC power converters**	**6 HOURS**
Concept of line and forced commutation, Single phase Semi and Full converters for R, R-L loads, Performance parameters, Effect of freewheeling diode, Three phase Semi and Full converters for R and RL load. Simple triggering circuits for single phase converters, triggering circuit requirement for three phase converters. Application: Triggering circuit for mobile charger.		
UNIT 2	**DC-AC Converters**	**6 HOURS**
Single phase bridge inverter for R and R-L load using MOSFET / IGBT, performance parameters, single phase PWM inverters. Three phase voltage source inverter for balanced star R load. Control circuits for single phase bridge inverters, control circuit requirement for three phase inverters. Application: Control circuit for Household UPS.		
UNIT 3	**DC-DC converters and AC Voltage Controller**	**6 HOURS**
Working principle of step down chopper (R-L load), Working principle of step up chopper (R load), Control strategies, Performance parameters, Classification of Chopper, SMPS. Single-phase AC voltage controller with R load, Three phase full wave AC voltage controllers, Cyclo-converters, types of cyclo-converter. Application: Control circuit for SMPS of a desktop.		
UNIT 4	**Resonant converters**	**6 HOURS**
Need for resonant converters, Classification, Resonant Switch: ZC resonant switch and ZV resonant switch, Quasi Resonant Converters: ZCS and ZVS, their comparison, Load resonant converters: SLR half bridge DC/DC converter in low frequency. Case study: Resonant converter for PV application		
UNIT 5	**Power Quality and Energy Storage**	**6 HOURS**
Power Quality considerations, Reactive Power and Harmonic Compensation, Active filters for power conditioning, Power quality issues, Energy Storage technologies: Batteries, Flywheels, Capacitors, Compressed air, Other storage technologies.		
UNIT 6	**Power Electronics Applications**	**8 HOURS**
Power Electronics in Capacitor Charging Applications. HVDC transmission: Main components of HVDC Converter station, Types of HVDC systems. Universal motor speed control. Power Electronics for Photovoltaic Power Systems: Basics, Types, Stand-alone PV systems, Grid connected PV systems. Power Electronics for wind power systems: Basics, Types, Stand-alone wind energy systems, Grid connected wind energy systems, Control of wind turbines.		

PRACTICAL		
PRACTICAL NO.01		**02 HOURS**
Design and Simulation of 1Ph/3Ph IGBT based PWM switched rectifier.		
PRACTICAL NO.02		**02 HOURS**
Design and simulation of Single and three phase dual converter drive using PSIM or MATLAB.		
PRACTICAL NO.03		**02 HOURS**
Design and simulate Triggering circuit for Thyristor (Using UJT or IC-785)/ MOSFET/ IGBT.		
PRACTICAL NO.04		**02 HOURS**
Design and simulate / Implement a Light dimmer using TRIAC / Lamp flasher using TRIAC.		
PRACTICAL NO.05		**02 HOURS**
Design and Simulate / Implement a Single phase AC voltage controller using Thyristors for R load.		
PRACTICAL NO.06		**02 HOURS**
Design and Simulate a single phase full bridge inverter.		
PRACTICAL NO.07		**02 HOURS**
Design and Simulate a three phase SPWM based inverter.		
PRACTICAL NO.08		**02 HOURS**
Report on Industrial visit to a Power Electronics Technology based industry.		
PRACTICAL NO.09		**12 HOURS**
Mini Project based on the above practicals (Capstone Project)		

TEXT BOOKS

1. Ned Mohan, T. Undeland and W. Robbins, Power Electronics Converters applications and design, 2nd edition, John Willey and sons, 2007, ISBN-13, 9788126510900
2. M H Rashid, Power Electronics circuits, devices and applications, 3rd edition, Pearson Education, 2014, ISBN-13: 978-93325357704
3. Robert W. Erickson, Fundamentals of Power Electronics, 2nd Edition, Kluwer Academic Publishers, 2001, ISBN-13: 978-0792372707

REFERENCE BOOKS

1. U. R. Moorthi, "Power Electronics, Devices, Circuits and Industrial Applications", Oxford University Press India; First Edition, 2005, ISBN: 978-0195670929
2. M. S. Jamil Asgar, "Power Electronics", PHI Learning Private Limited-New Delhi; 1 Edition, 2004, ISBN: 978-8120323964
3. Solanki C.S, Solar Photovoltaic Technology and Systems: A Manual for Technicians, Trainers and Engineers PHI, 2013, ISBN: 978-8120347113
4. Kothari, Renewable Energy Sources and Emerging Technologies, PHI Learning Private Limited-New Delhi; 2nd edition, 2011, ISBN: 978-8120344709
5. Volker Quaschning, Understanding Renewable Energy Systems, James and James- Earthscan, 2006, ISBN: 978-1844071364
6. Mehrdad Ehsani, Yimin Gao, Ali Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Standards media, 2009, ISBN: 978-1420053982

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Embedded Processor
	COURSE CODE	ET331
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Engineering tools & techniques, Embedded System Programming

COURSE OBJECTIVES :

ET331.CEO.1: Learn 32-bit microcontroller by understanding the architecture of ARM core.

ET331.CEO.2: Get acquainted with reconfigurable hardware platforms, operating systems,Test and verification tools etc. for embedded systems implementations.

ET331.CEO.3: Get familiar with basic concepts of embedded networking viz. CAN / Ethernet /GPS/GSM.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET331.CO.1: Design embedded processor based devices in real-world applications.

ET331.CO.2: Explain Architecture of ARM core & ARM 7 based microcontroller.

ET331.CO.3: Implement a solution using a combination of hardware (microcontroller) and software (Embedded firmware & its tool chain).

ET331.CO.4: Utilize the standard ports and interface devices on a typical microcntroller

THEORY COURSE CONTENT		
UNIT 1	**Introduction to ARM**	**8 HOURS**
Design approaches - CISC and RISC, ARMs approach towards RISC, Processor and memory organization and Instruction level parallelism, Comparison between 8/16/32 bit micro-controllers.		
UNIT 2	**Architecture: ARM Processor**	**8 HOURS**
ARM core architecture, ARM Pipeline, Register Set, ARM and Thumb instruction set, ARM programmers model, AHB and APB BUS architectures, Memory organization, Architectural support for higher level languages, Architectural support for Operating systems, Assembly and C programming for ARM, System Peripheral interfaces and System serial interfaces.		
UNIT 3	**ARM Exceptions and Interrupt Handling**	**8 HOURS**
Exception types in ARM, External interrupt, software interrupts handling, Abort handling, Vectored Interrupt Controller, Basic Configuration, Interrupt Sequences, Interrupt Latency. Architecture & features of LPC21XX, Memory map, PLL & VPB Divider, Pin connect block..		
UNIT 4	**Real World Interfacing**	**8 HOURS**
Use of ARM core based microcontroller interfacing with LCD, GLCD, Matrix KEYPAD, Working with timers and ADC/DAC, Interfacing GSM, GPS, Serial communication methods-UART, I2C and CAN, Wi-Fi module ESP8266 and AT Commands.		
UNIT 5	**GNU ARM Linux Tool Chain.**	**8 HOURS**
Concept of cross development, Cross development tools -GNU compiler, assembler, linker etc. Development tools and toolchains required for ARM/Linux applications. Tool chain build using buildroot. Linux based terminal -Minicom. JTAG debugging tools. First Linux application on ARM: Hello world!, Introduction to Ethernet and TCP/IP.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Using the serial interface (UART) form a communication link between two boards and exchange data between them.		
PRACTICAL NO.02		**4 HOURS**
Interfacing of EEPROM with LPC21XX using I2C.		
PRACTICAL NO.03		**4 HOURS**
Interfacing of GSM Module with LPC21XX		

PRACTICAL NO.04		**4 HOURS**
Interfacing of GPS Module with LPC21XX		
PRACTICAL NO.05		**2 HOURS**
Display a simple hello world message on a HTML page using ARM microcontroller and ESP8266 Wi-Fi.		
PRACTICAL NO.06		**2 HOURS**
Interface LED with LPC 21XX		
PRACTICAL NO.07		**4 HOURS**
On chip ADC interfacing with LPC21XX		
PRACTICAL NO.08		**2 HOURS**
On chip Timer interfacing with LPC21XX		
PRACTICAL NO.09		**4 HOURS**
GLCD Interfacing with LPC21XX		

TEXT BOOK

1. Steve Furber, ARM System on Chip Architecture, 2nd Edition, Pearson, 2001, ISBN: 9788131708408
2. Andrew N. Sloss, Dominic Symes and Chris Wright, ARM System Developers Guide: Designing and Optimizing System Software, 1st Edition, Morgan Kaufmann Publishers, 2011, ISBN: 1-55860-874-5

REFERENCE BOOK

1. Trevor Martin, The Insiders Guide to Philips ARM7-Based Microcontrollers: An Engineers Introduction To The LPC2100 Series, Hitex (UK) Ltd.
2. LPC 214x User manual (UM10139) :- www.nxp.com
3. ARM architecture reference manual : - www.arm.com

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	IoT Network and Protocols
	COURSE CODE	ET332
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : IoT Architecture and Sensors, Computer Programming

COURSE OBJECTIVES :

ET332.CEO.1: Understand the basic taxonomy and terminology of networking.
ET332.CEO.2: Know transmission fundamental of physical layer.
ET332.CEO.3: Learn different protocols used in IoT.
ET332.CEO.4: Differentiate between IoT & M2M communication.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET332.CO.1: Interpret fundamentals underlying principles of networking.
ET332.CO.2: Explain the types of transmission media with real time applications.
ET332.CO.3: Analysis the protocols used in IoT.
ET332.CO.4: Distinguish between IoT and M2M communication.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Networking**	**08 HOURS**
Introduction to Layered Network Models(OSI &TCP/IP),Basic Elements of Networks,Network Topologies,Network Architectures,Collision&Broad cast Domain,Ethernet Standards IEEE 802.3, Types of Networks,Conversion of Number System,Addressing Types,Design Issues for layers.		
UNIT 2	**Transmission Fundamentals**	**06 HOURS**
Data Rate Limits,Transmission Media,Switching Systems,Structure of Circuit and Packet Switch Networks.		
UNIT 3	**Networks Protocols**	**10 HOURS**
RFID,IEEE802.15.4,IPV6/IPV4,IPv6overLowPower Wireless Personal Area Networks (6WLoWPAN), Zigbee, User Datagram Protocol(UDP),Bluetooth and Bluetooth Low Energy ,Near Filed Communications(NFC), WiMax.		
UNIT 4	**Communications Protocols**	**08 HOURS**
CoAP, AMQP, MQTT, WiFi, WebSockets, LoRA		
UNIT 5	**IoT & M2M Communications**	**08 HOURS**
M2M,difference between IoT and M2M,ETSI M2M Architecture,system architecture, ETSI M2M SCL resource structure,SDN and NFV for IoT.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Configure a network topology using packet tracer software : Collision Domain & Broadcast Domain.		
PRACTICAL NO.02		**2 HOURS**
Basic Network command and Network Configuration Using Packet Tracer.		
PRACTICAL NO.03		**2 HOURS**
Creation of VLAN Using Packet Tracer.		
PRACTICAL NO.04		**2 HOURS**
Interfacing of WiFi/Xbee, module with Arduino.		
PRACTICAL NO.05		**2 HOURS**
Wireless communication between Arduino and PC using Bluetooth protocol.		

PRACTICAL NO.06		4 HOURS
Integrating of sensors, UDP data transfer from client to server.		
PRACTICAL NO.07		**4 HOURS**
Integrating of sensors and transmitting its data over a UDP socket to a server.		

TEXT BOOK

1. Arshdeep Bahga, Vijay Madisetti, Internet of Things, A Hands -on Approach, 1 st edition, University Press, 2015, ISBN: 978-81-7371- 954-7.
2. AndrewS.Tenenbaum , Computer Networks, PHI, 2014, ISBN: 81-203-2175-8

REFERENCE BOOK

1. Oliver Hersent, David Boswarthick, Omar Elloumy, The Internet of Things, 1 st edition,Mcgraw Higher EdWilly Publication,2015, ISBN: 978-81-265-5686-1.
2. Bernd Scholz-Reiter,Florian Michahelles, Architecting the Internet of Things, Springer, 2014, ISBN: 978-3-642-19157-2.
3. Holger Karl and Andreas Willing, Protocols and Architectures for Wireless Sensor Networks , WileyIndia, 2016, ISBN: 9788126533695.
4. Fourauzan B, Data Communications and Networking, 5 th edition, Tata McGraw- Hill, 2010, ISBN: 0 07058408 7.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Kinematics and Dynamics
	COURSE CODE	EX331
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : ME103 : Design Thinking, EXT301: Fundamental Of Robotics, ME105 : Applied Mechanics

COURSE OBJECTIVES :

EX331.CEO.1: To Explore the definition and classification of acceleration.

EX331.CEO.2: To Apply essential features of accelerated motion to the analysis of simple motion Scenario. .

EX331.CEO.3: To Explore concept of kinematics and dynamics for position control.

EX331.CEO.4: To Prepare path planning for robotic system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX331.CO.1: Apply matrix algorithm for computing kinematics of robots.

EX331.CO.2: Analyze kinematics and reverse kinematics of serial and parallel robots.

EX331.CO.3: Prepare the path planning for robotic system.

EX331.CO.4: Calculate Jacobian for serial and parallel robots.

THEORY COURSE CONTENT		
UNIT 1	**Kinematics**	**6 HOURS**
Mechanisms Introduction to subject of study , motivation and aim , examples with motion and force requirements , Terminology and definitions , types of links and kinematic pairs , kinematics chains and their classification , kinematic diagram , DOF calculation , DOF for planer and spatial kinematic chain.		
UNIT 2	**Inversions**	**6 HOURS**
Robotic mechanisms, dead center or singular configuration, Presence of crank , 4R chains , inversion and assembly modes , displacement analysis , problem , forward and inverse kinematics. Spur gear, law of toothed gearing,Interchangeable gears, Gear tooth action interference and undercutting, gear trains.		
UNIT 3	**Basics of Mechanism Gear Train**	**6 HOURS**
Introduction to Mechanisms, Mechanisms and Simple Machines, The Inclined Plane Screw Jack		
UNIT 4	**Force Analysis**	**6 HOURS**
Applied and Constrained Forces ,Free body diagrams , static Equilibrium conditions, Two,Three and four members, Static Force analysis in simple machine members ,Dynamic Force Analysis , Inertia Forces and Inertia Torque , DAlemberts principle,dynamic Force Analysis in simple machine members.		
UNIT 5	**Torque and friction**	**6 HOURS**
Concept of torque and calculations. Sliding and Rolling Friction angle,friction in threads , Friction Drives , Friction clutches, Belt and rope drives, brakes , Tractive resistance.		
UNIT 6	**Dynamics**	**6 HOURS**
Free vibrations , Equations of motion , natural Frequency , Damped Vibration, bending critical speed of simple shaft, Torsional vibration , Forced vibration, harmonic Forcing , Vibration solation.		

PRACTICAL		
PRACTICAL NO.01		**02 HOURS**
Study of gear parameters. Experimental study of velocity ratios of simple, compound, Epicyclic and differential gear trains.		
PRACTICAL NO.02		**02 HOURS**
A. Kinematics of Four Bar, Slider Crank, Crank Rocker, Double crank, Double rocker, Oscillating cylinder Mechanisms. B. Kinematics of single and double universal joints.		
PRACTICAL NO.03		**02 HOURS**
Determination of Mass moment of inertia of Fly wheel and Axle system. Determination of Mass Moment of Inertia of axisymmetric bodies using Turn Table apparatus. Determination of Mass Moment of Inertia using bifilar suspension and compound pendulum.		

PRACTICAL NO.04		**02 HOURS**
Motorized gyroscope Study of gyroscopic effect and couple.		
PRACTICAL NO.05		**02 HOURS**
Determination of range sensitivity, effort etc., for Watts, Porter, Proel and Hartnell Governors.		
PRACTICAL NO.06		**02 HOURS**
Develop a 6-axis arm for performing industrial tasks, unique for every group.		
PRACTICAL NO.07		**10 HOURS**
Mini Project based on the above practicals (Capstone Project).		

TEXT BOOK

1. 1. Reza Jazar, Theory of Applied Robotics,2010 , Springer US , ISBN : 978-0-387-68964-7
2. Ambekar A.G., Mechanism and Machine Theory Prentice Hall of India, New Delhi, 2007 ISBN :978-8120331341.
3. 2. Shigley J.E., Pennock G.R and Uicker J.J., Theory of Machines and Mechanisms, Oxford University Press, 2003 , ISBN :978-0190264482

REFERENCE BOOK

1. 1. Rao.J.S. and Dukkipatti R.V. ,Mechanisms and Machines, Wiley Eastern Ltd., New Delhi, 1992.ISBN :978-8177581270.
2. Richard Klafter,Robotic Engineering: An Integrated Approach, Prentice Hall,ISBN: 978-8121926164.
3. John Hannah and Stephens R.C., Mechanics of Machines, Viva Low Prices Student Edition, 1999, ISBN : 978-0713132311

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP302
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	NIL	NIL	NIL	50	25	75

PRE-REQUISITE : Basic Communication Skills

COURSE OBJECTIVES :

HP302.CEO.1: To define the importance of professional skills in students life
HP302.CEO.2: To explain them necessary, specific professional skills
HP302.CEO.3: To appraise students for placements through acquisition of professional skills
HP302.CEO.4: To support them detect their present level in respect of each professional skill and show direction for improvement

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP302.CO.1: Relate the importance of professional skills(L2)
HP302.CO.2: Build necessary, specific professional skills (L3)
HP302.CO.3: Analyze the environment of employ-ability (L4)
HP302.CO.4: Develop various techniques of effective team building in their professional life(L6)

PRACTICALS: (SECTION A)		
PRACTICAL NO.01	**Self Awareness**	**2 HOURS**
Concept of Johari Window, Advantages and disadvantages of every quadrant, Identifying the proportion of each quadrant in respect of self, Using the tools of Feedback & Exposure for self-development		
PRACTICAL NO.02	**Personal Interviews**	**6 HOURS**
Preparing for Interviews, Typical expected questions & suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Parameters of assessment, Initiating the discussion, Effective listening, Own contribution, Paraphrasing, Arguing and counter-arguing, Giving direction to the discussion		
PRACTICAL NO.04	**Team building and Motivation**	**2 HOURS**
Hallmark of effective teams, Barriers to team work, Subjugation of Individual interests for achievement of teams goal, Leading & motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2 HOURS**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique, Collective and individual Brain Storming,		
PRACTICAL NO.06	**Decision Making**	**2 HOURS**
Levels of decisions, Process of decision-making, Types of criteria, Individual and collective decision-making, Barriers in decision making, Keys to sound decision-making		
SECTION B:	**Aptitude Training.**	

REFERENCE BOOK

1. Stephen Covey: The Seven Habits of Highly Effective People, Simon and Schuster Ltd, ISBN: 0-671-71117-2
2. Krishna Mohan, Meera Banerji, Developing Communication Skills, Birla Institute of Technology and Science, ISBN: 033392-919-5
3. Charles Kepner and Benjamin Tregoe, The Rational Manager: A systematic Approach to Problem Solving and Decision Making , Tata McGraw-Hill Publishing Company Ltd., ISBN:13:978-0070341753
4. Priyadarshini Patnaik, Group Discussion and Interview Skills , Foundation Books, 1st Ed.- 2011, ISBN No.: 9788175967847, 8175967846.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Mini Project
	COURSE CODE	EX324
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	20	NIL	55	75

PRE-REQUISITE : ET206: Prototyping, EX213: Minor project

COURSE OBJECTIVES :

EX324.CEO.1: Understand the Product Development Cycle through Mini project.

EX324.CEO.2: Undertake & execute a mini Project through a group of students.

EX324.CEO.3: Inculcate skills in engineering product design and development process, budgeting, planning, testing, effective trouble-shooting practices, aesthetics and ergonomics.

EX324.CEO.4: Understand the role of professional and ethical practices, management principles, technical documentation and communication skills in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX324.CO.1: Execute an idea in a team as well as within constraints.

EX324.CO.2: Acquire knowledge of the techniques, skills and modern engineering tools necessary for engineering practices.

EX324.CO.3: Use standard engineering tools and processes for design, simulation, testing, analysis in implementation and deployment of theoretical idea into practice.

EX324.CO.4: Use standard documentation and presentation tools for a professional report and presentation of the work.

PREAMBLE:
It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

PRACTICAL

Stage- 1	**Formation of group and Allocation of project adviser**	**Week-1**

1. Project group formation and project advisor allocation by the department.
2. Project group shall consist of Minimum 02 and maximum 03 students per group (For detailed process please check Annexure-1 Mini project guidelines).
3. Selection of finalized topic from approved project topics by the department.
4. The project design idea shall be based on refereed papers, white papers, product, patent, application notes, industry problem, academic, institute or societal requirement, funded research, innovative thought, modification/ development in existing idea etc.
5. Each student will maintain a logbook/project diary. This diary will be utilized to monitor project progress throughout.

Stage- 2	**Project Review -1 Internal review by project adviser**	**Week-2&3**

1. The project group will work on,
a. Conceptualization of an Idea.
b. Literature review.
c. Market survey.
d. Finalizing the Specifications.
2. Presentation of work progress to project adviser and proceed to project approval.

Stage- 3	**Project Review -2 Project Approval**	**Week-4**

1. Presentation of concept to Department Review Committee (DRC) or Committee appointed by department.
2. Review of concept and feasibility of project and necessary suggestions for implementation by the committee.
3. The project group will make corrections and continue their work.

Stage-4	**Project Review -3 Internal review by project adviser**	**Week- 5to9**

1. The project group will work on, a. System Architecture and Design, b. Simulation /software development (As applicable), c. Manufacturing of project, d. Assembly, e. Testing, f. Troubleshooting.
2. Presentation of work progress to project adviser and proceed to final project progress review.

Stage-5	Project Review -4 Final Project progress review	Week-10&11

1. The project group will work on, a. Result analysis against specifications, b.Enclosure/Aesthetic design (As applicable), c.Technical report generation (Draft copy), d. Users manual (As applicable), e. Bill of material etc.
2. The technical report may incorporate following points:
Title, Introduction and Concept, Literature & Market survey, Theory and relevance, Block diagram, Drawings (As applicable), Specifications, Project plan, Bill of material, Enclosure/aesthetic design (As applicable), Results, Results analysis, Conclusion, References.
3. Presentation of project work, draft copy of technical report, Final presentation etc. to DRC or Committee appointed by department.
4. Review of project progress and necessary suggestions by DRC or Committee appointed by department for final presentation.
5. The project group will make corrections. After clearing all comments from DRC; project can be presented to final l examination.
6. Project must be approved by department to appear for final examination.

Stage-6	Examination: Final Demonstration and presentation	Week-12

1. Final examination will be divided in three parts: a) Demonstration, b) Presentation, c) Project documentation.
2. For final examination project must be demonstrated in front of examiner panel. For Industry sponsored projects or other installations examiner panel can visit the project venue.
3. All students must be physically present in front of examiner panel at the time of examination.
4. Only demonstrated projects can be evaluated for presentation and documentation.
5. Mini Project demonstration: Demo of project works and validation of project results to examiners panel.
6. Mini Project presentation: Presentation of overall project work form project idea to implementation and deployment of project to examiners panel.
7. Mini Project documentation: Presentation of technical documentary report to examiners panel.

Assessment:

1. Internal Assessment:
a. Project Review -2 Project Approval -05 Marks
b. Project Review -3 Internal review by project adviser- -05 Marks
c. Project Review -4 Final Project progress review- 10 Marks
2. Examination: Final Demonstration and presentation:
a. Mini Project demonstration: 20 Marks
b. Mini Project presentation: 20 Marks
c. Mini Project documentation: 15 Marks

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Final Year

Bachelor of Technology in Electronics Engineering

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**RELEASE DATE**	**:**	01/06/2019
	REVISION NO.	**:**	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ET401	VLSI Design	3	2	4
2.	DE1	ET41#	Department Elective - Refer Annexure	3	---	3
3.	OE3	ET42#	Open Elective - Refer Annexure	3	2	4
4.	HSS7	HP401	Engineering Economics	2	---	2
5.	HSS8 / SDP7	HP403 / ET403	Business Strategies / Programming in Java	---	2	1
6.	SDP8	EX402	Project – I	---	8	4
7.	SDP9	EX404	Summer Internship	---	---	4
TOTAL				**11**	**14**	**22**

SEMESTER:VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	EX431	Consumer Electronics	3	2	4
2.	DE2	ET44#	Department Elective - Refer Annexure	3	---	3
3.	OE4	ET45#	Open Elective - Refer Annexure	3	2	4
4.	HSS9	HP402	Sociology	2	---	2
5.	SDP10	EX432	Project – II	---	8	4
TOTAL				**11**	**12**	**17**

Note: L: Lecture, P: Practical

DEPARTMENT ELECTIVE (DE) DETAILS

1) Any one course to be optedin Semester VII & VIII

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DE1.1	ET411	Digital Image Processing	3	-	3
2.	DE1.2	ET412	Microwave Engineering	3	-	3
3.	DE1.3	ET413	RISC Processors	3	-	3
4.	DE1.4	ET414	Machine Learning	3	-	3

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DE2.1	EX441	Biomedical Engineering	3	-	3
2.	DE2.2	ET442	Artificial Intelligence	3	-	3
3.	DE2.3	ET443	Wireless Sensor Network	3	-	3
4,	DE2.4	ET444	Speech Signal Processing	3	-	3

OPEN ELECTIVE (OE) DETAILS

1) Any one course to be selected in Semester VII& VIII.
2) The corresponding course to be chosen from same domain.

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	DOMAIN	COURSE	TEACHING SCHEME		
					L	P	CREDIT
1.	OE3.1	ET421	Embedded System	Low-Power SoC Architecture & Applications	3	2	4
2.	OE3.2	ET422	Internet of Things (IoT)	Privacy and Security in IoT	3	2	4
3.	OE3.3	EX421	Robotics & Automation	Robotics Vision	3	2	4

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	DOMAIN	COURSE	TEACHING SCHEME		
					L	P	CREDIT
1.	OE4.1	ET451	Embedded System	Real-Time Embedded System	3	2	4
2.	OE4.2	ET452	Internet of Things (IoT)	Energy Management for IoT Devices	3	2	4
3.	OE4.3	EX451	Robotics & Automation	Intelligent and High Performance Robotics	3	2	4

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	VLSI Design
	COURSE CODE	ET401
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	30	40	30	50	-	150

PRE-REQUISITE : EX202 - Applied Digital circuits

COURSE OBJECTIVES :

ET401.CEO.1: Understand qualitative analysis for the design of various circuits using MOS
ET401.CEO.2: Provide an overview of various processors like CPLD and FPGA
ET401.CEO.3: Explore VHDL and verilog programming and various parameters
ET401.CEO.4: Get familiar with faults and testing.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET401.CO.1: Design CMOS circuits for Specific digital logic.
ET401.CO.2: Apply the knowledge about PLDs, FPGA Design & architectures in implementing digital design.
ET401.CO.3: Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
ET401.CO.4: Apply knowledge of testability in design and build self test circuit.

THEORY COURSE CONTENT		
UNIT 1	**CMOS Design**	**6 HOURS**
MOS Transistors, CMOS Fabrication, CMOS Inverter, CMOS combinational Logic, Transistor Sizing, Power Dissipation, Noise Margin, Transmission Gate, Body Effect, Short Channel & Hot Electron Effect, Technology Scaling, Design Rules, Stick Diagram.		
UNIT 2	**PLD Architecture and Application**	**6 HOURS**
Need of PLDs, ASIC, Programmable logic devices, Types of PLDs, advantages and disadvantages of PLDs , Complex PLDs, Field Programmable Gate Arrays (FPGAs) , FPGAs Technology , Implementing Functions in FPGA. Case study: Xilinx Artix-7 FPGA family		
UNIT 3	**VHDL Design**	**7 HOURS**
Elements of VHDL, Modeling Styles, Sequential Statements, Concurrent Statements, Packages, Sub Programs, Attributes, VHDL Modeling Of Combinational, Sequential Logics & State Machine Modeling (Mealy And Moore Machine) VHDL Test Bench.		
UNIT 4	**Introduction to verilog Design**	**7 HOURS**
Overview of Digital Design with Verilog HDL, Program Structure, Logic System, Nets, Variables, And Constants,Vectors & Operators, Arrays, Logical Operators & Expressions. Hierarchical Modeling Concepts, data types, Modules and Ports,Gate-Level Modeling, Dataflow Modeling, Behavioral Modeling.		
UNIT 5	**VLSI Testing**	**6 HOURS**
Types of Fault, Need of Design for Testability (DFT), Testability, Difference between testing and verification, Path Sensitizing, Sequential Circuit Test, BIST, Test Pattern Generation, JTAG & Boundary Scan, TAP Controller. Metastability and Solution.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Write a Verilog code for Full adder.		
PRACTICAL NO.02		**2 HOURS**
Write a Verilog code for counter		
PRACTICAL NO.03		**2 HOURS**
Write a VHDL code for Mealy State Machine/Moore State Machine-examples		
PRACTICAL NO.04		**2 HOURS**
Universal shift register with mode selection input for SISO, SIPO, PISO, & PIPO modes.		

PRACTICAL NO.05		2 HOURS
• Write a VHDL code to implement FIFO memory. • Write a VHDL code to control the speed, direction of DC & stepper motor.		
PRACTICAL NO.06		**2 HOURS**
Write VHDL code to generate ramp/square waveform using DAC		
PRACTICAL NO.07		**2 HOURS**
Write a VHDL code to display messages on the given seven segment display / keypad interfacing.		
PRACTICAL NO.10		**2 HOURS**
Design and implementation of Layout of Inverter ,NAND, NOR using CMOS 0.25 micron Technology in Microwind.		
PRACTICAL NO.11		**2 HOURS**
Design and implementation of Layout of Full adder/ Multiplexer/Demultiplexer using CMOS 0.25 micron Technology in Microwind.		
PRACTICAL NO.12		**1 HOURS**
Design and implementation of Layout of 2:1 Multiplexer using logic gates and transmission gates.		

TEXT BOOK

1. Neil Weste and David Harris, Principles of CMOS Design, 4th Edition, Pearson Education, 2010, ISBN: 9780321547743
2. John F Wakerly, Digital Design-Principles and Practices, 4th Edition Pearson education, ISBN : 9780131863897.
3. Charles H. Roth,Digital systems design using VHDL, PWS. ISBN : 978-8131500279.
4. Samir Palnitkar, Verilog HDL: A Guide to Digital Design and Synthesis,2nd Edition Publisher: Prentice Hall PTR Publication, February 21, 2003, ISBN: 978-0132599702.

REFERENCE BOOK

1. Wyane Wolf, Modern VLSI Design (System on Chip), 4th Edition, Pearson Education,2008, ISBN: 9780137145003
2. Jayaram Bhasker ,A VHDL Primer, 3rd Edition, Prentice Hall,ISBN-10: 0130965758.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Digital Image Processing
	COURSE CODE	ET411
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : Signals & Systems

COURSE OBJECTIVES :

ET411.CEO.1: To identify various basic operations on an image
ET411.CEO.2: To analyze spatial and frequency domain processing on an image
ET411.CEO.3: To design an algorithm for image compression and segmentation
ET411.CEO.4: To develop algorithms for features extraction and filtering

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET411.CO.1: Analyze fundamentals of image processing
ET411.CO.2: Develop an algorithm for spatial and frequency domain filtering
ET411.CO.3: Determine various image compression and segmentation techniques
ET411.CO.4: Design various applications based on image processing

THEORY COURSE CONTENT		
UNIT 1	**Basics of Image Processing**	**8 HOURS**
Components and basic steps involved in digital image processing, Sampling and quantization of images, Grading image quality (Spatial and Gray level resolution), significance of various file formats of image. Basic operations on images image addition, subtraction, logical operations, scaling translation, rotation. Introduction to Color Image processing (RGB Model).		
UNIT 2	**Image analysis in Spatial Domain**	**8 HOURS**
Point processing techniques: Intensity transformation, contrast stretching, histogram, histogram equalization. Neighborhood processing techniques: Concept of 2D filtering (2D Convolution), Smoothing filters with mask size of 3x3 and 5x5 (Low pass filter, median filter). Sharpening filters (high pass filter).		
UNIT 3	**Image analysis in Frequency Domain.**	**7 HOURS**
Fast Fourier Transform, 2D FFT, Representing image in frequency domain. Gaussian low pass filtering and high pass filtering. Homomorphism filtering. Image Restoration: Noise models, restoration using Inverse filtering and Wiener filtering.		
UNIT 4	**Image Compression**	**6 HOURS**
Redundancy and compression relation. Image compression models, Lossless compression: Variable length coding, LZW coding. Lossy Compression: Transform based coding DCT based compression, JPEG compression standard.		
UNIT 5	**Morphological Image Processing and Segmentation.**	**6 HOURS**
Basic, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, Boundary, Detection, Hole filling, Connected components, convex hull, thinning, thickening skeletons, and pruning. Segmentation: Edge detection		
UNIT 6	**Image Processing Applications**	**7 HOURS**
Extracting various features from image, importance of features in various image processing applications & biomedical image processing application.		

TEXT BOOK

1. Rafael C Gonzalez and Richard E Woods. Digital Image Processing, 3rd Edition, Pearson, 2013 ISBN: 9789332518469.
2. S. Jayaraman, S Esakkirajan, T Veerakumar. Digital Image Processing, 3rd Edition, Tata McGraw Hill, 2011, ISBN: 9780070144798

REFERENCE BOOK

1. S. Annadurai and R. Shammugalakshmi. Fundamentals of Digital Image Processing, 1st Edition, Pearson, 2007, ISBN : 8177584790
2. William K Pratt. Digital Image Processing, 4th Edition, Willey, 2010,ISBN: 9788126526840
3. Arthur Weeks Jr. Fundamentals of Digital Image Processing, 1st Edition, Wiley-IEEE, 1996,ISBN: 9780780334106.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Microwave Engineering
	COURSE CODE	ET412
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : ET323 – Antenna Theory and design

COURSE OBJECTIVES :

ET412.CEO.1: Apply transmission line concepts.
ET412.CEO.2: Apply knowledge related to different waveguide structures and their modes.
ET412.CEO.3: Apply knowledge related to different microwave devices.
ET412.CEO.4: Build understanding about power dividers and directional couplers.
ET412.CEO.5: Apply knowledge gained for microwave domain to solve real time industry scenarios.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET412.CO.1: Solve problems based on impedance concept using smith chart.
ET412.CO.2: Design waveguide structures for different modes and cutoff frequencies.
ET412.CO.3: Solve problems based on microwave devices.
ET412.CO.4: Solve problems based on Power dividers and directional couplers.
ET412.CO.5: Apply RF/Microwave domain skills required for different job roles existing in industry.

THEORY COURSE CONTENT		
UNIT 1	**Transmission line fundamentals**	**08 HOURS**
Transmission lines: equations, characteristic impedance, impedance matching, impedance transformation, S-parameters, VSWR, Smith chart , stub matching		
UNIT 2	**Waveguides and Strip lines**	**06 HOURS**
TEM,TE & TM waves, parallel plate waveguide, rectangular waveguide, circular waveguide, strip line , micro strip line, wave velocities , dispersion **Self - Study Component:** microwave junctions , ferrite isolators, phase shifters and circulators		
UNIT 3	**Microwave devices, Power dividers and directional couplers**	**08 HOURS**
Diodes Schottky , PIN , Varactor, Gunn ; Transistors ; Microwave integrated circuits ; Properties, power divider types T junction, Wilkinson , directional couplers types- waveguide directional couplers , Quadrature hybrid coupler, coupled line directional coupler		
UNIT 4	**Microwave Tubes**	**10 HOURS**
Limitations of conventional tubes, O and M type classification of microwave tubes, re-entrant cavity, velocity modulation. Construction, operation, performance analysis and applications of -Single cavity and two cavity klystron, Magnetron		
UNIT 5	**Microwave applications**	**10 HOURS**
RF network planning , link budget analysis , microwave links installation and commissioning , 5TH Generation cellular networks base station components , cellular components		

TEXT BOOK

1. David M. Pozar. Microwave Engineering, 4th edition, Wiley, ISBN 978-0-470-63155-3.
2. Samuel Y. Liao. Microwave Devices and Circuits, 3rd edition, Pearson, ISBN-10: 8177583530.

REFERENCE BOOK

1. Robert E. Collin. Foundations for Microwave Engineering, Wiley, ISBN- 0-7803-6031-1.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	RISC Processor
	COURSE CODE	ET413
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	40	30	NIL	NIL	100

PRE-REQUISITE : Microcontroller & Application

COURSE OBJECTIVES :

ET413.CEO.1: Understand features & architecture of ARM Processor.
ET413.CEO.2: Know architecture & features of ARM based microcontroller
ET413.CEO.3: Learn interfacing with different peripherals.
ET413.CEO.4: Get familiar with basic concepts of embedded networking viz. CAN, I2C, GPS/GSM.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET413.CO.1: Explain architecture of ARM core & ARM 7 based microcontroller
ET413.CO.2: Perform interfacing of different peripherals
ET413.CO.3: Develop embedded system applications using networking protocols.
ET413.CO.4: Perform Linux based application using ARM Processor

THEORY COURSE CONTENT		
UNIT 1	**Introduction to ARM processor.**	**8 HOURS**
Comparison of CISC and RISC, ARMs approach towards RISC Processor, memory organization and Instruction level parallelism, AMBA bus protocol, Comparison between 8/16/32 bit micro-controllers, Comparison of ARM 7, ARM 9, ARM 11.		
UNIT 2	**Architecture: ARM Processor.**	**8 HOURS**
ARM core architecture, ARM Pipeline, ARM and Thumb instruction set, ARM programmers model, Exception & Interrupts in ARM processor, Memory management, Introduction to instruction set & Assembly language programming.		
UNIT 3	**Introduction to LPC21XX Microcontroller.**	**8 HOURS**
Architecture & features of LPC21XX, Memory map, PLL & VPB Divider, Pin connect block, Interfacing with GLCD, LED, Interfacing & Programming with Timer, Serial Port, PWM.		
UNIT 4	**Real World Interfacing.**	**8 HOURS**
Interfacing with Matrix KEYPAD, ADC/DAC, Interfacing with GSM, GPS, I2C, SPI, CAN, Wi-Fi module ESP8266.		
UNIT 5	**GNU ARM Linux Tool Chain.**	**8 HOURS**
Concept of cross development, Cross development tools -GNU compiler, assembler, linker etc. Development tools and toolchains required for ARM/Linux applications. Tool chain build using buildroot. Linux based terminal -Minicom. JTAG debugging tools. First Linux application on ARM: Hello world!, Introduction to Ethernet and TCP/IP.		

TEXT BOOK

1. Steve Furber, ARM System on Chip Architecture, 2nd Edition, Pearson, 2001, ISBN: 9788131708408
2. Andrew N. Sloss, Dominic Symes and Chris Wright, ARM System Developers Guide: Designing and Optimizing System Software, 1st Edition, Morgan Kaufmann Publishers, 2011, ISBN: 1-55860-874-5

REFERENCE BOOK

1. Trevor Martin, The Insiders Guide to Philips ARM7-Based Microcontrollers: An Engineers Introduction To The LPC2100 Series, Hitex (UK) Ltd.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Machine Learning
	COURSE CODE	ET414
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : Computer Programming, Applied Mathematics

COURSE OBJECTIVES :

ET414.CEO.1: Illustrate the basic concepts and techniques of machine learning.

ET414.CEO.2: Explore supervised and unsupervised learning paradigms of machine learning for regression and classification.

ET414.CEO.3: Develop a deeper understanding of several algorithms in machine learning.

ET414.CEO.4: Evaluate and interpret the results of the machine learning algorithms for solving practical problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET414.CO.1: Explain fundamentals of machine learning.

ET414.CO.2: Describe supervised and unsupervised learning.

ET414.CO.3: Analyze mathematically various machine learning approaches and paradigms.

ET414.CO.4: Implement machine learning solutions for classification, regression, and clustering problems.

ET414.CO.5: Compare various machine learning techniques and to get an insight of when to apply a particular machine learning approach.

THEORY COURSE CONTENT		
UNIT 1	**Machine Learning Fundamentals**	**8 HOURS**
Introduction to Machine Learning, Types of Learning, Linear Regression, Logistic Regression, Concept of Under fitting and Over fitting, Bias-Variance Tradeoff.		
UNIT 2	**Statistics and Probabilistic Learning**	**8 HOURS**
Probability Concept, Decision Trees, Random Forest, Nave Bayes, Bayesian Learning, Feature Space, Dimensionality Reduction, Principal Components Analysis (PCA) and K Nearest Neighbors (KNN.) Case Study Using Decision Tree, PCA		
UNIT 3	**Support Vector Machine.**	**8 HOURS**
Support Vector Machine, Optimization Objective of SVM, Maximum Margin Principle, Lagrangian Multipliers for SVM and Kernel Function. Case Study Using SVM.		
UNIT 4	**Neural Networks.**	**8 HOURS**
Neural Network Representation, Perception, Activation Function and Types, Multilayer Network and Back-propagation Algorithm, Introduction to Deep Learning based on Convolution Neural Network. Case Study Using Neural Network/ Deep Learning.		
UNIT 5	**Clustering and Ensemble Learning.**	**8 HOURS**
Principal of Clustering, K-Means, Expectation-Maximization (EM) Algorithm, Ensemble Methods. Case Study Using Clustering Algorithm.		

TEXT BOOK

1. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, MIT Press, (ISBN: 978-0-262-01243-0).
2. Christopher Bishop, Pattern Recognition and Machine Learning, Second Edition, Springer. 2006, (ISBN-13: 978-0387310732).
3. Phil Kim, MATLAB Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence, Press, 2017, (ISBN 978-0-262-01243-0).
4. Tom Mitchell, Machine Learning, First Edition, McGraw-Hill Science/Engineering/Math, 1997, (ISBN: 0070428077).

REFERENCE BOOK

1. Trevor Hastie, Robert Tibshirani and Jerome Friedman, The Elements of Statistical Learning, Second Edition, Springer-Verlag,2009 ,(ISBN: 978-0-387-84857-0)
2. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012, (ISBN: 9780262018029).
3. Simon Haykin, Neural Networks: A comprehensive foundation, Prentice Hall International Inc. 1999, (ISBN: 0132733501).

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Low-Power SoC Architecture and Applications
	COURSE CODE	ET421
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : ET303 - Microcontroller and Application, ET311 - Embedded System Prog.

COURSE OBJECTIVES :

ET421.CEO.1: Learn System-on Chip architecture.
ET421.CEO.2: Study ARM CORTEX processors its features and applications in embedded domain
ET421.CEO.3: Learn real world interfacing with ARM CORTEX based microcontroller.
ET421.CEO.4: Know Nano devices and its use in SOC

COURSE OUTCOMES :

The students after completion of the course will be able to,

1. ET421.CO.1: Understand architecture of SOC.
1. ET421.CO.2: Explain architecture of ARM CORTEX and CORTEX based microcontroller
1. ET421.CO.3: Implement interfacing of real world peripherals with ARM CORTEX based microcontroller.
1. ET421.CO.4: Develop applications and programming based on ARM CORTEX based microcontroller
1. ET421.CO.5: Understand basic and advanced concept of Nano devices.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to System on Chip**	**8 HOURS**
SOC Evolution, Features and applications, SOC Design, Introduction to OMAP, Reconfigurable SOC, ASIC to System on Chip		
UNIT 2	**ARM CORTEX Processor**	**8 HOURS**
Introduction to ARM CORTEX series processors, Features, Architecture, Improvement of CORTEX over classical series Resistor model and Applications, Bit Banding, Tail Chaining, Thumb2 technology, Interrupts and Exceptions,Memory systems, CMSIS standard for ARM CORTEX.		
UNIT 3	**ARM CORTEX based Microcontroller**	**8 HOURS**
Survey of ARM CORTEX based microcontrollers, Architecture, Features and Comparison, Memory mapping, System Control, Clocking and Power control, NVIC, GPIO, Pin connect block, System Tick Timer, UARTs, Graphical LCD, ADC		
UNIT 4	**Real World Interfacing.**	**8 HOURS**
Interfacing of CORTEX based microcontrollers using CMSIS standard, Concept of communication, Interfacing and programming with CAN, USB, ETHERNET, PWM, WDT. Application development on ARM CORTEX based microcontroller		
UNIT 5	**Introduction to Nano Devices.**	**8 HOURS**
Introduction, nanotechnology potentials, Comparison of classical and quantum systems, General postulates of quantum mechanics, analogies between quantum mechanics and classicalelectromagnetic fields.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Implementation the on-chip UART0 on LPC1768 and transferring receiving data to from the Host machine PC and Ultra sonic sensor		
PRACTICAL NO.02		**4 HOURS**
Implementation of On-chip 10-bit ADC 4 / 8 channels on channel 1 on LPC1768 with or without Interrupt for reading Moisture and pH in the growth of the plants		
PRACTICAL NO.03		**4 HOURS**
Programming On-chip Nested Vector Interrupt Controller (NVIC)		
PRACTICAL NO.04		**2 HOURS**
TFT interfacing		

PRACTICAL NO.05	Perform Any 2 of the following	4 HOURS
i) Implementation of Ethernet protocol ii) Implementation of USB iii) Implementation of DMA Controller		
PRACTICAL NO.06		**4 HOURS**
Implementation of RTC		
PRACTICAL NO.07		**2 HOURS**
Implementation of PWM		

TEXT BOOK

1. Michael Keating, Pierre Bricaud,Reuse Methodology manual for System-On-A-Chip Designs, 2nd edition Kluwer Academic,2001, ISBN: 0-7923-8175-0.
2. Joseph Yiu.The Denitive Guide to ARM Cortex-M3 and Cortex-M4 Processors, 3rd Edition, Elsevier, ISBN: 9780124079182.
3. George W. Hanson.Fundamentals of NanoElectronics, 1stEdition by Pearson Education,2008,ISBN 97 80131957084.

REFERENCE BOOK

1. Trevor Martin. The Designers Guide to the Cortex-M Processor Family, 2nd Edition, Elsevier, 2013,ISBN: 978-0-080-98299-1.
2. B. Al Hashimi.System on chip-Next generation electronics. ISBN: 0-8634-1552-0
3. Technical references and user manuals on www.arm.com
4. PrakashRashinkar. Peter Paterson and Leena Singh. SoC Verification-Methodology and techniques, Kluwer Academic, 2001.ISBN 978-0-306-46995-4.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Privacy and Security in IoT
	COURSE CODE	ET422
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	–	150

PRE-REQUISITE : ET312 - IoT Architecture & Sensors, ET332 - IoT Network & Protocols

COURSE OBJECTIVES :

ET422.CEO.1: Familiarize IoT security and fundamentals..
ET422.CEO.2: Review about the various securing techniques in IoT.
ET422.CEO.3: Understand access management Solutions for IoT.
ET422.CEO.4: Interpret the need of privacy in IoT.
ET422.CEO.5: Learn about the applications of cloud for IoT.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET422.CO.1: Explain security and fundamentals in IoT.
ET422.CO.2: Describe the various securing techniques in IoT.
ET422.CO.3: Discuss access management solutions for IoT
ET422.CO.4: Apply the privacy techniques in IoT.
ET422.CO.5: Develop applications of cloud for IoT.

THEORY COURSE CONTENT		
UNIT 1	**IoT Security fundamentals**	**08 HOURS**
Need of security, security fundamentals, forms of protection, security standards, security issues, challenges and management. Role of privacy in IoT.		
UNIT 2	**Securing the Internet Of Things**	**08 HOURS**
Security mechanisms built in the IoT protocols, Security Architecture in the Internet of Things - Security Requirements in IoT. Authentication/Authorization for Smart Devices, Cryptographic primitives and its role in IoT		
UNIT 3	**Identity & Access Management Solutions for IoT.**	**10 HOURS**
Identity lifecycle authentication credentials IoT IAM infrastructure Authorization with Publish OR Subscribe schemes access control		
UNIT 4	**Privacy Preservation and Trust Models for IoT**	**09 HOURS**
Concerns in data dissemination Lightweight and robust schemes for Privacy protection Trust and Trust models for IoT		
UNIT 5	**Cloud Application and Security for IoT.**	**10 HOURS**
Development environments for service development; Amazon, Azure, Google App-cloud platform in industry, IoT physical servers and cloud offerings. Cloud services and IoT offerings related to IoT from cloud service providers Cloud IoT security controls.		

PRACTICAL		
PRACTICAL NO.01	**Title: Monitoring System**	**2 HOURS**
Design an IOT Monitoring System.		
PRACTICAL NO.02	**Title: Linux and HTML**	**4 HOURS**
Introduction to Linux and HTML for IoT application.		
PRACTICAL NO.03	**Title: Python and JS**	**4 HOURS**
Introduction to Python Programming and JavaScript for IoT application.		
PRACTICAL NO.04	**Title: Device Control**	**4 HOURS**
Controlling devices over cloud.		

PRACTICAL NO.05	Title: C programming	4 HOURS
IoT programming in C.		
PRACTICAL NO.06	**Title: Encryption Algorithm**	**4 HOURS**
Implementation of the Encryption algorithms in IoT .		
PRACTICAL NO.07	**Title: Decryption Algorithm**	**4 HOURS**
Implementation of the Decryption algorithms in IoT		

TEXT BOOKS

1. Brian Russell Drew Van Duren, Practical Internet of Things Security, Packt Publishing Ltd. ISBN: 9781788625821, 2018.
2. Pethuru Raj and Anupama C. Raman, The Internet of Things: Enabling Technologies, Platforms, and Use Cases, CRC Press, ISBN 9781498761284, 2017
3. Reese, G. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, Sebastopol, CA: O' Reilly Media, Inc., ISBN: 9780596157647, 2009.

REFERENCE BOOKS

1. Shancang Li, Li Da Xu, Securing the Internet of Things, Elsevier publication, ISBN 9780128044582, 2017
2. Fei Hu, Security and Privacy in Internet of Things (IoTs): Models, Algorithms and Implementations, ISBN 9781498723183, 2016
3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Morgan Kaufmann. Mastering Cloud Computing: Foundations and Applications Programming, Elsevier publication, 2013.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Robotic Vision
	COURSE CODE	EX421
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	30	40	30	-	50	150

PRE-REQUISITE : Fundamentals of Robotics and Design , Kinematics and Dynamics of Robotics

COURSE OBJECTIVES :

EX421.CEO.1: Introduce the principles and applications of vision system in modern manufacturing.
EX421.CEO.2: Classify and prioritize various vision algorithms.
EX421.CEO.3: Organize different object recognition method.
EX421.CEO.4: Explore MATLAB/Python for image processing application.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX421.CO.1: Choose optimum parameters for robotics vision system.
EX421.CO.2: Apply image processing algorithms in robotics application.
EX421.CO.3: Illustrate various image capturing and processing techniques.
EX421.CO.4: Experiment with object recognition strategies.

THEORY COURSE CONTENT		
UNIT 1	**Vision system**	**8 HOURS**
Basic Components Elements of visual perception, Lenses: Pinhole cameras, Camera geometry and color sensing, sensors in robotics		
UNIT 2	**Low Level Vision**	**10 HOURS**
Introduction, Image acquisition, illumination techniques, imaging geometry, some basic relationship between pixels, preprocessing		
UNIT 3	**High Level Vision**	**8 HOURS**
Introduction, segmentation, description, segmentation and description of 3D structures, recognition, interpretation **Further Reading:**		
UNIT 4	**Object recognition and feature extraction**	**8 HOURS**
Object recognition, System component, Complexity of the object recognition, Object representation, Feature detection, recognition strategies, verification		
UNIT 5	**Applications of robotics vision**	**8 HOURS**
Pick and place robot, pedestrian detection, face detection, Introduction to ADAS		

PRACTICAL		
PRACTICAL NO.01		**8 HOURS**
Hardware interfacing for image/video acquisition. Interfacing variety of hardware for image processing application		
PRACTICAL NO.02		**8 HOURS**
Image/Video processing techniques with OpenCV-Python/LABVIEW/MATLAB,Introduction to OpenCV-Python, Using modules for performing operations like image enhancement, filtering, thresholding, segmentation, edge detection etc.		
PRACTICAL NO.03		**8 HOURS**
Object detection with OpenCV-Python/LABVIEW/MATLAB, Development of algorithms for object detection in video/Camera streaming		

TEXT BOOK

1. Saeed B Niku, Introduction to robotics : analysis, Systems, applications, 2nd Ed New Delhi, Prentice Hall of India, 2009. 978-81-203-2379-7 Paperback
2. Richard D. Klafter, Robotics Engineering: An integrated approach ,Prentice-Hall (4 April 1989), 978-0134687520
3. Fu K S; Gonzalez R C; Lee C S G, Robotics: Controls, Sensing, Vision and Intelligence 00710990107 , McGraw-Hill Education, 978-0071004213

REFERENCE BOOK

1. Rafael C. Gonzalez and Richard E. Woods. Digital Image Processing, Wesley, 2007. ISBN 13: 978813726952.
2. Prof. S. K. Saha. Introduction to robotics, Tata-McGraw-Hill, ISBN -13 9780070140011.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP401
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP401.CEO.1: To enable the students to understand the basic concepts of Economics

HP401.CEO.2: To impart knowledge, with respect to practical applications of Economics .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP401.CO.1: The students would have understood the basic concepts of Economics.

HP401.CO.2: The students would have acquired knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions

HP401.CO.3: The course is designed to improve critical thinking, problem solving skills by using economic models and theories and predict economic relationships

HP401.CO.4: Students entering any profession in the workforce today must be able to utilize these basic economic principles. The course expected to develop critical understanding of current topics in economics and able to formulate their own opinions on economic issues

THEORY

UNIT 1	Introduction to Economics	6 HOURS

Economic Issues and Concepts; How Economist Work ; Theory of Demand & Supply; Meaning, Determinants, Law of Demand and Supply, Equilibrium between Demand & Supply; Elasticity of demand, price elasticity, income elasticity, cross elasticity.

UNIT 2	Micro Economics	6 HOURS

Revenue Concepts; Cost Concepts, Short run & Long run cost Concepts and curves, opportunity cost. Break even analysis; meaning, explanation, numerical. Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Competition , Oligopoly).

Further Reading:

UNIT 3	Macro Economy	5 HOURS

National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP,NDP, Personal income, disposal income. Inflation; meaning, types, causes, measures to control.

Further Reading:

UNIT 4	Indian Economy	5 HOURS

Characteristics of an Indian Economy; Human Development Index(HDI); Concepts of Foreign Trade, Goods and Services Tax(GST); Micro Small and Medium Enterprise(MSME) ; Foreign Direct Investment(FDI);Unemployment: meaning, types, causes, remedies.

Further Reading:

UNIT 5	Introduction to Banking & Money Market	6 HOURS

Banking; meaning, types, functions, Commercial Banks- Instruments in Operation of an Account, Central Bank- RBI; its functions, Concepts- CRR, Bank Rate, Repo Rate, Reverse Repo rate, SLR; Introduction to Money and Capital Market , Introduction to Fiscal policy- meaning and tools.

Further Reading:

REFERENCE BOOKS

1. R.Paneerselvam :Engineering Economics, , PHI publication ISBN : 978-81-203-5172-1
2. Robbins S.P. and Decenzo David A :Fundamentals of Management: Essential Concepts and Applications, Pearson Education, ISBN-13: 9780133499919
3. N Gregory Mankiw : Economics: Principles of Economics, Cengage Learning ISBN-10: 1305585127
4. L.M. Prasad: Principles and Practices of Management ISBN-10: 9351610500; ISBN-13: 978-9351610502
5. Tripathy and Reddy :Principles of Management ISBN, 1259050572, 9781259050572
6. Dr. K. K. Dewett & M. H. Navalur, S. Chand :Modern Economic Theory ISBN, : 9788121924634 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Bussiness Strategies
	COURSE CODE	HP403
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
-	2	-	-	25	-	25	50

PRE-REQUISITE : HP303 : Basics of Entrepreneurship

COURSE OBJECTIVES :

HP403.CEO.1: To understand the importance of growth and to be able to chart a path towards growth.
HP403.CEO.2: To revisit your business model
HP403.CEO.3: To give a growth orientation your customer acquisition, operations, revenue and sales strategy
HP403.CEO.4: To list and comply with the requirements relating to regulatory compliance
HP403.CEO.5: To be able to effectively pitch your venture to potential stakeholders .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP403.CO.1: Rephrase business model and Identify additional customer segments
HP403.CO.2: Identify channels and strategy for budgeting and planning.
HP403.CO.3: Make use of Legal aspect, Mentors, Advisors, and Experts in startups
HP403.CO.4: Analyze the growing revenues, sales planning, strengthening sales, improving margins
HP403.CO.5: Estimate customer lifetime value, competitor and peer's financial models for venture growth
HP403.CO.6: Formulate the all procedure for new venture ; Product market fit and A Pitch Deck

PRACTICALS:		
PRACTICAL NO.01	**Orientation to Growth**	**3 HOURS**
Getting Ready for Growth Why growth stage is different compared to startup phase, Why Product-Market fit is not enough, Case study, To assess readiness for growth, To chart a growth path .		
PRACTICAL NO.02	**Customers**	**3 HOURS**
Expanding Customer Base Revisit your business model and develop few variants (more business model types). Identify additional customer segments that your solution can address. Evaluate business models for the new customer segments. Relook at the Problem Statement (can you expand the scope and scalability of your business by repositioning your problem statement?) Explore additional ways to monetize.		
PRACTICAL NO.03	**Traction**	**12 HOURS**
Scaling How to gain traction beyond early customers. Defining traction (in quantifiable terms) and identifying the most important metrics to measure traction. Calculate cost of new customer acquisition. Estimate your customer lifetime value (LTV). Identifying waste in your operations and focusing your team on what is important for traction. **Channels and Strategies** The Bulls eye framework, Identify Channels using Bulls Eye Framework, Measuring the effectiveness of selected channels, Budgeting and planning.		
PRACTICAL NO.04	**Money**	**20 HOURS**
Growing Revenues. Stabilizing key revenue streams. Developing additional revenue streams (licensing, franchising). Exploring new channels and partnerships. Sales Planning. Understanding why customers buy and how buying decisions are made; Listening skills. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale. Strengthening Sales. Building a professional sales team. Sales compensation and incentives. Sales planning, setting targets Improving Margins. Testing price elasticity. Optimizing costs and operational expenses. Advanced concepts of unit costing. Financial Modeling. Financial modeling of your venture's growth. Analyzing competitor and peer's financial models.		
PRACTICAL NO.05	**Support**	**5 HOURS**
Legal Overview of legal issues and their impact on entrepreneurs. Importance of getting professional help (legal and accounting). Importance of being compliant and keeping proper documentation. Patents and Intellectual property. Trademarks. Mentors, Advisors, and Experts. The importance of a Mentor and how to find one. Role of business advisors and experts for specific targets in your growth plan.		
PRACTICAL NO.06	**Capstone Project: Pitch Your Venture**	**2 HOURS**

REFERENCE BOOKS

1. Zero to One: Note on Start Ups, or How to Build the Future, Peter Thiel and Blake Masters, Virgin Books,ISBN: 9780753555194
2. Tools of Titans: The Tactics, Routines, and Habits of Billionaires, Icons, and World-Class Performers, Timothy Ferriss, Random House,ISBN: 9781785041273.
3. Disrupted: My Misadventure in the Start-Up Bubble, Dan Lyons, Penguin Publishers, ISBN: 9781786491022
4. Unshakeable: Your Financial Freedom Playbook, Tony Robbins, Simon & Schuster Publishers,ISBN: 9781471164934
5. Grit: The Power of Passion and Perseverance, Angela Duckworth, Vermilion Publishing,ISBN: 9781785040207
6. Big Magic: Creative Living 4BEyond Fear, Elizabeth Gillbert, Penguin Publishers,ISBN: 9781408886182
7. Pivot: The Only Move That Matters Is Your Next One, Jernny Blake, Random House,ISBN: 9780241975466
8. Financial Management; Text and Problems, 7th Ed., A Khan and P. K. Jain, TataMacGraw Hill, ISBN: 9789353162184
9. Financial Management; Theory and Practice, 4th Ed., Prasanna Chandra, TataMacGraw Hill, ISBN: 9789339222574
10. Essentials of Management : An International and Leadership Perspective, 10th Ed., Harold Koontz and Heinz Weihrich, MGH, ISBN: 9789339222864
11. Kites in a Hurricane: Startups from Cradle to Fame, Rishi Kapal, SAGE Publishing, ISBN: 9789352807895
12. Wadhwani Foundation Advanced Course in Entrepreneurship

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Programming in Java
	COURSE CODE	ET403
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ISE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	2	20	40	30	50	-	50

PRE-REQUISITE : Basic knowledge of any programming language

COURSE OBJECTIVES :

ET403.CEO.1: familiarize basic concepts of object oriented programming with Java.
ET403.CEO.2: implement classes and objects of Java.
ET403.CEO.3: emphasize on inheritance and package, IO package and GUI.
ET403.CEO.4: cognize exception handling and multithreading in Java.

COURSE OUTCOMES :

The students after completion of the course will be able to,

1. ET403.CO.1: : Map data in the form of class and objects .
1. ET403.CO.2: Link the data and dataset in terms of inheritance and multithreading.
1. ET403.CO.3: Implement Simple projects using Java.

PRACTICAL		
PRACTICAL NO.01	**Creation of classes and its instances in Java**	**4 HOURS**
To declare a class, making objects. Implement simple codes to understand Class-Object Relationship. At least two different examples.		
PRACTICAL NO.02	**Different types of functions in Java**	**4 HOURS**
Implementing functions (methods) in Java for example factorial, finding area, finding average etc. or similar type		
PRACTICAL NO.03	**Inheritance in Java**	**1 HOURS**
Declare a player class. Inherit the classes Cricket player, Football player and Hockey player from player class to understand all terms of inheritance.		
PRACTICAL NO.04	**Constructor and destructor in Java**	**1 HOURS**
Declare class and object. Implement at least 2 types of constructors and destructors. Different ways of parameter passing to be implemented.		
PRACTICAL NO.05	**Function/Operator overloading in Java**	**1 HOURS**
Declare class and object. Implement at least 2 Function/Operator overloading, so that student understands polymorphism.		
PRACTICAL NO.06	**Packages in Java**	**1 HOURS**
Declare class and object. Understanding packages by defining methods/functions within a package and outside the package. Using import instruction to use these methods/functions.		
PRACTICAL NO.07	**Interfaces in Java**	**1 HOURS**
Declare class and object. Implement at least 2 different types of interfaces.		
PRACTICAL NO.08	**Exception handling mechanism in Java**	**1 HOURS**
Define Class. Write a java program which use try and catch for exception handling.		
PRACTICAL NO.09	**Multi-Threading in Java**	**1 HOURS**
Write a program to create multiple threads and demonstrate how two threads communicate with each other.		
PRACTICAL NO.10	**Validation Exercise**	**1 HOURS**
An exersize in Java: A group of 4 students can develop a small application in Java. Small projects like: Calculator, Dialog box, Chat box, GUI based music selection, GUI based Image display, GUI based bank database system, GUI based online shopping based on choice, E-learning system, GUI based Admission management system etc A part from above, student can choose any other topic with the approval of the course instructor.		

TEXT BOOK

1. HervertSchildt, The Complete Reference: JAVA2, McGraw Hill, 2011. ISBN: 9781259002465
2. E. Balaguruswamy, Programming with Java: A Primer, McGraw Hill,2009. ISBN: 9780070141698

REFERENCE BOOK

1. John P. Flynt, Java Programming, Thomson 2007. ISBN: 9781598632750
2. Ken Arnold, Programming Language, Pearson 2008. ISBN: 9788131702215

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Major Project - I
	COURSE CODE	EX402
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	8	NIL	NIL	NIL	100	50	150

PRE-REQUISITE : Mini Project

COURSE OBJECTIVES :

EX402.CEO.1: Implement the idea/ real time industrial problem/ current application from engineering domain.

EX402.CEO.2: Evaluate an alternative approaches and justify the use of selected tools and methods.

EX402.CEO.3: Inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.

EX402.CEO.4: Understand the roles and responsibility, accountability and learn team work ethics.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX402.CO.1: Solve real life problems by applying the knowledge and problem solving ability.

EX402.CO.2: Analyze alternative approaches, find feasible solution and apply most appropriate one.

EX402.CO.3: Use standard engineering tools and processes for analysis, design, simulation, testing, Implementation and deployment of idea into practice.

EX402.CO.4: Participate effectively in multidisciplinary and heterogeneous teams exhibiting team work, inter-personal Relationship, conflict management and leadership quality.

PREAMBLE:

The objective of this Major Project-I course is to understand the Product Development through team work. The students will able to shoulder the roles and responsibility and activity distribution amongst them. The students will learn designing, budgeting, planning, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards while developing the application/ product. The students will deliver a presentation on the advancement in Technology pertaining to the selected project topic and able to understand importance of document design and professional ethics.

GUIDELINES:

Project work stage I is an integral part of Project work. In this, the student shall complete the partial work of project, consist of problem statement, literature survey, Project specification and planning. The students expected to complete the project at least up to the design phase. As a part of project phase-I, candidate shall appear for two reviews and delivered the presentation on the advancement of selected project topic. The student shall submit the duly certified project report in standard format for satisfactory completion of work by the concern Advisor and Dean of the School. The examinee will be assessed by panel of examiner of which one is necessarily as a external examiner. The assessment will be broadly based on work undergone, content delivery, presentation skills, documentation, question answer and report. Preparation of the Literature survey paper and communicating and publishing in relevant publishing agency agency is recommended. Bonus 10 marks will be awarded. Follow the guideline and formats as mentioned in guideline document Annexure-I.

TIMELINE:

1. Formation of Project Group: 2 Weeks (1st ,2nd week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (3rd, 4th week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (7th, 8th week)
4. Preparation of Project Progress Report I (week 9th and 10th)
5. Project Phase-I Evaluation by external examiner (End Semester by 12th, 13th week)

ASSESSMENT:

1. Internal Assessment (TW)

a. Project Review -1 Project Approval -30 Marks
b. Project Review -2 Analysis and Design- -30 Marks
c. Project Review -3 Project progress Report-I and Presentation - 40 Marks
d. Paper publication/IPR -10 marks (Bonus)

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks
b. Project design / execution / demonstration : 20 Marks
c. Project Report preparation and documentation: 15 Marks

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Consumer Electronics
	COURSE CODE	EX431
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : All Departmental Core Subjects

COURSE OBJECTIVES :

EX431.CEO.1: Understand structure, installation and maintenance of audio and video systems.
EX431.CEO.2: Understand working of various office equipments and its maintenance.
EX431.CEO.3: Learn working principle, installation and maintenance of house hold appliances.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX431.CO.1: Inspect different blocks of television sets for troubleshooting.
EX431.CO.2: Identify and resolve the fault in audio system
EX431.CO.3: Test any office equipment in order to avoid malfunctioning.
EX431.CO.4: Measure the parameters of microwave oven for its functionality.
EX431.CO.5: Dissect the washing machine for troubleshooting.
EX431.CO.6: Estimate faults in refrigerator system

THEORY COURSE CONTENT		
UNIT 1	**Television**	**8 HOURS**
Elements of a television system, Display technology, Terminology for televisions, Transmission band, Aspect ratios, new developments, Remote Control: Operating Principle, Block Diagram, Operation and features, troubleshooting.		
UNIT 2	**Audio Systems**	**8 HOURS**
Introduction to Microphone, Loudspeaker and Music System: Principle, construction, working and characteristics Microphone: Different types of microphone, Loudspeakers: Characteristics of Loudspeaker, Horn type, Multiday speaker system. troubleshooting.		
UNIT 3	**Office Equipments.**	**10 HOURS**
Office Equipments: Scanners-Barcode, Printers, Xerox machine, Multifunction Unit, Electronic Weighing Systems - Operating principle, Block diagram, features. Digital Camera, Handicam, Home security System.		
UNIT 4	**Microwave Oven.**	**9 HOURS**
Principle of operation (Heating Principle), Block Diagram, features and specifications, Applications of Microwave Heating, troubleshooting.		
UNIT 5	**Washing Machine.**	**10 HOURS**
Washing Machine - Principle of operation, fuzzy logic, Block Diagram, features and specifications, troubleshooting.		
UNIT 6	**Refrigerator.**	**10 HOURS**
Principle of operation, Block Diagram, features and specifications, Elements of a refrigerator, Refrigerant and other elements, Troubleshooting.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
To observe the wave forms and voltage B/W and color T.V receiver.		
PRACTICAL NO.02		**4 HOURS**
Troubleshooting of color T.V.		
PRACTICAL NO.03		**4 HOURS**
To plot the frequency response of a microphone and a loud speaker.		

PRACTICAL NO.04		**4 HOURS**
Troubleshooting of Audio system.		
PRACTICAL NO.05		**4 HOURS**
Operation, Maintenance, Installation and Testing of office instruments.		
PRACTICAL NO.06		**4 HOURS**
Troubleshooting of microwave oven.		
PRACTICAL NO.07		**4 HOURS**
Troubleshooting of washing machine.		
PRACTICAL NO.08		**4 HOURS**
Troubleshooting of refrigerator.		

TEXT BOOKS

1. Audio and Video systems by R.G. Gupta Tata McGraw Hill 2010 (ISBN: 0070699763, 9780070699762)
2. Consumer Electronics by S.P.Bali, Pearson Education India; 1st edition 2004 (ISBN: 8131717593, 978-8131717592)

REFERENCE BOOKS

1. Troubleshooting and Repairing Microwave Ovens (Paperback)by Homer L. Davidson, McGraw-Hill 4th edition (ISBN-10: 0070157677)
2. Handbook of air conditioning and refrigeration by Shan K. Wang, McGraw-Hill 2nd edition (ISBN 0-07-068167-8)
3. The Washing Machine Manual: DIY Plumbing, Maintenance, Repair, Haynes, 2006, (ISBN 1844253481, 9781844253487)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Biomedical Engineering
	COURSE CODE	EX441
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : ET202: Analog Electronics, ME201: Material Engineering

COURSE OBJECTIVES :

EX441.CEO.1: Study the anatomy and bio-signals related to heart, brain and muscles
EX441.CEO.2: Learn about biomedical & radiological Instruments and their electrical safety.
EX441.CEO.3: Study the biotelemetry and telemedicine concepts of biomedical engineering.
EX441.CEO.4: Know about the field of biomechanics and biomaterials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

Ex441.CO.1: Elaborate the origin of various bio-signals and the electrodes used to measure them.
Ex441.CO.2: Illustrate the various biomedical and radiological instruments
Ex441.CO.3: Apply the knowledge of electrical safety while designing.
Ex441.CO.4: Apply the knowledge of biotelemetry and telemedicine in the fields of biomedical.
Ex441.CO.5: Apply the concept of biomechanics and biomaterial in biomedical Engineering.

THEORY COURSE CONTENT		
UNIT 1	**Human Anatomy & Bio-signals**	**7 HOURS**
Structure of cell, Physiological systems of the Body, Nervous System, Cardiovascular System. Bio-signals: Action & Resting potential, Propagation of action potential, Bioelectric Potentials / Bio-signals - ECG, EEG, EMG. Electrode Theory, Biopotential Electrodes, Biochemical Electrodes. **Self Study:** ERG, EOG & EGG. **Case Study:** Anatomy and physiology of Auditory System		
UNIT 2	**Biomedical Instruments**	**7 HOURS**
Medical standards IEEE 11073, JCIA, JCAHO, Introduction of Biomedical Instrumentation, Bio Amplifiers, Biometrics, Components of Man-Instruments System, Life Saving Devices- Pacemakers, Defibrillators, ECG: Amplifiers, Electrodes & Leads, Einthoven Triangle, ECG Block diagram. EEG: Measurement, 10-20 Electrode System. **Self Study:** EMG building blocks, Amplifier and Electrodes **Case Study:** Camera Pill		
UNIT 3	**Measurement of non-Electrical Parameters**	**7 HOURS**
Temperature, respiration rate and pulse rate measurements. Blood Pressure: indirect methods - auscultatory method, oscillometric method, direct methods: electronic manometer, Pressure amplifiers - systolic, diastolic, mean detector circuit. Blood flow and cardiac output measurement: Indicator dilution, thermal dilution and dye dilution method. **Self Study:** Electromagnetic and ultrasound blood flow measurement. **Case study:** Kidney Dialysis		
UNIT 4	**Noninvasive Diagnostic instrumentation and electrical safety**	**7 HOURS**
Principles of ultrasonic measurement, X-Ray Machine & Digital Radiography, X-Ray Computed Tomography, MRI System., Elements of intensive care monitoring Physiological effects of Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention. Grounding and Shielding, Biomedical Ethics. **Self Study:** Thermography **Case Study:** fMRI		
UNIT 5	**Biotelemetry and Telemedicine**	**6 HOURS**
Introduction to Biotelemetry, Physiological Parameters adaptable to biotelemetry, components of Biotelemetry system, Application of Telemetry in Patient Care. Basic Telemedicine System, Picture Archiving and Communication System, Telemedicine by Mobile Communication. **Self Study:** Medical Information System **Case Study:** Online Medical Health App		
UNIT 6	**Biomaterials**	**6 HOURS**
Three Basic Quantifiable Features of Biomaterials, Body response to wounding, Immune System Defense, Examples: Role of Mechanical Properties of Biomaterials, Immune System Links. **Self Study:** Biomaterials Engineering Strategies **Case study:** Engineering solutions to foot drop.		

TEXT BOOK

1. L. Cromwell, F. J. Weibell and E. A. Pfeiffer, Biomedical Instrumentation and Measurements, Pearson Education, 2nd edition, ISBN: 81-317-0315-0.
2. R. S. Khandpur, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2nd edition, ISBN: 02-07-047355-2.
3. M. M. Domach, Introduction to Biomedical Engineering, Pearson, 2nd edition, ISBN: 978-93-325-5526-6.

REFERENCE BOOK

1. G. S. Sawhney, Fundamentals of Biomedical Engineering, New Age International, 2007, ISBN-13 : 978-81-224-2549-9
2. J. Enderle, S. Blanchard and J. Bronzino, Introduction to Biomedical Engineering, Elsevier Academic Press Series, 2nd edition, Indian Reprint ISBN-13: 978-81-312-0002-5.

MIT Academy of Engineering (An autonomous Institute Affilated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Artificial Intelligence
	COURSE CODE	ET442
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	–	30	40	30	–	–	100

PRE-REQUISITE : ET414 Machine Learning

COURSE OBJECTIVES :

ET442.CEO.1: To describe the rationale for different real time applications of AI
ET442.CEO.2: To apply the concept of Fuzzy systems
ET442.CEO.3: To understand deep learning over neural networks
ET442.CEO.4: To outline natural language processing fundamentals

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET442.CO.1: Articulate fuzzy logic to solve problems.
ET442.CO.2: Use deep learning model for data classification
ET442.CO.3: Explain use of transfer learning for suitable applications
ET442.CO.4: Describe natural language processing techniques

THEORY COURSE CONTENT		
UNIT 1	**Introduction to AI and Fuzzy logic**	**8 HOURS**
Definition of artificial intelligence, importance of artificial intelligence in real world applications. Introduction to fuzzy logic, classical sets, fuzzy sets, cartesian product of relation, classical relation, fuzzy relations.		
UNIT 2	**Introduction to deep learning**	**8 HOURS**
Feed forward perceptron Model, multilayer perceptron (MLP), back propagation algorithm, various activation functions, deep learning process. Deep learning using convolutional neural networks (CNN). The importance of striding, dilation, pooling used in CNN.		
UNIT 3	**Further steps in deep learning**	**8 HOURS**
Transfer learning using LeNet. Principles of deep learning image classification topologies like AlexNet, VGG-16/VGG-19, Inception and ResNet, GoogLeNet. Introduction to recurrent Neural nets (RNN).		
UNIT 4	**Introduction to natural language processing (NLP)**	**8 HOURS**
The concept of syntax, semantics, and wrapping. Basic applications: Word2Vec based on Skip-Gram Model, Distributed representations of words and phrases and their compositionality.		
UNIT 5	**Real world applications of artificial intelligence/ learning**	**8 HOURS**
Understanding and analyzing AI applications in real world. Few applications like: Face recognition, Suspicious activity recognition, Object detection and classification, Text analysis, Sentiment analysis / Feedback analysis, Recommender systems, Online shopping System, Music signal classification, Speech recognition / Speaker recognition.		

TEXT BOOKS

1. S N Sivanandan and S N Deepa, Principles of Soft computing, Wiley, 2013 edition, ISBN: 9788126527410
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016, ISBN: 9780262035613
3. Edward Loper, Ewan Klein, Steven Bird, Natural Language Processing with Python, O'Reilly Media Inc, June 2009, ISBN: 9780596803346

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Wireless Sensor Networks
	COURSE CODE	ET443
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	-	30	40	30	-	-	100

PRE-REQUISITE : ET302 – Analog Communication, ET321 – Digital Communication

COURSE OBJECTIVES :

ET443.CEO.1: Learn the various applications of WSNs
ET443.CEO.2: Study different protocols for WSNs
ET443.CEO.3: Understand concept of routing protocol and network management for WSNs
ET443.CEO.4: Study various operating systems used for WSNs

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET443.CO.1: Apply knowledge of wireless sensor networks(WSN) to various application areas
ET443.CO.2: Identify communication protocols employed in WSNs.
ET443.CO.3: Understand and explain protocol design issues (especially energy-efficiency) and protocol designs for wireless sensor networks
ET443.CO.4: Conduct performance analysis of WSN.

THEORY COURSE CONTENT		
UNIT 1	**Wireless Sensor Networks Concepts and Applications**	**08 HOURS**
Introduction, Types of WSNs, Performance Metrics of WSNs, WSNs Standards		
UNIT 2	**Protocol Stack of Wireless Sensor Networks**	**08 HOURS**
Physical Layer, Data Link Layer, Network Layer, Transport Layer, Application Layer, Cross-Layer Protocols for WSNs		
UNIT 3	**Routing Protocols for Wireless Sensor Networks**	**10 HOURS**
Data Dissemination and Gathering, Routing Challenges and Design Issues in WSNs, Routing Strategies in WSNs-WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing.		
UNIT 4	**Network Management for Wireless Sensor Networks**	**09 HOURS**
Network Management Requirements, Traditional Network Management Models, Network Management Design Issues, Other Issues Related to Network Management- Naming, Localization		
UNIT 5	**Operating Systems for Wireless Sensor Networks**	**10 HOURS**
Operating System Design Issues, Examples of Operating Systems- TinyOS, Mate, MagnetOS, SenOS, etc.		

TEXT BOOK

1. Hossam Mahmoud Ahmad, Wireless Sensor Networks, 1st Edition, Springer Singapore, 2016 (ISBN: 978-981-10-0412-4)
2. Ian F. Akyildiz and Mehmet Can Vuran, Wireless Sensor Networks, 1st Edition, Wiley, 2010 (ISBN: 978-0-470-03601-3)

REFERENCE BOOK

1. Kazem Sohraby, Daniel Minoli and Taieb Znati, Wireless Sensor Networks, John Wiley Publication, 2007 (ISBN: 978-0-471-74300-2)
2. Waltenegus Dargie abd Christian Poellabauer, Fundamentals Of Wireless Sensor Networks, 1st Edition, A John Wiley and Sons, Ltd., Publication, 2010 (ISBN: 978-0-470-99765-9)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Speech Signal Processing
	COURSE CODE	ET444
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : EX322 - Digital Signal Processing

COURSE OBJECTIVES :

ET444.CEO.1: Interpret the anatomy and physiology of speech organs.
ET444.CEO.2: Illustrate the theory of speech production
ET444.CEO.3: Infer the linear predictive loading (LPC) analysis
ET444.CEO.4: Appraise the Noise estimation and analysis.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET444.CO.1: Illustrate vocal tract, practical vocal tract model for speech analysis and synthesis
ET444.CO.2: Analyze the Principles of speech synthesis
ET444.CO.3: Explain Multidimensional voice profile (MDVP), Pratt, Dr. speech software
ET444.CO.4: Discrete Circuits in speech information processing

THEORY COURSE CONTENT		
UNIT 1	**Speech production, Acoustic and Phonetics Hearing**	**6 HOURS**
Introduction, Anatomy and physiology of speech organs, Articulatory phonetics, Acoustic phonetics, Acoustic Theory of speech production, Acoustic of vocal tract, practical vocal tract model for speech analysis and synthesis, speech perception, separating sound sources, speech sounds and features-vowels, voice, unvoiced fricatives.		
UNIT 2	**Speech Signal Analysis**	**8 HOURS**
Short time speech analysis, spectrogram(wide and narrow band), Time domain analysis of speech signals, short time avg, zero crossing rate, Frequency domain analysis of speech-(short time fourier transform, Forman ant estimation and tracking), Linear predictive loading (LPC) analysis, spectral estimation via LPC, Lattice LPC model, pole zero LPC model, Cepstral analysis, mel scale spectrum.		
UNIT 3	**Coding of Speech Signals.**	**6 HOURS**
Speech coding techniques, waveform approximating coders, synthesis LPC Coding, Harmonic speech coding, multimodel speech coding, speech vocoders, spectral coders, Non LP source voice codes, vectors quantization codes, Low rate and high rate vocoders.		
UNIT 4	**Noise Estimation Analysis in Speech Signal**	**8 HOURS**
Influence of noise in speech application, noise properties, methodologies of noise removal, normalized least means square[NLMS] algorithm, Time varying LMS algorithm, Noise cancelling and its effectiveness, additive white noise and quantized noise. Audio Amplifiers, Types of audio amplifier, audio amplifier Vs RF amplifiers,Controls in audio amplifiers, microphones-working principle, types,		
UNIT 5	**Speech Enhancement and Synthesis.**	**6 HOURS**
Introduction, Interfacing sounds, speech enhancement techniques, Echo Cancellation, Spectral subtraction, method involving fundamental frequency tracking, enhancement by resynthesis, Principles of speech synthesis, synthesis methods, voice response system, synthesis of intonation, speech synthesis for different speakers, speech synthesis in other languages, synthesis model. Text to speech synthesis.		
UNIT 6	**Design with programmable logic devices**	**6 HOURS**
Introduction, ASR Speech, Segmenting speech, Preprocessing, HMM Model for speech recognition, Language model in speech recognition, feature extraction, speaker recognition by Human, speaker verification Vs Recognition, speaker recognition techniques, Features that distinguish speakers, spectral features, prosodic features, Language and account identification. Electroglottography, speech signal of voice in spectral domain, impedance matching technique, analysis of speaking, Multidimensional voice profile (MDVP), Pratt, Dr. speech software, MATLAB Toolbox for speech processing.		

TEXT BOOK

1. Lawrence Rabiner,Biing H wangJuang ,Fundamentals of speech recognition, Pearson publication, ISBN-978-81-775-8560-5
2. ShailajaApte, Speech Signal Processing, Willy India Publication

REFERENCE BOOK

1. Daniel and James H. Martin.Speech and Language processing,Pearson Education-ISBN-81-7808-594-1
2. Douglas OShaughnessy Speech Communication, Wiley India edition, ISBN-978-81-265-3610-8
3. A. M.Kondos,Digital Speech,Wiley student edition ISBN-9812-53-172-6
4. Shrikant Narayanan, Abeer Alwan Text to speech synthesis, Pearson Education,ISBN -81-297-1078-1

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Real-Time Embedded System
	COURSE CODE	ET451
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : ET331: Embedded Processor, ET413: RISC Processors

COURSE OBJECTIVES :

ET451.CEO.1: Explore the real-time scheduling algorithms
ET451.CEO.2: Perform computation required for the real-time embedded systems.
ET451.CEO.3: Focus on the management of real-time resources

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET451.CO.1: Analyze the scheduling algorithms for real-time computing,
ET451.CO.2: Apply the techniques to evaluate worst-case delays and utilization bounds.
ET451.CO.3: Design embedded systems with real-time constraints

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Real-Time Systems**	**8 HOURS**
Overview of real-time applications and concepts with emphasis on the distinguishing characteristics of real-time systems and the constraints that they must satisfy		
UNIT 2	**Real-Time operating systems**	**8 HOURS**
Differences between General purpose and Real-Time Operating Systems. Basic operating-system functions needed for real-time computing.		
UNIT 3	**Real-Time schedulers**	**8 HOURS**
Real-time scheduling and schedulers ability analysis, including clock-driven and priority-driven scheduling		
UNIT 4	**Real-Time Resource Management**	**8 HOURS**
Resource management in real-time systems, including potential problems and their resolution as well as practical issues in building real-time systems. Resource sharing in real-time systems		
UNIT 5	**Applications**	**8 HOURS**
Applications: multimedia, VoIP/VoWLAN, VoD, info and home appliances, medical devices, sensors & actuators, virtual reality, automotive electronics (powertrain controls and infotainment systems, ITS), automated manufacturing, I large embedded systems (ships, planes)		

PRACTICAL		
PRACTICAL NO.01		**6 HOURS**
Implementation of Real-time scheduling algorithms		
PRACTICAL NO.02		**4 HOURS**
Implementation of Real-time operating system services viz. Semaphores		
PRACTICAL NO.03		**8 HOURS**
Implement the Inter-task communication and synchronization mechanisms		
PRACTICAL NO.04		**8 HOURS**
Building an RTOS Kernel from Scratch. How better to learn about task scheduling, resource management and synchronization issues in real-time systems than making your own real-time operating system from scratch. We will focus on developing the kernel for a RTOS and investigate different task scheduling policies to better understand scheduling theory and how to develop predictable systems for safety-critical applications.		

PRACTICAL NO.05		6 HOURS
Building Real-Time applications		
PRACTICAL NO.06		**6 HOURS**
Capstone Projects		

TEXT BOOK

1. Rajib Mall, Real-Time Systems: Theory and Practice, Pearson Education, 2007, ISBN: 9788131700693
2. C. Siva Ram Murthy and G. Manimaran, 'Resource Management in Real Time Systems and Networks', the MIT Press, 2001. ISBN:0262133678

REFERENCE BOOK

1. Jane Liu, Real-time Systems, Prentice Hall; ISBN: 0130996513.
2. Giorgio C. Buttazzo, Hard Real-Time Computing Systems, 2nd Edition, Springer, 2004. ISBN: 9781441935786
3. Edward A. Lee and Sanjit A. Seshia, Introduction to Embedded Systems, A Cyber-Physical Systems Approach, http://LeeSeshia.org, ISBN 978-0-557-70857-4, 2011.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Energy Management for IoT Devices
	COURSE CODE	ET452
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	-	125

PRE-REQUISITE : IoT Network & Protocols, Privacy and Security in IoT

COURSE OBJECTIVES :

ET452.CEO.1: Understand the various energy sources and energy harvesting based sensor networks
ET452.CEO.2: Learn about the various Piezoelectric materials and Non-linear techniques
ET452.CEO.3: Understand the various Power sources for WSN
ET452.CEO.4: Learn about the applications of Energy harvesting systems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET452.CO.1: Identify various energy sources and energy harvesting based sensor networks
ET452.CO.2: Explain the various piezoelectric materials and Non-linear techniques.
ET452.CO.3: Analyze various Power sources for WSN.
ET452.CO.4: Develop applications of Energy harvesting systems.

THEORY COURSE CONTENT		
UNIT 1	**Energy Harvesting Systems**	**09 HOURS**
Introduction - Energy sources - energy harvesting based sensor networks - photovoltaic cell technologies - generation of electric power in semiconductor PV cells - types		
UNIT 2	**Piezo-Electric Energy Harvesting and Electromechanical Modeling**	**09 HOURS**
Piezoelectric materials transducers harvesters microgenerators strategies for enhancing the performance of energy harvesters. Electromechanical modeling of Lumped parameter model and coupled distributed parameter models and closed-form solutions		
UNIT 3	**Electromagnetic Energy Harvesting and Non-Linear Techniques**	**08 HOURS**
Basic principles micro fabricated coils and magnetic materials scaling power maximations micro and macro scale implementations. Non-linear techniques vibration control & steady state cases		
UNIT 4	**Energy Harvesting Wireless Sensors**	**09 HOURS**
Power sources for WSN Power generation conversion examples case studies. Harvesting microelectronic circuits power conditioning and losses		
UNIT 5	**Selected Applications of Energy Harvesting Systems**	**08 HOURS**
Case studies for Implanted medical devices Bio-MEMS based applications harvesting for RF sensors and ID tags powering wireless SHM sensor nodes		

PRACTICAL		
PRACTICAL NO.01	**Design of Power Management Algorithms**	**4 HOURS**
Power management algorithms for energy harvesting sensing systems		
PRACTICAL NO.02	**Design of Low Power Node**	**4 HOURS**
Design of low power node using ultra power MCU and signal conditioning		
PRACTICAL NO.03	**Design of Low Power Network**	**4 HOURS**
Design of low power connectivity in network using low power protocols		
PRACTICAL NO.04	**Design of Energy-efficient Application**	**4 HOURS**
Design of an energy efficient application using low power IoT devices		

TEXT BOOK

1. Carlos Manuel Ferreira Carvalho, Nuno Filipe Silva VerssimoPaulino, CMOS Indoor Light Energy Harvesting System for Wireless Sensing Applications, springer
2. Danick Briand, Eric Yeatman, Shad Roundy ,Micro Energy Harvesting, Willey

REFERENCE BOOK

1. Yen Kheng Tan, Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage, and Power Management, 1st Edition, CRC PRESS

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Intelligent and high performance Robotics
	COURSE CODE	EX451
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	–	50	150

PRE-REQUISITE : EX314 - Fundamentals of Robot & Design, EX414 - Robotics Vision

COURSE OBJECTIVES :

EX451.CEO.1: Describe methods of solving problems using Artificial Intelligence.
EX451.CEO.2: Percolate the concepts of optimal control for obtaining high performance.
EX451.CEO.3: Illustrate the concepts of Expert Systems and machine learning.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX451.CO.1: Classify different types of learning, planning and reasoning under AI methods.
EX451.CO.2: Identify appropriate AI methods to solve a given problem.
EX451.CO.3: Formalize a given problem in the language/framework of different AI methods.
EX451.CO.4: Explore and analyze diverse fields in robotic applications.

THEORY COURSE CONTENT		
UNIT 1	**ARTIFICIAL INTELLIGENCE FOR ROBOTICS**	**08 HOURS**
History, state of the art, Need for AI in Robotics. Thinking and acting humanly, intelligent agents, structure of agents. PROBLEM SOLVING: Solving problems by searching Informed search and explorationConstraint satisfaction problemsAdversarial search, knowledge and reasoningknowledge representation first order logic.		
UNIT 2	**Planning**	**08 HOURS**
Planning with forward and backward State space search Partial order planning Planning graphsPlanning with propositional logic Planning and acting in real world.		
UNIT 3	**Reasoning**	**08 HOURS**
Uncertainty Probabilistic reasoningFiltering and predictionHidden Markov modelsKalman filters-Dynamic Bayesian Networks, Speech recognition, make decisions. Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.		
UNIT 4	**Learning**	**08 HOURS**
Forms of learning Knowledge in learning Statistical learning methods reinforcement learning, communication, perceiving and acting, Probabilistic language processing, perception.		
UNIT 5	**AI in Robotics**	**08 HOURS**
Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics Ariel robots- Collision avoidance-Robots for agriculture, mining, exploration, underwater, civilian and military applications, nuclear applications, Space applications		

PRACTICAL: Perform following experiments using		
PRACTICAL NO.01	**Capstone Project Development**	**18 HOURS**
Power management algorithms for energy harvesting sensing systems		

TEXT BOOK

1. Stuart Russell, Peter Norvig, Artificial Intelligence: A modern approch, Pearson Education, India2003. , ISBN : 978-0136042594.
2. Negnevitsky, M, Artificial Intelligence: A guide to Intelligent Systems,. Harlow: Addison-Wesley, 2002., ISBN : 978-1408225745.

REFERENCE BOOK

1. David Jefferis, Artificial Intelligence: Robotics and Machine Evolution, Crabtree Publishing Company, 1992. , ISBN : 978-0778700463

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Sociology
	COURSE CODE	HP402
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP402.CEO.1: The course focuses on the society in India with an attempt to acquaint students with sociology as a social science and the distinctiveness as a social science.

HP402.CEO.2: It displays the relevance and significance of sociology in understanding the society and in attempting to solve its problems.

HP402.CEO.3: Many of the Sociological Changes are an answer to the age-old social norms and practices giving rise to a solution which is critical to social issues and problems.

HP402.CEO.4: The course sensitizes students to the emerging social issues and enables them to acquire sociological understanding of these issues with an ability to answer the problems.

HP402.CEO.5: Projects in Sociology are tools that facilitate the construction of knowledge in imparting the right attitude towards social issues .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP402.CO.1: Get acquainted to sociology as a social science.

HP402.CO.2: Explain the significance of sociology in solving problems.

HP402.CO.3: Derive solutions to critical social issues.

HP402.CO.4: Change their attitude towards social issues.

THEORY

UNIT 1	Introduction to Sociology	6 HOURS

The nature of Sociology, meaning of Sociology: Origin, Definition, Scope, Culture, meaning, components, beliefs, values, norms, technology, diversity, towards a global culture.

UNIT 2	Sociolization	5 HOURS

Socialization, Agents of Socialization, Heredity and Environment, Group, Social structure, Status and role, family, school, peer group, media, adult socialization, resocialization, Role of Social moments, Illustrations: Women, Tribal & Dalit Movements .

Further Reading:

UNIT 3	Nature and factors of Social Change	5 HOURS

Change: Meaning. Nature and factors of Social Change: Biological Factors. Demographic Factors, Technological Factors, Economic Factors Cultural Factors, Info-tech factors, Meaning of Gender sensitization, Discrimination, violence and Abuse.

Further Reading:

UNIT 4	Visions of Social Change in India	4 HOURS

Idea of development planning and mixed economy, Constitution, law and social change, Education and social change.

Further Reading:

UNIT 5	Works and Economic Life	4 HOURS

Social organization of work in different types of society- slave society, feudal society, industrial /capitalist society. Formal and informal organization of work. Labour and society.

Further Reading:

UNIT 6	Introduction to Applied sociology	4 HOURS

The use of Sociology: Introduction to applied Sociology-Sociology and social problems, Ecology and Environment: Pollution, Global warming and Greenhouse effect. Impact of Industrialization and Urbanization on Environment.

REFERENCE BOOKS

1. T.B. Bottomore, Sociology: A Guide to Problems and Literature, Blackie and Sons Publishers, 1978, ISBN:978-0043000267
2. Sociology: A guide to problems and literature. Bombay: George Allen and Unwin (India): Harlambos, M.1998. ISBN: 978-0043000267
3. Sociology: Themes and perspectives. New Delhi Oxford University Press.: Inkeles, Alex, 1987
4. What is Sociology, Madras: Macmillan, India: Johnson, Harry M. 1995.
5. Sociology: A Systematic Introduction. New Delhi, Allied Publishers. ISBN: 978-8170231370 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Major Project - II
	COURSE CODE	EX432
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	8	NIL	NIL	NIL	100	50	150

PRE-REQUISITE : Major Project-I

COURSE OBJECTIVES :

EX432.CEO.1: Follow the standard guideline to meet the objective for development of Project.
EX432.CEO.2: Test rigorously before deployment of Systems.
EX432.CEO.3: Verify and Validate the work Undertaken.
EX432.CEO.4: Consolidate the work and preparation of final report.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX432.CO.1: Show the evidence of independent evaluation.
EX432.CO.2: Critically analyzed the result and their implementation methodology.
EX432.CO.3: Validate the results with standard tools and techniques.
EX432.CO.4: Understand the importance of documentation and report writing.

PREAMBLE:

The objective of this Major Project-II to implement the full and final project and the report. After The remaining project work which consist of selection of approach / methodology / tools and techniques, Designing, installation, results and performance evaluation. Also includes the comparative analysis and validation of result. Should prepare the Project report as per format for satisfactory completion of work certified by concern project advisor and dean.

GUIDELINES:

In Project Work Stage-II, the student shall complete the remaining project work which consists of Selection of Methodology, Tools and Technology, Installations, Design, Implementations, testing, Results, performance analysis if applicable (discussions using data tables per parameter considered for the improvement with existing/known algorithms/systems) and comparative analysis and validation of results and conclusions. The student shall prepare and submit the report of Project work in standard format for satisfactory completion of the work that is the duly certified by the concerned advisor and Dean of the school. It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded. Follow the guideline and formats as mentioned in guideline document.(Annexure-II).

TIMELINE:

1. Presentation of Project Review- 3 Project Progress Monitoring DRC review (Week 5th)
2. Presentation of Project Review 4 Project Progress Monitoring and Report Preparation (Week-8th)
3. Internal Examination/ Project Expo: Project-2 Demonstration and presentation- (Week 10th)
4. External Examination: Project-2 Demonstration and Presentation- (End semester-Week 12th or 13th)

ASSESSMENT:

1. Internal Assessment (TW)

a. Project Review -3 Progress Monitoring - 30 Marks

b. Project Review -4 Progress Monitoring and Report Preparation -30 Marks

c. Project Expo/ Examination- Evaluation Presentation and Demonstration- 30 Marks

d. Paper publication/presentation/IPR -10 Marks

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Final Year

Bachelor of Technology in

Electronics Engineering

(Amendments for Semester Long Internship)

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering **(An Autonomous Institute Affiliated to SPPU)**	**SEMESTER LONG INTERNSHIP** **Rules and Regulations** **(2016 - 2020)**

1. ELIGIBILITY:

1. No live backlogs
2. CGPA of 8.50 and above
3. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student)

Only students satisfying the above criteria can be permitted for semester-long internship in any MNCs / R&D laboratories such as DRDO, NCL, NEERI, CDAC and Institutions like IITs/ NITs / International institutes of repute.

2. DEADLINES:

For the current batch, the applications must be submitted by 30, November 2019 by all students desired to go for the semester long internship.

3. APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including details of the organization along with the details of the project in brief, copy of their CV and copies of mark sheet to the respective school Corporate Relations (CR) coordinator. The application must be as per the format given below.

Application for Internship Program

Sr. No.	Particulars	
1	Name of the applicant (in bold letters)	
2	Gender	
3	School	
4	Date of Birth & Age (as on date)	
5	Roll Number & PRN	
6	Address for correspondence with mobile / telephone number and email-id	
7	Name & address of the Institute / Industry	
8	Core Domain of Institute / Industry	
9	Contact details Supervisor / HR Mobile / Telephone number and email-id	
10	Period of internship	24-26 weeks
11	Details of the Project proposed	

Signatures

Student	**School Internship Coordinator**
Approved by:	
No. of credits proposed	6 / 10
Dean --- School of _____ Engineering	MIT AOE Seal
Date:	

4. RULES & CONDITIONS:

I. Sponsored project should be along the same track of the minor (Open Elective) chosen by the student. (desirable)

II. Semester long internship is applicable only in the 8th semester. The distribution of credits for the VIII semester is as follows;

DC	Department Core	4 Credits
DE	Department Elective	3 Credits
OE	Open Elective	4 Credits
HSS	Humanities & Social science	2 Credits
SDP	Skill development and Project	4 Credits

III. For a student who is going for a semester long internship, 10 credits (OE, HSS and SDP) will be awarded if OE is part of the internship otherwise 6 credits will be awarded.

IV. The equivalence courses for the DC, DE and OE must be floated by the Schools.

V. The credits of DC, DE and OE should be earned through MOOC courses.

VI. If a student is not able to successfully earn the credits of the DC / DE / OE within the stipulated time, they will not be eligible for the graduation in the same academic year.

5.1 ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel.

I. The Panel for the evaluation should be 3 members (if 3 credits) or 4 members (if 5 credits).
The composition of the team would be as follows.
   i. Dean, Respective School
   ii. CR Coordinator / Project Coordinator / Project Guide
   iii. Project Guide (Industry)
   iv. The domain expert (In case of 5 credits, as per the minor specialization)

II. Presentation I at the end of 45th day and presentation II at the end of 90th day from the start of the project combined to a total weightage of 5 credits **(3 credits if OE is exempted).** It can be possible to do through Skype, if acceptable to the panel. **In Grade card it will be mentioned as SLIP – Project Design.**

III. Presentation at the end of the Internship Work and Final Internship Report after the completion of the Internship Work combined for a total weightage of 5 credits **(3 credits if OE is exempted)** and should be as per the template). **In Grade card it will be mentioned as SLIP – Project Implementation.**

5.2 ASSESSMENT METHOD FOR OTHER COURSES RUN THROUGH INSTITUTE LMS:

Credits for the courses run through Go-Webinar will be assessed using the following methods.

I. There will be SIX assignments (one per unit) to be submitted through the moodle. This will have a weightage of 30% of the total score. This contributes to the IA for the course.

II. There will be SIX quizzes (one per unit) to be conducted through moodle. This will have a weightage of 30% of the total score. This contributes to the ISE for the course.

III. One FINAL presentation to be done at the end and evaluated by a team of THREE members including the Course Champion, Instructor and any other nominated member by the respective School Dean. This will have a weightage of 40% of the total score. This contributed for the ESE of the course.

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	RELEASE DATE	:	01/06/2019
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ET401	VLSI Design	3	2	4
2.	DE1	ET41#	Department Elective	3	-	3
3.	OE3	ET42#	Open Elective	3	2	4
4.	HSS7	HP401	Engineering Economics	2	-	2
5.	HSS8 / SDP7	HP403 / ET403	Business Strategies / Programming in Java	-	2	1
6.	SDP8	ET402	Project – I	-	8	4
7.	SDP9	ET404	Summer Internship	-	-	4
TOTAL				**11**	**14**	**22**

SEMESTER: VIII (Semester Long Internship not inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ET431	Consumer Electronics @	4	-	4
2.	DE2	ET44#	Department Elective	3	-	3
3.	OE4	ET45#	Open Elective @	4	-	4
4.	SEMESTER LONG INTERNSHIP – Project Design			-	6	3
5.	SEMESTER LONG INTERNSHIP – Project Implementation			-	6	3
TOTAL				**11**	**12**	**17**

MIT | Academy of Engineering (An Autonomous Institute)	**CURRICULUM STRUCTURE (2016 - 2020)**		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**RELEASE DATE**	**:**	01/06/2019
	REVISION NO.	**:**	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ET401	VLSI Design	3	2	4
2.	DE1	ET41#	Department Elective	3	-	3
3.	OE3	ET42#	Open Elective	3	2	4
4.	HSS7	HP401	Engineering Economics	2	-	2
5.	HSS8 / SDP7	HP403 / ET403	Business Strategies / Programming in Java	-	2	1
6.	SDP8	ET402	Project – I	-	8	4
7.	SDP9	ET404	Summer Internship	-	-	4
TOTAL				**11**	**14**	**22**

SEMESTER: VIII (Semester Long Internship inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ET431	Consumer Electronics	4	-	4
2.	DE2	ET44#	Department Elective	3	-	3
4.	SEMESTER LONG INTERNSHIP – Project Design			-	10	5
5.	SEMESTER LONG INTERNSHIP – Project Implementation			-	10	5
TOTAL				**7**	**20**	**17**

@ - Courses run through institute LMS.

DEPARTMENT ELECTIVE ON MOOCS PLATFORM			
SR. NO.	**COURSE DETAILS**	**MOOC DETAILS**	**NO. OF WEEKS**
1.	Electronic Systems for Cancer Diagnosis (IISc)	SWAYAM	12
2.	AI: Knowledge Representation and Reasoning (IIT M)	SWAYAM	12
3.	Block-chain Architecture Design and Use Cases	NPTEL	8

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MIT ACADEMY OF ENGINEERING, ALANDI

Savitribai Phule Pune University

Curriculum for

Bachelor of Technology in

Electronics & Telecommunication Engineering

(Choice Based Credit System)

2016-2020

BoS Chairman
Dean, School of
Electrical Engineering

Member Secretary
Academic Council
Dean Academics

Chairman
Academic Council
Director MITAOE

DEAN
School of Electrical Engineering
MIT Academy of Engineering
Alandi (D.), Pune-412 105.

MIT Academy of Engineering

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (ELECTRONICS & TELECOMMUNICATION ENGINEERING)

The BTECH Program shall be based on the following type of courses

SL. NO.	TYPE OF COURSE	ABBREVIATION
1.	Natural Science	NSC
2.	Engineering Science	ESC
3.	Program Core	PC
4.	Discipline Core	DC
5.	Department Elective	DE
6.	Open Elective	OE
7.	Humanities and Social Science	HSS
8.	Skill Development and Project	SDP

The Course and Credit Distribution shall be as under,

SL. NO.	TYPE OF COURSE	NO. OF COURSES	TOTAL CREDITS	
			NO.	%
1.	Natural Science	**4**	**18**	**10.96**
2.	Engineering Science	**4**	**16**	**9.76**
3.	Program Core	**5**	**19**	**11.59**
4.	Discipline Core	**12**	**48**	**29.27**
5.	Department Elective	**2**	**6**	**3.66**
6.	Open Elective	**4**	**16**	**9.76**
7.	Humanities and Social Science	**8/9**	**17**	**10.37**
8.	Skill Development and Project	**10/9**	**24**	**14.63**
TOTAL		**49**	**164**	**100**

COURSE DISTRIBUTION : SEMESTER WISE										
SL. NO.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	Natural Science	2	2							**4**
2.	Engineering Science	2	2							**4**
3.	Program Core			3	2					**5**
4.	Discipline Core			2	2	3	3	1	1	**12**
5.	Department Elective							1	1	**2**
6.	Open Elective					1	1	1	1	**4**
7.	Humanities & Social Science	1	1		1	2	1	1/2	1	**8/9**
8.	Skill Development & Project	1	1	1	1	1	1	3/2	1	**10/9**
TOTAL		**6**	**6**	**6**	**6**	**7**	**6**	**7**	**5**	**49**

CREDIT DISTRIBUTION : SEMESTER WISE										
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit										
SL. NO.	**TYPE OF COURSE**	**NO. OF CREDITS/SEMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	Natural Science	9	9							**18**
2.	Engineering Science	8	8							**16**
3.	Program Core			11	8					**19**
4.	Discipline Core			8	8	12	12	4	4	**48**
5.	Department Elective							3	3	**6**
6.	Open Elective					4	4	4	4	**16**
7.	Humanities & Social Science	2	2		3	3	2	3	2	**17**
8.	Skill Development & Project	2	2	2	2	2	2	8	4	**24**
TOTAL		**21**	**21**	**21**	**21**	**21**	**20**	**22**	**17**	**164**

MIT | Academy of Engineering (An Autonomous Institute)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	**2016-17**
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**RELEASE DATE**	**:**	**1/06/2016**
FIRST YEAR BACHELOR OF TECHNOLOGY	**REVISION NO.**	**:**	**0.0**

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS101	Mathematics – 1	4	1	5
2.	NSC2	AS102 / AS103	Physics / Chemistry	3	2	4
3.	ESC1	EX101 / CV101	Electrical & Electronics Engg. / Applied Mechanics	3	2	4
4.	ESC2	ME101/ IT101	Engineering Graphics / Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – I	1	2	2
6.	SDP1	ME102 / ME103	Experimental Tools & Techniques / Design Thinking	-	4	2
TOTAL				**13**	**15**	**21**

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC3	AS104	Mathematics – 2	4	1	5
2.	NSC4	AS103 / AS102	Chemistry / Physics	3	2	4
3.	ESC3	CV101 / EX101	Applied Mechanics / Electrical & Electronics Engg.	3	2	4
4.	ESC4	ME101/ IT101	Engineering Graphics / Computer Programming	2	4	4
5.	HSS2	HP102	Language & Communication – II	1	2	2
6.	SDP2	ME103 / ME102	Design Thinking / Experimental Tools & Techniques	-	4	2
TOTAL				**13**	**15**	**21**

L: Lecture, P: Practical, T: Tutorial, *Applicable for FY BTECH

MIT | Academy of Engineering (An Autonomous Institute)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2017-18
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	1/06/2017
SECOND YEAR BACHELOR OF TECHNOLOGY	REVISION NO.	:	0.0

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS202	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	ET202	Analog Electronics	3	2	4
5.	DC2	ET203	Digital Systems and Applications	3	2	4
6.	SDP3	ET206	Prototyping	-	4	2
TOTAL				**14**	**14**	**21**

SEMESTER:IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	-	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	ET211	Signals and Systems	3	2	4
5.	DC4	ET212	Network Analysis Techniques	3	2	4
6.	SDP4	ET213	Minor Project	-	4	2
TOTAL				**15**	**12**	**21**

L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	**2018-19**
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**RELEASE DATE**	**:**	**1/06/2018**
THIRD YEAR BACHELOR OF TECHNOLOGY	**REVISION NO.**	**:**	**0.0**

SEMESTER:V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	ET301	Control Systems	3	2	4
2.	DC6	ET302	Analog Communication	3	2	4
3.	DC7	ET303	Microcontroller & Application	3	2	4
4.	OE1	ET31#	Open Elective - Refer Annexure	3	2	4
5.	HSS4	HP301	Project Management	1	2	2
6.	HSS6	HP303	Basics of Entrepreneurship	-	2	1
7.	SDP5	ET30#	Skill Development Lab - Refer Annexure	-	4	2
TOTAL				**13**	**16**	**21**

SEMESTER : VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	ET321	Digital Communication	3	2	4
2.	DC9	ET322	Digital Signal Processing	3	2	4
3.	DC10	ET323	Antenna Theory & Design	3	2	4
4.	OE2	ET33#	Open Elective - Refer Annexure	3	2	4
5.	HSS5	HP302	Professional Skills	1	2	2
6.	SDP6	ET324	Mini Project	-	4	2
TOTAL				**13**	**14**	**20**

L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	**2019-20**
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**RELEASE DATE**	**:**	**1/06/2019**
FINAL YEAR BACHELOR OF TECHNOLOGY	**REVISION NO.**	**:**	**0.0**

SEMESTER:VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ET401	VLSI Design	3	2	4
2.	DE1	ET41#	Department Elective - Refer Annexure	3	-	3
3.	OE3	ET42#	Open Elective - Refer Annexure	3	2	4
4.	HSS7	HP401	Engineering Economics	2	-	2
5.	HSS8 / SDP7	HP403 / ET403	Business Strategies/ Programming in Java	-	2	1
6.	SDP8	ET402	Project – I	-	8	4
7.	SDP9	ET404	Summer Internship	-	-	4
TOTAL				**11**	**14**	**22**

SEMESTER:VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ET431	Advanced Communication Systems	3	2	4
2.	DE2	ET44#	Department Elective - Refer Annexure	3	-	3
3.	OE4	ET45#	Open Elective - Refer Annexure	3	2	4
4.	HSS9	HP402	Sociology	2	-	2
5.	SDP10	ET432	Project – II	-	8	4
TOTAL				**11**	**12**	**17**

L: Lecture, P: Practical

CREDITS				
1 Lecture Hour = 1 Credit2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit				
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	21	21	**42**
2.	Second Year	21	21	**42**
3.	Third Year	21	20	**41**
4.	Final Year	22	17	**39**
TOTAL				**164**

CONTACT HOURS				
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	28	28	**56**
2.	Second Year	28	27	**55**
3.	Third Year	29	27	**56**
4.	Final Year	25	23	**48**
TOTAL				**215**

ANNEXURE

Natural Science (NSC) : 4 Courses		
1.	AS101	Mathematics – 1
2.	AS102	Mathematics – 2
3.	AS103	Physics
4.	AS104	Chemistry

Engineering Science (ESC) : 6 Courses		
1.	EX101	Electrical and Electronic Engineering
2.	CV101	Applied Mechanics
3.	ME101	Engineering Graphics
4.	IT101	Computer Programming
5.	ME104	Science of Nature orModel Making
6.	CS101	Logic Design

Program Core (PC) : 5 Courses		
1.	CH201	Environmental Science
2.	AS202	Applied Mathematics
3.	ET201	System Engineering
4.	IT201	Engineering Informatics
5.	ME201	Material Engineering

Discipline Core (DC) : 12 Courses		
1.	ET202	Analog Electronics
2.	ET203	Digital Systems & Applications
3.	ET211	Signals and Systems
4.	ET212	Network Analysis Techniques
5.	ET301	Control Systems
6.	ET302	Analog Communication
7.	ET303	Microcontroller & Application
8.	ET321	Digital Communication
9.	ET322	Digital Signal Processing
10.	ET323	Antenna Theory & Design
11.	ET401	VLSI Design
12.	ET431	Advanced Communication Systems

Department Elective (DE) : 2 Courses		
1.	ET411	Digital Image Processing
	ET412	Microwave Engineering
	ET413	RISC Processors
	ET414	Machine Learning
2.	EX441	Biomedical Engineering
	ET442	Artificial Intelligence
	ET443	Wireless Sensor Network
	ET444	Speech Signal Processing

Open Elective (OE) : 4 Courses		
Sl. No.	**Course Code**	**Course**
1	ET311	Embedded System Programming (ESP)
2	ET331	Embedded Processor
3	ET421	Low-Power SoC Architecture & Applications
4	ET451	Real Time Embedded System
5	ET312	IoT Architecture and Sensors
6	ET332	IoT Network & Protocols
7	ET422	Privacy and Security in IoT
8	ET452	Energy Management for IoT Device
9	EX311	Fundamentals of Robotics
10	EX331	Kinematics and Dynamics of Robotics
11	EX421	Robotics Vision
12	EX451	Intelligent and High Performance Robotics

Open Elective (OE) :Term - I (List of courses for Academic Year 2018-19)		
Chemical		
1	CH311	Process Modeling and Simulation.
2	CH312	Piping Engineering
Civil		
3	CV311	Construction Planning & Management
Computer		
4	CS311	Descriptive Analytics
5	CS312	Artificial Intelligence
Electronics		
6	EX311	Fundamentals of Robotics
E & TC		
7	ET311	Embedded System Programming (ESP)
8	ET312	IoT Architecture and Sensors
IT		
9	IT311	Cryptography & System Security
Mechanical		
10	ME311	Geometric Modeling & Design
11	ME312	Fundamentals of Robotics
12	ME313	Work Process Assessment

Open Elective (OE) :Term - II (List of courses for Academic Year 2018-19)		
Chemical		
1	CH331	Process Engineering.
2	CH332	Piping Layout
Civil		
3	CV331	Operation Research
Computer		
4	CS331	Predictive Analysis
5	CS332	Machine Learning
Electronics		
6	EX331	Kinematics and Dynamics of Robotics
E & TC		
7	ET331	Embedded Processor
8	ET332	IoTNetwork & Protocols
IT		
9	IT331	Cyber Security
Mechanical		
10	ME331	Finite Element Analysis
11	ME332	Kinematics & Dynamics of Robots
12	ME333	Facility Planning & Design

Open Elective (OE) :Term - I (List of courses for Academic Year 2019-20)		
Chemical		
1	CH421	Process Optimization
2	CH422	Piping Design & Engineering
Civil		
3	CV421	Financial Management
Computer		
4	CS421	Big Data Analytics
5	CS422	Deep Learning
Electronics		
6	EX421	Robotics Vision
E & TC		
7	ET421	Low-Power SoC Architecture & Applications (SoC&A)
8	ET422	Privacy and Security in IoT
IT		
9	IT421	Ethical Hacking & Cyber Laws
Mechanical		
10	ME421	Computational Fluid Dynamics
11	ME422	Robotics Vision and Control
12	ME423	Operations Management

Open Elective (OE) :Term - II (List of courses for Academic Year 2019-20)		
Chemical		
1	CH451	Process Intensification & Integration
2	CH452	Pipeline Engineering
Civil		
3	CV451	Visualization and Information Exchange
Computer		
4	CS451	Practitioner's approach for Data analytics
5	CS452	Pattern Recognition
Electronics		
6	EX451	Intelligent and High Performance Robotics
E & TC		
7	ET451	Real-Time Embedded System (RES)
8	ET452	Energy Management for IoT Devices
IT		
9	IT451	Cyber Forensics
Mechanical		
10	ME451	Advanced Analysis
11	ME452	Intelligent and High Performance Robotics
12	ME453	Supply Chain Management

Humanities and Social Science (HSS) : 9 Courses		
Sl. No.	**Course**	
1.	HP101	Language & Communication – I
2.	HP102	Language & Communication – II
3.	HP201	Psychology
4.	HP301	Project Management
5.	HP302	Professional Skills
6.	HP303	Basics of Entrepreneurship
7.	HP401	Engineering Economics
8.	HP402	Sociology
9.	HP403	Business Strategies

Skill Development and Project (SDP) : 10 Courses		
Sl. No.	**Course**	
1.	ME102	Engineering Tools and Techniques
2.	ME103	Design Thinking
3.	ET206	Prototyping
4.	ET213	Minor Project
5.	ET304	Graphical Programming Lab
	ET305	MATLAB
	EX304	Embedded Linux
6.	ET324	Mini Project
7.	ET403	Programming in Java
8.	ET402	Project – I
9.	ET404	Summer Internship
10.	ET432	Project – II

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

First Year

Bachelor of Technology

2016-2020

(With Effect from Academic Year: 2016-2017)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2016-2017
FIRST YEAR BACHELOR OF TECHNOLOGY	RELEASE DATE	:	1/06/2016
	REVISION NO.	:	1.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS 101	Mathematics -1	4	1	5
2.	NSC2	AS 102/ AS 103	Physics/Chemistry	3	2	4
3.	ESC1	EX 101/ CV 101	Electrical & Electronics Engg/Applied Mechanics	3	2	4
4.	ESC2	ME 101/ IT 101	Engineering Graphics/Computer programming.	2	4	4
5.	HSS1	HP 101	Language &Communication -1	1	2	2
6.	SDP1	ME 102/ ME 103	Experimental Tools &Techniques/Design Thinking	--	4	2
TOTAL				13	15	21

SEMESTER:II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC3	AS 104	Mathematics -2	4	1	5
2.	NSC4	AS 103/ AS 102	Chemistry/ Physics	3	2	4
3.	ESC3	CV 101/ EX 101	Applied Mechanics/ Electrical & Electronics Engg	3	2	4
4.	ESC4	IT 101/ ME 101	Computer programming/ Engineering Graphics	2	4	4
5.	HSS2	HP 102	Language &Communication -2	1	2	2
6.	SDP2	ME 103/ ME 102	Design Thinking/ Experimental Tools &Techniques	--	4	2
TOTAL				13	15	21

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics I
	COURSE CODE	AS101
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII

COURSE OBJECTIVES :

AS101.CEO.1: To recall and apply the methods of solving system of equations using matrices.
AS101.CEO.2: To find nth derivative and expansion of different functions.
AS101.CEO.3: To classify and solve first order ordinary differential equations.
AS101.CEO.4: To categorize and inspect the applications of first order differential equations.
AS101.CEO.5: To apply the concepts of partial differentiation.
AS101.CEO.6: To demonstrate an understanding towards the applications of partial differentiation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS101.CO.1: Inspect system of equations using matrices. [L4]
AS101.CO.2: Illustrate problems based on nth derivative and expansion of functions. [L2]
AS101.CO.3: Solve first order ordinary differential equations. [L3]
AS101.CO.4: Analyze simple real world phenomenon governed by first order ordinary differential equations. [L4]
AS101.CO.5: Infer the problems based on properties of partial differentiation. [L2]
AS101.CO.6: Examine the applications of partial differentiation. [L4]

THEORY		
UNIT 1	**Matrices**	**12 HOURS**
Rank, Solutions of system of linear equations: Homogeneous and Non Homogeneous systems,Linear dependence and independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem		
UNIT 2	**Successive Differentiation**	**8 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative, Taylors and Maclaurins theorem for expansion of functions .		
UNIT 3	**First order ordinary differential equations**	**10 HOURS**
Exact differential equations, Differential equations reducible to exact by finding integrating factors, linear differential equations, Differential equations reducible to linear form .		
UNIT 4	**Applications of first order ordinary differential equation**	**10 HOURS**
Newtons law of cooling, Electrical circuits, rectilinear motion, one dimensional heat conduction, Chemical applications- Mixing problems .		
UNIT 5	**Partial Differentiation**	**8 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative and differential, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 6	**Applications of Partial Differentiation**	**8 HOURS**
Jacobian, properties of Jacobian, Jacobian of Implicit functions, Finding partial derivative using Jacobians, Functional dependence, maxima and minima of functions of two variables.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Rank, System of Linear equations: Homogeneous and Non Homogeneous systems.		
TUTORIAL NO.02		**1 HOURS**
Linear Dependence and Independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem.		
TUTORIAL NO.03		**1 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative.		
TUTORIAL NO.04		**1 HOURS**
Expansion of functions using Taylors and Maclaurins theorems.		

TUTORIAL NO.05		**1 HOURS**
Finding solutions to exact differential equations, Differential equations reducible to exact by finding integrating factors		
TUTORIAL NO.06		**1 HOURS**
Linear differential equations,Differential equations reducible to linear.		
TUTORIAL NO.07		**1 HOURS**
Newtons law of cooling, Kirchoffs law of electrical circuits, rectilinear motion		
TUTORIAL NO.08		**1 HOURS**
One dimensional heat conduction, Chemical applications Mixing Problems		
TUTORIAL NO.09		**1 HOURS**
Examples on Partial Differentiation and Chain rule,Total derivative and differential		
TUTORIAL NO.10		**1 HOURS**
Examples on Eulers Theorem, Differentiation of an implicit function		
TUTORIAL NO.11		**1 HOURS**
Examples on Jacobian, properties of Jacobian, Functional dependence		
TUTORIAL NO.12		**1 HOURS**
Examples on Functional dependence,Maxima and minima of functions of two variables		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Thomas Calculus by G.B. Thomas, Maurice D. Weir, Joel R. Hass (ISBN:9789332519091, Pearson Education, 12th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig(ISBN-13: 9788126554232, Wiley Eastern Ltd., 10th edition)
3. Advanced Engineering Mathematics by R.K. Jain& S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Physics
	COURSE CODE	AS102
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS102.CEO.1: To make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.(L3).

AS102.CEO.2: To analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.(L4).

AS102.CEO.3: To apply the concept of behavior of light and understand the polarization phenomena.(L3) .

AS102.CEO.4: To classify and understand the difference of classical mechanics and quantum mechanics.(L2).

AS102.CEO.5: To derive the basic laws governing the motion of quantum particles.(L4).

AS102.CEO.6: To apply the concept of quantum mechanics to different applications and supplement the reasoning vis--vis understanding of different branches of Physics.(L3).

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS102.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.(L5).

AS102.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.(L3).

AS102.CO.3: Apply that light is transverse in nature. (L3) .

AS102.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.(L2).

AS102.CO.5: Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.(L5) .

AS102.CO.6: Apply the concepts of Quantum Physics in different branches of engineering.(L3) .

THEORY

UNIT 1	**Measurement and importance of span (order) of physical quantities**	**7 HOURS**

Concept of (i)significant numbers, (ii) accuracy versus precision (iii)error versus uncertainty (iv)systematic error versus random error (v) quantifying the uncertainty. Least-count of an apparatus, Methods to measure least-count with specific examples of vernier-calipers, screw-gauge, travelling microscope and spectrometer. Span (orders of magnitude) of prominent physical parameters with specific examples of Gravitational constant(G), Speed of light(c),Planks constant(h), Boltzmann constant(k) and wavelengths of electromagnetic spectrum. Importance of the orders of G, c, h and k alongwith hypothetical picture of world in case of their order becomes unity (1). Length-scale and time-scale of specific physical phenomenon.

UNIT 2	**Optics (Interference and diffraction of Light)**	**7 HOURS**

Particle nature and wave-nature with examples of wave and particle behavior of light, Introduction to wave nature, Concept of thin film, Stokes law of phase-change on reflection from a thin film, Thin film interference, Coating of lenses as an application of thin film interference, Interference in films of uniform and non-uniform thickness (with derivation), Applications of thin-film interference, Newton Ring Experiment and its applications, Diffraction as a particular case of interference.

UNIT 3	**Polarization of Light**	**6 HOURS**

Polarization of light, Production and analysis of polarized light (Brewsters law, Law of Malus), Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.

UNIT 4	**Quantum Mechanics-I .**	**8 HOURS**

Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Plancks quantum law of blackbody radiation, Matter-waves, De-Broglies concept of matter waves, Heisenbergs Uncertainty Principle, Operators, Eigen values and Eigen functions, Expectation Values, Wave-function, Physical significance of wave function.

UNIT 5	Quantum Mechanics-II .	8 HOURS
Schrodingers equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohrs atomic model.		

UNIT 6	Applications of Quantum Mechanics-LASER .	6 HOURS
Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einsteins coefficients), Principle and working of LASER with example, Application of LASER in optical fibre communication.		

PRACTICALS		
PRACTICAL NO.01		**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02		**2 HOURS**
Determination of the refractive index of a given liquid using Newton Rings Experiment.		
PRACTICAL NO.03		**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04		**2 HOURS**
Determination of the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05		**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06		**2 HOURS**
Verification of Bohrs atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07		**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08		**2 HOURS**
Determination of wavelength of a laser beam using Lloyds mirror arrangement.		

PRACTICAL NO.09		2 HOURS
Determination of Radius of Curvature of a given planoconvex lens using Newtons Rings apparatus.		
PRACTICAL NO.10		**2 HOURS**
Determination of wavelength of different colours present in a white light.		

TEXT BOOK

1. The Feynman Lectures on Physics: Volume-1-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-82-8.(Narosa Publisher)
2. The Feynman Lectures on Physics: Volume-3-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-84-2. (Narosa Publisher)

REFERENCE BOOK

1. Measurement and Instrumentation Principles: Alan S Morris, Butterworth Heinemann, ISBN 07506508184
2. AjoyGhatak ,Optics, Tata Mc Graw Hill Publishing Company. Ltd., 2nd Edition, ISBN- 0-07058583-0
3. Jenkins White, Fundamentals of Optics, Mc Graw Hill Science, ISBN-0070853460.
4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-, Mc Graw Hill Education (India) Pvt. Ltd., 6th Edition, ISBN-10- 0070151555,
5. L. I. Schiff ,Quantum Mechanics, Tata Mc Graw Hill Education (India) Pvt. Ltd., 3rd Edition, ISBN-10- 0070856435, ISBN- 13- 9780070856431.
6. PAM Dirac,Principles of Quantum Mechanics Cbs publishers and Distributors, ISBN-10-0195671074, ISBN- 13- 978019567107
7. D J Griffiths, Introduction to Quantum Mechanics, Pearson Prentice Hall Publishers.
8. Serway and Jewett, University Physics for Scientists and Engineers, Cengage Learning Publishers.
9. K. Thyagarajan and AjoyGhatak, Lasers: Fundamentals and applications, Springer, ISBN 9781441964410.
10. Worsnop and Flint; Advanced Practical Physics, Little Hampton book service Ltd., ISBN-10: 0423738909, ISBN-13: 978-0423738902.
11. Robert Eisberg and Robert Resnick; Quantum Mechanics: Of Atoms, Molecules, Solids, Nuclei and Particles; Wiley

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Chemistry
	COURSE CODE	AS103
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : Basic Chemistry of XI and XII

COURSE OBJECTIVES :

AS103.CEO.1: To summarize the basic chemistry and classic methods of analysis, which includes solution, concentrations and indicators.

AS103.CEO.2: To outline the technology involved in improving quality of water for its industrial use.

AS103.CEO.3: To illustrate the basic concepts of analytical techniques that facilitates rapid and reliable measurements.

AS103.CEO.4: To demonstrate the use of ultra violet visible spectroscopy as invaluable tools in synthetic chemistry.

AS103.CEO.5: To list and explain the principle & techniques of separation methods.

AS103.CEO.6: To define the basic aspects of advanced materials & their applications.

COURSE OUTCOMES :

On successful completion of the course the student will be able to

AS103.CO.1: Relate classic methods of analysis by preparing solutions of desired concentrations & carrying out quantitative analysis by volumetric methods. (L1)

AS103.CO.2: :Identify different methodologies for water quality analysis for industrial application. (L3)

AS103.CO.3: Apply basic concepts of electro-analytical techniques for analysis of various chemical compounds and solutions. (L3)

AS103.CO.4: Extend the knowledge of calculating wavelength of absorption of various chemical compounds using UV-Visible spectroscopy. (L2)

AS103.CO.5: Outline the different methods for separation of mixtures of various chemical compounds.(L2)

AS103.CO.6: Categorize the different engineering materials and to solve engineering problems.(L4)

THEORY

UNIT 1	**Instrumental volumetric analysis**	**7 HOURS**

Introduction, methods of expressing concentrations (Self-study), primary and secondary standard solutions. Instrumental & non instrumental analysis principles & types; Types of Titrations based on reaction, AcidBase titrations: Indicatorstheory of indicators, acid base indicators, mixed and universal indicators; Titration curve for Strong acidStrong base type, Introduction to Weak acidStrong base, Strong acid-Weak base titration, Precipitation titration, Applications in quantitative analysis.

UNIT 2	**Water treatment and effluent management**	**7 HOURS**

Introduction to conventional water treatment: Complexometric titrations: Principle, EDTA titrations, choice of indicators, Hardness of water & Alkalinity of water, causes, types, numerical, internal methods of water softening, Advanced wastewater & water Treatment: i) filtration method: Carbon adsorption ii) ion-exchange method iii) membrane techniques: reverse osmosis and electro-dialysis & their applications in water purification.

UNIT 3	**Electroanalytical Techniques**	**7 HOURS**

Introduction to electrodes, pH metry: Standardization of pH meter, titration curve for the mixture of acids Vs strong base, differential plots, Conductometry: Introduction, Kohlrauschs law, measurement of conductance, Application of conductometer in Acid-Base titrations & Precipitation titrations. Potentiometry: Introduction, application in redox titrations example of Fe/Ce titration.

UNIT 4	Ultra Violet Spectroscopy	7 HOURS
Introduction, nature of UV, Beers law, absorption of UV radiation by organic molecule leading to different excitation, Terms used in UV Spectroscopy- Chromophore, Auxochrome, Bathochromic shift(Red shift), hypsochromic shift(Blue shift), hyperchromic and hypochromic effect. Instrumentation,Effect of conjugation on position of UV band. Calculation of max by Woodward and Fisher rules for dienes and enone systems, Applications of UV Spectroscopy- Determination of structure, Determination of stereo chemistry (Cis and trans)		

UNIT 5	: Chromatography	6 HOURS
Introduction and classification of chromatographic methods, Theory, Principle, technique and applications of-Column Chromatography, Thin layer Chromatography, Paper Chromatography, Gas Chromatography. Applications of chromatographic techniques		

UNIT 6	: Engineering Materials.	8 HOURS
Introduction to Material Sciences, Polymers: Introduction, Specialty polymers, Applications in electronic gadgets, housing & construction, automobiles etc. Biomaterials: Introduction, characteristics, examples, challenges, Carbon nano materials: Introduction, types & applications. Smart materials: Introduction, types, examples like piezo materials, shape memory, thermo responsive etc..		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Preparation and Standardization of solutions		
PRACTICAL NO.02		**2 HOURS**
Estimation of ions from given solution by Redox titration		
PRACTICAL NO.03		**2 HOURS**
Determination of the total hardness of a given water sample by EDTA method		
PRACTICAL NO.04		**2 HOURS**
Adsorption: Removal of organic dyes by activated charcoal		
PRACTICAL NO.05		**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.06		**2 HOURS**
Conduct metric titrations		
PRACTICAL NO.07		**2 HOURS**
Verification of Beers law & colorimetric estimation		

PRACTICAL NO.08		**2 HOURS**
Determination of max of organic/ inorganic compound using UV-visible spectrophotometer		
PRACTICAL NO.09		**2 HOURS**
Separation of mixture of two organic compounds by Thin Layer Chromatography		
PRACTICAL NO.10		**2 HOURS**
Separation of two cations by paper chromatography		
PRACTICAL NO.11		**2 HOURS**
Separation & purification of chemical compounds by Gas chromatography		

TEXT BOOK

1. Jain & Jain, Engineering Chemistry, 15th Edition, Dhanpat Rai Publications company
2. S.M. Khopkar , Basic Concept of Analytical Chemistry,2nd edition, New Age Science Ltd ISBN-10: 1906574006 ISBN-13: 978- 1906574000
3. Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, Laxmi Publications Pvt. Ltd.

REFERENCE BOOK

1. V.M.Parikh , Absorption Spectroscopy of Organic Molecules, Addison Wesley Longman Publishing Co, ISBN 10: 0201057085,ISBN 13: 9780201057089.
2. Skoog, Fundamentals of Analytical Chemistry, Cengage Learning, ISBN-13: 978-0495558286, ISBN-10: 0495558281
3. Willard, Merritt, Dean and Settle, Instrumental Methods of chemical analysis, 6th edition, Wadsworth Publishing Co. ISBN-10: 0534081428, ISBN-13: 978-0534081423.
4. Donald R. Askeland, Pradeep Fulay, W. J. Wright, The Science & Engineering of Materials, 6th Edition, Cengage Learning, 2010
5. O. P. Virmani & A. K. Narula , Applied Chemistry: Theory and Practice , New Age International Pvt. Ltd. Publishers, ISBN-10: 8122408141, ISBN-13: 978-8122408140

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical & Electronics Engineering
	COURSE CODE	EX101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE :

COURSE OBJECTIVES :

EX101.CEO.1: To impart knowledge of energy scenario and use of renewable energy systems.
EX101.CEO.2: To explain the fundamentals of single-phase and three-phase systems.
EX101.CEO.3: To explain power supply components, electronic devices.
EX101.CEO.4: To summarize various Digital systems and application.
EX101.CEO.5: To build the knowledge of measuring system and signal conditioning circuits.
EX101.CEO.6: To get acquainted with different electrical machines.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX101.CO.1: Develop the Renewable energy system (PV) as per given specifications [L3]
EX101.CO.2: Illustrate behavior of single phase A.C. circuits and three phase A.C. circuits. [L2]
EX101.CO.3: Analyze analog circuit applications.[L3]
EX101.CO.4: Design Digital applications.[L5]
EX101.CO.5: the use of Instrumentation system in various fields.[L2]
EX101.CO.6: Identify electrical machines used in typical domestic and industrial sector based on application. [L2]

THEORY

UNIT 1	Energy Resources & Technology	6 HOURS

Energy Scenario, Energy Resources, Basic concepts about thermal, hydro and nuclear power stations (block diagram approach only).Energy conversion from thermal and mechanical energy, Energy Conservation, Use of Energy Efficient Technologies, Application of Renewable Energy Systems, Battery technology, Introduction to power quality: Definition, causes, effects, Introduction to energy audit.

UNIT 2	A.C. Circuits	7 HOURS

A.C. fundamentals, RMS and average value, R-L,R-C,RLC series parallel circuits, phasor diagram, power and power factor. Three phase voltage generation and their waveforms, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, Difference between neutral and ground conductors.

UNIT 3	Power Supply and Electronics Devices	7 HOURS

Rectifiers and Power Supplies, Elements of IC Regulated Power Supply. BJT - structure and operation, CE, CB, CC configurations, Transistor as a switch and Amplifier. MOSFET- structure (enhancement), operation and application as a switch. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.

UNIT 4	Digital Systems	7 HOURS

Digital: Logic gates, Boolean algebra, SOP representation, Combinational circuit Design: Half Adder, Full Adder, MUX, DMUX, Comparator, Code converter, Decoder Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor based systems, Embedded systems

UNIT 5	Measuring System	6 HOURS

Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, IR, Speed & LVDT. Op-Amp IC 741 pin configuration, Op-amp parameters, Inverting, Non- Inverting & Differential configuration Applications: Summing & Difference amplifier, Comparator, Voltage follower.

UNIT 6	Electrical Machines	7 HOURS

Construction of Transformer, principle of operation, EMF equation. Construction, principle of operation and types of three-phase Induction motor and DC motor, PMDC, BLDC, servo motor, stepper motor, Universal motor, Application of Electrical Motors in domestic and Industrial sector.

PRACTICALS : Total 8 Experiments from two groups.		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test it.		
PRACTICAL NO.02	**Single Phase Energy (Watt-hour) measurement.**	**2 HOURS**
To measure energy and power factor. To examine improvement in the power factor. To estimate and compare energy consumption with energy meter.		
PRACTICAL NO.03	**R-L-C series A.C. circuit**	**2 HOURS**
To calculate exact values of R, L and C for lagging and leading power factor To find power losses in R, L and C.		
PRACTICAL NO.04	**Verification of relation between Line and Phase quantities in Star and Delta circuits**	**2 HOURS**
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation. To connect Bulb load in Delta connection and verify the relation.		
PRACTICAL NO.05	**Open circuit & Short circuit test on a Single Phase transformer**	**2 HOURS**
To find iron loss and no load current To find full load copper loss and winding parameters To determine efficiency and regulation of transformer		
PRACTICAL NO.06	**Load test on D.C. Shunt Motor.**	**2 HOURS**
To find the torque and output power of motor To calculate the efficiency of motor.		
PRACTICAL NO.07	**Step angle control of Stepper motor.**	**2 HOURS**
To gain familiarity with the properties of stepper motors. To calculate the step angle of motor.		
PRACTICAL NO.08	**Speed control of BLDC/PMDC Motor.**	**2 HOURS**
To find the relation between voltage and speed of motor To develop any small application.		
PRACTICAL NO.09	**Electronics Components and Measuring instruments:**	**2 HOURS**
To study Passive components Resistors, Capacitors & Inductor. To test semiconducting components Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		
PRACTICAL NO.10	**DC Regulated Power Supply:**	**2 HOURS**
To design 12V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	**BJT as a switch and Amplifier.**	**2 HOURS**
To adapt BJT as a switch On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		

PRACTICAL NO.12	Combinational Digital Circuits:	2 HOURS
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	**Sequential Digital Circuits:**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	**OP-AMP Applications**	**2 HOURS**
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OPAMP as summing and difference amplifier. To verify the application of OPAMP as voltage follower.		
PRACTICAL NO.15	**Sensors and Transducer**	**2 HOURS**
To study and verify operation of LVDT. To study and verify the operation of Temperature sensors. (PT100, LM35)		
PRACTICAL NO.16	**Design and Simulate using MULTISIM(Minimum 2)**	**2 HOURS**
To design a counter to display 2-digit Decimal Number (00 to 99) on 7-Segment Display. To design a Flashing LED Display for a specific Pattern using MUX. To design of Inverting/Non-Inverting Amplifier using Op-Amp IC-741 for a specific gain.		

TEXT BOOK

1. B. H. Khan,Non-Conventional Energy Resources, Tata McGraw Hill, 2nd Edition, 2009, 978-0070142763.
2. Edward Hughes, Electrical and Electronic Technology Pearson India, 10th Edition, 2011, ISBN-978-8131733660
3. Neil Storey, Electronics A Systems Approach, Pearson Education Asia, 5th Edition,2013, ISBN-978-0273773276

REFERENCE BOOK

1. 1. V. N. Mittle and ArvindMittal, Basic Electrical Engineering, McGraw Hill Education, 2ndEdition,2005,ISBN- 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, McGraw Hill, 4th Edition, 2010, 978-0070699670.
3. Thomas L. Floyd, Electronics Devices & Circuits, Pearson Education India, 5th Edition, 1998, 978-0136491385.
4. Paul Horowitz, Winfield Hill, The Art of Electronics, Cambridge University press, 3rd Edition, 978-0521809269.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE : Physics and Mathematics of XI & XII

COURSE OBJECTIVES :

CV101.CEO.1: To classify force systems and explain the conditions of equilibrium.
CV101.CEO.2: To illustrate laws of friction.
CV101.CEO.3: To demonstrate the concepts of centroid and moment of inertia.
CV101.CEO.4: To describe kinematic parameters of motion.
CV101.CEO.5: To make use of laws of motion for kinetics.
CV101.CEO.6: To explain energy and momentum methods.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV101.CO.1: Determine the resultant and support reactions.(L5)
CV101.CO.2: Analyze bodies involving frictional forces. (L4)
CV101.CO.3: Evaluate centroids of bodies and moment of inertia of sections. (L5)
CV101.CO.4: Identify the type of motion and its kinematic parameters. (L3)
CV101.CO.5: Analyze the motion under action of constant and variable forces. (L4)
CV101.CO.6: Apply energy and momentum methods for kinetics. (L3)

THEORY		
UNIT 1	**Fundamentals of statics**	**8 HOURS**
Basic concepts and fundamental principles, force, moment of a force, couple, resolution and composition of forces, Free body diagrams, equations of equilibrium, equilibrium of coplanar and non-coplanar force system, applications to jib crane, beams, and cables.		
UNIT 2	**Friction**	**6 HOURS**
Introduction, types of friction, laws of friction, angle of friction, angle of repose, cone of friction, engineering applications - blocks and wedges, ladder friction, screw jack, pulley and belt drives, band brakes.		
UNIT 3	**Properties of surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity, centroids of composite 1D and 2D objects. Introduction to moment of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, MI of composite objects. Distributed loading, fluid pressure-application to dams and gates.		
UNIT 4	**Kinematics**	**8 HOURS**
Basic concepts in kinematics, Motion with uniform and variable acceleration, Motion curves, Curvilinear Motion in Rectangular coordinates, path coordinates, polar coordinates. Kinematic Link and Kinematic Pair, Kinematic Chain, Mechanisms and its inversions, instantaneous centre of rotation, Kennedy's Theorem, Applications- slider and crank mechanism, Railway engine and its supporting flywheel motions, Linkage mechanism of excavator and its system.		
UNIT 5	**Kinetics**	**6 HOURS**
Kinetics of rectilinear and circular motion of a particle acted upon by a constant and variable force system, Newtons second laws of Motion, Equations of motion, concept of dynamic equilibrium, and motion of connected bodies. Basic principles of vehicle dynamics, Forces acting on a vehicle, tire mechanics, Dynamics of linear and lateral motion.		
UNIT 6	**Energy and Momentum**	**8 HOURS**
Work, power and energy, Principles of work and Energy,Motion under a ConservativeCentral Force. Application to Space Mechanics. Impulse, momentum, Principle of Impulse and Momentum, Collisions-elastic and plastic, Direct central impact, coefficients of restitution.Applications-vehicle collisions, sports viz. cricket, tennis, billiard.		

PRACTICALS		
PRACTICAL NO.01	**Group 1] Basic principles/laws**	**2 HOURS**
1. To verify triangle law/ Lami's theorem 2. To verify polygon law of forces. 3. To verify law of moments. 4. To verify equilibrium of parallel forces. (Beam Reactions) 5. To verify equilibrium of concurrent forces in space.		
PRACTICAL NO.02	**Group 2] Friction**	**2 HOURS**
1.To verify laws of friction. 2. To determine angle of repose for a given block and surface. 3. To determine static coefficient of friction for a block on horizontal plane. 4. To determine static coefficient of friction for a block on inclined plane. 5. To determine static coefficient of friction for flat belt and drum.		
PRACTICAL NO.03	**Group 3] Centroid/centre of gravity**	**2 HOURS**
1. To determine centroid of irregular triangular lamina. 2. To determine centroid of polygonal lamina. 3. To determine centre of gravity of a wire bend. 4. To determine centroid of a composite lamina. 5. To find the shift of centroid after cutting some part of lamina.		
PRACTICAL NO.04	**Group 4] Motion(Dynamics)**	**2 HOURS**
1. To study curvilinear motion of a particle. 2. To verify value of g using compound pendulum. 3. To determine coefficient of restitution. 4. To determine mass moment of inertia of a fly wheel. 5. To verify law of conservation of momentum.		
PRACTICAL NO.05	**Group 5] Graphical Exercises**	**2 HOURS**
1. To determine resultant of concurrent forces. 2. To determine resultant of parallel/general forces. 3. To determine reactions for a simple beam. 4. To draw motion curves for given kinematics problem. 5. To determine relative velocity by graphical method. Part B] Students will have to complete a task/activity after each practical which will be based on the theme of that group. (10 Hrs)		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", Tata McGraw-Hill Education, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics", Pearson Education, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II", Tata Mc-Graw, ISBN: 978-0077402327
2. Ferdinand Singer, Harper and Row "Engineering Mechanics Statics and Dynamics", ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics", Cengage Learning, ISBN:8131509907

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	40	50	10	50	Nil	150

PRE-REQUISITE :

COURSE OBJECTIVES :

ME101.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME101.CEO.2: To develop & apply visualization skill to simple Objects.
ME101.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME101.CO.1: Recall fundamentals of projections (L1)
ME101.CO.2: Interpret engineering drawings (L2)
ME101.CO.3: Apply visualization skill to draw various views of object (L3)
ME101.CO.4: Analyzeengineeringdrawings (L4)
ME101.CO.5: Decide annotations for two dimensional drawings (L5)
ME101.CO.6: Develop and/or comprehend a simple engineeringdrawing in both First and Third angle orthographic projections(L4)

THEORY		
UNIT 1	**Visual Thinking & Solid Geometry**	**5 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections & Sectional Views**	**5 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views.		
UNIT 3	**Isometric Projections**	**5 HOURS**
Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of isometric View of Pyramid, Cone, Sphere.		
UNIT 4	**Interpretation of given view/ missing view**	**5 HOURS**
Identification of lines/ edges and surfaces, visualization of given orthographic views, adding missing/ third view, adding a sectional view, to convert a given view into sectional view.		
UNIT 5	**Auxiliary Projections**	**4 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View.		
UNIT 6	**Freehand Sketching & Technical Drawing**	**4 HOURS**
Free hand sketching- FV & TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles.		

PRACTICALS : Each Assignment contains 2 questions.		
PRACTICAL NO.01		**10 HOURS**
Projection of Lines, Plane, Solids		
PRACTICAL NO.02		**8 HOURS**
Orthographic Projections, Missing Views		
PRACTICAL NO.03		**6 HOURS**
Isometric Projections		
PRACTICAL NO.04		**4 HOURS**
Auxiliary View		

PRACTICALS : Assignments to be drawn on modeling software package.		
PRACTICAL NO.05		**4 HOURS**
Absolute and Incremental drawing.		
PRACTICAL NO.06		**6 HOURS**
Draw commands, Modify commands, Array, fillet, offset commands		
PRACTICAL NO.07		**2 HOURS**
Project drafting		
PRACTICAL NO.08		**12 HOURS**
Sketching, Solid Modeling, Assembly		
PRACTICAL NO.09		**4 HOURS**
Project modeling		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to Auto CAD, TMH Publishing co Ltd, 5th Edition, 2012, (ISBN 13: 9780070648371)
2. Basant Agarwal and C M Agarwal, Engineering Drawing, TMH Publishing co Ltd, 2nd Edition 2013, (ISBN13: 978-1-259-06288-9)
3. K C John, Engineering Graphics for Degree, PHI learning pvt. Ltd. New Delhi,2009, (ISBN: 97881-203-3788-6)
4. R. K. Dhavan, A Text Book of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

1. Luzadder, Warren J., Duff, John M, Fundamentals of Engineering, Prentice Hall of India,11th Edition, 2010, (ISBN: 978-81-203-0885-5)
2. Basudev Bhattacharya, Machine Drawing includes Autocad Supplements, Oxford University Press India, First Edition, 2011, (ISBN 13: 9780198070771)
3. K. Venugopal, Prabhu Raja V., Engineering Drawing and Graphics, New age Publications, First Edition, 2008, (ISBN: 978-81-224-2457-7)
4. N B Shaha and B C Rana, Engineering Drawing, Pearson Education, 2012, (ISBN: 9788131798058)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Computer Programming
	COURSE CODE	IT101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	4	40	50	10	25	NIL	125

PRE-REQUISITE : Knowledge of computer system.

COURSE OBJECTIVES :

IT101.CEO.1: To define and summarize the basic terminologies used in computer programming.
IT101.CEO.2: To develop and demonstrate logic for a given problem using algorithms and Flowcharts.
IT101.CEO.3: To evaluate solutions for the given problem using problem solving tools.
IT101.CEO.4: To identify and analyze different control structures.
IT101.CEO.5: To understand and use of simple data structures using Python.
IT101.CEO.6: To demonstrate and understand different computer applications in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT101.CO.1: Analyze a problem and identify and define the computing requirements appropriate to its solution[L3][L4].
IT101.CO.2: Apply the knowledge and strategies for structuring code, dividing problems up into pieces that can be solved independently, then integrating the pieces into a whole to solve a large problem [L3].
IT101.CO.3: Analyze when to select the different types of data structures such as arrays and lists as a framework for solving a problem [L4].
IT101.CO.4: Design, correctly implement and document solutions to problems using Python [L6].
IT101.CO.5: Analyze and compare alternative solutions to computing problems [L2][L4]
IT101.CO.6: Adapt to new developments in the field of computer science [L6].

THEORY		
UNIT 1	**Problem Solving Concepts**	**6 HOURS**
General Problem Solving Concepts-types of problems, problem solving with computers, difficulties with problem solving, Problem solving concepts for the computer: Constants, Variables, Data types, operators, Expressions, Equations, Problem solving tools.Programming structure-Modules and their functions, Cohesion and Coupling, Local and Global Variables, Parameters, return values		
UNIT 2	**Problem solving and Logic structure**	**8 HOURS**
Logic structures, Problem solving with sequential logic structure - The sequential logic structure, solution development. Problem Solving with Decisions decision logic structure, multiple Decision instructions, straight-through logic, positive logic, negative logic, logic conversion, Problem solving with loops and case logic structures.		
UNIT 3	**Arrays, Strings and File Processing**	**8 HOURS**
One dimensional, multidimensional array,finding maximum number in a set, Partitioning of array, finding smallest element, searching an array for a range. String Handling Operations: Concatenation, Copy, Substring, Compare, Length, Case Change, and Reverse. File handling and file handling operations, File Handling Modes.		
UNIT 4	**Programming Applications**	**6 HOURS**
Programming applications, Predictive analysis with examples, Graphics and animation, working with matrices, Graphics & Visualization, Differential Equation: Linear Differential Equations, Digital Signal Processing: Plotting different waveforms.		

PRACTICALS		
PRACTICAL NO.01		**6 HOURS**
1. Find the result of allthe arithmetic operations (Addition,Subtraction,Multiply, Division and modulo) in Python. 2. Show the distance in miles per gallon with respect user defined value in Python. 3. Find the kinetic energy of an object.		
PRACTICAL NO.02		**6 HOURS**
1. Write a Python program for printing result of five subjects for five students. 2. Choose any value and find whether the number is even or odd. 3. Identify whether the number entered by user is prime or not.		

PRACTICAL NO.03		6 HOURS
1. Solve the Fibonacci sequence using recursive function in Python. 2. Illustrate factorial of non-negative numbers in Python. 3. Build asterisk (*) graph in Python		
PRACTICAL NO.04		**6 HOURS**
Electric circuits, Chemical applications- Mixing problems.		
PRACTICAL NO.05		**6 HOURS**
1. Select the number from the entered list and find its position in Python (use Linear Search). 2. Select the number and find its position of in Python (use Binary search). 3. Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain)		
PRACTICAL NO.06		**6 HOURS**
1. Select a text file and count number of words, repeated words in a file. 2. Choose the words from the file, store in the list and sort the list is ascending order. 3. Create duplicate the file from an original file.		
PRACTICAL NO.07		**6 HOURS**
1. Predict whether the entered string is palindrome or not. 2. Compare two strings and convert in opposite case in Python. 3. Select any two words and perform concatenation operation		
PRACTICAL NO.08		**14 HOURS**
1. Create a simple picture in python using graphics package. 2. Construct 2D and 3D plotting the Objects. 3. Create Sine waveform, Cosine waveform, Square waveform, Saw-tooth waveform, using MATLAB and discrete the same. 4. Solve the matrix operations (Addition, Multiplication, and Transverse) in MATLAB. 5. Design an application to display student result using predictive analysis		

TEXT BOOK

1. 1. Problem Solving and Programming Concepts ,Maureen Sprankle , Pearson Publication, Seventh Edition, ISBN 81-317-0711-3.
2. How to think like a Computer Scientist, Learning with Python Allen Downey, Jeffrey Elkner, Chris Meyers, Green Tea Press ISBN: 0-9716775-0-6.

REFERENCE BOOK

1. 1. Learning Python Mark Lutz Oreilly Publication 5th Edition ISBN-13: 978-1449355739.
2. A MATLAB Exercise Book LudmilaKuncheva, Cameron Gray, Perfect-bound Paperback, ISBN 9781291784794.
3. How to solve it by Computer, R.G.Dromey, First Edition, Pearson Publication, ISBN 978-81-315-0562-9.
4. Introduction To Computation And Programming Using Python "Guttag John V, PHI(2014), ISBN-13 : 978-8120348660.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 1
	COURSE CODE	HP101
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level

COURSE OBJECTIVES :

HP101.CEO.1: To introduce a variety of English texts to the students.
HP101.CEO.2: To teach basic English grammar.
HP101.CEO.3: To guide the students to write in English coherently and formally.
HP101.CEO.4: To improve the students overall communicative competence in English through activities like group discussions and debates.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP101.CO.1: Interpret texts written in English. [L2, L5]
HP101.CO.2: Apply English grammar rules correctly. [L3]
HP101.CO.3: Develop sentences and texts in English coherently and formally. [L3, L6]
HP101.CO.4: Demonstrate overall improvement in communication skills. [L 2]

THEORY		
UNIT 1	**Functional Grammar**	**4 HOURS**
Use of tenses in day to day communication and academic writing, Direct and Indirect Speeches, Active and Passive voices, Degrees of comparison, Use of the parts of speech in sentence composition, Verb forms and Modal auxiliaries		
UNIT 2	**Communication**	**8 HOURS**
Concept of communication, Types-verbal and non-verbal, principles of effective communication, barriers to communication, cross-cultural communication		
UNIT 3	**Academic Writing**	**6 HOURS**
Essentials of good writing, Review writing, Letter writing, Report writing, Prcis writing, and Essay writing		

PRACTICALS		
PRACTICAL NO.01	**Common Errors in Communicative English**	**6 HOURS**
A task of identifying and correcting the common errors in general as well as academic English by using audios and relevant academic texts; tips on punctuation.		
PRACTICAL NO.02	**Debate**	**4 HOURS**
Concept, Dos & Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos & Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.04	**Role Play**	**4 HOURS**
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation		
PRACTICAL NO.05	**Review and Letter Writing**	**4 HOURS**
How to write a review, characteristics and essentials of a good review, writing a review on a book or short story, types of letters- formal, informal; layout of business letters		

PRACTICAL NO.06	Report Writing and Prcis Writing	4 HOURS
Types of reports, format and writing a report, What is prcis writing? Rules of prcis writing		
PRACTICAL NO.07	**Essay Writing**	**2 HOURS**
What is an essay? Tips to write a good essay, Types of essays		

REFERENCE BOOK

1. 1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Raymund Murphy: Essential Grammar in Use, Cambridge, 3rd Edition, ISBN-13: 9780521133890
3. William Sanborn Pfeiffer: Technical Communication A Practical Approach, 6th Edition, Pearson Education, ISBN-13: 978-8131700884
4. Dutt et.al. : A Course in Communication Skills, Foundation, 1st Edition
5. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
6. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
7. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
8. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques- I
	COURSE CODE	ME102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	30	-	20	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME102.CEO.1: To introduce different tools and study the various measurement techniques.
ME102.CEO.2: To study different parts of the system along with its functions and applications.
ME102.CEO.3: To list various tools used for the said application.
ME102.CEO.4: To identify the function of various parts of system.
ME102.CEO.5: To impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME102.CEO.6: To apply the knowledge to find the solutions for basic engineering problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME102.CO.1: Recall the tools required for measurements. (L1)
ME102.CO.2: Summarize the applications of various engineering tools used. (L2)
ME102.CO.3: Identify the right tool for selected purpose. (L3)
ME102.CO.4: Inspect various parts of the system .(L4)
ME102.CO.5: Justify the most appropriate technique which can be compatible with the existing environment. (L5)
ME102.CO.6: Develop the system which will give appropriate solution to the identified problem. (L6)

PRACTICALS		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Study and analysis of various components on the motherboard of a standard desktop computer.
2. Installation of various components like hard disk drive on the motherboard and check the system setup for verification.
3. Formatting the hard disk drive and installation of Windows and Linux operating system making the system dual boot
4. Study of various network components like switch, Router and configure the devices.
5. Crimping of Unshielded Twisted Pair cable. (Cat-6) 6. Study of TCP/IP Stack, and configure as well as develop a Local Area Network.
7. Configuration of Network Monitoring tool and checking the results
8. Installation of DHCP server and checking the results.
9. Installation of web server and checking the results.
10. Configuration of MS Access and Deploying Access 2007 Runtime-Based Solutions
11. Study and usage of Google Tools (creating Forms, Blog).
12. Using the Google form with add on, create a PDF file of the form.
13. Designing a static HTML page
14. Uploading the pages using FTP server on a web site
15. Deploy a simple web site using LAMP server creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Basic electronics component and switches
2. PCB and Soldering Tools And Technique
3. Relay and application
4. Manufacturing of extension board/Spike Guard
5. Series and parallel connection of Electrical Load
6. Actuators and application (Electrical and Mechanical).
7. PCB Wizard
8. Proteus
9. Virtual Instrumentation.
10. Cathode Ray Oscilloscope
11. Power Supply

PRACTICAL NO.03	Mechanical Engineering Laboratories (Minimum 6practicals from the following	12 HOURS

1. Linear and angular measurements.
2. Types of mechanism and making any one mechanism containing four links using card board.
3. Open a household component and explain it with free hand sketches.
4. Draw the outline of the problem identified for project on software package.
5. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
6. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
7. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
8. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
9. Measurement of Relative humidity of air in the lab.
10. Measurement of hardness of Steel and Aluminum.
11. Measurement of stiffness of helical spring (compression or tension). Open IT
12. Mixer or kitchen machine/ Printer.
13. Refrigerator/ Window Air Conditioner.
14. Boiler and accessories / thermal power plant (Mini).
15. Two stroke or four stroke engine.
16. Assembly and Disassembly of parts in any software package.
17. Introduction to threaded fasteners and joints using threaded fasteners.

PRACTICAL NO.04	Chemical Engineering (Minimum 3 practicals from the following	06 HOURS

1. Determination of specific gravity of liquid
2. Study of molecular diffusion
3. Liquid liquid extraction: Separation of one liquid component from the solution.
4. Solid-liquid separation from filtration
5. Membrane Separation process
6. Fuel from Plastic
7. Demonstration of mechanical operation models.
8. Production of Biodiesel
9. Open and Study Heat Exchangers.
10. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Mimimum 3 Practicals from the following)	06 HOURS

1. To find the area and included angle of given plot and fix boundary from given plan.
2. To determine the level difference between 5 points with level tube and determine height of tower with trigonometry.
3. To draw the plan of given housing to a given scale.
4. To draw line diagram of household water supply line and sewage line with list of materials used.
5. To draw line diagram of rain water harvesting unit with all details and its importance.
6. To make report on daily water requirement in public building and its waste water disposal, and reuse.
7. To identify and make report on the earthquake resisting structural members of building and its role.
8. To demonstrate the lifesaving dos and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

TEXT BOOK

1. Bruce Hallberg, Networking A Beginners Guide , 4th edition, Tata McGraw-Hill,2005, ISBN 0-07-060791-5
2. R.S. Khandpur, Printed Circuit Boards Design, Fabrication, Assembly and Testing, Tata McGraw-Hill Education, 2005, ISBN 0070588147, 9780070588141.
3. S R Dara, Engineering Chemistry, 5th edition, S.Chand , ISBN 81-219-0359-9

REFERENCE BOOK

1. Mackenzie L. Davis, Water and Wastewater Engineering, 13th edition, Tata McGraw- Hill, ISBN 978-1-25-906483-8
2. R. S. Khurmi, J. K. Gupta, Theory of Machines, 14th edition, S. Chand, ISBN 81-219-2524-X
3. Philip Wankat, Seperation Process Engineering , 3rd edition, Pearson, ISBN 978-93-325-2484-2
4. N.V. Ragvendra, L. Krishnamurthy, Engineering Metrology and Measurements, Oxford University Press, ISBN 978-0-19-808549-2.
5. Dr. Vinod Hosur, Earthquake- Resistant Design of Building Structures, Wiley, ISBN 978-81265-3859-1
6. M. S. Shetty, Concrete Technology, S. Chand, 2008, ISBN 9788121900034.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME103
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	25	-	25	50

PRE-REQUISITE : -

COURSE OBJECTIVES :

ME103.CEO.1: Disseminate the philosophy of design thinking.
ME103.CEO.2: Impart the information regarding User centric approach.
ME103.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME103.CEO.4: Enhancethinking in order to inspect diverse solutions.
ME103.CEO.5: Sensitize about the feasibility, desirability and viability criterias for selection of appropriate solution.
ME103.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME103.CO.1: Recall fundamental principles of design thinking (L1)
ME103.CO.2: Explain all the dimensions of user and his needs using design thinking approach (L2)
ME103.CO.3: Identify user centric problem by using information gathering techniques (L3)
ME103.CO.4: Compare multiple solutions through ideation process (L4)
ME103.CO.5: Justify most appropriate solution for defined user centric problem (L5)
ME103.CO.6: Develop the most optimum solution (L6)

SESSION		
SESSION 1		**2 HOURS**
Design thinking Methodology General Problem Statement, Random check list, mind mapping, Categorization of random check list.		
SESSION 2		**2 HOURS**
Brainstorming of problem areas, Research Methodology Information gathering Primary, Secondary Sources, data presentation, Preparation of survey forms		
SESSION 3		**2 HOURS**
SWOT analysis, drawing inferences, translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of cuboids, cylinders, simple form products (Isometric views) Ideation sketches, Ergonomic and aesthetic consideration in design		
SESSION 4		**2 HOURS**
Concept validation, evaluation and detailing, prototyping		

PROJECT		
PHASE NO.01		**4 HOURS**
General Problem Statement and problem background		
PHASE NO.02		**4 HOURS**
Research methodology		
PHASE NO.03		**4 HOURS**
Design Brief		
PHASE NO.04		**8 HOURS**
Ideation		
PHASE NO.05		**4 HOURS**
Concept Evaluation, Validation and Concept detailing		
PHASE NO.06		**8 HOURS**
Prototyping		
PHASE NO.07		**8 HOURS**
Report Writing		

TEXT BOOK

1. Engineering Design Process, Second Edition Yousef Haik and Tamer ShahinPublisher, Global Engineering. Cengage Learning. ISBN-13: 978-0-495-66814-5.
2. Product Design and Development, Kevin Otto and Kristin Wood, Product Design: Techniques in Reverse Engineering and New Product Development, Pearson Education Inc. ISBN-10: 0130212717.
3. Product Lifecycle Management, Grieves, Michael, McGraw-Hill, 2006. ISBN 0071452303.
4. Lateral Thinking: Creativity Step by Step Harper Perennial; Reissue edition (24 February 2015) (Perennial Library) Six Thinking Hats by Edward de Bono Paperback ISBN-10: 0060903252.
5. Design Methods, John Chris Jones., John Wiley & Sons, David Fulton Publishers, London, ISBN 0-471-28496-3.

Web references

1. www.designcouncil.org.uk
2. www.surveymonkey.com
3. http://en.red-dot.org

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics II
	COURSE CODE	AS104
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII, Mathematics I

COURSE OBJECTIVES :

AS104.CEO.1: To identify different methods to evaluate integrals.
AS104.CEO.2: To classify and solve linear differential equations of higher order
AS104.CEO.3: To demonstrate an understanding towards evaluating multiple integrals.
AS104.CEO.4: To relate and examine the applications of multiple integrals.
AS104.CEO.5: Analyse different probability distribution functions.
AS104.CEO.6: To study different statistical methods for solving problems

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS104.CO.1: Distnguish different methods to evaluate integrals.(L4)
AS104.CO.2: Conclude solutions for higher order lineardifferential equations(L4)
AS104.CO.3: Evaluate the multiple integrals(L5)
AS104.CO.4: Apply the knowledge of multiple integrals wherever required(L3)
AS104.CO.5: Solve the probability distribution problems(L3)
AS104.CO.6: Assess statistical problems(L5)

THEORY COURSE CONTENT		
UNIT 1	**Integral Calculus**	**8 HOURS**
Reduction Formulae , Beta - Gamma functions and Differentiation under integral sign.		
UNIT 2	**Linear Differential Equations of higher order**	**8 HOURS**
General solution of Linear Differential equations with constant coefficients, Method of Variation of parameters, Equations reducible to Linear Differential equation with constant coefficients: Cauchy&Legendres linear differential equations		
UNIT 3	**Multiple Integrals**	**8 HOURS**
Tracing ofCurves: Cartesian curves, Polar curves, Parametric curves ,Double Integration, Evaluation of Double Integration, Change of order of integration, Integration by transforming Cartesian to Polar Coordinate system, Triple integration, Integration by transforming to spherical and cylindrical polar coordinates		
UNIT 4	**Applications of Multiple Integrals**	**8 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		
UNIT 5	**Probability**	**8 HOURS**
Probability, probability density function, probability distribution:Binomial, Poisson, Normal .		
UNIT 6	**Statistics**	**8 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Examples on Reduction Formulae, Beta and Gamma functions. Examples on Differentiation under integral sign		
TUTORIAL NO.02		**1 HOURS**
General solution of Linear Differential equations with constant coefficients , Method of Variation of parameters.		
TUTORIAL NO.03		**1 HOURS**
Equations reducible to Linear Differential equation with constant coefficients: Cauchy- Euler equations		

TUTORIAL NO.04		**1 HOURS**
Tracing of Cartesian curves .Tracing of Polar and Parametric curves .Double Integration, Evaluation of Double Integration, Change the order of integration.		
TUTORIAL NO.05		**1 HOURS**
Integration by transforming Cartesian to Polar Coordinate system, Triple integration,Integration by transforming to spherical and cylindrical polar coordinates.Applications of multiple integrals:To find Area, Volume		
TUTORIAL NO.06		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.07		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		
TUTORIAL NO.08		**1 HOURS**
Probability, probability density function, Probability distribution:Binomial		
TUTORIAL NO.09		**1 HOURS**
Probabilitydistribution :Poisson, Normal. Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.10		**1 HOURS**
Moments, skewness and kurtosis,correlation and regression.		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Calculus by G.B. Thomas &R.L.Finney (ISBN:81-7758-325-5, Pearson Education, 9th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig, Volume I & II (ISBN-10: 8126543132, ISBN-13: 978-8126543137, Wiley Eastern Ltd.)
3. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

5. Advanced Engineering Mathematics by Dennis G. Zill& Warren S. Wright; Jones and Bartlett Publishers, 4th edition, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.

6. Higher Engineering Mathematics by B.S. Grewal (ISBN:81-7409-195-5,Khanna Publications,39 th edition)

7. Applied statistics and probability for engineers fourth edition by Douglas C. montgomery , George C runger(ISBN No:978-81-265-2315-3 wiley)

8. Miller& Freunds Probability and statistics for engineers by richard A johnson, irwin-miller,johnfreund(ISBN no:978-93325-5041-4,Pearson)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 2
	COURSE CODE	HP102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level; Language and Communication- 1

COURSE OBJECTIVES :

HP102.CEO.1: To familarise the students with sounds in English and introduce phonemic transcription.

HP102.CEO.2: CEO.2: To enrich the vocabulary of the students with AWL and NAWL.

HP102.CEO.3: To acquaint the students with public speaking, presentation and interview skills in English.

HP102.CEO.4: To develop the students reading and listening skills with the use of written audio and video texts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP102.CO.1: Recognise and reproduce the sounds in English effectively. [L1]

HP102.CO.2: Choose and employ appropriate words from AWL and NAWL in communication. [L1, L3]

HP102.CO.3: Express their ideas effectively and demonstrate skills in interpersonal communication. [L2, L3]

HP102.CO.4: Analyse and infer from written, audio and video texts. [L 2, L4]

THEORY		
UNIT 1	**Phonetics and Vocabulary**	**3 HOURS**
Phonemes in English and phonemic transcription; Essential academic vocabulary (Academic Word List and New Academic Word List); Dictionary Skills; Phrasal verbs and collocations		
UNIT 2	**Oral Communication**	**4 HOURS**
Public Speaking; Presentation Skills; Interview Skills and telephonic communication; Meetings (types, agenda and minutes)		
UNIT 3	**Active Listening and Reading with Comprehension**	**5 HOURS**
Concept and types of listening; Steps in listening with comprehension; Essentials of good listening; Concept and types of reading; Guidelines for reading with comprehension; Analytical reading		

PRACTICALS		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**2 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Vocabulary Enrichment**	**2 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills		
PRACTICAL NO.03	**Phrasal Verbs and Collocations**	**2 HOURS**
Use of phrasal verbs and collocations; reading literary pieces, essays to identify phrasal verbs in context; story-telling		
PRACTICAL NO.04	**Public Speaking**	**2 HOURS**
Attributes of a good public speaker; prepared and extemporaneous speech; Listening to and Reading famous speeches		
PRACTICAL NO.05	**: Presentations**	**2 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.06	**Interview Skills and Telephonic Communication**	**2 HOURS**
Etiquettes of attending interviews; Preparation; Telephonic communication; Mock Interviews		

PRACTICAL NO.07	**Mock Meetings**	**2 HOURS**
Importance of effective interpersonal communication; working in teams; Mock Meetings		
PRACTICAL NO.08	**Active Listening**	**6 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		
PRACTICAL NO.09	**Reading with Comprehension**	**4 HOURS**
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
3. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
4. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
5. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
6. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
7. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Second Year

Bachelor of Technology in Electronics & Telecommunication Engineering

2016-2020

(With Effect from Academic Year: 2017-2018)

MIT | Academy of Engineering (An Autonomous Institute)	COURSE STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	2017-18
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**RELEASE DATE**	**:**	1/06/2017
	REVISION NO.	**:**	0.0

SEMESTER: III

SL. NO.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS202	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	ET202	Analog Electronics	3	2	4
5.	DC2	ET203	Digital Systems and Applications	3	2	4
6.	SDP3	ET206	Prototyping	---	4	2
TOTAL				**14**	**14**	**21**

SEMESTER:IV

SL. NO.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	---	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	ET211	Signals and Systems	3	2	4
5.	DC4	ET212	Network Analysis Techniques	3	2	4
6.	SDP4	ET213	Minor Project	---	4	2
TOTAL				**15**	**12**	**21**

Note: L: Lecture, P: Practical

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2016 - 2017
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Environmental Science
	COURSE CODE	CH201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	15	-	50	125

PRE-REQUISITE : AS103: Chemistry

COURSE OBJECTIVES :

CH201.CEO.1: Give an overview of exploitation of various natural resources and its impact on the environment.
CH201.CEO.2: Understand the ecosystem and biodiversity.
CH201.CEO.3: Understand the importance of environment and its conservation.
CH201.CEO.4: Learn about the environmental pollution sources, effects and control measures.
CH201.CEO.5: Make aware of the national and international issue for the environment.
CH201.CEO.6: Make aware about the social and environmental responsibility.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH201.CO.1: Identify the various human activities adversely affecting the natural resources and the balance ecosystem.
CH201.CO.2: Observe the various aspects of ecosystems and suggest ways to protect them.
CH201.CO.3: Experiment the pollution of given locality and suggest steps to mitigate pollution.
CH201.CO.4: Record the sources of pollution and their controls.
CH201.CO.5: Compare laws and standards for pollution.
CH201.CO.6: Categorize the social and professional responsibility towards environment.

THEORY COURSE CONTENT		
UNIT 1	**Environment**	**5 HOURS**
Importance of environment, Biosphere, Structure and function of an ecosystem, ecological pyramids, effects of population growth on environment. Natural cycles: hydrologic, carbon, nitrogen, phosphorus and Sulphur cycle. Understanding carbon foot prints, Role of the environmental engineer. Need of environmental legislations and environmental Acts in India. Functions of central and state pollution control boards. **Further Reading:**		
UNIT 2	**Resources**	**4 HOURS**
Natural, conventional and non-conventional, Natural and manmade disasters on environment. Case studies on use and Impact of overutilization of natural resources: Food, forest, water, energy, land. **Further Reading:**		
UNIT 3	**Pollution**	**4 HOURS**
Structure and composition of atmosphere, Pollution, types of pollution, causes of pollution effects, control and prevention. Air, solid and water waste management Pollution prevention and control act. **Further Reading:**		
UNIT 4	**Pollution Impact**	**5 HOURS**
Case study on Nuclear Accidents; floods; land slid; climate change; air pollution in cities, water pollution; noise pollution. Case study on drought situation in Vidarbha-Marathwada. **Further Reading:**		
UNIT 5	**Social Issues**	**5 HOURS**
Case study on Plastic waste management, domestic waste issue, food problem in India & globally. Modernization of agriculture, traffic and pollution, e-waste disposal. **Further Reading:**		
UNIT 6	**Sustainable Development**	**5 HOURS**
Concept of sustainable development. Utilization and conservation of natural resources. Rainwater harvesting & Water management techniques. Role of an individual in environment protection. Energy audit, disaster management. **Further Reading:**		

PRACTICAL		
PRACTICAL NO.01	**Title: Fukushima Japan Nuclear Accident**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.02	**Title: Malin Land Slide**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.03	**Title: Drought Situation in Vidarbha & Marathwada**	**2 HOURS**
Details of the drought situation will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of situations.		
PRACTICAL NO.04	**Title: River water pollution case study**	**2 HOURS**
Details of the River pollution of Ganga, Indrayani etc. will be discussed with the students. Students are supposed to write a case study report on the various causes of river pollution, preventive measures to avoid this & water treatment methodologies forriver water treatment.		
PRACTICAL NO.05	**Title: Project**	**16 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		

TEXT BOOKS

1. Rao C.S. Environmental Pollution Control Engineering, Wiley Eastern Publications. ISBN: 9780470217634.
2. Kamaraj. P & Arthanareeswari .M, Environmental Science Challenges and Changes, 4th Edition, Sudhandhira Publications, 2010.
3. Sharma. B.K. and Kaur, Environmental Chemistry, Goel Publishing House, Meerut, 1994 ISBN:8182830125.
4. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. ISBN-10: 1111988935 ISBN: 9781111988937
5. Metcalf Eddy Wastewater engineering: Treatment and reuse, McGraw Hill, ISBN: 007041878.

REFERENCE BOOKS

1. Garg, S.K and Garg, R., Ecological and Environmental Studies, Khanna Publishers, Delhi, 2006.ISBN: 9788174092182.
2. H. S. Peavy, D. R. Rowe, G. Tchobanoglous, Environmental Engineering, McGraw Hill, ISBN: 8428204470.
3. Helen Kavitha. P Principles of Environmental Science, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
4. Henry J.G. and Heinke G.W., Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
5. Masters G.M., Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall of India, New Delhi, 2004. ISBN: 0131481932 ISBN: 9780131481930.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS202.CEO.1: To find the Laplace transform of continuous time signals (functions).
AS202.CEO.2: To determine the Fourier constants and construct the Fourier series.
AS202.CEO.3: To construct the integral representation of functions using Fourier transform.
AS202.CEO.4: To find the Z transform of discrete time signals (functions).
AS202.CEO.5: To apply numerical methods for constructing functions and solving Differential Equations.
AS202.CEO.6: To write and execute the program on problems of Laplace, Fourier and numerical methods using MATLAB.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS202.CO.1: Analyze the output response of given linear system using Laplace Transform.
AS202.CO.2: Analyze the frequency response of the system using appropriate Fourier transform.
AS202.CO.3: Determine the stability of discrete system and the solution of difference equation using Z-Transform .
AS202.CO.4: Justify the selection of appropriate transform for a given system.
AS202.CO.5: Determine the solution of ordinary differential equations using Eulers, Runge-Kutta 4th order and the interpolation using Newtons and Lagranges interpolating methods.
AS202.CO.6: Implement Laplace Transform, Fourier transform and Numerical methods to find the solution of given problem using MATLAB.

THEORY

UNIT 1	Laplace Transform I	6 HOURS

Introduction of Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication by t, Division by t. Laplace Transform of derivatives, integration, Unit Step function, Impulse Function and Periodic Functions.

UNIT 2	Laplace Transform II	6 HOURS

Introduction of Inverse Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication bys, Division bys. Inverse Laplace Transform of elementary functions, Derivatives, Integration. Use of partial fractions to find Inverse Laplace Transform. Solution and analysis of linear differential equation to linear system.

UNIT 3	Fourier Series	6 HOURS

Periodic functions, Fourier series, Dirichlets conditions, determination of Fourier constants, Half ranges series, Even function series, odd function series, arbitrary period functions series.

UNIT 4	Fourier Transform	6 HOURS

Introduction of Fourier Transform, Complex exponential form of Fourier series, Fourier Integral Theorem (without proof), Fourier transform and its properties, Fourier Sine Transform, Fourier Cosine Transform, and Inverse Fourier transforms, Fourier Transform of derivatives of a function, Analysis of frequency response.

UNIT 5	Z- Transform and Inverse Z-Transform	6 HOURS

Z-transform: Introduction, Definition, Z-transform of standard functions, Properties of Z- transform: Linearity, change of scale, shifting, multiplication by k, division by k. One sided Z-transform, Pole-zero plot and stability of a system. Inverse Z- transform: Introduction, Basic results, Partial fraction method, Inversion integral method, Solution to the difference equation.

UNIT 6	Numerical Methods	6 HOURS

Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method and Ordinary differential equations by Eulers, Modified Eulers, Runge-Kutta 4th order methods.

PRACTICAL: Any 10 practicals are performed as per the requirement of a branch.		
PRACTICAL NO.01		**2 HOURS**
Introduction to MATLAB: Syntax, keywords, matrices, polynomials, loops.		
PRACTICAL NO.02		**2 HOURS**
Introduction to MATLAB: In-built functions, 2D/3D plots, creating simple programs.		
PRACTICAL NO.03		**2 HOURS**
Finding Laplace transforms of functions, solution of differential equations using Laplace transforms.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms.		
PRACTICAL NO.05		**2 HOURS**
Numerical Integration: Trapezoidal, Simpsons 1/3rd and Simpsons 3/8th rule.		
PRACTICAL NO.06		**2 HOURS**
Interpolation techniques: Lagranges Interpolation.		
PRACTICAL NO.07		**2 HOURS**
Interpolation techniques: Newtons Interpolation.		
PRACTICAL NO.08		**2 HOURS**
Solution of differential equation by modified Eulers method.		
PRACTICAL NO.09		**2 HOURS**
Solution of differential equation by Runge-Kutta method.		
PRACTICAL NO.10		**2 HOURS**
Curve Fitting: Linear, Quadratic.		
PRACTICAL NO.11		**2 HOURS**
Solution of algebraic equations: Newton- Raphson method.		
PRACTICAL NO.12		**2 HOURS**
Solution of algebraic equations: Bisection method.		
PRACTICAL NO.13		**2 HOURS**
Curve Fitting: Cubic, Exponential.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2003, ISBN-13: 9788126537204, 8126537205.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	System Engineering
	COURSE CODE	ET201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	NIL	25	125

PRE-REQUISITE :

1: ME102 Engineering Tools and Techniques
2: ME103 Design Thinking

COURSE OBJECTIVES :

ET201.CEO.1: To describe the rationale for using systems thinking for complex adaptive systems
ET201.CEO.2: To prioritize with stakeholders in a participatory way for research study
ET201.CEO.3: To design system engineering frame work
ET201.CEO.4: To apply system engineering tools
ET201.CEO.5: To evaluate the system

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET201.CO.1: Explain the rationale for using systems thinking for complex adaptive systems.
ET201.CO.2: Analyze interaction with stakeholders in a participatory way for research study.
ET201.CO.3: Design System Engineering framework.
ET201.CO.4: Apply system engineering tools.
ET201.CO.5: Evaluate the system.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Systems Thinking**	**4 HOURS**
Introduction to Systems Thinking and Understanding simple systems, Complex and Complex Adaptive Systems, Stakeholders and their engagement. **Further Reading : Case studies - Public health system, transportation system, solid waste management system.**		
UNIT 2	**System Dynamics Simulation**	**6 HOURS**
Standard test system conceptualization and mapping: an introduction to causal loop diagrams (Systems Thinking Diagrams; Influence Diagrams), principles of stock-and-flow diagrams, Application of stock and flow diagrams to engineering problems, Analysis using agent-based models, Application of systems thinking to policy decision making. **Further Reading : Case studies - Understand how to use Vensim PLE / Netlogo (Free academic version) to develop causal loop diagrams. Application of Stock and Flow Diagrams to Public Health.**		
UNIT 3	**Introduction to Systems Engineering**	**8 HOURS**
History and definitions, mission of system, types of system, system and its environment, System as a product, Systems Engineering as a profession, System Engineering Process and Management, Life cycle Integration. **Further Reading: Case studies - London Walkie-Scorchie Skyscraper, BRT system, garbage collection, Unmanned aerial vehicle, Washing machine etc.**		
UNIT 4	**System Engineering Design**	**8 HOURS**
System development process - Systems engineering method, Systems testing through out development. Requirement Engineering - Inputs, requirement types, purpose, Requirement analysis, requirement outputs. Case studies – Unmanned Aerial System. Functional Analysis - Schematic, Functional block diagram. Design Synthesis - Process, Product realization, Product implementation, Product Integration, Product verification, product validation, product transition. **Further Reading: Development approaches – Waterfall, incremental spiral, evolutionary acquisition.**		
UNIT 5	**System Engineering Tools**	**8 HOURS**
Context diagrams, QFD (Quality function deployment), House of quality, Timeline analysis sheet and requirement allocation sheet, Functional flow diagrams, Design synthesis tools- Concept description sheet (CDS), Functional matrix diagram, Requirement break down structure, N2 diagrams, data flow diagrams, control flow diagrams, behavioral diagrams. **Further Reading: Popular System life cycle models (DoDMIL STD 499B, IEEE 1220 SEP, EIA 632 SEP, ISO/IEC15288, Professional Engineering model, NASA model, software life cycle models).**		
UNIT 6	**Partial Differential equations.**	**7 HOURS**
Verifying and validating the system, managing the configuration of the system, managing technical risk, project management, ILS (Integrated logistic support). **Further Reading: Case studies - Aircraft system.**		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Community based causal mapping – Developing causal loop diagrams for health care using Vensim.		
PRACTICAL NO.02		**2 HOURS**
Developing stock-and-flow diagrams for health care system using Vensim.		
PRACTICAL NO.03		**2 HOURS**
(Any 02) 1. Unmanned aerial vehicle 2. Conduct some research into the London building known as the Walkie Scorchie. Identify what circumstances led to the building earning that unfortunate name and suggest which aspects of the systems engineering process may not have been followed correctly (at least as the issues have been reported in the media).The following links may assist in your investigations. http://www.dezeen.com/2013/09/06/we-made-a-lot-of-mistakes-with-this-building-says-walkie-scorchie- architect-vinoly/ http://www.ibtimes.co.uk/walkie-scorchie-talkie-building-sunlight-london-reflects-504342. 3. Examine in detail the BRT of New Delhi,Identify what circumstances led to the failure of the system. 4. Garbage collection 5. Washing machine		
PRACTICAL NO.04		**2 HOURS**
Determine the typical structure and contents of the system requirements specification (SyRS) for any one of the case study.		
PRACTICAL NO.05		**2 HOURS**
Choose an example related to your own discipline and then list and describe three detailed design tools to come up with a satisfactory design for anyone of the case study.		
PRACTICAL NO.06		**2 HOURS**
We want to modify our house (or from any one of the case studies) by for futuristic requirement to accommodate your children after marriage.Explain how accurate technical data on the house (as confirmed by PCA and FCA) supports this modification. Explain how the early design stages could have assisted with this modification if expandability/ future growth had been accounted for.		
PRACTICAL NO.07		**2 HOURS**
Mini project based on society, science and technology problem clubbed with Field visit and presentation (Define problem, data collection, requirement analysis,functional analysis.Design solution, progressive presentation of solution and final presentation). Note: The group of students should be from different program (Multidisciplinary group).		

PRACTICAL NO.08		2 HOURS
Watch the movie The Pentagon wars and write a two page report to assess what aspects System Engineering went wrong. (https://www.youtube.com/watch?v=iDYpRhoZqBY) .		
PRACTICAL NO.09		**2 HOURS**
Field visit / Industrial visit from system engineering point of view.		
PRACTICAL NO.10		**2 HOURS**
Working model case study of Quad copter/ aero modeling from system engineering point of view.		

TEXT BOOK

1. John D Sterman, "Business dynamics- Systems Thinking and modelling for a complex world", McGrawHill, ISBN: 007238915X.
2. Weinberg, G.M., An Introduction to General Systems Thinking, New York, NY: Dorset House Publishing, 2001, ISBN-13: 978-0932633491.
3. Alexander Kossiakoff, William N.Sweet, Systems Engineering: Principles and Practice, Wiley, 2009, ISBN-13: 978-8126524532.

TEXT BOOK

1. R. C. Dorf Dennis M Buede,The Engineering Design of systems, Wiley; 2nd edition, 2002, ISBN-13: 978-0070530393.
2. International Council of Systems Engineering, Systems Engineering Handbook, A guide for System Life Cycle Processes and Activities, version 3.2.1, January 2011.
3. Department of defense, systems engineering fundamentals, defense acquisition university press (Free e-book), https://www.scribd.com/document/321957824/SEFGuide-01-01.
4. Michael Ryschkewitsch, The Art and Science of Systems Engineering, (free e-book), https://www.nasa.gov/pdf/311198main-Art-and-Sci-of-SE-LONG-1-20-09.pdf
5. EIA 632 standard - www.psconsultech.com/yahoo-site-admin/assets/docs/EIA632.9212432.pdf
6. MIL standard - www.product-lifecycle-management.com/download/mil-std-499b-draft1993.pdf.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Analog Electronics
	COURSE CODE	ET202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	25	25	150

PRE-REQUISITE : EX101 Electrical and Electronics Engineering

COURSE OBJECTIVES :

ET202.CEO.1: Realize some of the basic electronic circuits using diodes, transistors, OP-AMP.

ET202.CEO.2: Analyze the analog electronic circuits, both discrete and integrated, required of an electronics engineer.

ET202.CEO.3: Familiarize with the circuit design techniques involving discrete devices as well as the integrated circuits.

ET202.CEO.4: Comprehend frequency response, feedback and stability of an amplifier.

ET202.CEO.5: Analyze and model the transistors at low and high frequencies.

COURSE OUTCOMES :

The students after completion of the course will be able to

ET202.CO.1: Identify and correctly utilize the external lead structure and basic electrical characteristics of common semiconductor devices (PN junctions, MOSFETs, and BJTs).

ET202.CO.2: Illustrate the feedback mechanism in the design of electronic circuits.

ET202.CO.3: Scrutinize and project electronic circuits for various signals at low and high frequencies.

ET202.CO.4: Analyze performance parameters of various electronics circuits.

ET202.CO.5: Compile component ideas into electronic circuits.

THEORY :

UNIT 1	Semiconductor Devices	6 HOURS

Diode circuits, Biasing circuits of BJT, Bias stability, Thermal runway, Thermal stability, Introduction to MOSFETs, Non ideal voltage current characteristics of EMOS, Protection circuits, Introduction to BICMOS technology .

UNIT 2	BJT and FET Amplifiers	6 HOURS

BJT small signal amplifier, Hybrid model of BJT, Approximate and exact analysis of BJT, MOSFET DC Analysis, Small signal model of MOSFET, High frequency model of MOSFET, Frequency response of amplifiers, Multistage amplifiers. .

UNIT 3	Feedback Amplifiers and Oscillators	8 HOURS

Concept of negative feedback, Effects of negative feedback on gain, bandwidth and impedances, Topologies of negative feedback viz. series and shunt, Types of amplifiers, Concept of positive feedback, Barkhausen criteria, RC Phase shift, Wien bridge Oscillator Hartley and Colpitts Oscillators, Clapp Oscillator Oscillators inFM transmitter circuit

UNIT 4	Operational Amplifiers	6 HOURS

Differential amplifier circuit and its configurations, level shifter circuits, current mirror circuits, performance parameters of OP-AMP viz. input bias current, offset current, offset voltage, Slew Rate and CMRR.

UNIT 5	Operational Amplifiers Applications - I	6 HOURS

Integrator, Frequency response of ideal and practical integrator, Differentiator, Frequency response of ideal and practical differentiator, Isolation amplifier, Requirements of Instrumentation amplifier, 3 OP-AMP Instrumentation amplifier, OP-AMP Integrator as ADC.

UNIT 6	Operational Amplifiers Applications II	6 HOURS

Comparators, Applications of Comparator, Schmitt Trigger(symmetrical/asymmetrical), Need of precision rectifier, Half wave , Full wave precision rectifiers, Square wave and Triangular wave generator,Sample and hold circuit , Converters using OP-AMP

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Limiter circuits in FM transmitter circuit.		
PRACTICAL NO.02		**4 HOURS**
Small signal amplifier for Public Address (PA) system.		
PRACTICAL NO.03		**2 HOURS**
Frequency response of the amplifier		
PRACTICAL NO.04		**4 HOURS**
Tuned circuit in FM transreceiver		
PRACTICAL NO.05		**2 HOURS**
OP-AMP parameters.		
PRACTICAL NO.06		**2 HOURS**
Low Pass and High Pass filter using OP-AMP.		
PRACTICAL NO.07		**2 HOURS**
Precision rectification in peak detector circuit.		
PRACTICAL NO.08		**4 HOURS**
Level detector using OPAMP.		

TEXT BOOKS:

1. Millman & Halkias, Integrated Electronics, Tata McGraw-Hill (TMH) Education, 2001, ISBN: 9780074622452
2. Donald A. Neamen, Electronic Circuit Analysis and Design, TMH Publishing Company Limited, 3rd Edition, ISBN:9780070634336
3. Boylestad & Louis Nashelsky, Electronic Devices & Circuit theory, Pearson New International Edition, 11th Edition, ISBN: 9780133109047

REFERENCES:

1. Millman & Halkias, Microelectronics, Tata McGraw-Hill (TMH) Education, 2001,ISBN: 9780074637364
2. Thomas L. Floyd, David L. Buchla, Electronics Fundamentals: Circuits, Devices and Applications, 8th Edition, Pearson Education Limited 2014, ISBN: 978-1292025681
3. David A. Bell, Operational Amplifiers and Linear ICs, Prentice Hall of India, 2nd Edition ISBN: 8120323599
4. Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits , TMH, 2002,3rd Edition, ISBN: 9780070530447

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Digital Systems and Applications
	COURSE CODE	ET203
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	30	50	20	50	-	150

PRE-REQUISITE : EX101 - Electrical and Electronics Engineering

COURSE OBJECTIVES :

ET203.CEO.1: Design various combinational and sequential logic circuits.
ET203.CEO.2: Analyze sequential circuits using state machines.
ET203.CEO.3: Design digital circuits using semiconductor memories.
ET203.CEO.4: Model digital circuits using hardware description language.
ET203.CEO.5: Introduce use of processor, its architecture and functioning.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET203.CO.1: Design combinational circuits and its applications.
ET203.CO.2: Design various sequential circuits.
ET203.CO.3: Construct state diagrams for various sequential circuits.
ET203.CO.4: Identify various logic families and semiconductor memories.
ET203.CO.5: Develop VHDL code for various combinational and sequential digital circuits.
ET203.CO.6: Classify various architectures of microprocessor.

THEORY COURSE CONTENT		
UNIT 1	**Combinational Logic Design**	**6 HOURS**
BCD Arithmetic operations, Digital Codes and Parity, Applications of data selector and distributers, Applications of Multi I/O combinational circuits, Parity generators / checkers. Applications: Adder / Subtraction System, Process controller using comparator . **Further Reading: Data transmission system with error detection**		
UNIT 2	**Sequential Circuits**	**6 HOURS**
Latches, applications of Flip Flops, Shift Registers, Universal shift register and its applications (Ring, twisted ring counters and pulse train generators), counters and its design, counters as a frequency dividers. Applications: Counting Real world events, Experimental tachometer . **Further Reading: Digital clock**		
UNIT 3	**State Machines.**	**8 HOURS**
Mealy and Moore models, state machine notations, synchronous circuit analysis, Clocked synchronous state machine design, design of state diagram for Up-Down decade counter, Sequence detector, Algorithmic state machines Applications: Traffic Light Controller. **Further Reading: ATM Machine**		
UNIT 4	**Digital Logic Families and Semiconductor Memories.**	**6 HOURS**
Classification of Logic families, Characteristics of TTL and CMOS, TTL to CMOS interface, CMOS to TTL interface, Design and functioning of ROM, PAL and PLA, Comparison between ROM, PAL and PLA, Introduction to CPLD and FPGA.		
UNIT 5	**Introduction to HDL.**	**6 HOURS**
Introduction to hardware description languages, Modeling and signal assignments in VHDL, Basic constructs and Programming using VHDL. **Further Reading: Application for VHDL: Design of combinational circuits**		
UNIT 6	**Introduction to Processor.**	**6 HOURS**
Introduction to processor, types of computers, overview of Microcomputer and operations, Microprocessor evolution, Comparison between RISC and CISC, Comparison between Von Neumann and Harvard, types of memories. **Further Reading: Case Study - Data acquisition system**		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Design and implementation of Code Converter using IC 74HC154.		
PRACTICAL NO.02		**4 HOURS**
Design and implementation of Parity Generators and Checkers.		

PRACTICAL NO.03		**2 HOURS**
Design & implementation of BCD Adders and Subtractors		
PRACTICAL NO.04		**4 HOURS**
Design & implementation of Synchronous Counters.		
PRACTICAL NO.05		**2 HOURS**
Design & implementation of Asynchronous Counters.		
PRACTICAL NO.06		**2 HOURS**
Design & implementation of 8- Bit Universal Shift Register .		
PRACTICAL NO.07		**2 HOURS**
Design & implementation of Sequence detector.		
PRACTICAL NO.08		**4 HOURS**
Study of Traffic Light controller design using logic gates and digital IC.		

TEXT BOOK

1. Floyd, Digital Fundamentals, 10 th edition, Pearson Education India, 2011, ISBN: 978-8131734483.
2. Tokheim, Digital Electronics Principles and Applications, 6 th edition, McGraw Hill Education, 2004, ISBN:978-00705879080.
3. J. Bhasker, VHDL Primer, 3 rd edition, Pearson Education India, 2011, ISBN: 978-9332557161.
4. Douglas V. Hall, Microprocessors and Interfacing: Programming and Hardware, 3 rd edition, ISBN: 978-0070257429 McGraw-Hill

REFERENCE BOOK

1. M. Morris Mano, Digital Design, 8 th edition, Pearson Education, 2006, ISBN: 9780131989245
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. D. P Leach, A. P. Malvino and G. Saha, Digital Principles and Applications, Tata McGraw-Hill , 2006, ISBN: 978-0028018218.
4. John F. Wakerly, Digital Design: Principles and Practices, 4 th edition, Pearson Education, 2008, ISBN: 9788131713662.
5. A. Anandkumar, Fundamental of Digital Circuits, 2 nd edition, PHI Publications, 2009, ISBN: 9788120336797.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Prototyping
	COURSE CODE	ET206
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	75	75

PRE-REQUISITE : ME101 - Engineering Graphics, ME102 - Engineering Tools and Techniques, ME103 - Design Thinking, EX101 - Electrical and Electronics Engineering, CV101 - Applied Mechanics, IT101 - Computer Programming

COURSE OBJECTIVES :

ET206.CEO.1: Learn about materiality and techniques.
ET206.CEO.2: Justify the product development cycle through prototype project.
ET206.CEO.3: Inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET206.CEO.4: Develop abilities to transmit technical information clearly and test the same by delivery of presentation based on the prototype Project.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET206.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET206.CO.2: Apply acquired skills to the construction of a prototype project.
ET206.CO.3: Develop a prototype project by performing tasks in team.
ET206.CO.4: Demonstrate the work carried out in a team.

PRACTICAL

Course Introduction:

This course is aiming at a Project Based Learning methodology. Through a series of projects, students will learn to design, build, and debug engineering prototype systems. They will cover multiple aspects of the prototyping process.

Students will complete four modules in rotational manner,

1. Mechanical Prototyping (MP)
2. Electronic Prototyping (EP)
3. Software Prototyping(SP)
4. Civil Prototyping(CP)

Each module will have on an average six laboratory sessions. The students will complete them in rotational manner. Every module will award for 75 marks.

Marks of all four course modules will be averaged and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

MODULE: 1/4	**Mechanical Prototyping (MP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to prototyping**	**02 HOURS**

1. Introduction to Prototyping, traditional prototyping vs. advance rapid Prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Suitable materials and their properties.
3. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.
4. Formation of a group of 5 students per project team.

PRACTICAL NO. 02	**Design of models**	**04 HOURS**

1. Introduction of CAD software and its interaction with prototype machine.
2. 3D Modeling using CAD software package.
3. Identify physical constraints of prototyping

PRACTICAL NO. 03	Preprocessing of prototype	06 HOURS

1. Generating STL files from the 3D models & working on STL files.
2. Pre-Processing the 3D Model in KISslicer / Cuba software.
3. Suitable filament selection and its properties.

PRACTICAL NO. 04	Orientation and support generation	04 HOURS

1. Operate Repeater / Cuba software, Selection of Orientation, Supports generation.
2. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Assembly of model	08 HOURS

1. Complete machine setup.
2. Hands on experience of rapid prototype machine for part/object, assembly manufacturing.
3. Material selection, cost benefit analysis for prototyping, financial aspect.

PRACTICAL NO. 06	Project presentation	04 HOURS

1. Final Presentation and report submission (assessment).

REFERENCE BOOK

1. Rapid Prototyping: Principles and Applications in Manufacturing, Chua C K, Leong K F, Chu S L, World Scientific, ISBN-13: 978-9812778987.
2. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Gibson D W Rosen, Brent Stucker, Springer, ISBN: 978-1-4419-1119-3.
3. Rapid Prototyping: Principles and Applications in Manufacturing,Noorani R, John Wiley & Sons, ISBN: 978-0-471-73001-9.
4. Rapid Tooling: Technologies and Industrial Applications, Hilton P, Jacobs P F, CRC press. ISBN:978-0824787882
5. Rapid Prototyping and Engineering applications: A tool box for prototype development, Liou W L, Liou F W, CRC Press, ISBN: 978-0849334092.
6. Rapid Prototyping: Theory & practice, Kamrani A K, Nasr E A, Springer, ISBN: 978-0-387-23291-1.
7. Kenneth Cooper, Rapid Prototyping Technology: Selection and Application, Marcel Dekker, Inc. New York, ISBN: 082470261.

MODULE: 2/4	Electronic Prototyping (EP)	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to design and construction of electronic prototyping**	**02 HOURS**

1. Gain familiarity with basic stages; Conceptualization, Detailed Design and Implementation.
2. Acquire concepts of basic processes in electronic prototyping.
3. Form a group of students. (03 max)
4. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span.
5. Develop a plan for construction of electronic proto from a concept.

PRACTICAL NO. 02	Basic electronic prototyping skills	02 HOURS

1. Soldering
   - Demonstrate structure of solder wire, soldering temperature, soldering station and gun.
   - Highlight Industrial safety norms, use of lead free solder, extractor fan etc.
   - Use of flux, desoldering gun, desoldering techniques, removing components/wires.
   - Fix Solder defects and inspect quality of solder joints.
2. Wiring
   - Cleaning, stripping and tinning the wires.
   - Connections and protections for wires.
   - Using cable ties , heat shrink tubes, sleeves and other wire dressing techniques.
3. Breadboard
   - Bending wires and making connections on breadboards.
   - Placing components on breadboards.
   - Testing circuits using breadboards.
4. Perfboards
   - Wire connections and component assembly on perfborads.
   - Debugging assembled circuit and increasing stability.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	04 HOURS

1. Gain familiarity with PCB Design software.
2. Draw schematics for PCB design.
3. Make PCB layout as per circuit diagram.
4. Learn PCB design standards.
5. Export PCB files like gerber (.gbr), .pdf etc.

PRACTICAL NO. 04	PCB fabrication	08 HOURS

1. Develop negative imprints of top and bottom sides and expose to PCB.
2. Perform etching process for PCB.
3. Perform cleaning and shearing for required size.
4. Check continuity of tracks.
5. Use drilling machine to make drills.

PRACTICAL NO. 05	Assembly and testing of electronic proto	08 HOURS

1. Make assembly of electronic prototype as per IPC 610 D.
2. Insert components, perform lead cutting with standard clearance.
3. Review mechanical fitment of PCB with component insertion.
4. Solder components and make wiring.
5. Test prototype for electrical functionality, to perform rework if required.
6. Assemble PCB with mechanical fitments and assemblies.
7. Analyze performance and compare with specifications.

PRACTICAL NO. 06	Final project presentation	04 HOURS

1. Demonstrate an electronic prototype in a team.
2. Write a report on implementation of prototype. (10-15 pages max)
3. Present prototype implementation in a team by Power Point presentation.
4. Enumerate proposed specifications of electronic prototype.
5. Highlight financial aspects including proposed cost and bill of material.

REFERENCE BOOK

1. Printed Circuit Boards: Design and Technology, Walter C. Bosshart, Tata McGraw-Hill Education, 1983, ISBN: 978-0074515495.
2. Electronic Assembly Fabrication, Charles A. Harper, 1st ed.,McGraw-Hill Education, 2002 ISBN: 978-0071378826.
3. Soldering in Electronics Assembly, Frank Riley, 1st ed., Springer, 2013, ISBN: 978-3-662-13163-3.
4. Electronic Techniques: Shop Practices and Construction, R. S. Villanucci, A. W. Avtgis, W.F. Megow, 6th ed., Practice-Hall, 1999. ISBN: 978-0130195661.
5. Printed Circuit Boards: Design, Fabrication, and Assembly, R. S. Khandpur, 1st ed. McGraw-Hill Education, 2005, ISBN: 978-0071464208.
6. Practical Electronics for Inventors, Paul Scherz , Simon Monk ,3rd Edition, McGraw-Hill Education, 2013, ISBN 978-0071771337 (Available on TAB edition, Kindle)
7. IPC-J-STD-001E-2010, Requirements for Soldered Electrical and Electronic Assemblies, IPC. , ISBN: 9781580986922.
8. IPC-A-610 D-2014, Acceptability of Electronic Assemblies, IPC. ISBN: 9781611931549.

MODULE: 3/4	**Software Prototyping (SP)**	**28 HOURS**

PRACTICAL

PRACTICAL NO. 01	**Introduction to software engineering**	**04 HOURS**

Concepts, Software development life cycle (SDLC). Student need to use AEIOU Framework (Design Thinking) to decide the problem statement. Students will work in group of three on AEIOU framework

PRACTICAL NO. 02	**Design UML Diagrams for given problem statement**	**04 HOURS**

Students have to work in group on Project Development canvas and then design following,

1. Creation of data Flow diagram
2. Creation of block diagram
3. Design a Activity Diagram

PRACTICAL NO. 03	**Requirement analysis**	**04 HOURS**

1. Find the requirement specification of given problem statement and formulate the feasible solution.
2. Paper (low-fidelity) prototype: choose the interface intend to develop, giving the reasons (pros and cons) and describing it summarily - choose the similar interface, indicating its key characteristics.

PRACTICAL NO. 04	Design analysis	06 HOURS

1. Make an Inspiration board.
2. Start an inspiration board by listing 5-10 words that relate to your design idea or point of view. These words can be anything – from similar designs to feelings that the idea evokes.
3. Once youve listed your words, come up with at least five inspirations, and share them by providing links or images within your assignment submission. For each inspiration, give a brief (1-2 sentences) and insightful explanation of why you chose it (What did you take away from it? What did you learn from it. In other words, why did it inspire you?). Each of these inspirations should offer a different perspective to the design you are working on.

PRACTICAL NO. 05	Design analysis	06 HOURS

1. Create Storyboards
2. A storyboard is a comic-strip-like set of drawings about what interface does and how it is used to accomplish tasks in a real usage scenario. A good storyboard should clearly demonstrate who the user is, the usage situation, and the user's motivations for using the interface. It should show what the user can accomplish with interface, but it needn't (and often shouldn't) show a specific user interface design. For a storyboard including an app screen, the details of the screen are not relevant, but what those screens enable you to accomplish is. Each storyboard should comprise 5-8 panels and will provide all details of end product.

PRACTICAL NO. 06	Presentation	04 HOURS

1. Each group will be given 10 min to present their work.

REFERENCE BOOK

1. Software Engineering A practitioners Approach, Roger S, Pressman, 7th Edition, ISBN: 9780073375977
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.

REFERENCE BOOK

6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MODULE: 4/4	**Civil Prototyping (CP))**	**28 HOURS**
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**04 HOURS**
Introduction of bamboo as a construction material, its physical, mechanical properties, selection, seasoning and treatment, testing, joinery, case studies of bamboo buildings.		
PRACTICAL NO. 02	**Analysis of determinant trusses.**	**04 HOURS**
Study of different types of trusses, analysis of determinant trusses by method of joint and method of section		
PRACTICAL NO. 03	**Design bamboo trusses**	**04 HOURS**
Design of different bamboo trusses (span more than 3m), Hands on for different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo truss**	**08 HOURS**
Making of bamboo truss		
PRACTICAL NO. 05	**Testing bamboo truss**	**04 HOURS**
Testing of different bamboo truss		
PRACTICAL NO. 06	**Final project presentation**	**04 HOURS**
Comparative study of analytical and test results of forces in truss members, final project presentation.		

REFERENCE BOOK

1. Vector mechanics for Engineers: statics and dynamics by Beer & Johnston 10th edition, McGraw Hill Education , ISBN: 978-0073398242
2. Bamboo Architecture & Design (Architecture & Materials), by Chris van Uffelen, , ISBN: 978-3037681824
3. Designing and Building with Bamboo ,Jules J.A. Janssen Technical University of Eindhoven Eindhoven, The Netherlands, ISBN 978-8186247464
4. Codes and standards:
   IS 1902:1993.Code of Practice for preservation of bamboo and cane for non-structural purposes.
   IS 6874:1973 Methods of test for round bamboos
   IS 7344:1974 Specification for bamboo tent bamboos.
   IS 8242:1976 Methods of tests for split bamboos
   IS 8295 (Part 1): 1976 Specification for bamboo chicks
   ISO 22157 Standard guidelines for tensile, compressive, shear and bending Strength Parallel to grain and Perpendicular to grain.

REFERENCE

1. Paris Agreement http://unfccc.int/paris_agreement/items/9485.php
2. Kyoto Protocol(http://unfccc.int/kyoto_protocol/items/2830.php)
3. Green Building Objectives & Checklist, Auroville Bamboo Centre, Pudducherry, Tamilnadu.(http://aurovillebamboocentre.org/)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Psychology
	COURSE CODE	HP201
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	NIL	20	40	15	NIL	NIL	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP201.CEO.1: To introduce the basic concept and scope of Organizational Behavior.
HP201.CEO.2: To teach the theory of personality and its implications in the organization.
HP201.CEO.3: To evince types and styles of Leadership and the impact of values on the same.
HP201.CEO.4: To guide learners through a decision making process.
HP201.CEO.5: To enhance participants skills when practicing team work concepts through business games.
HP201.CEO.6: To introduce the concept of Motivation and constructive ways of coping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP201.CO.1: Explain human behavior in the workplace from an individual, group, and Organizational perspective.
HP201.CO.2: Develop an ability to analyze ones own personality and that of others in Organizations.
HP201.CO.3: Compare different leadership styles with an understanding of how core values affect Leadership.
HP201.CO.4: Demonstrate decision making ability
HP201.CO.5: Identify the problems associated with organizing and managing teams.
HP201.CO.6: Comprehend the correlation amongst stress, motivation and personality.

THEORY

UNIT 1	Organizational Behaviour	6 HOURS

Meaning of Psychology and Organizational Behaviour, Psychology in Organization: History of Organizational Psychology; Scope and Research in Organizational Behaviour, Structure of Organization, Organizational culture, Strong vs Weak culture, Culture vs Formalization.

UNIT 2	Perception and Decision Making	6 HOURS

Meaning, process and determinants of Perception, Process of Decision Making, The link between Perception and Individual Decision Making, Influences on Decision Making: Individual Differences & Organizational constraints, Process and ethics of decision making.

UNIT 3	Personality, Values and Leadership	6 HOURS

What is Personality, The Big Five Personality Model, The importance of values; values and ethical behavior, Leadership, Understanding Personality, values and Leadership, Emotional Intelligence-Personal and Social Competence.

UNIT 4	Understanding Team Work and Conflict Resolution	6 HOURS

Difference between groups and teams, Types of teams, Turning Individuals into Team players, Team building and Team based work, Team dynamics, Types of conflict and conflict resolution.

UNIT 5	Motivation & Stress	4 HOURS

Motivation and its types, Content and Process Theories of Motivation, Concept and reactions to stress, Potential effects of stress, Coping with and managing stress.

TEXT BOOK

1. S. P. Robbins, Organizational Behavior Prentice-Hall India, 1995, ISBN-11:81-203-2875-2.
2. F. Luthans, Organizational Behavior. McGraw-Hill, 1995, ISBN-13: 0072873876.
3. U. Sekarn, Organizational Behavior: Text and Cases, Tata McGraw Hill, 1996, ISBN: 0074603663.
4. Furnham, The Psychology of Behavior at Work, Psychology Press, 1997, ISBN: 1841695041 .

REFERENCE BOOK

1. M. D. Dunnett, Handbook of Industrial-Organizational Psychology, Jaico Press, 1990, ISBN: 978089106-041-3.
2. M. A. - Ansari, Managing people at work: Leadership styles and influence strategies, Sage, 1990, ISBN: 0803996500.
3. J. B. P. Sinha, Work Culture in Indian Context, Sage, 1990, ISBN: 0019-5286.
4. D.M. Pestonjee, Stress and Coping: The Indian Experience, 2nd ed., Sage Publications, 1999, ISBN: 0761993126.
5. L. N. Jewell & M. Siegall, Contemporary Industrial/Organizational Psychology, West Publishing Company, 1990, ISBN: 0314715991.
6. D. Katz and-R. L. Kahn, The Social Psychology of Organizations, Wiley, 1966, ISBN: 978-0-471-023553.
7. M.L. Blum, and J.C. Naylor, Industrial Psychology, CBS Publishers & Distributors, 1984, ISBN: 8123908601.
8. K. H. Blanchard and P. Hersey, Management of Organizational Behavior: Utilizing Human Resources, Prentice-Hall India, 1993, ISBN: 0-13-5512868-9.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	-	25	125

PRE-REQUISITE : IT101 - Computer Programming, ME102 - Engineering Tools and Techniques

COURSE OBJECTIVES :

IT201.CEO.1: To introduce facts, concept and theory of an information system.
IT201.CEO.2: To understand evolution of an information system.
IT201.CEO.3: To explain an information life cycle.
IT201.CEO.4: To develop IoT based information system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT201.CO.1: Interpret Data, Information and Knowledge. [Understanding]
IT201.CO.2: Make use of data acquisition techniques for an information system. [Apply]
IT201.CO.3: Categories different storage techniques. [Analyze]
IT201.CO.4: Build dashboard for effective communication of information. [Apply]
IT201.CO.5: Determine components of Human computer interaction. [Evaluate]
IT201.CO.6: Examine IoT based information system. [Analyze]

THEORY :

UNIT 1	Evolution of Information	6 HOURS

Data, Types of Data: Primary data, Secondary data, Meta data, Operational data and Derived data
Information: Life Cycle, Semantics of information, Knowledge
Data forms: Analog and Digital (Telephone and Stenography) ADC, DAC
Evolution of Information- Man Machine Interaction
Self-Study: Grade Sheet Generation system
Further Reading: Railway reservation, Inventory machine

UNIT 2	Information Generation	6 HOURS

Data Acquisition, Human interface, Hardware Interface: Input / Output devices
Data Transformation: Rearranging, Classifying, Calculating, Summarizing;
Self-Study: Weather forecasting System
Further Reading: Example on advanced Spark Programming

UNIT 3	Information Storage and Transmission	6 HOURS

Need of data storage, Types of storage: stand alone, centralized, distributed, and cloud.
Encryption and decryption (define and need)
Transmission Type, Synchronous, Asynchronous, Serial, Parallel, Satellite, radio
Case Study: Dial up, Broadband
Self-Study: Stand Alone and Disk storage
Further Reading: Wireless (Bluetooth, XBEE)

UNIT 4	Information Visualization	6 HOURS

Representations: Graphs and Charts: Pi Chart, Scatter plot, Histogram, Heat map, Maps, Geo maps
Case Study: Dynamic dashboard

UNIT 5	Human Computer Interface	6 HOURS

Introduction of HCI, Types mobile, stand-alone, computer etc, Interactive devices touch screen, mic, keys, keyboard, scanner, camera etc., HCI design principles- standards, Usability principles portability, scalability, GUI design and evaluation, Interactive Multimedia document search- image, audio, video, animation
Case study: Ticket Generation Kiosk
Self-Study: Web based systems interactivity
Further Reading: Usable GUI Design

UNIT 6	Internet of things	6 HOURS

IoT: Overview, Characteristics and Architecture
Embedded Devices: Sensors, Actuators, Arduino and RaspberryPI
IOT Ecosystem: Basic elements / building blocks of IOT application, Systematic method to design IOT application
Applications: Asset management, Industrial automation, Smart cities
Self-Study: IoT Essentials
Further Reading:IOT and big Data

PRACTICAL :		
PRACTICAL NO.01		**8 HOURS**
In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow: Identification of an interdependent elementary data items which have facts and figures Data collection through sensors Processing using Arduino Data Storage using MySQL in an accessible form Data visualization using graphs		
PRACTICAL NO.02		**8 HOURS**
Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system. Create a graph showing how revenue evolves throughout the year for each of the sales channels Create an interactive chart that can be used to switch between different sales channels. Create three different views of the data: monthly sales revenue, sales revenue by category, and revenue by the top five distributors.		
PRACTICAL NO.03		**8 HOURS**
Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi. Identify the home appliances that require human interaction for its operations and state the need of automation. Identify system component Design circuit diagram Assemble system components Program the interface System Testing System Deployment		

TEXT BOOK

1. Ralph M Stair, George W Reynolds, "Fundamentals of Information Systems", Course Technology Inc; 5th edition, 2008, ISBN 978-1423925811.
2. Benny Raphael, Ian F. C. Smith, "Engineering Informatics: Fundamentals of Computer-Aided Engineering", Wiley-Blackwell; 2nd Revised edition, 2013, ISBN-13: 978-1119953418.
3. Paul Mcfedries, Excel Data Analysis: Your Visual Blueprint for Analyzing Data, Charts and Pivot Tables, Wiley; Fourth edition 2013, ISBN-13 978-8126544004

REFERENCE BOOK

1. Gerard Jounghyun Kim, HumanComputer Interaction: Fundamentals and Practice, CRC Press, Auerbach Publications, 1 edition, 2015 ISBN 9781482233896
2. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, 2013 ISBN-13: 978-1118430620

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	Nil	25	125

PRE-REQUISITE : Physics, Chemistry

COURSE OBJECTIVES :

ME201.CEO.1: To select material for engineering application.
ME201.CEO.2: To classify the available materials.
ME201.CEO.3: To utilize available material for specified purpose.
ME201.CEO.4: To compare desired quality of materials from standard data.
ME201.CEO.5: To measure useful properties of materials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME201.CO.1: Select material for engineering application.
ME201.CO.2: Classify the available materials.
ME201.CO.3: Utilize available material for specified purpose.
ME201.CO.4: Compare desired quality of materials from standard data.
ME201.CO.5: Measure useful properties of materials.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**8 HOURS**
Classifications and specifications of steels and cast iron. Heat treatment of steels, Defects due to heat treatment and remedial measures. Classification of surface hardening treatments. Classification, Composition, Properties & applications of: Copper and Its alloys, Nickel and Its alloys, Aluminum and Its alloys. Specific alloys: soldering & brazing alloy, Precipitation hardening alloys. Bearing materials and their applications.		
UNIT 2	**Engineering Polymers, Ceramics and Glass**	**6 HOURS**
Classification of polymers, Polymer types-thermoplastics-thermoset-Elastomers, Polymer synthesis and processing-injection moulding-extrusion-blow moulding-calendaring, Degradation of polymers-chemical, thermal, -biological-mechanical. Polymer recycling methods Introduction to Advanced Ceramics-Barium Titanate, Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications, Introduction to Cermets and its application. HIGH PERFORMANCE POLYMERS:Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation		
UNIT 3	**Composite Materials**	**6 HOURS**
Need of composites. Particle-reinforced composites, large-particle composites, dispersion-strengthened composites. Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic-matrix composites, carbon–carbon composites, fiber-reinforced composites, structural composites, laminar composites.		
UNIT 4	**Electronic and Photonic materials**	**6 HOURS**
Electronic Materials: Intrinsic and extrinsic semiconductors-p-n junction, Bandgap diagrams for conductor, semiconductor and insulator, IR detectors, Hall effect Superconducting Materials: Normal and High temperature superconductivity, Applications. Photonic Materials: LED, LCD, Photo conducting materials, Photo detectors, Photonic crystals and applications. Advancements in electronic materials: Smart materials		
UNIT 5	**Testing of Engineering Materials**	**8 HOURS**
Need and Comparison of destructive and non-destructive tests, Study of destructive testing: Engineering stress-strain curve, true stress-strain curve, Jominy End Quench Test for hardenability, Izod and Charpy Impact Test. Vickers, Rockwell hardness tests. Non –Destructive Testing Non-Destructive testing: Principles & procedure, advantages, disadvantages and Industrial applications of NDT like Sonic & Ultrasonic testing and Radiography tests. Brief overview of another NDT test- Eddy current test, Magnetic Particle Test		
UNIT 6	**Nanomaterials.**	**6 HOURS**
Basic concepts of Nano science and Nanotechnology, Carbon nanotubes, Principle of SEM, TEM and AFM, X ray diffraction Fundamentals principles of SEM, SE and BSE imaging modes, Fracture mode analysis and failure analysis using SEM. Potential uses of nonmaterial's' in electronics, robotics, sports equipment, mobile electronic devices, Medical applications of nanomaterials-Cancer, AIDS treatment.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Jominy End Quench Test**	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO.02	**Izod / Charpy Impact Test**	**2 HOURS**
Izod / Charpy Impact Test.		
PRACTICAL NO.03	**Hardness Test**	**4 HOURS**
Vickers,/ Rockwell, Brinell/Durometers & Poldi Hardness Test.		
PRACTICAL NO.04	**Magnetic Particle & Dye Penetrant Test**	**4 HOURS**
Magnetic Particle & Dye Penetrant Test.		
PRACTICAL NO.05	**Ultra-sonic Test**	**4 HOURS**
Ultra sonic test for detection of flaws in materials.		
PRACTICAL NO.06	**Determination of Hall coefficient**	**4 HOURS**
Determination of Hall coefficient for a semiconducting material.		
PRACTICAL NO.07	**Soldering**	**4 HOURS**
Hard and Soft soldering using soldering materials.		
PRACTICAL NO.08	**Industrial Visit**	
Visit to advanced materials characterization laboratory.		

TEXT BOOK

1. Material Science & Metallurgy for Engineers, Dr. V.D. Kodgire & S. V. Kodgire, Everest Publications.31st Edition, ISBN No: 8186314008
2. Mechanical Behavior & Testing of Materials, A. K. Bhargava, C.P. Sharma P H I Learning Private Ltd. 2011 edition, ISBN No 13-9788120342507

REFERENCE BOOK

1. Engineering Metallurgy, Higgins R. A., Viva books Pvt. Ltd., 2004 ISBN No 13-9788176490276
2. Material Science & Engineering, Raghavan V., Prentice Hall of India, New Delhi. 2003 ISBN No 13-9788120324558
3. Introduction to Physical Metallurgy, Avner, S. H., Tata McGraw-Hill, 2014, ISBN 13-9780074630068
4. Materials Science & Engineering, W. Callister, Wiley Publications,2013, ISBN No 13-9788126521432
5. Physical Metallurgy for Engineers, Clarke D.S. & Varney W.R. Affiliated East-West Press, New Delhi ISBN No 13-978-8176710350

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Signals and Systems
	COURSE CODE	ET211
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	25	25	150

PRE-REQUISITE : Electrical & Electronics Engineering

COURSE OBJECTIVES :

ET211.CEO.1: Classify signals and systems and describe their properties on continuous and discrete domains.

ET211.CEO.2: Describe and perform different time and frequency domain transformations.

ET211.CEO.3: Explore the concept of correlation, energy spectral density(ESD), power spectral density (PSD).

ET211.CEO.4: Illustrate sampling and reconstruction theorem.

ET211.CEO.5: Analyze linear time invariant (LTI) system using Z transform..

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET211.CO.1: Classify various types of signals and systems..

ET211.CO.2: Analyze Linear Time Invariant Systems.

ET211.CO.3: Inspect continuous and discrete time systems in time and frequency domain.

ET211.CO.4: Describe sampling theorem and reconstruction of signal.

ET211.CO.5: Test discrete time systems using Z transform.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Signals and Systems**	**9 HOURS**
Definition of signals, Classification of signals, Elementary signals, Signal operations, Examples of signals, Definition of systems, Overview of nonlinear system with example, Classification of systems, Examples of systems.		
UNIT 2	**Analysis of Linear Time Invariant (LTI) Systems**	**8 HOURS**
Representation of LTI systems, Discrete time LTI systems, Convolution sum, Continuous time LTI systems, Convolution integral, Properties of LTI system, System interconnection .		
UNIT 3	**Fourier Analysis of Signals**	**9 HOURS**
Implication of Fourier Transform properties on signal, Discrete Time Fourier Transform, Correlation, Autocorrelation, Energy spectral density (ESD) and power spectral density (PSD), Application in communication systems.		
UNIT 4	**Sampling Theorem**	**8 HOURS**
Sampling, DT signals, Sampling theorem in time domain, Frequency relationship, Recovery of analog signals, Aliasing, Mapping between analog frequency and digital frequency, Representation of signals as vectors, concept of basis function and orthogonality.		
UNIT 5	**Discrete Time System Analysis**	**8 HOURS**
Region of Convergence for Z transform, Analysis of Linear Time Invariant system using Z transform, Pole-Zero stability consideration in Z domain, Block diagram representation for discrete time liner time invariant(LTI) system.		

PRACTICAL		
PRACTICAL NO.01	**Generation of Elementary signals**	**2 HOURS**
To generate standard elementary signals in continuous and discrete time domain. To study behavior of plots of elementary signals.		
PRACTICAL NO.02	**Dependent and independent operations on signals**	**4 HOURS**
To perform signal addition and multiplication in continuous and discrete time domain. To perform time shifting, scaling operations in continuous and discrete time domain. To verify the result analytically.		

PRACTICAL NO.03	**Response of Linear Time Invariant (LTI) system**	**2 HOURS**
To observe responses of LTI system whose impulse response is known. To characterize the system based on observations of responses.		
PRACTICAL NO.04	**Sampling Theorem**	**2 HOURS**
To analyze undersampled and oversampled signals. To comment on reconstructed signal while observing sampling signal. To verify Nyquist criterion		
PRACTICAL NO.05	**Frequency identification using Fourier analysis**	**4 HOURS**
To observe spectra of DTMF tone. To measure frequencies using spectra.		
PRACTICAL NO.06	**Fourier analysis of a signal**	**2 HOURS**
To extract fundamental frequency and harmonics. To observe spectra.		
PRACTICAL NO.07	**Correlation of a signal**	**2 HOURS**
To correlate given signals. To comment on results of autocorrelation and cross correlation.		
PRACTICAL NO.08	**LTI system using Z Transform**	**2 HOURS**
To study the transfer function of the system. To check if the given system is stable and causal.		
PRACTICAL NO.09	**Audio signal processing**	**2 HOURS**
To read .wav file and plot audio input signal. To implement sampling and reconstruction of audio/music signals. To perform filtering audio/music signals.		
PRACTICAL NO.10	**Image Analysis**	**2 HOURS**
To inspect captured image from mobile camera. To write a program to import image file in MATLAB. To show image information. To perform image filtering		

TEXT BOOK

1. Signals and Systems, Alan V. Oppenheim, Alan S. Willsky and Ian T. Young, 2nd Edition, Pearson, 2015 (ISBN: 978-9332550230)
2. Principles of Linear Systems and Signals, B. P. Lathi, 2nd Edition, Oxford Press, 2009 (ISBN: 978-0198062271)
3. Fundamentals of Signals and Systems, Michael Robert and Govind Sharma, 2nd Edition, McGraw Hill Education, 2010 (ISBN: 978-0070702219)

REFERENCE BOOK

1. Signals and Systems, Simon Haykin,Barry Van Veen, 2nd Edition, John Wiley & Sons, 2007 (ISBN: 978-8126512652)
2. An Introduction to Analog and Digital Communications, Simon Haykins, ,2nd Edition Wiley India, 2006 (ISBN: 978-0471432227)
3. Signals and Systems - principles and applications, Shaila Dinkar Apte, 1st Edition, Cambridge University press, 2016. (ISBN: 978-1107146242)
4. Signals and Systems with MATLAB, Won Young Yang, 1st Edition, Springer, 2011 (ISBN: 978-8132203957)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Network Analysis Techniques
	COURSE CODE	ET212
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	25	25	150

PRE-REQUISITE : EX101 - Electrical and Electronics Engineering, ES201 - Applied Mathematics

COURSE OBJECTIVES :

ET212.CEO.1: Learn the analysis of AC and DC circuits using various techniques.
ET212.CEO.2: Study time-domain and frequency-domain analysis of RL, RC and RLC circuits.
ET212.CEO.3: Learn resonance and filter circuits.
ET212.CEO.4: Study the two port networks parameters and functions.
ET212.CEO.5: Introduce the concept of transmission lines and applications there-of.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET212.CO.1: Analyze complex linear circuits analytically and graphically.
ET212.CO.2: Solve network equations using graph theory.
ET212.CO.3: Examine the performance of tuned circuits in time domain and frequency domain and its application in filter design.
ET212.CO.4: Analyze different filter configurations and applications there-of.
ET212.CO.5: Inspect two port network of a given electronic circuit.
ET212.CO.6: Apply the concepts of transmission line of plane electromagnetic waves in bounded media.

THEORY COURSE CONTENT		
UNIT 1	**Circuit Analysis and Graph theory**	**9 HOURS**
Convention and formation of node and loop analysis, Network theorems and applications, Network graphs and its matrices, equilibrium equations, concept of duality and its application..		
UNIT 2	**Time and Frequency Domain Analysis**	**8 HOURS**
Exponential response of RL and RC circuits, Natural and forced response of RL and RC circuits for source free and source driven circuits, Natural and forced response of RLC circuits, Analysis of RL, RC and RLC circuits in 's' domain.		
UNIT 3	**Resonance Circuits**	**6 HOURS**
Series Resonance: Impedance, Phase angle variations with frequency, Voltage and current variation with frequency, Bandwidth, Selectivity, Effect of generator resistance on Bandwidth and Selectivity, Magnification factor. Parallel resonance: Resonant frequency and admittance variation with frequency, bandwidth and selectivity, MRI (Case Study).		
UNIT 4	**Filters and Applications**	**7 HOURS**
Properties of symmetrical and asymmetrical networks, Filter fundamentals, Constant k-filters and m-derived filters, terminating half sections, and composite filters, application of filter in attenuators, study of AM/FM radio (Case study).		
UNIT 5	**Two port Networks**	**6 HOURS**
Two port networks: Z, Y, h, g, ABCD parameters along with condition of reciprocity and symmetry, Relation between two port network parameters, Equivalent networks.		
UNIT 6	**Network Transmission Line**	**6 HOURS**
Line of cascaded T section, General solution of transmission line, wavelength, velocity and propagation in transmission line, impedance matching techniques and application to distortion-less line and telephone cable, strip line.		

PRACTICAL		
PRACTICAL NO.01	**Verification of network theorems**	**2 HOURS**
1. Solve the given circuit mathematically 2. Calculate voltage and current across load 3. Design and validate above circuits on bread-board		
PRACTICAL NO.02	**Analysis of RL, RC and RLC circuits**	**2 HOURS**
1. Measure and interpret the transient response of a first-order and second-order circuit 2. Determine and simulate the frequency response of a tuned circuit using simulation program		
PRACTICAL NO.03	**Analysis of series resonance circuits**	**2 HOURS**
To observe the resonance and calculate resonant frequency, band width, quality factor in series resonance circuit		
PRACTICAL NO.04	**Analysis of parallel resonance circuits**	**2 HOURS**
To observe the resonance and calculate resonant frequency, band width, quality factor in Parallel resonance circuit		
PRACTICAL NO.05	**Design of one/two port network**	**2 HOURS**
1. Interconnection of two ports (series connection, parallel connection, cascade connection) 2. Design Equivalent networks		
PRACTICAL NO.06	**Impedance matching to find Z and Y parameters of a two port network**	**2 HOURS**
1. Impedance matching of a T-network, Pi-networks 2. Impedance matching of a ladder networks		
PRACTICAL NO.07	**To design and measure the attenuation of a symmetrical type attenuation**	**2 HOURS**
1. Measure attenuation symmetrical T attenuation 2. Measure attenuation symmetrical Pi attenuation		
PRACTICAL NO.08	**Measure unknown impedance of given loads and plots it on smith chart at different frequencies**	**4 HOURS**
1. impedance of an open line and draw its graph 2. Measure impedance of a short circuited line and draw its graph		
PRACTICAL NO.09	**Analysis of Filters**	**4 HOURS**
1. Reactance vs attenuation constant and characteristic of a low pass filter and its impedance 2. Attenuation vs frequency, phase shift vs frequency characteristics		
PRACTICAL NO.10	**Measurement of transmission line parameters**	**2 HOURS**
1. Measurement of characteristics impedance propagation constant 2. Measurement of VSWR for a given transmission line.		

TEXT BOOK

1. William Hayt, Jack Kemmerly and Steven Durbin, Engineering Circuit Analysis, 8^{th} Edition, Mcgrawhill, 2013, ISBN: 9781259098635
2. D. Roy Choudhary, Network and Systems, 2^{nd} Edition, New Age International, 2010 ISBN: 9788122427677
3. John Douglas Ryder, Networks Lines and Fields, 2^{nd} Edition, PHI, 1949, ISBN: 9788120302990

REFERENCE BOOK

1. Franklin F. Kuo, Network Analysis and Synthesis, 2^{nd} Edition, Wiley, 2010 (ISBN: 9788126510016).
2. M. E. Van Valkenburg, Network Analysis, 3^{rd} Edition, Pearson Education India, 2015 (ISBN: 978-9332550131).
3. L Ganesan and S Sreejamole, Transmission Lines and Waveguides, McGraw Hill Education, ISBN-13: 978-0070672833.
4. John D. Kraus, Daniel A. Fleisch, Electromagnetics With Applications, McGraw Hill Education, 5^{th} edition, 2010, ISBN-13: 978-0070702400.
5. S. P.Ghosh and A. K. Chakraborty, Network Analysis and Synthesis, 1^{st} edition, 2009, McGraw Hill Education, ISBN-9780070144781
6. William D. Stanley, Network Analysis with Applications, 4^{th}, 2003, Pearson Education India, ISBN-978-8131703182.
7. Robert L.Boylestad, Introductory Circuit Analysis , 12^{th} edition, Pearson Education, ISBN-978-0137146666.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Minor Project
	COURSE CODE	ET213
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	50	NIL	25	75

PRE-REQUISITE : ME103: Design Thinking, ET206: Prototyping

COURSE OBJECTIVES :

ET213.CEO.1: Learn to identify and define a problem to be solved.
ET213.CEO.2: Develop design for the solution of the problem using engineering tools available.
ET213.CEO.3: Design working model for the solution of the problem.
ET213.CEO.4: Evaluate the model built for its correctness, reliability and sustainability.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET213.CO.1: Illustrate how to define the problem to be solved.
ET213.CO.2: Apply knowledge of various engineering tools to develop the solution to the problem.
ET213.CO.3: Analyze various options available to solve the problem and select the appropriate one.
ET213.CO.4: Justify the selection of the method to solve the problem.
ET213.CO.5: Build the working model of the solution to solve the problem.

PREAMBLE:

It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

GUIDELINES:

1. Every student shall undertake the Minor Project in semester IV
2. Every student shall work on an approved project, a group of 03 students (maximum) shall be allotted for each minor project
3. The group members could be from different departments to support the interdisciplinary functioning
4. The students have to identify the social problem by through discussion with people, site visits, etc.
5. Once the problem is identified, students have to collect the sufficient data to prove the importance of the problem to be solved
6. By analyzing the collected data, students have to define the actual problem
7. Once the problem is defined, the students have to enumerate various approaches and solutions to solve the problem
8. The students have to select and justify one of the solutions identified based on the feasibility, affordability and ease of use
9. The solution of the selected approached has to be developed using some prototype or model or implementation
10. The three-member committee of jury members will be appointed to monitor the progress and continuous evaluation of each project. One of the members will be the project guide. Assessment of the project for award of grade shall be done jointly by the guide and committee of jury members

TIMELINE:

1. Project group formation: 1 Week
2. Identification of the problem to be solved: 2 Weeks
3. Data collection to prove the validity of the problem: 2 Weeks
4. Identification of the various approaches to solve the problem: 2 weeks
5. Justification of the approach selected to solve the problem: 1 week
6. Building the solution to the problem using prototype or implementation: 6 Weeks
7. Report writing: 2 Weeks

ASSESSMENT:

Presentation 1: Motivation and need for the selected problem to be solved

Presentation 2: To prove the validity of the problem to be solved using data collected

Presentation 3: Identified approaches to solve the problem and justification of approach selected

Presentation 4: Progress towards the prototyping or implementation of the solution to the problem

Presentation 5: Final demonstration

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MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Third Year

Bachelor of Technology in Electronics & Telecommunication Engineering

2016-2020

(With Effect from Academic Year: 2018-2019)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	01/06/2018
	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	ET301	Control Systems	3	2	4
2.	DC6	ET302	Analog Communication	3	2	4
3.	DC7	ET303	Microcontroller &Application	3	2	4
4.	OE1	ET31#	Open Elective - Refer Annexure	3	2	4
5.	HSS4	HP301	Project Management	1	2	2
6.	HSS6	HP303	Basics of Entrepreneurship	-	2	1
7.	SDP5	ET304	Graphical Programming Lab	-	4	2
		ET305	MATLAB			
		EX304	Embedded Linux			
TOTAL				**13**	**16**	**21**

SEMESTER: VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	ET321	Digital Communication	3	2	4
2.	DC9	ET322	Digital Signal Processing	3	2	4
3.	DC10	ET323	Antenna Theory &Design	3	2	4
4.	OE2	ET33#	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP302	Professional Skills	1	2	2
6.	SDP6	ET324	Mini Project	-	4	2
TOTAL				**13**	**14**	**20**

OPEN ELECTIVE (OE) DETAILS

1) Any one course to be selected for Semester V& VI each.
2) The corresponding course to be chosen from same domain.

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	DOMAIN	COURSE	TEACHING SCHEME		
					L	P	CREDIT
1.	OE1.1	ET311	Embedded System	Embedded System Programming	3	2	4
2.	OE1.2	ET312	Internet of Things (IoT)	IoT Architecture and Sensors	3	2	4
3.	OE1.3	EX311	Robotics & Automation	Fundamentals of Robotics	3	2	4

SEMESTER: VI

SL. No.	COURSE TYPE	COURSE CODE	DOMAIN	COURSE	TEACHING SCHEME		
					L	P	CREDIT
1.	OE2.1	ET331	Embedded System	Embedded Processor	3	2	4
2.	OE2.2	ET332	Internet of Things (IoT)	IoTNetwork & Protocols	3	2	4
2.	OE2.3	EX331	Robotics & Automation	Kinematics and Dynamics	3	2	4

Note: L: Lecture, P: Practical

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Control Systems
	COURSE CODE	ET301
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	50	-	150

PRE-REQUISITE : Applied Mathematics, Network Analysis Techniques, Signals and Systems

COURSE OBJECTIVES :

ET301.CEO.1: Learn the mathematical model and transfer function of LTI systems.
ET301.CEO.2: Study time-domain and frequency-domain analysis of LTI systems.
ET301.CEO.3: Understand concept of stability and methods for inferring stability of a systems.
ET301.CEO.4: Study state variable modeling and its analysis for SISO and MIMO systems.
ET301.CEO.5: Understand the concept of motion control using PID.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET301.CO.1: Determine the transfer function of varied systems by different techniques.
ET301.CO.2: Model SISO and MIMO systems using state space techniques.
ET301.CO.3: Analyze the performance of LTI systems using time-domain and frequency domain techniques.
ET301.CO.4: Infer stability of a system by different analytical and graphical methods.
ET301.CO.5: Explain a closed loop motion control system with an application.

THEORY COURSE CONTENT		
UNIT 1	**Modeling in Frequency Domain**	**8 HOURS**
Introduction to Feedback Control System, Types of Control Systems, Modeling of Simple Electrical and Mechanical Systems, Block Diagram Algebra, Signal Flow Graph.		
UNIT 2	**Modeling in Time Domain**	**8 HOURS**
State-space representations, Eigen values and Eigen vectors, Transfer function from state model, Solution of state equations, Controllability and Observability.		
UNIT 3	**Time Domain Analysis**	**8 HOURS**
Time-domain analysis, Second-order systems, Stability Characteristic-equation and roots, Routh-Hurwitz criteria, Root Locus technique.		
UNIT 4	**Frequency Domain Analysis**	**8 HOURS**
Concept of frequency response, Correlation between time and frequency response, Frequency domain specifications, Bode plot, Polar plots, Nyquist Stability Criterion.		
UNIT 5	**Motion Control**	**8 HOURS**
Concept, Block Schematic, Sensors for motion control, Principle, Modeling and Analysis of Servomotors, Basic algorithm: PID and State feedback control, Design Case Study.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Analysis of a Systems.		
PRACTICAL NO.02		**2 HOURS**
Performance Analysis of Closed Loop Systems.		
PRACTICAL NO.03		**2 HOURS**
Time Domain Analysis using Root Locus.		
PRACTICAL NO.04		**2 HOURS**
Frequency Response Analysis.		
PRACTICAL NO.05		**2 HOURS**
Compensator Design.		

PRACTICAL NO.06		**2 HOURS**
PID control of a System.		
PRACTICAL NO.07		**6 HOURS**
System Identification and Analysis of a DC Motor.		

TEXT BOOK

1. Katsuhiko Ogata, Modern Control Engineering, 5 th edition, PHI, 2010, ISBN: 978-0136156734.
2. Benjamin C. Kuo and Farid Golnaraghi, Automatic Control Systems, 8 th edition, Wiley-India, 2009, ISBN: 978-8126513710.
3. Norman S. Nise, Control Systems Engineering, Wiley India Edition, 2018, ISBN: 978-8126571833.

REFERENCE BOOK

1. R. C. Dorf and R. H. Bishop, Modern Control Systems, 11 th Edition, Pearson, 2009, ISBN: 978-0132067102.
2. William S. Levine (Ed), The Control Handbook, Vol. I, CRC-IEEE Press, 1999, ISBN: 978-1420073669.
3. Slobodan N. Vukosavic, Digital Control of Electrical Drives, Springer, 2007, ISBN: 978-0387259857.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Analog Communication
	COURSE CODE	ET302
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Applied Mathematics I, Applied Mathematics II, Signals and Systems

COURSE OBJECTIVES :

ET302.CEO.1: Illustrate fundamental concepts required for communication.
ET302.CEO.2: Analyse amplitude, angle modulation techniques, their types, mathematical analysis and representation.
ET302.CEO.3: Study random variables and random, stochastic processes.
ET302.CEO.4: Explain analog communication receivers, their types & characteristics.
ET302.CEO.5: Study noise performance of different analog modulation techniques.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET302.CO.1: Inspect a basic flow and essential metrics in the process communication.
ET302.CO.2: Examine different amplitude, angle modulation techniques.
ET302.CO.3: Explain various transmitter and receiver circuits.
ET302.CO.4: Analyze random processes and random variables.
ET302.CO.5: Measure the noise performance of different analog modulation techniques.

THEORY COURSE CONTENT		
UNIT 1	**Electronic Communication**	**6 HOURS**
Electromagnetic spectrum, Block Diagram representation of a generalized communication system, Communication resources, modes. Signal transmission: baseband & pass band signals, analog & digital transmission, Modulation, Need of modulation, demodulation.		
UNIT 2	**Amplitude Modulation Techniques**	**7 HOURS**
Types of Analog Modulations, Principles of Amplitude Modulation, Current & power relations,Generation & detections, Self-Study: VSB modulation, VSB generation & detection, Comparison of different AM techniques.		
UNIT 3	**Angle Modulation Techniques**	**6 HOURS**
Principles of Angle Modulation, Frequency modulation, Frequency deviation and modulation index, , bandwidth of Angle modulated signal, Spectrum analysis of FM wave, Narrow band and Wideband FM, Generation & detection, Relationship between FM & PM, Self-Study: Comparison of AM, FM & PM.		
UNIT 4	**Analog Signal Transmitter & Receiver Systems**	**7 HOURS**
AM transmitters, Receiver parameters, AM receivers, Double conversion AM receivers, Linear integrated circuit AM receiver, FM receivers, FM stereo broadcasting, Two way FM radio communication.		
UNIT 5	**Random Variables & Stochastic Processes**	**8 HOURS**
Concept of Random variables, Joint & Conditional probability, Statistical independence, Bayes Theorem, Probability distribution functions & Probability density functions, Central limit theorem. Introduction to Random Processes, Statistical averages, Power spectral densities, Stationarity, Ergodicity.		
UNIT 6	**Noise Calculations in Analog Systems**	**6 HOURS**
Classification and sources of noise, Noise parameters, Power Spectral density of noise, Noise calculations in AM, FM, PM. Pre emphasis & De-emphasis circuits.		

PRACTICAL: Perform following experiments using MATLAB / Hardware experiments		
PRACTICAL NO.01	**Sampling**	**2 HOURS**
Study of natural and flat top sampling.		
PRACTICAL NO.02	**AM Modulator and Demodulator**	**2 HOURS**
Study of AM modulator and demodulator.		
PRACTICAL NO.03	**DSB SC Modulator**	**2 HOURS**
Study of double side band suppressed carrier modulation technique.		
PRACTICAL NO.04	**SSB SC Modulator**	**2 HOURS**
Study of single side band suppressed carrier modulation technique		
PRACTICAL NO.05	**Frequency Modulation**	**2 HOURS**
Study of frequency modulation and demodulation circuit		
PRACTICAL NO.06	**AM transmitter**	**2 HOURS**
Study of AM transmitter		
PRACTICAL NO.07	**Design of Mixer**	**4 HOURS**
Design a circuit of mixer using Simulink / Multisim		
PRACTICAL NO.08	**Pre emphasis and De emphasis**	**4 HOURS**
Design a pre-emphasis and de-emphasis circuit using MATLAB / Multisim		
PRACTICAL NO.09	**Modulation Circuitry**	**4 HOURS**
Design any of the above modulation techniques in MATLAB / Multisim or (Write a program to build the modulation circuit)		

TEXT BOOK

1. Wayne Tomasi,"Electronic Communications Systems: Fundamentals through Advanced", Pearson Always Learning 5th edition , ISBN: 987-8131719534
2. Simon Haykin, "Communication System", 4th Edition, Wiley publications, ISBN 0471178691
3. A. Bruce Carlson, Paul B. Crilly, Communication Systems, McGraw-Hill, 5th Edition, ISBN: 978- 0073380407

REFERENCE BOOK

1. John G. Prokis, MasoudSalehi,"Communication Systems Engineering", Pearson Always learning, 2nd edition ISBN-13: 9787040169058
2. T. L. Singal, "Analog & Digital Communications", Tata McGraw hill education, latest Edition, ISBN: 9780071072694.
3. Dennis Roddy & Coolen, "Electronic Communication", Prentice Hall, 4th Edition, ISBN: 9780835915984.
4. George Kennedy, "Electronic Communication Systems", McGraw-Hill, 5th Edition, ISBN: 9780028005928.
5. B. P. Lathi, "Modern Digital & Analog Communication Systems", Oxford university press, 4th edition, ISBN: 9780198073802.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Microcontroller and Applications
	COURSE CODE	ET303
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL*	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Electrical & Electronics Engineering, Computer Programming

COURSE OBJECTIVES :

ET303.CEO.1: Get acquainted with the role of microcontroller in embedded system
ET303.CEO.2: Understand architecture and features of typical microcontroller
ET303.CEO.3: Study various hardware and software tools for developing applications
ET303.CEO.4: Learn interfacing of various peripherals with microcontrollers

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET303.CO.1: Compare the features of different families of the microcontrollers
ET303.CO.2: Explain the architecture and features of the 8 bit microcontroller
ET303.CO.3: Perform the interfacing of various peripherals with the microcontroller
ET303.CO.4: Design a microcontroller based applications

THEORY COURSE CONTENT		
UNIT 1	**Overview of Microcontroller**	**6 HOURS**
Microcontroller and Embedded Processors, Inside the microcontroller, Pin diagram, Port Structure, Register Bank, Special Function Registers, Concept of reset, Oscillator, Concept of interrupt, Survey of different families of microcontrollers, Instruction Set (Ex. 8051)		
UNIT 2	**Microcontroller - 8 bit**	**6 HOURS**
Selection criteria of the microcontroller, Architecture [Block Diagram and Pin Diagram], Memory organization, Port Structure, Hardware Stack (Ex. PIC18Fxxx)		
UNIT 3	**Programming**	**4 HOURS**
Introduction to assembly language, Concept of Assembler directives, Editor, Linker, Loader, Debugger, Simulator, Emulator, Introduction to Embedded-C, Integrated Development Environment (IDE), Cross compiler, ISP.		
UNIT 4	**GPIO Interface**	**8 HOURS**
Interfacing with LEDs, Push Buttons/switch, Buzzer, Relay, 7-segment display, LCD, Matrix Keypad, Digital sensor interface, Analog to Digital Converter (ADC)/Analog sensor, Digital to Analog Converter (DAC), Stepper motor and DC motor		
UNIT 5	**On-chip modules Interface**	**8 HOURS**
Interface of Timers, UART/USART module, Software and hardware interrupts, External interrupt interface		
UNIT 6	**Special Feature Interface.**	**6 HOURS**
Master Slave Serial Protocol (MSSP) Communication, Capture-Compare-PWM (CCP) module		

PRACTICAL (any 8)		
PRACTICAL NO.01	**Introduction to Integrated Development Environment**	**2 HOURS**
Study of Integrated Development Environment (IDE)		
PRACTICAL NO.02	**GPIO Interface**	**2 HOURS**
Interfacing of LEDs, buzzer, relay		
PRACTICAL NO.03	**LCD Display Interface**	**2 HOURS**
Interfacing of 16 x2 LCD display		

PRACTICAL NO.04	**ADC Interface**	**2 HOURS**
Interfacing of ADC chip/module		
PRACTICAL NO.05	**Timer Interface**	**2 HOURS**
Generation of delay using Timer module		
PRACTICAL NO.06	**PWM Generation**	**2 HOURS**
Generation of PWM of duty cycle		
PRACTICAL NO.07	**Serial Communication**	**2 HOURS**
Interfacing of UART for serial communication		
PRACTICAL NO.08	**Sensor Interface**	**2 HOURS**
Interfacing of analog sensor and/or digital sensor		
PRACTICAL NO.09	**Keypad Interface**	**2 HOURS**
Interfacing of push button, matrix keypad		
PRACTICAL NO.10	**MSSP**	**2 HOURS**
Interfacing of I2C devices ex. RTC / Interfacing of SPI devices ex. EEPROM		

TEXT BOOK

1. Muhammad Ali Mazidi, RolinMcKinlay and Danny Causey, PIC Microcontroller and Embedded Systems Using Assembly and C for PIC18, 1st Edition, Pearson, 2007 (ISBN: 9780131194045)
2. Ramesh Gaonkar, Fundamentals of Microcontrollers and Applications in EmbeddedSystems with PIC18 Microcontroller Family, 1st Edition, Thomson and Delmar, 2007 (ISBN: 9781401879143)

REFERENCE BOOK

1. Muhammad Ali Mazidi, The 8051 microcontroller & embedded systems 2nd Edition ,PHI
2. MykePredko, Programming and Customizing The PIC Microcontroller, 3rd Edition, TMH, 2007 (ISBN: 9780070223509)
3. Manuals and Datasheets of PIC Series Microcontroller and Peripherals and 8051
4. Application Notes PIC Series Microcontroller

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Embedded System Programming
	COURSE CODE	ET311
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Electrical & Electronics Engineering, Computer Programming

COURSE OBJECTIVES :

ET311.CEO.1: Develop comprehensive skills in designing assembler

ET311.CEO.2: Comprehend the importance of linkers, loaders and software tools in embedded system programming

ET311.CEO.3: Grasp the embedded system programming concepts and fundamentals of an operating system

ET311.CEO.4: Implement various process scheduling and synchronization techniques in an operating system

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET311.CO.1: Explore various embedded system software such as compilers, linkers, load and assemblers

ET311.CO.2: Distinguish the basic linkers, loaders and software tools for program development

ET311.CO.3: Master various process management concepts including scheduling, synchronization

ET311.CO.4: Utilize the GNU Development tools to build embedded applications in Linux environment

THEORY COURSE CONTENT		
UNIT 1	**Programming Embedded System**	**8 HOURS**
Embedded Program for PIC 18F, Role of Infinite loop, Compiling, Linking and locating, downloading and debugging using Flash Magic and IDE tool		
UNIT 2	**Introduction to 16-bit processor**	**8 HOURS**
Architecture of 16 bit processor, Instruction set, Assembler: Assembly language programming, simple assembly scheme, Pass structure of assembler		
UNIT 3	**Embedded Tool chain 8 Hours**	**8 HOURS**
Compilers: Basic compilers function, Phases of compilation, code optimization techniques, interpreters, loaders and linkers: basic loader functions, its types		
UNIT 4	**Fundamentals of Embedded Operating System**	**8 HOURS**
Overview of operating systems, Process Management - Process and threads, Scheduling algorithms - Non pre-emptive and pre-emptive scheduling, Inter Process Communication Semaphores		
UNIT 5	**Linux Fundamentals**	**8 HOURS**
Introduction to Linux, Basic Linux commands and concepts, Basic text editing, Linux File System, Shell programming, Processes and threads in Linux, GNU Development tools, gdb, GNU, makefile		

PRACTICAL (any 8)		
PRACTICAL NO.01		**2 HOURS**
Handling of the String and File library functions		
PRACTICAL NO.02		**2 HOURS**
Assembly Language Programming (ALP) in 8051 using Assembler ASM51 and Emulator 8051		
PRACTICAL NO.03		**2 HOURS**
Assembly Language Programming (ALP) in 8086 using Microsoft Assembler MASM 6.11		
PRACTICAL NO.04	**ADC Interface**	**2 HOURS**
Interactive Shell Scripting in Linux with Decision Making and Loop controls		
PRACTICAL NO.05		**2 HOURS**
C programs in Linux using GNU Compiler Collection (GCC) and Debugging the programs using gdb utility		

PRACTICAL NO.06		**2 HOURS**
System Calls to handle Processes and files		
PRACTICAL NO.07	**Serial Communication**	**2 HOURS**
Inter-process communication using semaphore		
PRACTICAL NO.08		**2 HOURS**
Design of Pass-I of Two-pass Assembler for pseudo machine code - 8086. Generate any one table viz. Mnemonics, Symbol, Literal, Pool. Implementation of scheduling algorithm		

TEXT BOOK

1. John J. Donovan, Systems Programming, 2nd Edition, McGraw Hill, 2010, ISBN: 9780074604823
2. Michael Barr and Anthony M, Programming Embedded Systems with C & GNU Development Tools, 2nd Edition, Oreilly, 2006, ISBN: 9788184042627

REFERENCE BOOK

1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Operating System Concepts, 8th Edition, Wiley, 2009, ISBN: 9788126520510
2. A. S. Tanenbaum, Modern Operating Systems, 3rd Edition, PHI, 2009, ISBN: 9788120339040
3. Alfred Aho, Ravi Sethi & Jeffrey D. Ullman, Compilers Principles, techniques and tools, Pearson education, ISBN: 0-321-48681-1
4. Leland L. Beck, System Software, Pearson Editions, ISBN: 9788177585551

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	IoT Architecture and Sensors
	COURSE CODE	ET312
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Electrical & Electronics Engineering, Computer Programming

COURSE OBJECTIVES :

ET312.CEO.1: Understand the fundamentals of Internet of Things.
ET312.CEO.2: Make use of devices, gateways and data management in IoT.
ET312.CEO.3: Explain IoT reference model and its architecture.
ET312.CEO.4: Identify sensors, actuators for IoT Application.
ET312.CEO.5: Explain basic need of security and privacy in IoT.
ET312.CEO.6: Analyze real world IoT design constraints in IoT Application.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET312.CO.1: Explain the fundamentals IoT Mechanisms.
ET312.CO.2: Analyze data and knowledge management in IoT technology.
ET312.CO.3: Explain IoT reference model and its architecture.
ET312.CO.4: Develop IoT applications using sensors, actuators and Network devices.
ET312.CO.5: Explain the needs of security and privacy in IoT.
ET312.CO.6: Analyze IoT platform design methodology and its design constraints.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Internet of Things**	**8 HOURS**
Introduction : Definition and Characteristics of IoT, History and Evolution of IoT, Physical and logical Design of IoT, Fundamental IoT Mechanisms and IoT enabled Technologies, IoT Levels and Templates, Domain Specific Applications of IoTs.		
UNIT 2	**IoT and M2M**	**7 HOURS**
Introduction to M2M, Difference between IoT and M2M, M2M and IoT Technology Fundamentals: Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a service (XaaS), M2M and IoT analytic, Knowledge management.		
UNIT 3	**IoT Architecture**	**7 HOURS**
Architecture reference model: Introduction, Reference model and architecture, IoT Reference model, M2M to IoT-an architectural overview: Building architecture, Main design principles and needed capabilities, State of the art, Standards considerations.		
UNIT 4	**Sensors and Actuators**	**6 HOURS**
Sensors & Transducers: Introduction to Sensors, Classification, Different Types, Properties and Working Principles of Sensors , Introduction to Actuators and its Types.		
UNIT 5	**Security, Privacy and Governance in IoT**	**6 HOURS**
Elements of Internet of Things security, Privacy In IoT Networks : Secure Data Aggregation, Privacy In Beacons, Overview on Governance in IoT		
UNIT 6	**IOT Platform Design Methodology**	**6 HOURS**
Introduction to IoT Platform Design Methodology and Case Studies Illustrating IoT Design: Home Automation and Smart City.		

PRACTICAL		
PRACTICAL NO.01	**Introduction to IoT Programming**	**6 HOURS**
Introduction to C programming: Data Types, Conditional Statements: if & else if, Iterative statements : for, while & do while, Function : Call by Value.		
PRACTICAL NO.02	**Interfacing of Sensors and actuators with ESP 8266 and Bluetooth module**	**4 HOURS**
Sensor : DHT 11/22, LM 35, Ultrasonic sensor/ IR sensor, Pressure sensor, Motor : Servo, Stepper, DC, LCD & Seven Segment Display .		

PRACTICAL NO.03	IoT System- Logical Design using Python	6 HOURS
Python Data Types, Data Structures, Control Flow and Function and Introduction of basic Linux commands and Python Installation.		
PRACTICAL NO.04	**IoT Physical Devices and Endpoints**	**4 HOURS**
Interfacing of Sensors and actuators with raspberry pi.		
PRACTICAL NO.05	**Presentation**	**2 HOURS**
Present the build application in a team.		

TEXT BOOK

1. Arshdeep Bahga, Vijay Madisetti, Internet of Things, A Hands -on Approach, 1 st edition, University Press, 2015, ISBN: 978-81-7371- 954-7
2. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, StamatisKarnouskos, Stefan Avesand & David Boyle , From Machine-to-Machine to the Internet of Things, Elsevier, 2014, ISBN: 978-0-12-407684-6

REFERENCE BOOK

1. Daniel Minoli, Building the Internet of Things with IPv6 and MIPv6 : The Evolving World of M2M Communications, Willy Publication, ISBN: 978-1-118-47347-4.
2. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley, 2014, ISBN: 978-1-118-43062-0.
3. Parikshit N. Mahalle & Poonam N. Railkar, Identity Management for Internet of Things, River Publishers, ISBN: 978-87-93102-90-3.
4. Rajkumar Buyya, Amir Vahid Dastjerdi, Internet of Things Principles and Paradigm, Elsevier, 2016, ISBN: 978-0-12-805395-9.
5. H. S. Kalsi, Electronic Instrumentation, 3 rd edition, Mcgraw Higher Ed, 2010, ISBN: 9780070702066.
6. Ramon Pallas-Areny, John G. Webster , Sensors and Signal Conditioning, 2 nd edition, Wiley, 2012, ISBN: 9780470054574.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Fundamental of Robotics
	COURSE CODE	EX311
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : EX101: Electrical and Electronics Engineering, IT101: Computer Programming, ME103: Design Thinking

COURSE OBJECTIVES :

EX311.CEO.1: To understand the basics of robotics and classification.
EX311.CEO.2: To describe different types of sensors.
EX311.CEO.3: To study and analyze different transmission system used in robot.
EX311.CEO.4: To illustrate use of virtual instrumentation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX311.CO.1: Memorize history, concepts and key components of robotics technology.
EX311.CO.2: Summarize classification, kinematics, sensors and actuators of industrial robots.
EX311.CO.3: Analyze various issues in designing of manipulator,end effectors.
EX311.CO.4: Design and implement algorithm in LabVIEW for navigating machine.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**
Introduction, History, Specifications of Robots, Usage Of Robots,Classifications of robots by Application, by Coordinate system, By Actuation system, By Programming Method ,Work envelope, Flexible automation versus Robotic technology .		
UNIT 2	**Sensors and Actuators**	**6 HOURS**
Sensor classification, Internal Sensors, External Sensors, Sensor Selections. , Actuators , Pneumatic, hydraulic, electric , servomotor stepper motor, Selection of motors.		
UNIT 3	**Power Transmission System**	**6 HOURS**
Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Rotary to Rotary motion conversion, Rotary to Linear motion conversion, Rack and Pinion drives, Applications.		
UNIT 4	**Manipulators**	**6 HOURS**
Construction of Manipulators, Manipulator Kinematics , translation and rotational matrix , Homogeneous transformation matrix , Electronic and Pneumatic manipulators.		
UNIT 5	**Robot End Effectors**	**6 HOURS**
Classification of End effectors , Tools as end effectors. Drive system for grippers Mechanical adhesive vacuum magnetic grippers , Hooks and scoops,Gripper force analysis and gripper design. Active and passive grippers.		
UNIT 6	**Virtual Instrumentation**	**6 HOURS**
Historical perspectives, advantages, block diagram and architecture of a virtual instrument, data flow techniques, graphical programming in data flow, comparison with conventional programming.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Study of different types of robots and component requirement analysis of particular robot.		
PRACTICAL NO.02		**4 HOURS**
Study of different types of sensors using Electronics trainer kit.		
PRACTICAL NO.03		**4 HOURS**
Design and selection of transmission system required for particular mechanism.		
PRACTICAL NO.04		**4 HOURS**
Study of Pneumatic , hydraulic , electric actuators using mechatronics trainer kit.		

PRACTICAL NO.05		**4 HOURS**
Design and simulate actuator to pick and place objects of different shape.		
PRACTICAL NO.06		**2 HOURS**
Design and simulate DAS using LabView.		
PRACTICAL NO.07		**10 HOURS**
Capstone Project - Building a Robotic System.		

TEXT BOOK

1. Mikell P. Groover ,Industrial Robots Technology , Programming and applications , McGraw Hill , New York , 2014 , ISBN :978-0070249899
2. Deb S. R. and Deb S, Robotics Technology and Flexible Automation, Tata McGraw Hill Education Pvt. Ltd, 2010. ISBN :978-0070077911
3. John J.Craig ,Introduction to Robotics, Pearson, 2009 ,2nd edition , ISBN : 978-0201543612

REFERENCE BOOK

1. S.K.Saha,Introduction to robotics, Tata-McGraw-Hill Publication,ISBN: 978-0070140011
2. Richard Klafter,Robotic Engineering: An Integrated Approach, Prentice Hall,ISBN: 978-8121926164.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Management
	COURSE CODE	HP301
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	15	25	10	NIL	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP301.CEO.1: To introduce the basic concept and scope of Project Management.
HP301.CEO.2: To teach the theory of project Initiation and its analysis with project vision.
HP301.CEO.3: To introduce the concept of risk analysis and different types of tools used in project planning.
HP301.CEO.4: To guide learners monitoring and controlling project progress.
HP301.CEO.5: To introduce the concept of System dynamics, project audit and reviews.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP301.CO.1: Explain the concept of project management.
HP301.CO.2: Develop an ability to analyze scope, objective and vision of project initiation.
HP301.CO.3: Able to analyze risk and different tools of project planning.
HP301.CO.4: Develop an ability to measure progress of project by monitoring and controlling
HP301.CO.5: Identify the problems associated with project and reviewing the same.

THEORY		
UNIT 1	**Introduction Project Management**	**5 HOURS**
Meaning of Project Management, Classifications of projects, The Triple Constraint, The PMBOK project management process framework, Standard project team roles and project organisation (Functional, matrix, projectised), System approach, Systems development, System analysis, Project feasibility, Product life cycle, Project appraisal, Project contracting, The phases of SDLC.		
UNIT 2	**Project Initiation**	**5 HOURS**
Determining the project business reason, creating a project charter (market and technical analysis), financial analysis evaluation of project proposals, risk analysis, sensitivity analysis and social cost benefits analysis, defining scope and objectives, define a project vision.		
UNIT 3	**Project Planning**	**6 HOURS**
Planning fundamentals, identifying the project team responsibilities, project master plan, work breakdown structure, and other tools of project planning, estimating the efforts and duration of tasks, Identifying and analyzing risks, PERT,CPM,GERT,SLAM,DPM and resource allocation.		
UNIT 4	**Project monitoring and controlling**	**4 HOURS**
Executingthe project on time, Measuring project progress, Identifying corrective actions, Internal & external project control, control process, variance limit, issues in project control.		
UNIT 5	**Project Learning**	**4 HOURS**
System dynamics, Project audit, Change management, Project reviews and reporting.		

PRACTICALS		
PRACTICAL NO.01	**SDLC**	**2 HOURS**
Preparing for managing and developing a perfect model of SDLC for a particular given problem.		
PRACTICAL NO.02	**PERT and CPM**	**2 HOURS**
Planning a project under PERT and CPM charts		
PRACTICAL NO.03	**GERT and SLAM**	**2 HOURS**
Planning a project under GERT and SLAM charts		
PRACTICAL NO.04	**DPM**	**2 HOURS**
Solving practical problems under DPM		

PRACTICAL NO.05	**Variance Limit**	**2 HOURS**
Project monitoring under variance and controlling according to the given situations.		
PRACTICAL NO.06	**System Dynamics**	**2 HOURS**
Understanding System dynamics by solving case studies		
PRACTICAL NO.07	**Change Management**	**2 HOURS**
Solving case studies for learning how change management works.		
PRACTICAL NO.08	**Project Reviewing**	**2 HOURS**
Solving many practical problems by reviewing projects as well as some case studies.		

TEXT BOOK

1. James P. Clements and Gido, Effective Project Management Cengage India 5th Edition , ISBN: 9781111824051
2. John Nicholas, Project Management for Business and Technology: Principles and Practice, PHI-Eastern economy 3rd Edition, ISBN: 0-7506-7824-0
3. Juana Clark Craig, Project Management Lite, 2nd Edition, ISBN-13: 9781478129226
4. Harold R. Kerzner, Project Management, 11th Edition, ISBN: 978-1-118-48322-0

REFERENCE BOOK

1. Erik Larson and Clifford Gray, Project Management: The Managerial Process, McGraw Hill ISBN-10: 0-07-340334-2
2. Enzo Frigneti, The Practice of Project Management, KOGAN PAGE INDIA PRIVATE LIMITED,ISBN: 9788175545397
3. Geogary M. Horine, Project Management, QUE 4th Edition, ISBN: 9780134653914
4. Cynthia Stackpole Snyder, A User manual to The PMBOK Guide, ISBN: 9781118546604
5. Brown, James T., The Handbook of Program Management: How to Facilitate Project Success with Optimal Program Management, Second Edition. The McGraw-Hill Companies, 2014, ISBN 978-0071837859
6. Frame, J. Davidson, Managing Projects in Organizations: How to Make the Best Use of Time, Techniques, and People, 3rd edition, Jossey-Bass, 2003, ISBN 0-787-96831-5
7. Kerzner, Harold, ProjectManagement: Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 10th edition, Wiley, 2009, ISBN 0-470-27870-6
8. Meredith, R. Jack and Mantel, Jr., Samuel J., Project Management: A Managerial Approach, 7th edition, Wiley, 2008, ISBN 0-470-22621-8
9. Stackpole, Cynthia Snyder, A Project Manager's Book of Forms: A Companion to the PMBOK Guide, Wiley, 2009, ISBN 978-0470389843
10. Weiss, Joseph and Wysocki, Robert, Five-phase Project Management: A Practical Planning And Implementation Guide, Basic Books, 1992, ISBN 0-201-56316-9

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Basic Entrepreneurship
	COURSE CODE	HP303
	COURSE CREDITS	1
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA			
-	2	-	-	25	-	25	50

PRE-REQUISITE : WF Orientation Course

COURSE OBJECTIVES :

HP303.CEO.1: To understand the fit between you and your entrepreneurialambitions
HP303.CEO.2: To find a problem worthsolving
HP303.CEO.3: To identify yourcustomers
HP303.CEO.4: To develop a solution for your customers' problems and problemsolution
HP303.CEO.5: To build and demonstrate anMVP
HP303.CEO.6: To structure a business model around the problem, customer, and solution and present your Business ModelCanvas.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP303.CO.1: Why entrepreneurship requires
HP303.CO.2: Outline the Problems Worth Solving by using various techniques like DT, JTBD
HP303.CO.3: Identify the Customer Segments and Early Adopters
HP303.CO.4: Develop the solution demo for identify problem.
HP303.CO.5: Create Business Model Canvas and Minimum Viable Product

PRACTICALS:		
PRACTICAL NO.01	**GET STARTED - Discover Yourself**	**2 HOURS**
Find your flow, Effectuation, Case Study: Tristan Walker: The extroverted introvert, Identify your entrepreneurial style.		
PRACTICAL NO.02	**IDEA/PROBLEM - Identify Problems Worth Solving**	**4 HOURS**
What is a business opportunity and how to identify it. Find problems around you that are worth solving. Methods for finding and understanding problems - (Observation, Questioning, DT, Jobs to be done (JTBD) How to run problem interviews to understand the customer's worldview Introduction to Design Thinking - Process and Examples Generate ideas that are potential solutions to the problem identified - DISRUPT GOOTB: Run problem interviews with prospects Class Presentation: Present the problem you "love" Form teams		
PRACTICAL NO.03	**CUSTOMER**	**6 HOURS**
Identify Your Customer Segments and Early Adopters The difference between a consumer and a customer (decision maker); Market Types, Segmentation and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns. Identify the innovators and early adopters for your startup.Craft Your Value Proposition Come up with creative solutions for the identified problems Deep dive into Gains, Pains and Jobs-To-Be-Done (using Value Proposition Canvas, or VPC) Identify the UVP of your solution using the Value Proposition section of the VPC Outcome-Driven InnovationClass Presentation: Communicating the Value Proposition- 1 min Customer Pitch		
PRACTICAL NO.04	**BUSINESS MODEL**	**4 HOURS**
Get Started with Lean Canvas Basics of Lean Approach and Canvas; Types of Business Models (b2b; b2c)		
PRACTICAL NO.05	**VALIDATION**	**9 HOURS**
Develop the Solution Demo Build solution (mockups) demo, How to run solution interviews, GOOTB: Run Solution interviews. Does your solution solve the problem for your customers: The problem-solution test. Sizing the Opportunity Differences between a Startup venture and a small business; Industry Analysis Understanding what is Competition and it's role, Analyze competition Case study: Blue Ocean Strategy Building an MVP Identify an MVP and build it - I; Document and validate your assumptions Build-Measure-Learn feedback loop and the MVP/Javelin Board How to do MVP Interviews GOOTB: Run MVP interviews Is there a market for your product –The product-market fit test Class Presentation: Present your MVP		
PRACTICAL NO.06	**MONEY**	**5 HOURS**
Revenue Streams Basics of how companies make money. Understand income, costs, gross and net margins. Identify primary and secondary revenue streams. Pricing and Costs Value, price, and costs; Different pricing strategies. Understand product costs and operations costs; Basics of unit costing Financing Your New Venture How to finance business ideas, Various sources of funds available to an entrepreneur and pros and cons of each, What investors expect from you, Practice Pitching to Investors and Corporates.		

PRACTICAL NO.07	TEAM	2 HOURS
Team Building Shared Leadership Role of a good team in a venture's success; What to look for in a team; How do you ensure there is a good fit? Defining clear roles and responsibilities. How to pitch to candidates to join your startup Explore collaboration tools and techniques - Brainstorming, Mind mapping, Kanban Board, #Slack.		
PRACTICAL NO.08	**MARKETING & SALES**	**2 HOURS**
Positioning Understand the difference between product and brand and the link between them. Define the positioning statement for your product/service and how it should translate into what your customers should see about that brand in the marketplace. Channels & Strategy Building Digital Presence and leveraging Social media, Creating your company profile page, Measuring the effectiveness of selected channels, Budgeting and planning. Sales Planning Understanding why customers buy and how buying decisions are made; Listening. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale.		
PRACTICAL NO.09	**SUPPORT**	**2 HOURS**
Planning & Tracking Importance of project management to launch and track progress Understanding time management, workflow, and delegation of tasks Business Regulation Basics of business regulations of starting and operating a business; Importance of being compliant and keeping proper documentation How to find help to get started		
PRACTICAL NO.10	**Capstone Project: Present Your BMC (Optional - and MVP)**	**2 HOURS**
BMC: Business Model Canvas. / MVP: Minimum Viable Product.		

REFERENCES

1. Read Forbes article and do Group Discussionhttps://www.forbes.com/sites/chrismyers/2015/12/16/find-your-flow-and-success-will-follow/
2. https://necrophone.com/2014/01/20/effectuation-the-best-theory-of-entrepreneurship-you-actually-follow-whether-youve-heard-of-it-or-not/
3. Use your self awareness to find out what motivates and drives Entrepreneurial activity - Ted Talk "What is your Entrepreneurial style - EntrepreneurKnow
4. Prof. Clay Christensen "IdentifyingCustomerNeeds" https://www.youtube.com/watch?v=yVCZ-7xSsCw
5. Understand the customer problem by GOOTB":by GOOTB":https://www.youtube.com/watch?v=sEENIZgscDw
6. https://www.forbes.com/sites/danschawbel/2013/12/17/geoffrey-moore-why-crossing-the-chasm-is-still-relevant
7. Value Proposition: https://www.youtube.com/watch?v=jZN6CUieuOQ&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
8. Value Proposition & Customer Need:https://www.youtube.com/watch?v=6FnG8pJL8yM&index=3&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
9. https://strategyn.com/turn-customer-input-into-innovation/ CASE STUDIES in ODI: https://jobs-to- be-done.com/tagged/case-study
10. TheLeanBMC https://www.youtube.com/watch?v=FjBe7UO1hc
11. Ash Maurya -Capture your BMC in 20
12. minuteshttps://www.youtube.com/watch?v=7o8uYdUaFR4&t=462s
13. Ash Maurya - How to Prioritize Risks on Your BusinessModel https://www.youtube.com/watch?v=01z7EPXS42k
14. https://pt.slideshare.net/bmorelean/dan-lemberg-lean-pitch
15. https://startups.fb.com/en-in/categories/development/
16. Designing Experiments: https://www.youtube.com/watch?v=WiMZWCg1Hu8&t=111s
17. Customer Development Process:https://www.youtube.com/watch?v=lLEebbiYIkI
18. Beating the Competition: https://www.youtube.com/watch?v=46uP6vOj5G0
19. Q&A with Garr :https://www.youtube.com/watch?v=SmJjjOrusyI
20. Basic Accounting Lingo for Entrepreneurs:https://www.youtube.com/watch?v=Y7Pm1jEEKE
21. Vinod Khosla : How Leaders can BUILDhttps://www.youtube.com/watch?v=bRCoBgCn1Q
22. Vinod Khosla: https://www.youtube.com/watch?v=VIrNLzTs9cw
23. How to Pitch the way VC's think, so you can convince co-founders : https://www.youtube.com/watch?v=fTgU7THoKCw
24. Tony Buzan:http://www.tonybuzan.com/about/mind-mapping/
25. Google : Think branding:https://www.youtube.com/watch?v=1l2CUjkg0ug
26. The Battle for your mind using Positioning:https://www.youtube.com/watch?v=jQrY8xRx-0 Design rules-https://www.igorinternational.com/, Web design course:https://www.coursera.org/specializations/web-designStrikingly Free : https://www.strikingly.com/online-resume/linkedin
27. https://certification.hubspot.com/inbound-sales-certification-course
28. https://www.udemy.com/courses/business/sales/
29. https://www.accountingtools.com/articles/2017/5/17/sales-budget-sales-budget-example

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Graphical Programming Lab
	COURSE CODE	ET304
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : IT101: Computer Programming, ET206: Prototyping

COURSE OBJECTIVES :

ET304.CEO.1: Understand the concept of virtual instrumentation and graphical programming
ET304.CEO.2: Explore the computing tool of LabVIEW for development of basic algorithms
ET304.CEO.3: Learn how to develop basic applications in the LabVIEW graphical programming Environment
ET304.CEO.4: Develop the skill set in industry relevant platform of LabVIEW

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET304.CO.1: Build, simulate and solve diverse problems using LabVIEW
ET304.CO.2: Make a use of the programming structures and data types that exist in LabVIEW
ET304.CO.3: Create user interface with charts, graph and buttons
ET304.CO.4: Make a use of LABVIEW to create data acquisition, analysis and display operations
ET304.CO.5: Construct remote instruments which can run independent of operating system

PRACTICAL		
PRACTICAL NO.01	**LabVIEW and Automation**	**4 HOURS**

- The origin of NI-LabVIEW
- Dataflow and Graphical Programming Language
- NI Example Finder
- Assignment 1.1

PRACTICAL NO.02	LabVIEW under the Hood	4 HOURS

- The LabVIEW Environment Front Panels, Block Diagram, Projects, SubVIs, Icon and Connectors
- Assignment 2.1 - Getting Started The first LabVIEW Program (General)
- Alignment grid, Pull-Down Menus, Floating Palettes
- Placing Items on Front Panel and Block Diagram
- Labeling, Changing font, style, size and color of text
- Assignment 2.2 - Master the Basic LabVIEW Skills (Front Panel and Block Diagram Basics)

PRACTICAL NO.03	Controlling Program Flow	4 HOURS

- Looping (For, While, Shift Registers, Uninitialized Shift Registers)
- Assignment 3.1 - Counting the loops
- Assignment 3.2 - Shift Register - Example
- While Loop + Case Structure Combination
- Assignment 3.3 - Equations/Calculator

PRACTICAL NO.04	LabVIEW Data Types	4 HOURS

- Numeric Types, Strings, Arrays
- Clusters
- Data type conversion
- Assignment 4.1
- Assignment 4.2
- Assignment 4.3

PRACTICAL NO.05	LabVIEW Charts	4 HOURS

- Waveform Charts Chart update modes, single and multiple plot charts
- Clearing charts
- Stacked and Overlaid Plots
- Assignment 5.1

PRACTICAL NO.06	LabVIEW Graphs	2 HOURS

- Single and Multiple Plot Waveform Graphs
- XY Graph
- Using Graph Palette
- Assignment 6.1

PRACTICAL NO.07	Exploring String	4 HOURS

- Using String Functions
- Parsing Functions
- Assignment 7.1 - String Construction
- Assignment 7.2 - More String Parsing

PRACTICAL NO.08	File I/O	2 HOURS

- How they work
- Express Writing and Reading of Measurement Files
- Assignment 8.1 - Writing to a Spreadsheet Files
- Assignment 8.2 - Reading from a Spreadsheet File

PRACTICAL NO.09	Signal Measurement and Generation	2 HOURS

- Introduction to Data Acquisition - DAQ and other Acronyms
- Selecting DAQ Measurement Hardware

PRACTICAL NO.10	Building an Application* and Documentation	8 HOURS

- Define the problem
- Specify the I/O Hardware
- First Design and then write Program
- VI and Control Description
- Printing LabVIEW Panels and Diagrams

PRACTICAL NO.11	Presentation	4 HOURS

- Prepare an users and a programmers manual for build application (template to be given)
- Present the build application in a team

***Building an Application:** Using LabVIEW, create a VI program that controls an experiment consisting of at least three instruments. (Fewer Instruments can be used if MANY functions are controlled by the VI.) The VI should include:

- Plotting of data on the screen
- Saving of data to a file. Saved data must be readable by a spreadsheet program (like Excel).
- At least 3 sub-VIs and at least 1 sub-VI embedded within another sub-VI (Student written).
- User-friendly instructions and controls
- At least one imported graphic and at least three different fonts and colors on the user interface window
- Adequate annotations within the block diagram window of all VIs and sub-Vis.

Note: Points will also be awarded for creativity and difficulty level of the projects.

TEXT BOOK

1. Jeffrey Travis, Jim Kring, LabVIEW for Everyone, Pearson Education, 3rd edition (ISBN: 978-81-317-2649-5)
2. Gary W. Johnson, Richard Jennings, LabVIEW Graphical Programming, McGraw Hill Education, 4th edition (ISBN: 978-1-25-900533-6)

REFERENCE BOOK

1. Jerome Jovitha, Virtual Instrumentation using LabVIEW, PHI, 1st edition (ISBN: 978-8120340305)
2. Rick Bitter, TaqiMohiuddin, Matt Nawrocki, LabVIEW Advanced Programming Techniques, CRC Press, 2nd edition (ISBN: 978-08-493-3325-5)
3. National Instruments LabVIEW User Guide

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	MATLAB
	COURSE CODE	ET305
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : AS202-Applied mathematics

COURSE OBJECTIVES :

ET305.CEO.1: Introduce the MATLAB and SIMULINK environment.
ET305.CEO.2: Analyze and model a given system using MATLAB programming
ET305.CEO.3: Get explore to Graphical User Interface

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET305.CO.1: Use MATLAB and Simulink for Problem Solving
ET305.CO.2: Construct a Mathematical model of a given system
ET305.CO.3: Build a GUI for a given application

PRACTICAL		
PRACTICAL NO.01	**Overview of MATLAB and Scilab**	**10 HOURS**
• Matrix multiplication without using inbuilt MATLAB function • MATLAB program to sort n numbers contained in an array • Introduction to Scilab • To Differentitation between MATLAB and Scilab • Programming in Scilab		
PRACTICAL NO.02	**Advanced MATLAB functions**	**08 HOURS**
• Function call, User defined functions and examples • Advanced MATLAB functions • Conditional and nested conditional statements		
PRACTICAL NO.03	**Simulink and Simscape**	**08 HOURS**
• Link .m file and .mdl file • Modelling in Simulink as well as in Simscape • Multi domain system modelling using Simscape		
PRACTICAL NO.04	**Graphical User Interface**	**08 HOURS**
• Introduction of GUI • Creating visual aspects of GUI • Example : Temperature conversion		
PRACTICAL NO.05	**Statistics and Searching**	**08 HOURS**
• Statistical functions • Set operations • Indexing into vectors of structures • Sequential and binary search		

PRACTICAL NO.06	Toolboxes	08 HOURS

- Signal Processing Toolbox
- Image Processing Toolbox

PRACTICAL NO.07	Project	06 HOURS

- Identify domain for particular application
- Use above toolbox
- Build a software project based on the selected application (GUI is must)

PRACTICAL NO.08	Presentation	04 HOURS

- Present the application in group

TEXT BOOKS

1. Stephan J. Chapman, MATLAB Programming for engineers, 5th edition, Cengage Learning, ISBN 9781111576721
2. Amos Giliat, MATLAB : An introduction with applications, New Delhi, Wiley Publications, 4th edition, ISBN:9788126537204

REFERENCE BOOK

1. Patrick Marchand, Graphics and GUIs with MATLAB, CRC Web site, 3rd edition, ISBN-13: 978-1584883203

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Embedded Linux
	COURSE CODE	EX304
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : EX202 - Applied Digital Circuits, IT201 - Engineering Informatics

COURSE OBJECTIVES :

EX304.CEO.1: To configure and implement Linux Kernel for embedded hardware
EX304.CEO.2: To design program for Embedded application using open source Linux platform

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX304.CO.1: Explore the features of Linux through command line and shell programming
EX304.CO.2: Demonstrate the usage of file system in Linux
EX304.CO.3: Implement Linux scheduling algorithms
EX304.CO.4: Configure and use toolchain in the embedded Linux environment
EX304.CO.5: Design the various device drivers for embedded application

PREAMBLE :

Linux has been adopted for embedded products in the worldwide public switched telephone network, global data networks, and wireless cellular handsets, as well as radio node controllers and backhaul infrastructure that operate these networks. Linux has enjoyed success in automobile applications, consumer products such as games and PDAs, printers, enterprise switches and routers, and many other products.

Linux supports a vast variety of hardware architectures, platforms, and devices. Linux supports a huge variety of applications and networking protocols. Linux is scalable. Linux can be deployed without the royalties required by traditional proprietary embedded operating systems.

An increasing number of hardware and software vendors now support Linux. Embedded Linux has won the race. Indeed, you probably have embedded Linux in your car or home. The reasons for the rapid growth in Embedded Linux:

- Adoption of Linux among developers and manufacturers of embedded products continues to accelerate
- Use of Linux in embedded devices continues to grow at an exciting pace
- Many factors are driving the growth of Linux in the embedded market
- Several standards and relevant organizations are influencing embedded Linux

PRACTICAL : Perform following Practical on any Linux Distribution		
PRACTICAL NO.01	**Title**	**2 HOURS**
• Basic Linux Commands and Linux File System		
PRACTICAL NO.02	**Title**	**2 HOURS**
• Basic C Programming in Linux using GCC		
PRACTICAL NO.03	**Title**	**4 HOURS**
• Configure, Compile and deploy the Linux Kernel on ARM9 based Embedded Board		
PRACTICAL NO.04	**Title**	**2 HOURS**
• Building the experimental setup for the Embedded Linux Development on ARM9 Target Board		

PRACTICAL NO.05	Title	4 HOURS
• Build and execute simple applications in Embedded Linux Environment viz. Single Thread, Thread communication and synchronization		
PRACTICAL NO.06	**Title**	**2 HOURS**
• Implementation of Kernel Loadable Device Driver Module in Embedded Linux Environment		
PRACTICAL NO.07	**Title**	**2 HOURS**
• Handling of an External Interrupt in Embedded Linux Environment		
PRACTICAL NO.08	**Title**	**8 HOURS**
• Capstone Project		

TEXT BOOKS

1. Daniel P. Bovet, Understanding the Linux Kernel, 3rd Edition, O'Reilly Publication, ISBN-13: 978-0596005658
2. Karim Yaghmour, Jon Masters, Gilad Ben-Yossef, & Philippe Gerum, Building Embedded Linux systems", 2nd Edition, O'Reilly Publication, ISBN-13: 978-0596529680
3. Alessandro Rubini & Jonath Corbet, Linux Device Drivers", 3rd Edition, O'Reilly Publication, ISBN: 978-0-596-00590-0

REFERENCE BOOK

1. Chris Simmonds Mastering Embedded Linux Programming, 2nd revised Edition (30 June 2017), Packt Publishing Limited; ISBN-13: 978-1787283282
2. Gene Sally, Pro Linux Embedded System, Apress; 1st ed. edition (28 December 2009), ISBN-13: 978-1430272274
3. Christopher Hallinan, Embedded Linux Primer: A Practical Real-World Approach, 2nd Edition, Prentice Hall Publications, ISBN-13: 978-0137017836
4. The Atmel ARM926EJ-S ARM Thumb Processor - based Microcontroller AT91SAM9260 manual
5. Linux Standard Base Project, http://www.linuxfoundation.org/collaborate/workgroups/lsb

Capstone Projects

Building applications on ARM9 based Embedded Development boards deployed with Embedded Linux The following problems are suggested by Industry experts

A **Design of Device Driver Character Device Driver**

1. Write a device driver to interface LCD
2. Write a device driver to interface Matrix Key Board
3. Write a device driver to interface UART Based Devices like GSM Modem, RFID, Thermal Printer, Finger print module
4. Write a device driver to interface EEPROM based on I2C Peripheral

B **Applications on Embedded Linux**

1. Build an application for attendance systems using Finger print, LCD, Keyboard
2. Build an application for attendance systems using RFID Card, LCD, Keyboard
3. Build an application for Billing systems using Thermal Printer, LCD, Keyboard, EEPROM
4. Build an application for billing systems using Finger Print, LCD, Keyboard
5. Build an application for communication based display solutions using GSM Modem, LCD, Keyboard

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Digital Communication
	COURSE CODE	ET321
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	–	150

PRE-REQUISITE : ET211- Signal and Systems, ET302-Analog Communication

COURSE OBJECTIVES :

ET321.CEO.1: Review the fundamental concepts which are essential from communication point of view
ET321.CEO.2: Scrutinize various modulation and demodulation techniques
ET321.CEO.3: Examine error performance in digital communication system
ET321.CEO.4: Understand information theoretic behavior in communication system, several source and channel coding techniques
ET321.CEO.5: Learn each process of typical communication system in detail

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET321.CO.1: Illustrate the fundamental concepts of random variables and processes (L2)
ET321.CO.2: Inspect different modulation and demodulation schemes (L4)
ET321.CO.3: Analyze techniques for effective estimation & detection at receiver (L4)
ET321.CO.4: Examine multiplexer hierarchies and multiple access techniques (L4)
ET321.CO.5: Analyze various source and channel coding methods (L4)

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Digital Communications & First Degree**	**08 HOURS**
Review of random variables and Stochastic processes, Block diagram of communication system, Types of wireless channels, Sampling and quantization, Transmitter and receiver		
UNIT 2	**Digital Modulation Techniques& First Degree**	**09 HOURS**
Signal space representation, Signal space concept, Orthogonality Representation of digitally modulated signal: Basis function, Constellation diagram, Gram Schmidt process, Digital modulation techniques: Amplitude, phase and frequency shift keying, Continuous phase modulation		
UNIT 3	**Receiver Techniques.**	**09 HOURS**
Classification of receivers, Correlation and Matched filter demodulator, Estimation and detection, Optimal receiver, Maximum Aposteriori Probability and Maximum Likelihood receiver, Analysis of receiver in AWGN channel		
UNIT 4	**Multiple Access Techniques**	**09 HOURS**
Multiplexers and hierarchies, Timing and frequency synchronization, inter-symbol interference and its mitigation, equalization, Basics of TDMA, FDMA and CDMA, Spread spectrum technique, Introduction to OFDM		
UNIT 5	**Information Theory, Capacity and Coding**	**09 HOURS**
Introduction to information theory, Entropy, Mutual Information, Source coding theorem, Types of source encoding, Channel capacity, Information capacity theorem, Channel encoding theorem, Types of channel encoding, hamming distance, hamming weight, Error correction and detection capability		

PRACTICAL: Perform following experiments using MATLAB / Hardware experiments		
PRACTICAL NO.01	**Pulse Code Modulation**	**2 HOURS**
Study of Pulse Code Modulation (PCM) (Hardware)		
PRACTICAL NO.02	**Delta Modulation**	**2 HOURS**
Study of Delta Modulation (DM) (Hardware)		
PRACTICAL NO.03	**Adaptive Delta Modulation**	**2 HOURS**
Study of Adaptive Delta Modulation (ADM) (Hardware)		
PRACTICAL NO.04	**Binary Phase Shift Keying**	**2 HOURS**
Perform BPSK modulation technique. (Hardware)		
PRACTICAL NO.05	**Quadrature Phase Shift Keying**	**4 HOURS**
Perform QPSK modulation technique. (Hardware)		

PRACTICAL NO.06	**Binary Frequency Shift Keying**	**2 HOURS**
Perform BFSK modulation technique. (Hardware)		
PRACTICAL NO.07	**Direct Sequence Spread Spectrum**	**4 HOURS**
Generation and detection of DSSS and observe its spectrum (Hardware)		
PRACTICAL NO.08	**Line Codes and Spectral Analysis**	**2 HOURS**
Study of various data formats and their spectrum (Hardware)		
PRACTICAL NO.09	**PN Sequence & its spectrum**	**2 HOURS**
Study of generation of PN sequence and its spectrum (Hardware)		
PRACTICAL NO.10	**Error probability of BPSK and QPSK**	**4 HOURS**
Write a MATLAB program to calculate and plot the error probability of any BPSK and QPSK modulation schemes.		

TEXT BOOK

1. 1. John G. Prokis, Masoud Salehi, Communication Systems Engineering, Pearson Always learning, 2nd edition ISBN-13: 9787040169058
2. 2 Bernard Sklar, Digital Communication , Pearson, 2nd Edition, ISBN: 9788131720929
3. 3. P. Ramkrishna Rao, Digital Communication, TMH, ISBN: 9780070707764

REFERENCE BOOK

1. G.B. Thomas, Maurice D.Weir, Joel R. Hass, Thomas Calculus, 12 th edition, Pearson Education, 2002, ISBN: 9789332519091
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house , 2010, ISBN: 8173194203.
4. Peter V. ONeil, Advanced Engineering Mathematics, 7 th edition, Cenage Learning, 2012, ISBN: 13: 9788131503102.
5. Dennis G. Zill & Warren S. Wright, Advanced Engineering Mathematics, 4 th edition,Dennis G. Zill & Warren S. Wright, Advanced Engineering Mathematics, 2011, ISBN: 10: 0-7637-7966-0, ISBN: 13: 978-0-7637-7966-5.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Digital Signal Processing
	COURSE CODE	ET322
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : AS202 - Applied Mathematics, ET211 - Signals and Systems

COURSE OBJECTIVES :

ET322.CEO.1: Understand the concept of digital signal processing and its implications and applications in diverse engineering problems
ET322.CEO.2: Study different transforms and their use in design and analysis of LTI Systems.
ET322.CEO.3: Learn the design and realization of IIR and FIR filters by different methods.
ET322.CEO.4: Study the concept of multirate signal processing
ET322.CEO.5: Gain familiarity with DSP ProcessorTMS320C6713

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET322.CO.1: Analyze LTI systems using DFT
ET322.CO.2: Model IIR and FIR filters
ET322.CO.3: Develop single stage and multi-stage sampling rate converters
ET322.CO.4: Infer the problems based on properties of partial differentiation.
ET322.CO.5: Build practical applications using DSP processor in the context of architecture and programming

THEORY COURSE CONTENT		
UNIT 1	**Discrete Fourier Transform**	**9 HOURS**
Introduction to DSP, Basic Elements, Requirements, Advantages and Features Review: Sampling and Reconstruction, System Analysis using Z-Transform Discrete Fourier Transform (DFT): Concept, Properties, Circular and Linear Convolution, FFT Algorithms: Decimation in Time (DIT) and Decimation in Frequency (DIF), Linear Filtering: Overlap-Add and Overlap-Save method. **Applications: Spectral Analysis, JPEG Image compression using DCT & Video Compression using MPEG.**		
UNIT 2	**IIR Filter Design**	**9 HOURS**
Concept of IIR, Design methods Approximation of Derivatives, Impulse Invariance, Bi-linear Transformation. Analog Approximations: Butterworth, Chebychev, Elliptic, Bessel. Frequency transformations, Filter Structures. **Applications: IIR filter design for real time Applications**		
UNIT 3	**FIR Filter Design**	**8 HOURS**
Concept of FIR, Need of Linear Phase, Concept of Group Delay and Phase Delay, Linear phase constraint: Symmetric and Anti-symmetric response, Types of linear phase filter, Design using Window Method and Frequency Sampling Method, Filter Structures. **Applications: ECG Signal**		
UNIT 4	**Multirate Signal Processing**	**8 HOURS**
Concept, Decimation by factor D, Interpolation by factor I, Sampling rate conversion by a rational factor I/D, Filter Design for sampling rate conversion, Multistage approach to sampling rate conversion. **Applications: Speech & audio coding**		
UNIT 5	**DSP Processors**	**8 HOURS**
Architecture, Hardware Units, Fixed-Point and Floating-Point Formats Finite Word Length Effects, Programming Issues, Real-Time Implementation. Case Study of Digital Signal Processor TMS320C6xxx: Architecture **Applications: Implementation of IIR and FIR Filters, FFT Algorithm, Fast Convolution**		

PRACTICALS

1. The labs 1 to 5 are to be performed using software like C/ MATLAB/ SCILAB etc.

2. The labs 6 to 7 are to be performed using DSP Processor

PRACTICAL NO. 1	**Discrete Fourier Transform (DFT) Properties and Applications**	**4 HOURS**
1. To implement properties of DFT 2. To find the frequency response from the impulse response using DFT 3. To implement Spectral Analysis Using the DFT		
PRACTICAL NO.02	**Spectral Analysis and Leakage Effect**	**4 HOURS**
1. To implement DIT & DIF FFT algorithm. 2. To implement Spectral Analysis Using the FFT. 3. To find the Spectral Leakage Effect using FFT algorithm		
PRACTICAL NO.03	**IIR Filter Design**	**4 HOURS**
1. To design and implement Butterworth IIR filter using FDA tool and Simulink 2. To design and implement Chebychev IIR filter using FDA tool and Simulink		
PRACTICAL NO.04	**FIR Filter Design**	**4 HOURS**
1. To design and implement FIR filter using windowing method 2. To design and implement Low Pass FIR Filtering for high frequency noise removal 3. FIR filter to remove 50/60Hz from an ECG signal		
PRACTICAL NO.05	**Multirate Filter Design**	**2 HOURS**
Design and Simulate Multirate Filter		
PRACTICAL NO.06	**DSP Processor**	**2 HOURS**
DSP Starter Kit Signal Generation, Convolution, I/O Interface		
PRACTICAL NO.07	**Case Study**	**2 HOURS**
Mini project based on society, science and technology problem clubbed with paper implementation (MATLAB, Scilab and Simulink) and presentation (Define problem, data collection, requirement analysis, functional analysis. Design solution, progressive presentation of solution and final presentation)		
PRACTICAL NO.08		**4 HOURS**
1. Implementation of Filter IIR/FIR. 2. Implementation of FFT Algorithm		

TEXT BOOKS

1. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 4th Ed., Pearson, 2007 (ISBN: 9788131710005)
2. Sen M. Kuo and Woon-Seng S. Gan, Digital Signal Processors: Architectures, Implementations and Applications, 1st Ed., Pearson, 2010 (ISBN: 9788131717936)
3. S. K. Mitra, Digital Signal Processing- A Computer Based approach , 3rd Ed., McGraw Hill Education, 2007 (ISBN: 978-007066756)
4. L. R. Rabiner and and R. W. Schafer, Digital Processing of Speech Signals, Prentice Hall (ISBN: 9780132136037)
5. A. Murat Tekalp, Digital Video Processing, 1st Edition, Prentice Hall, (ISBN: 9780131900752)

REFERENCE BOOK

1. Emmanuel C. IFaeachor and Barrie W. Jervis, Digital Signal Processing : A Practical Approach, 2nd Edition, Pearson, 2008 (ISBN: 9788131708248)
2. Alan V. Oppenheim and Ronald W. Schafer,Discrete Time Signal Processing, 3rd Edition, Pearson, 2013 (ISBN: 9789332505742)
3. Li Tan, Digital Signal Processing :Fundamentals and Applications, 1st Edition, Elsevier-Academic Press, 2008 (ISBN: 9780123740908)
4. P. P. Vaidyanathanm, Multirate Systems And Filter Banks, 1st Edition, Pearson, 2008 (ISBN: 978-0136057185)
5. Wills Tompkins, Biomedical Digital Signal Processing, Prentice Hall, 1999 (ISBN: 9780130672162)
6. TMS320C6XXX CPU and Instruction Set Reference guide, Texas Instruments, 2000 (www.ti.com)
7. V.K Ingle and J. G. Proakis, Digital Signal Processing using MATLAB, Thompson Brooks/ Cole Singapore, 2007

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Antenna Theory and Design
	COURSE CODE	ET323
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : AS202 - Applied Mathematics, ET212 - Network Analysis Techniques

COURSE OBJECTIVES :

ET323.CEO.1: Understand Maxwells Equation and Apply to the basic electromagnetic problems.
ET323.CEO.2: Study the techniques of impedance matching using smith chart.
ET323.CEO.3: Understand the concept of radiation mechanism and various techniques involved in antenna parameter measurement.
ET323.CEO.4: Analyze and develop mathematical model of an antenna.
ET323.CEO.5: Understand the concept of micro-strip radiations.
ET323.CEO.6: Study the concept of antenna array and antennas for various applications.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET323.CO.1: Explain Maxwells Equation, uniform plane waves and its implications in antenna and wave propagation.
ET323.CO.2: Calculate basics antenna parameters and identify antenna specifications.
ET323.CO.3: Understand the concept of radiation mechanism and various techniques involved in antenna parameter measurement.
ET323.CO.4: Analyze and develop mathematical model of an antenna.
ET323.CO.5: Explain the concept of micro-strip radiations
ET323.CO.6: Develop the concept of antenna array from a single element for various applications

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Electromagnetic Theory**	**10 HOURS**
Electromagnetic Spectrum, applications in various bands of electromagnetic spectrum, representation of electromagnetic waves, review of Faradays Law, Amperes Law, Gauss Law and Biot- Savart Law, Greens Theorem, Formulation of Maxwells Equation, phasor representation of Maxwells Equation, Poynting Vector and Poyntings Theorem. **Self-Study Component:** Vector Algebra, Physical Significance of Divergence and Curl, Coordinate System - Cartesian, Spherical and Cylindrical (Source: NPTEL Lectures Prof. Shevgaonkar, IIT Bombay).		
UNIT 2	**Antenna Basics**	**08 HOURS**
IEEE Definition of antenna, various types of antenna and their application, antenna parameters, test equipment used for measuring antenna parameters, auxiliary potential functions, and electric field for electric and magnetic current sources, magnetic field for electric and magnetic current sources, far field radiation. Analysis of linear wire antenna: infinitesimal dipole. **Applications:** C-Band Antenna in A DTH, Dielectric Antenna in Cellular Mobile Phone. **Self-Study Component:** Analysis of linear wire antenna: small dipole, finite length dipole, half wavelength dipole, and monopole. **Self-Study Component:** Survey report on types of antenna on a typical base transmission tower.		
UNIT 3	**Linear Antenna Arrays and Broad Band Dipoles**	**06 HOURS**
Introduction to arrays, two element array, N-element linear array: Uniform amplitude and spacing, directivity. Introduction to broad band dipole, biconical antenna, triangular sheet, Bow-tie, cylindrical dipole, folded dipole. **Applications:** Multi-Function Array Radar **Self-Study Component:** Antenna Beam Steering using YIG Phase Shifters		
UNIT 4	**Introduction to Micro-strip radiators**	**06 HOURS**
Characteristics, advantages and dis-advantages of Micro-Strip Antennas (MSA), feeding techniques, methods of analysis of MSA, radiation mechanism of MSA, broadband techniques for MSA. **Applications:** Conformal Antenna on Missiles.		
UNIT 5	**Regularly Shaped Broad Band MSA**	**06 HOURS**
Introduction to Rectangular MSA, models for RMSAs, design consideration of RMSA, tolerance analysis of RMSA, higher order modes of RMSA, Analysis of various plots related to RMSA. **Application:** Antennas used in telemetry **Self - Study Component:** Introduction to circular MSA and semi-circular MSA		
UNIT 6	**Design and Analysis of Microstrip Array Design**	**06 HOURS**
Introduction to Microstrip Array Design, Fractal Antenna **Case Study I:** Linear Array Design with Microstrip Patches. **Case Study II:** Meta-Materials.		

PRACTICAL		
PRACTICAL NO.01	**Measurement of various parameters of dipole antenna**	**2 HOURS**
1. To setup configuration 2. To tabulate received SNR in dB 3. To generate radiation patterns 4. To analyze the radiation patterns		
PRACTICAL NO.02	**Measurement of various parameters of folded dipole antenna**	**2 HOURS**
1. To setup configuration 2. To tabulate received SNR in dB 3. To generate radiation patterns 4. To analyze the radiation patterns		
PRACTICAL NO.03	**Measurement of various parameters of parabolic reflector antenna**	**2 HOURS**
1. To setup configuration 2. To tabulate received SNR in dB 3. To generate radiation patterns 4. To analyze the radiation patterns		
PRACTICAL NO.04	**Measurement of various parameters of Yagi-Uda antenna**	**2 HOURS**
1. To setup configuration 2. To tabulate received SNR in dB 3. To generate radiation patterns 4. To analyze the radiation patterns		

PRACTICAL NO.05	Introduction to Ansys High Frequency Simulation Software	2 HOURS
1. To setup project by launching HFSS 2. To setup project by creating substrate 3. To set up project by creating co-axial feed		
PRACTICAL NO.06	**Introduction to Ansys High Frequency Simulation Software Analyzing the model**	**2 HOURS**
1. To add solution setup 2. To add frequency sweep 3. To validate checks 4. To create reports		
PRACTICAL NO.07	**Design of probe feed patch antenna (RMSA) using HFSS**	**6 HOURS**
1. To formulate design parameters for a given frequency of operation 2. To repeat steps of Exp.5 with different feed configuration		
PRACTICAL NO.08	**Analysis of probe feed patch antenna (RMSA) using HFSS**	**2 HOURS**
1. To create reports of Exp. 7 2. To analyze the radiation pattern E and H fields 3. To analyze VSWR plots 4. To analyze reflection coefficients 5. To summarize the design		
PRACTICAL NO.09	**HFSS simulation of antenna matching network**	**2 HOURS**
HFSS simulation of antenna matching network		
PRACTICAL NO.10	**Design and simulation of dipole antenna using HFSS**	**2 HOURS**
Design and simulation of dipole antenna using HFSS		

PRACTICAL NO.11	Design and simulation of monopole antenna using HFSS	2 HOURS
Design and simulation of monopole antenna using HFSS		
PRACTICAL NO.12	**Design and simulation of antenna array using HFSS**	**2 HOURS**
Design and simulation of antenna array using HFSS		

TEXT BOOK

1. Girish Kumar and K. P. Ray, Broadband Microstrip Antenna, Artech House, Boston, London, ISBN 1-58053-244-6.
2. Constantine A. Balanis, Antenna Theory- Analysis and Design, Third edition, John Wiley & Sons, ISBN-0-471-66782-X.
3. Mathew N.O. Sadiku, Elements of Electromagnetics, 6Th Edition, Oxford University Press, 2014, ISBN-9780199743001.

REFERENCE BOOK

1. John D. Kraus, Antenna,Second edition, Tata-McGraw Hill, ISBN-0-07-035422-7.
2. Ramesh Garg, Parkash Bhartia, Inder Bahl and Apisak Ittipiboon,"Microstrip Antenna Design Handbook", Artech House, Boston, London, ISBN 0-89006-513-6

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Embedded Processor
	COURSE CODE	ET331
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Engineering tools & techniques, Embedded System Programming

COURSE OBJECTIVES :

ET331.CEO.1: Learn 32-bit microcontroller by understanding the architecture of ARM core.

ET331.CEO.2: Get acquainted with reconfigurable hardware platforms, operating systems,Test and verification tools etc. for embedded systems implementations.

ET331.CEO.3: Get familiar with basic concepts of embedded networking viz. CAN / Ethernet /GPS/GSM.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET331.CO.1: Design embedded processor based devices in real-world applications.

ET331.CO.2: Explain Architecture of ARM core & ARM 7 based microcontroller.

ET331.CO.3: Implement a solution using a combination of hardware (microcontroller) and software (Embedded firmware & its tool chain).

ET331.CO.4: Utilize the standard ports and interface devices on a typical microcntroller

THEORY COURSE CONTENT		
UNIT 1	**Introduction to ARM**	**8 HOURS**
Design approaches - CISC and RISC, ARMs approach towards RISC, Processor and memory organization and Instruction level parallelism, Comparison between 8/16/32 bit micro-controllers.		
UNIT 2	**Architecture: ARM Processor**	**8 HOURS**
ARM core architecture, ARM Pipeline, Register Set, ARM and Thumb instruction set, ARM programmers model, AHB and APB BUS architectures, Memory organization, Architectural support for higher level languages, Architectural support for Operating systems, Assembly and C programming for ARM, System Peripheral interfaces and System serial interfaces.		
UNIT 3	**ARM Exceptions and Interrupt Handling**	**8 HOURS**
Exception types in ARM, External interrupt, software interrupts handling, Abort handling, Vectored Interrupt Controller, Basic Configuration, Interrupt Sequences, Interrupt Latency. Architecture & features of LPC21XX, Memory map, PLL & VPB Divider, Pin connect block..		
UNIT 4	**Real World Interfacing**	**8 HOURS**
Use of ARM core based microcontroller interfacing with LCD, GLCD, Matrix KEYPAD, Working with timers and ADC/DAC, Interfacing GSM, GPS, Serial communication methods-UART, I2C and CAN, Wi-Fi module ESP8266 and AT Commands.		
UNIT 5	**GNU ARM Linux Tool Chain.**	**8 HOURS**
Concept of cross development, Cross development tools -GNU compiler, assembler, linker etc. Development tools and toolchains required for ARM/Linux applications. Tool chain build using buildroot. Linux based terminal -Minicom. JTAG debugging tools. First Linux application on ARM: Hello world!, Introduction to Ethernet and TCP/IP.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Using the serial interface (UART) form a communication link between two boards and exchange data between them.		
PRACTICAL NO.02		**4 HOURS**
Interfacing of EEPROM with LPC21XX using I2C.		
PRACTICAL NO.03		**4 HOURS**
Interfacing of GSM Module with LPC21XX		

PRACTICAL NO.04		**4 HOURS**
Interfacing of GPS Module with LPC21XX		
PRACTICAL NO.05		**2 HOURS**
Display a simple hello world message on a HTML page using ARM microcontroller and ESP8266 Wi-Fi.		
PRACTICAL NO.06		**2 HOURS**
Interface LED with LPC 21XX		
PRACTICAL NO.07		**4 HOURS**
On chip ADC interfacing with LPC21XX		
PRACTICAL NO.08		**2 HOURS**
On chip Timer interfacing with LPC21XX		
PRACTICAL NO.09		**4 HOURS**
GLCD Interfacing with LPC21XX		

TEXT BOOK

1. Steve Furber, ARM System on Chip Architecture, 2nd Edition, Pearson, 2001, ISBN: 9788131708408
2. Andrew N. Sloss, Dominic Symes and Chris Wright, ARM System Developers Guide: Designing and Optimizing System Software, 1st Edition, Morgan Kaufmann Publishers, 2011, ISBN: 1-55860-874-5

REFERENCE BOOK

1. Trevor Martin, The Insiders Guide to Philips ARM7-Based Microcontrollers: An Engineers Introduction To The LPC2100 Series, Hitex (UK) Ltd.
2. LPC 214x User manual (UM10139) :- www.nxp.com
3. ARM architecture reference manual : - www.arm.com

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	IoT Network and Protocols
	COURSE CODE	ET332
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : IoT Architecture and Sensors, Computer Programming

COURSE OBJECTIVES :

ET332.CEO.1: Understand the basic taxonomy and terminology of networking.
ET332.CEO.2: Know transmission fundamental of physical layer.
ET332.CEO.3: Learn different protocols used in IoT.
ET332.CEO.4: Differentiate between IoT & M2M communication.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET332.CO.1: Interpret fundamentals underlying principles of networking.
ET332.CO.2: Explain the types of transmission media with real time applications.
ET332.CO.3: Analysis the protocols used in IoT.
ET332.CO.4: Distinguish between IoT and M2M communication.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Networking**	**08 HOURS**
Introduction to Layered Network Models(OSI &TCP/IP),Basic Elements of Networks,Network Topologies,Network Architectures,Collision&Broad cast Domain,Ethernet Standards IEEE 802.3, Types of Networks,Conversion of Number System,Addressing Types,Design Issues for layers.		
UNIT 2	**Transmission Fundamentals**	**06 HOURS**
Data Rate Limits,Transmission Media,Switching Systems,Structure of Circuit and Packet Switch Networks.		
UNIT 3	**Networks Protocols**	**10 HOURS**
RFID,IEEE802.15.4,IPV6/IPV4,IPv6overLowPower Wireless Personal Area Networks (6WLoWPAN), Zigbee, User Datagram Protocol(UDP),Bluetooth and Bluetooth Low Energy ,Near Filed Communications(NFC), WiMax.		
UNIT 4	**Communications Protocols**	**08 HOURS**
CoAP, AMQP, MQTT, WiFi, WebSockets, LoRA		
UNIT 5	**IoT & M2M Communications**	**08 HOURS**
M2M,difference between IoT and M2M,ETSI M2M Architecture,system architecture, ETSI M2M SCL resource structure,SDN and NFV for IoT.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Configure a network topology using packet tracer software : Collision Domain & Broadcast Domain.		
PRACTICAL NO.02		**2 HOURS**
Basic Network command and Network Configuration Using Packet Tracer.		
PRACTICAL NO.03		**2 HOURS**
Creation of VLAN Using Packet Tracer.		
PRACTICAL NO.04		**2 HOURS**
Interfacing of WiFi/Xbee, module with Arduino.		
PRACTICAL NO.05		**2 HOURS**
Wireless communication between Arduino and PC using Bluetooth protocol.		

PRACTICAL NO.06		4 HOURS
Integrating of sensors, UDP data transfer from client to server.		
PRACTICAL NO.07		**4 HOURS**
Integrating of sensors and transmitting its data over a UDP socket to a server.		

TEXT BOOK

1. Arshdeep Bahga, Vijay Madisetti, Internet of Things, A Hands -on Approach, 1 st edition, University Press, 2015, ISBN: 978-81-7371- 954-7.
2. AndrewS.Tenenbaum , Computer Networks, PHI, 2014, ISBN: 81-203-2175-8

REFERENCE BOOK

1. Oliver Hersent, David Boswarthick, Omar Elloumy, The Internet of Things, 1 st edition,Mcgraw Higher EdWilly Publication,2015, ISBN: 978-81-265-5686-1.
2. Bernd Scholz-Reiter,Florian Michahelles, Architecting the Internet of Things, Springer, 2014, ISBN: 978-3-642-19157-2.
3. Holger Karl and Andreas Willing, Protocols and Architectures for Wireless Sensor Networks , WileyIndia, 2016, ISBN: 9788126533695.
4. Fourauzan B, Data Communications and Networking, 5 th edition, Tata McGraw- Hill, 2010, ISBN: 0 07058408 7.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Kinematics and Dynamics
	COURSE CODE	EX331
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : ME103 : Design Thinking, EXT301: Fundamental Of Robotics, ME105 : Applied Mechanics

COURSE OBJECTIVES :

EX331.CEO.1: To Explore the definition and classification of acceleration.

EX331.CEO.2: To Apply essential features of accelerated motion to the analysis of simple motion Scenario. .

EX331.CEO.3: To Explore concept of kinematics and dynamics for position control.

EX331.CEO.4: To Prepare path planning for robotic system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX331.CO.1: Apply matrix algorithm for computing kinematics of robots.

EX331.CO.2: Analyze kinematics and reverse kinematics of serial and parallel robots.

EX331.CO.3: Prepare the path planning for robotic system.

EX331.CO.4: Calculate Jacobian for serial and parallel robots.

THEORY COURSE CONTENT		
UNIT 1	**Kinematics**	**6 HOURS**
Mechanisms Introduction to subject of study , motivation and aim , examples with motion and force requirements , Terminology and definitions , types of links and kinematic pairs , kinematics chains and their classification , kinematic diagram , DOF calculation , DOF for planer and spatial kinematic chain.		
UNIT 2	**Inversions**	**6 HOURS**
Robotic mechanisms, dead center or singular configuration, Presence of crank , 4R chains , inversion and assembly modes , displacement analysis , problem , forward and inverse kinematics. Spur gear, law of toothed gearing,Interchangeable gears, Gear tooth action interference and undercutting, gear trains.		
UNIT 3	**Basics of Mechanism Gear Train**	**6 HOURS**
Introduction to Mechanisms, Mechanisms and Simple Machines, The Inclined Plane Screw Jack		
UNIT 4	**Force Analysis**	**6 HOURS**
Applied and Constrained Forces ,Free body diagrams , static Equilibrium conditions, Two,Three and four members, Static Force analysis in simple machine members ,Dynamic Force Analysis , Inertia Forces and Inertia Torque , DAlemberts principle,dynamic Force Analysis in simple machine members.		
UNIT 5	**Torque and friction**	**6 HOURS**
Concept of torque and calculations. Sliding and Rolling Friction angle,friction in threads , Friction Drives , Friction clutches, Belt and rope drives, brakes , Tractive resistance.		
UNIT 6	**Dynamics**	**6 HOURS**
Free vibrations , Equations of motion , natural Frequency , Damped Vibration, bending critical speed of simple shaft, Torsional vibration , Forced vibration, harmonic Forcing , Vibration solation.		

PRACTICAL		
PRACTICAL NO.01		**02 HOURS**
Study of gear parameters. Experimental study of velocity ratios of simple, compound, Epicyclic and differential gear trains.		
PRACTICAL NO.02		**02 HOURS**
A. Kinematics of Four Bar, Slider Crank, Crank Rocker, Double crank, Double rocker, Oscillating cylinder Mechanisms. B. Kinematics of single and double universal joints.		
PRACTICAL NO.03		**02 HOURS**
Determination of Mass moment of inertia of Fly wheel and Axle system. Determination of Mass Moment of Inertia of axisymmetric bodies using Turn Table apparatus. Determination of Mass Moment of Inertia using bifilar suspension and compound pendulum.		

PRACTICAL NO.04		**02 HOURS**
Motorized gyroscope Study of gyroscopic effect and couple.		
PRACTICAL NO.05		**02 HOURS**
Determination of range sensitivity, effort etc., for Watts, Porter, Proel and Hartnell Governors.		
PRACTICAL NO.06		**02 HOURS**
Develop a 6-axis arm for performing industrial tasks, unique for every group.		
PRACTICAL NO.07		**10 HOURS**
Mini Project based on the above practicals (Capstone Project).		

TEXT BOOK

1. 1. Reza Jazar, Theory of Applied Robotics,2010 , Springer US , ISBN : 978-0-387-68964-7
2. Ambekar A.G., Mechanism and Machine Theory Prentice Hall of India, New Delhi, 2007 ISBN :978-8120331341.
3. 2. Shigley J.E., Pennock G.R and Uicker J.J., Theory of Machines and Mechanisms, Oxford University Press, 2003 , ISBN :978-0190264482

REFERENCE BOOK

1. 1. Rao.J.S. and Dukkipatti R.V. ,Mechanisms and Machines, Wiley Eastern Ltd., New Delhi, 1992.ISBN :978-8177581270.
2. Richard Klafter,Robotic Engineering: An Integrated Approach, Prentice Hall,ISBN: 978-8121926164.
3. John Hannah and Stephens R.C., Mechanics of Machines, Viva Low Prices Student Edition, 1999, ISBN : 978-0713132311

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP302
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	NIL	NIL	NIL	50	25	75

PRE-REQUISITE : Basic Communication Skills

COURSE OBJECTIVES :

HP302.CEO.1: To define the importance of professional skills in students life
HP302.CEO.2: To explain them necessary, specific professional skills
HP302.CEO.3: To appraise students for placements through acquisition of professional skills
HP302.CEO.4: To support them detect their present level in respect of each professional skill and show direction for improvement

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP302.CO.1: Relate the importance of professional skills(L2)
HP302.CO.2: Build necessary, specific professional skills (L3)
HP302.CO.3: Analyze the environment of employ-ability (L4)
HP302.CO.4: Develop various techniques of effective team building in their professional life(L6)

PRACTICALS: (SECTION A)		
PRACTICAL NO.01	**Self Awareness**	**2 HOURS**
Concept of Johari Window, Advantages and disadvantages of every quadrant, Identifying the proportion of each quadrant in respect of self, Using the tools of Feedback & Exposure for self-development		
PRACTICAL NO.02	**Personal Interviews**	**6 HOURS**
Preparing for Interviews, Typical expected questions & suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Parameters of assessment, Initiating the discussion, Effective listening, Own contribution, Paraphrasing, Arguing and counter-arguing, Giving direction to the discussion		
PRACTICAL NO.04	**Team building and Motivation**	**2 HOURS**
Hallmark of effective teams, Barriers to team work, Subjugation of Individual interests for achievement of teams goal, Leading & motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2 HOURS**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique, Collective and individual Brain Storming,		
PRACTICAL NO.06	**Decision Making**	**2 HOURS**
Levels of decisions, Process of decision-making, Types of criteria, Individual and collective decision-making, Barriers in decision making, Keys to sound decision-making		
SECTION B:	**Aptitude Training.**	

REFERENCE BOOK

1. Stephen Covey: The Seven Habits of Highly Effective People, Simon and Schuster Ltd, ISBN: 0-671-71117-2
2. Krishna Mohan, Meera Banerji, Developing Communication Skills, Birla Institute of Technology and Science, ISBN: 033392-919-5
3. Charles Kepner and Benjamin Tregoe, The Rational Manager: A systematic Approach to Problem Solving and Decision Making , Tata McGraw-Hill Publishing Company Ltd., ISBN:13:978-0070341753
4. Priyadarshini Patnaik, Group Discussion and Interview Skills , Foundation Books, 1st Ed.- 2011, ISBN No.: 9788175967847, 8175967846.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Mini Project
	COURSE CODE	ET324
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	20	NIL	55	75

PRE-REQUISITE : ET206: Prototyping, ET213: Minor project

COURSE OBJECTIVES :

ET324.CEO.1: Understand the Product Development Cycle through Mini project.

ET324.CEO.2: Undertake & execute a mini Project through a group of students.

ET324.CEO.3: Inculcate skills in engineering product design and development process, budgeting, planning, testing, effective trouble-shooting practices, aesthetics and ergonomics.

ET324.CEO.4: Understand the role of professional and ethical practices, management principles, technical documentation and communication skills in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET324.CO.1: Execute an idea in a team as well as within constraints.

ET324.CO.2: Acquire knowledge of the techniques, skills and modern engineering tools necessary for engineering practices.

ET324.CO.3: Use standard engineering tools and processes for design, simulation, testing, analysis in implementation and deployment of theoretical idea into practice.

ET324.CO.4: Use standard documentation and presentation tools for a professional report and presentation of the work.

PREAMBLE:
It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

PRACTICAL

Stage- 1	**Formation of group and Allocation of project adviser**	**Week-1**

1. Project group formation and project advisor allocation by the department.
2. Project group shall consist of Minimum 02 and maximum 03 students per group (For detailed process please check Annexure-1 Mini project guidelines).
3. Selection of finalized topic from approved project topics by the department.
4. The project design idea shall be based on refereed papers, white papers, product, patent, application notes, industry problem, academic, institute or societal requirement, funded research, innovative thought, modification/ development in existing idea etc.
5. Each student will maintain a logbook/project diary. This diary will be utilized to monitor project progress throughout.

Stage- 2	**Project Review -1 Internal review by project adviser**	**Week-2&3**

1. The project group will work on,
a. Conceptualization of an Idea.
b. Literature review.
c. Market survey.
d. Finalizing the Specifications.
2. Presentation of work progress to project adviser and proceed to project approval.

Stage- 3	**Project Review -2 Project Approval**	**Week-4**

1. Presentation of concept to Department Review Committee (DRC) or Committee appointed by department.
2. Review of concept and feasibility of project and necessary suggestions for implementation by the committee.
3. The project group will make corrections and continue their work.

Stage-4	**Project Review -3 Internal review by project adviser**	**Week- 5to9**

1. The project group will work on, a. System Architecture and Design, b. Simulation /software development (As applicable), c. Manufacturing of project, d. Assembly, e. Testing, f. Troubleshooting.
2. Presentation of work progress to project adviser and proceed to final project progress review.

Stage-5	Project Review -4 Final Project progress review	Week-10&11

1. The project group will work on, a. Result analysis against specifications, b.Enclosure/Aesthetic design (As applicable), c.Technical report generation (Draft copy), d. Users manual (As applicable), e. Bill of material etc.
2. The technical report may incorporate following points:
Title, Introduction and Concept, Literature & Market survey, Theory and relevance, Block diagram, Drawings (As applicable), Specifications, Project plan, Bill of material, Enclosure/aesthetic design (As applicable), Results, Results analysis, Conclusion, References.
3. Presentation of project work, draft copy of technical report, Final presentation etc. to DRC or Committee appointed by department.
4. Review of project progress and necessary suggestions by DRC or Committee appointed by department for final presentation.
5. The project group will make corrections. After clearing all comments from DRC; project can be presented to final l examination.
6. Project must be approved by department to appear for final examination.

Stage-6	Examination: Final Demonstration and presentation	Week-12

1. Final examination will be divided in three parts: a) Demonstration, b) Presentation, c) Project documentation.
2. For final examination project must be demonstrated in front of examiner panel. For Industry sponsored projects or other installations examiner panel can visit the project venue.
3. All students must be physically present in front of examiner panel at the time of examination.
4. Only demonstrated projects can be evaluated for presentation and documentation.
5. Mini Project demonstration: Demo of project works and validation of project results to examiners panel.
6. Mini Project presentation: Presentation of overall project work form project idea to implementation and deployment of project to examiners panel.
7. Mini Project documentation: Presentation of technical documentary report to examiners panel.

Assessment:

1. Internal Assessment:
a. Project Review -2 Project Approval -05 Marks
b. Project Review -3 Internal review by project adviser- -05 Marks
c. Project Review -4 Final Project progress review- 10 Marks
2. Examination: Final Demonstration and presentation:
a. Mini Project demonstration: 20 Marks
b. Mini Project presentation: 20 Marks
c. Mini Project documentation: 15 Marks

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Final Year

Bachelor of Technology in Electronics & Telecommunication Engineering

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**RELEASE DATE**	**:**	01/06/2019
	REVISION NO.	**:**	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ET401	VLSI Design	3	2	4
2.	DE1	ET41#	Department Elective - Refer Annexure	3	-	3
3.	OE3	ET42#	Open Elective - Refer Annexure	3	2	4
4.	HSS7	HP401	Engineering Economics	2	-	2
5.	HSS8 / SDP7	HP403 / ET403	Business Strategies / Programming in Java	-	2	1
6.	SDP8	ET402	Project – I	-	8	4
7.	SDP9	ET404	Summer Internship	-	-	4
TOTAL				**11**	**14**	**22**

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ET431	Advanced Communication Systems	3	2	4
2.	DE2	ET44#	Department Elective - Refer Annexure	3	-	3
3.	OE4	ET45#	Open Elective - Refer Annexure	3	2	4
4.	HSS9	HP402	Sociology	2	-	2
5.	SDP10	ET432	Project – II	-	8	4
TOTAL				**11**	**12**	**17**

Note: L: Lecture, P: Practical

DEPARTMENT ELECTIVE (DE) DETAILS

1) Any one course to be optedin Semester VII & VIII

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DE1.1	ET411	Digital Image Processing	3	-	3
2.	DE1.2	ET412	Microwave Engineering	3	-	3
3.	DE1.3	ET413	RISC Processors	3	-	3
4.	DE1.4	ET414	Machine Learning	3	-	3

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DE2.1	EX441	Biomedical Engineering	3	-	3
2.	DE2.2	ET442	Artificial Intelligence	3	-	3
3.	DE2.3	ET443	Wireless Sensor Network	3	-	3
4,	DE2.4	ET444	Speech Signal Processing	3	-	3

OPEN ELECTIVE (OE) DETAILS

1) Any one course to be selected in Semester VII& VIII.
2) The corresponding course to be chosen from same domain.

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	DOMAIN	COURSE	TEACHING SCHEME		
					L	P	CREDIT
1.	OE3.1	ET421	Embedded System	Low-Power SoC Architecture & Applications	3	2	4
2.	OE3.2	ET422	Internet of Things (IoT)	Privacy and Security in IoT	3	2	4
3.	OE3.3	EX421	Robotics & Automation	Robotics Vision	3	2	4

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	DOMAIN	COURSE	TEACHING SCHEME		
					L	P	CREDIT
1.	OE4.1	ET451	Embedded System	Real-Time Embedded System	3	2	4
2.	OE4.2	ET452	Internet of Things (IoT)	Energy Management for IoT Devices	3	2	4
3.	OE4.3	EX451	Robotics & Automation	Intelligent and High Performance Robotics	3	2	4

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	VLSI Design
	COURSE CODE	ET401
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	30	40	30	50	-	150

PRE-REQUISITE : EX202 - Applied Digital circuits

COURSE OBJECTIVES :

ET401.CEO.1: Understand qualitative analysis for the design of various circuits using MOS
ET401.CEO.2: Provide an overview of various processors like CPLD and FPGA
ET401.CEO.3: Explore VHDL and verilog programming and various parameters
ET401.CEO.4: Get familiar with faults and testing.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET401.CO.1: Design CMOS circuits for Specific digital logic.
ET401.CO.2: Apply the knowledge about PLDs, FPGA Design & architectures in implementing digital design.
ET401.CO.3: Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
ET401.CO.4: Apply knowledge of testability in design and build self test circuit.

THEORY COURSE CONTENT		
UNIT 1	**CMOS Design**	**6 HOURS**
MOS Transistors, CMOS Fabrication, CMOS Inverter, CMOS combinational Logic, Transistor Sizing, Power Dissipation, Noise Margin, Transmission Gate, Body Effect, Short Channel & Hot Electron Effect, Technology Scaling, Design Rules, Stick Diagram.		
UNIT 2	**PLD Architecture and Application**	**6 HOURS**
Need of PLDs, ASIC, Programmable logic devices, Types of PLDs, advantages and disadvantages of PLDs , Complex PLDs, Field Programmable Gate Arrays (FPGAs) , FPGAs Technology , Implementing Functions in FPGA. Case study: Xilinx Artix-7 FPGA family		
UNIT 3	**VHDL Design**	**7 HOURS**
Elements of VHDL, Modeling Styles, Sequential Statements, Concurrent Statements, Packages, Sub Programs, Attributes, VHDL Modeling Of Combinational, Sequential Logics & State Machine Modeling (Mealy And Moore Machine) VHDL Test Bench.		
UNIT 4	**Introduction to verilog Design**	**7 HOURS**
Overview of Digital Design with Verilog HDL, Program Structure, Logic System, Nets, Variables, And Constants,Vectors & Operators, Arrays, Logical Operators & Expressions. Hierarchical Modeling Concepts, data types, Modules and Ports,Gate-Level Modeling, Dataflow Modeling, Behavioral Modeling.		
UNIT 5	**VLSI Testing**	**6 HOURS**
Types of Fault, Need of Design for Testability (DFT), Testability, Difference between testing and verification, Path Sensitizing, Sequential Circuit Test, BIST, Test Pattern Generation, JTAG & Boundary Scan, TAP Controller. Metastability and Solution.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Write a Verilog code for Full adder.		
PRACTICAL NO.02		**2 HOURS**
Write a Verilog code for counter		
PRACTICAL NO.03		**2 HOURS**
Write a VHDL code for Mealy State Machine/Moore State Machine-examples		
PRACTICAL NO.04		**2 HOURS**
Universal shift register with mode selection input for SISO, SIPO, PISO, & PIPO modes.		

PRACTICAL NO.05		2 HOURS
• Write a VHDL code to implement FIFO memory. • Write a VHDL code to control the speed, direction of DC & stepper motor.		
PRACTICAL NO.06		**2 HOURS**
Write VHDL code to generate ramp/square waveform using DAC		
PRACTICAL NO.07		**2 HOURS**
Write a VHDL code to display messages on the given seven segment display / keypad interfacing.		
PRACTICAL NO.10		**2 HOURS**
Design and implementation of Layout of Inverter ,NAND, NOR using CMOS 0.25 micron Technology in Microwind.		
PRACTICAL NO.11		**2 HOURS**
Design and implementation of Layout of Full adder/ Multiplexer/Demultiplexer using CMOS 0.25 micron Technology in Microwind.		
PRACTICAL NO.12		**1 HOURS**
Design and implementation of Layout of 2:1 Multiplexer using logic gates and transmission gates.		

TEXT BOOK

1. Neil Weste and David Harris, Principles of CMOS Design, 4th Edition, Pearson Education, 2010, ISBN: 9780321547743
2. John F Wakerly, Digital Design-Principles and Practices, 4th Edition Pearson education, ISBN : 9780131863897.
3. Charles H. Roth,Digital systems design using VHDL, PWS. ISBN : 978-8131500279.
4. Samir Palnitkar, Verilog HDL: A Guide to Digital Design and Synthesis,2nd Edition Publisher: Prentice Hall PTR Publication, February 21, 2003, ISBN: 978-0132599702.

REFERENCE BOOK

1. Wyane Wolf, Modern VLSI Design (System on Chip), 4th Edition, Pearson Education,2008, ISBN: 9780137145003
2. Jayaram Bhasker ,A VHDL Primer, 3rd Edition, Prentice Hall,ISBN-10: 0130965758.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Digital Image Processing
	COURSE CODE	ET411
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : Signals & Systems

COURSE OBJECTIVES :

ET411.CEO.1: To identify various basic operations on an image
ET411.CEO.2: To analyze spatial and frequency domain processing on an image
ET411.CEO.3: To design an algorithm for image compression and segmentation
ET411.CEO.4: To develop algorithms for features extraction and filtering

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET411.CO.1: Analyze fundamentals of image processing
ET411.CO.2: Develop an algorithm for spatial and frequency domain filtering
ET411.CO.3: Determine various image compression and segmentation techniques
ET411.CO.4: Design various applications based on image processing

THEORY COURSE CONTENT		
UNIT 1	**Basics of Image Processing**	**8 HOURS**
Components and basic steps involved in digital image processing, Sampling and quantization of images, Grading image quality (Spatial and Gray level resolution), significance of various file formats of image. Basic operations on images image addition, subtraction, logical operations, scaling translation, rotation. Introduction to Color Image processing (RGB Model).		
UNIT 2	**Image analysis in Spatial Domain**	**8 HOURS**
Point processing techniques: Intensity transformation, contrast stretching, histogram, histogram equalization. Neighborhood processing techniques: Concept of 2D filtering (2D Convolution), Smoothing filters with mask size of 3x3 and 5x5 (Low pass filter, median filter). Sharpening filters (high pass filter).		
UNIT 3	**Image analysis in Frequency Domain.**	**7 HOURS**
Fast Fourier Transform, 2D FFT, Representing image in frequency domain. Gaussian low pass filtering and high pass filtering. Homomorphism filtering. Image Restoration: Noise models, restoration using Inverse filtering and Wiener filtering.		
UNIT 4	**Image Compression**	**6 HOURS**
Redundancy and compression relation. Image compression models, Lossless compression: Variable length coding, LZW coding. Lossy Compression: Transform based coding DCT based compression, JPEG compression standard.		
UNIT 5	**Morphological Image Processing and Segmentation.**	**6 HOURS**
Basic, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, Boundary, Detection, Hole filling, Connected components, convex hull, thinning, thickening skeletons, and pruning. Segmentation: Edge detection		
UNIT 6	**Image Processing Applications**	**7 HOURS**
Extracting various features from image, importance of features in various image processing applications & biomedical image processing application.		

TEXT BOOK

1. Rafael C Gonzalez and Richard E Woods. Digital Image Processing, 3rd Edition, Pearson, 2013 ISBN: 9789332518469.
2. S. Jayaraman, S Esakkirajan, T Veerakumar. Digital Image Processing, 3rd Edition, Tata McGraw Hill, 2011, ISBN: 9780070144798

REFERENCE BOOK

1. S. Annadurai and R. Shammugalakshmi. Fundamentals of Digital Image Processing, 1st Edition, Pearson, 2007, ISBN : 8177584790
2. William K Pratt. Digital Image Processing, 4th Edition, Willey, 2010,ISBN: 9788126526840
3. Arthur Weeks Jr. Fundamentals of Digital Image Processing, 1st Edition, Wiley-IEEE, 1996,ISBN: 9780780334106.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Microwave Engineering
	COURSE CODE	ET412
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : ET323 – Antenna Theory and design

COURSE OBJECTIVES :

ET412.CEO.1: Apply transmission line concepts.
ET412.CEO.2: Apply knowledge related to different waveguide structures and their modes.
ET412.CEO.3: Apply knowledge related to different microwave devices.
ET412.CEO.4: Build understanding about power dividers and directional couplers.
ET412.CEO.5: Apply knowledge gained for microwave domain to solve real time industry scenarios.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET412.CO.1: Solve problems based on impedance concept using smith chart.
ET412.CO.2: Design waveguide structures for different modes and cutoff frequencies.
ET412.CO.3: Solve problems based on microwave devices.
ET412.CO.4: Solve problems based on Power dividers and directional couplers.
ET412.CO.5: Apply RF/Microwave domain skills required for different job roles existing in industry.

THEORY COURSE CONTENT		
UNIT 1	**Transmission line fundamentals**	**08 HOURS**
Transmission lines: equations, characteristic impedance, impedance matching, impedance transformation, S-parameters, VSWR, Smith chart , stub matching		
UNIT 2	**Waveguides and Strip lines**	**06 HOURS**
TEM,TE & TM waves, parallel plate waveguide, rectangular waveguide, circular waveguide, strip line , micro strip line, wave velocities , dispersion **Self - Study Component:** microwave junctions , ferrite isolators, phase shifters and circulators		
UNIT 3	**Microwave devices, Power dividers and directional couplers**	**08 HOURS**
Diodes Schottky , PIN , Varactor, Gunn ; Transistors ; Microwave integrated circuits ; Properties, power divider types T junction, Wilkinson , directional couplers types- waveguide directional couplers , Quadrature hybrid coupler, coupled line directional coupler		
UNIT 4	**Microwave Tubes**	**10 HOURS**
Limitations of conventional tubes, O and M type classification of microwave tubes, re-entrant cavity, velocity modulation. Construction, operation, performance analysis and applications of -Single cavity and two cavity klystron, Magnetron		
UNIT 5	**Microwave applications**	**10 HOURS**
RF network planning , link budget analysis , microwave links installation and commissioning , 5TH Generation cellular networks base station components , cellular components		

TEXT BOOK

1. David M. Pozar. Microwave Engineering, 4th edition, Wiley, ISBN 978-0-470-63155-3.
2. Samuel Y. Liao. Microwave Devices and Circuits, 3rd edition, Pearson, ISBN-10: 8177583530.

REFERENCE BOOK

1. Robert E. Collin. Foundations for Microwave Engineering, Wiley, ISBN- 0-7803-6031-1.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	RISC Processor
	COURSE CODE	ET413
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	30	40	30	NIL	NIL	100

PRE-REQUISITE : Microcontroller & Application

COURSE OBJECTIVES :

ET413.CEO.1: Understand features & architecture of ARM Processor.
ET413.CEO.2: Know architecture & features of ARM based microcontroller
ET413.CEO.3: Learn interfacing with different peripherals.
ET413.CEO.4: Get familiar with basic concepts of embedded networking viz. CAN, I2C, GPS/GSM.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET413.CO.1: Explain architecture of ARM core & ARM 7 based microcontroller
ET413.CO.2: Perform interfacing of different peripherals
ET413.CO.3: Develop embedded system applications using networking protocols.
ET413.CO.4: Perform Linux based application using ARM Processor

THEORY COURSE CONTENT		
UNIT 1	**Introduction to ARM processor.**	**8 HOURS**
Comparison of CISC and RISC, ARMs approach towards RISC Processor, memory organization and Instruction level parallelism, AMBA bus protocol, Comparison between 8/16/32 bit micro-controllers, Comparison of ARM 7, ARM 9, ARM 11.		
UNIT 2	**Architecture: ARM Processor.**	**8 HOURS**
ARM core architecture, ARM Pipeline, ARM and Thumb instruction set, ARM programmers model, Exception & Interrupts in ARM processor, Memory management, Introduction to instruction set & Assembly language programming.		
UNIT 3	**Introduction to LPC21XX Microcontroller.**	**8 HOURS**
Architecture & features of LPC21XX, Memory map, PLL & VPB Divider, Pin connect block, Interfacing with GLCD, LED, Interfacing & Programming with Timer, Serial Port, PWM.		
UNIT 4	**Real World Interfacing.**	**8 HOURS**
Interfacing with Matrix KEYPAD, ADC/DAC, Interfacing with GSM, GPS, I2C, SPI, CAN, Wi-Fi module ESP8266.		
UNIT 5	**GNU ARM Linux Tool Chain.**	**8 HOURS**
Concept of cross development, Cross development tools -GNU compiler, assembler, linker etc. Development tools and toolchains required for ARM/Linux applications. Tool chain build using buildroot. Linux based terminal -Minicom. JTAG debugging tools. First Linux application on ARM: Hello world!, Introduction to Ethernet and TCP/IP.		

TEXT BOOK

1. Steve Furber, ARM System on Chip Architecture, 2nd Edition, Pearson, 2001, ISBN: 9788131708408
2. Andrew N. Sloss, Dominic Symes and Chris Wright, ARM System Developers Guide: Designing and Optimizing System Software, 1st Edition, Morgan Kaufmann Publishers, 2011, ISBN: 1-55860-874-5

REFERENCE BOOK

1. Trevor Martin, The Insiders Guide to Philips ARM7-Based Microcontrollers: An Engineers Introduction To The LPC2100 Series, Hitex (UK) Ltd.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Machine Learning
	COURSE CODE	ET414
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : Computer Programming, Applied Mathematics

COURSE OBJECTIVES :

ET414.CEO.1: Illustrate the basic concepts and techniques of machine learning.

ET414.CEO.2: Explore supervised and unsupervised learning paradigms of machine learning for regression and classification.

ET414.CEO.3: Develop a deeper understanding of several algorithms in machine learning.

ET414.CEO.4: Evaluate and interpret the results of the machine learning algorithms for solving practical problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET414.CO.1: Explain fundamentals of machine learning.

ET414.CO.2: Describe supervised and unsupervised learning.

ET414.CO.3: Analyze mathematically various machine learning approaches and paradigms.

ET414.CO.4: Implement machine learning solutions for classification, regression, and clustering problems.

ET414.CO.5: Compare various machine learning techniques and to get an insight of when to apply a particular machine learning approach.

THEORY COURSE CONTENT		
UNIT 1	**Machine Learning Fundamentals**	**8 HOURS**
Introduction to Machine Learning, Types of Learning, Linear Regression, Logistic Regression, Concept of Under fitting and Over fitting, Bias-Variance Tradeoff.		
UNIT 2	**Statistics and Probabilistic Learning**	**8 HOURS**
Probability Concept, Decision Trees, Random Forest, Nave Bayes, Bayesian Learning, Feature Space, Dimensionality Reduction, Principal Components Analysis (PCA) and K Nearest Neighbors (KNN.) Case Study Using Decision Tree, PCA		
UNIT 3	**Support Vector Machine.**	**8 HOURS**
Support Vector Machine, Optimization Objective of SVM, Maximum Margin Principle, Lagrangian Multipliers for SVM and Kernel Function. Case Study Using SVM.		
UNIT 4	**Neural Networks.**	**8 HOURS**
Neural Network Representation, Perception, Activation Function and Types, Multilayer Network and Back-propagation Algorithm, Introduction to Deep Learning based on Convolution Neural Network. Case Study Using Neural Network/ Deep Learning.		
UNIT 5	**Clustering and Ensemble Learning.**	**8 HOURS**
Principal of Clustering, K-Means, Expectation-Maximization (EM) Algorithm, Ensemble Methods. Case Study Using Clustering Algorithm.		

TEXT BOOK

1. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, MIT Press, (ISBN: 978-0-262-01243-0).
2. Christopher Bishop, Pattern Recognition and Machine Learning, Second Edition, Springer. 2006, (ISBN-13: 978-0387310732).
3. Phil Kim, MATLAB Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence, Press, 2017, (ISBN 978-0-262-01243-0).
4. Tom Mitchell, Machine Learning, First Edition, McGraw-Hill Science/Engineering/Math, 1997, (ISBN: 0070428077).

REFERENCE BOOK

1. Trevor Hastie, Robert Tibshirani and Jerome Friedman, The Elements of Statistical Learning, Second Edition, Springer-Verlag,2009 ,(ISBN: 978-0-387-84857-0)
2. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012, (ISBN: 9780262018029).
3. Simon Haykin, Neural Networks: A comprehensive foundation, Prentice Hall International Inc. 1999, (ISBN: 0132733501).

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Low-Power SoC Architecture and Applications
	COURSE CODE	ET421
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : ET303 - Microcontroller and Application, ET311 - Embedded System Prog.

COURSE OBJECTIVES :

ET421.CEO.1: Learn System-on Chip architecture.
ET421.CEO.2: Study ARM CORTEX processors its features and applications in embedded domain
ET421.CEO.3: Learn real world interfacing with ARM CORTEX based microcontroller.
ET421.CEO.4: Know Nano devices and its use in SOC

COURSE OUTCOMES :

The students after completion of the course will be able to,

1. ET421.CO.1: Understand architecture of SOC.
1. ET421.CO.2: Explain architecture of ARM CORTEX and CORTEX based microcontroller
1. ET421.CO.3: Implement interfacing of real world peripherals with ARM CORTEX based microcontroller.
1. ET421.CO.4: Develop applications and programming based on ARM CORTEX based microcontroller
1. ET421.CO.5: Understand basic and advanced concept of Nano devices.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to System on Chip**	**8 HOURS**
SOC Evolution, Features and applications, SOC Design, Introduction to OMAP, Reconfigurable SOC, ASIC to System on Chip		
UNIT 2	**ARM CORTEX Processor**	**8 HOURS**
Introduction to ARM CORTEX series processors, Features, Architecture, Improvement of CORTEX over classical series Resistor model and Applications, Bit Banding, Tail Chaining, Thumb2 technology, Interrupts and Exceptions,Memory systems, CMSIS standard for ARM CORTEX.		
UNIT 3	**ARM CORTEX based Microcontroller**	**8 HOURS**
Survey of ARM CORTEX based microcontrollers, Architecture, Features and Comparison, Memory mapping, System Control, Clocking and Power control, NVIC, GPIO, Pin connect block, System Tick Timer, UARTs, Graphical LCD, ADC		
UNIT 4	**Real World Interfacing.**	**8 HOURS**
Interfacing of CORTEX based microcontrollers using CMSIS standard, Concept of communication, Interfacing and programming with CAN, USB, ETHERNET, PWM, WDT. Application development on ARM CORTEX based microcontroller		
UNIT 5	**Introduction to Nano Devices.**	**8 HOURS**
Introduction, nanotechnology potentials, Comparison of classical and quantum systems, General postulates of quantum mechanics, analogies between quantum mechanics and classicalelectromagnetic fields.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Implementation the on-chip UART0 on LPC1768 and transferring receiving data to from the Host machine PC and Ultra sonic sensor		
PRACTICAL NO.02		**4 HOURS**
Implementation of On-chip 10-bit ADC 4 / 8 channels on channel 1 on LPC1768 with or without Interrupt for reading Moisture and pH in the growth of the plants		
PRACTICAL NO.03		**4 HOURS**
Programming On-chip Nested Vector Interrupt Controller (NVIC)		
PRACTICAL NO.04		**2 HOURS**
TFT interfacing		

PRACTICAL NO.05	Perform Any 2 of the following	4 HOURS
i) Implementation of Ethernet protocol ii) Implementation of USB iii) Implementation of DMA Controller		
PRACTICAL NO.06		**4 HOURS**
Implementation of RTC		
PRACTICAL NO.07		**2 HOURS**
Implementation of PWM		

TEXT BOOK

1. Michael Keating, Pierre Bricaud,Reuse Methodology manual for System-On-A-Chip Designs, 2nd edition Kluwer Academic,2001, ISBN: 0-7923-8175-0.
2. Joseph Yiu.The Denitive Guide to ARM Cortex-M3 and Cortex-M4 Processors, 3rd Edition, Elsevier, ISBN: 9780124079182.
3. George W. Hanson.Fundamentals of NanoElectronics, 1stEdition by Pearson Education,2008,ISBN 97 80131957084.

REFERENCE BOOK

1. Trevor Martin. The Designers Guide to the Cortex-M Processor Family, 2nd Edition, Elsevier, 2013,ISBN: 978-0-080-98299-1.
2. B. Al Hashimi.System on chip-Next generation electronics. ISBN: 0-8634-1552-0
3. Technical references and user manuals on www.arm.com
4. PrakashRashinkar. Peter Paterson and Leena Singh. SoC Verification-Methodology and techniques, Kluwer Academic, 2001.ISBN 978-0-306-46995-4.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Privacy and Security in IoT
	COURSE CODE	ET422
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	–	150

PRE-REQUISITE : ET312 - IoT Architecture & Sensors, ET332 - IoT Network & Protocols

COURSE OBJECTIVES :

ET422.CEO.1: Familiarize IoT security and fundamentals..
ET422.CEO.2: Review about the various securing techniques in IoT.
ET422.CEO.3: Understand access management Solutions for IoT.
ET422.CEO.4: Interpret the need of privacy in IoT.
ET422.CEO.5: Learn about the applications of cloud for IoT.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET422.CO.1: Explain security and fundamentals in IoT.
ET422.CO.2: Describe the various securing techniques in IoT.
ET422.CO.3: Discuss access management solutions for IoT
ET422.CO.4: Apply the privacy techniques in IoT.
ET422.CO.5: Develop applications of cloud for IoT.

THEORY COURSE CONTENT		
UNIT 1	**IoT Security fundamentals**	**08 HOURS**
Need of security, security fundamentals, forms of protection, security standards, security issues, challenges and management. Role of privacy in IoT.		
UNIT 2	**Securing the Internet Of Things**	**08 HOURS**
Security mechanisms built in the IoT protocols, Security Architecture in the Internet of Things - Security Requirements in IoT. Authentication/Authorization for Smart Devices, Cryptographic primitives and its role in IoT		
UNIT 3	**Identity & Access Management Solutions for IoT.**	**10 HOURS**
Identity lifecycle authentication credentials IoT IAM infrastructure Authorization with Publish OR Subscribe schemes access control		
UNIT 4	**Privacy Preservation and Trust Models for IoT**	**09 HOURS**
Concerns in data dissemination Lightweight and robust schemes for Privacy protection Trust and Trust models for IoT		
UNIT 5	**Cloud Application and Security for IoT.**	**10 HOURS**
Development environments for service development; Amazon, Azure, Google App-cloud platform in industry, IoT physical servers and cloud offerings. Cloud services and IoT offerings related to IoT from cloud service providers Cloud IoT security controls.		

PRACTICAL		
PRACTICAL NO.01	**Title: Monitoring System**	**2 HOURS**
Design an IOT Monitoring System.		
PRACTICAL NO.02	**Title: Linux and HTML**	**4 HOURS**
Introduction to Linux and HTML for IoT application.		
PRACTICAL NO.03	**Title: Python and JS**	**4 HOURS**
Introduction to Python Programming and JavaScript for IoT application.		
PRACTICAL NO.04	**Title: Device Control**	**4 HOURS**
Controlling devices over cloud.		

PRACTICAL NO.05	Title: C programming	4 HOURS
IoT programming in C.		
PRACTICAL NO.06	**Title: Encryption Algorithm**	**4 HOURS**
Implementation of the Encryption algorithms in IoT .		
PRACTICAL NO.07	**Title: Decryption Algorithm**	**4 HOURS**
Implementation of the Decryption algorithms in IoT		

TEXT BOOKS

1. Brian Russell Drew Van Duren, Practical Internet of Things Security, Packt Publishing Ltd. ISBN: 9781788625821, 2018.
2. Pethuru Raj and Anupama C. Raman, The Internet of Things: Enabling Technologies, Platforms, and Use Cases, CRC Press, ISBN 9781498761284, 2017
3. Reese, G. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, Sebastopol, CA: O' Reilly Media, Inc., ISBN: 9780596157647, 2009.

REFERENCE BOOKS

1. Shancang Li, Li Da Xu, Securing the Internet of Things, Elsevier publication, ISBN 9780128044582, 2017
2. Fei Hu, Security and Privacy in Internet of Things (IoTs): Models, Algorithms and Implementations, ISBN 9781498723183, 2016
3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Morgan Kaufmann. Mastering Cloud Computing: Foundations and Applications Programming, Elsevier publication, 2013.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Robotic Vision
	COURSE CODE	EX421
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	30	40	30	-	50	150

PRE-REQUISITE : Fundamentals of Robotics and Design , Kinematics and Dynamics of Robotics

COURSE OBJECTIVES :

EX421.CEO.1: Introduce the principles and applications of vision system in modern manufacturing.
EX421.CEO.2: Classify and prioritize various vision algorithms.
EX421.CEO.3: Organize different object recognition method.
EX421.CEO.4: Explore MATLAB/Python for image processing application.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX421.CO.1: Choose optimum parameters for robotics vision system.
EX421.CO.2: Apply image processing algorithms in robotics application.
EX421.CO.3: Illustrate various image capturing and processing techniques.
EX421.CO.4: Experiment with object recognition strategies.

THEORY COURSE CONTENT		
UNIT 1	**Vision system**	**8 HOURS**
Basic Components Elements of visual perception, Lenses: Pinhole cameras, Camera geometry and color sensing, sensors in robotics		
UNIT 2	**Low Level Vision**	**10 HOURS**
Introduction, Image acquisition, illumination techniques, imaging geometry, some basic relationship between pixels, preprocessing		
UNIT 3	**High Level Vision**	**8 HOURS**
Introduction, segmentation, description, segmentation and description of 3D structures, recognition, interpretation **Further Reading:**		
UNIT 4	**Object recognition and feature extraction**	**8 HOURS**
Object recognition, System component, Complexity of the object recognition, Object representation, Feature detection, recognition strategies, verification		
UNIT 5	**Applications of robotics vision**	**8 HOURS**
Pick and place robot, pedestrian detection, face detection, Introduction to ADAS		

PRACTICAL		
PRACTICAL NO.01		**8 HOURS**
Hardware interfacing for image/video acquisition. Interfacing variety of hardware for image processing application		
PRACTICAL NO.02		**8 HOURS**
Image/Video processing techniques with OpenCV-Python/LABVIEW/MATLAB,Introduction to OpenCV-Python, Using modules for performing operations like image enhancement, filtering, thresholding, segmentation, edge detection etc.		
PRACTICAL NO.03		**8 HOURS**
Object detection with OpenCV-Python/LABVIEW/MATLAB, Development of algorithms for object detection in video/Camera streaming		

TEXT BOOK

1. Saeed B Niku, Introduction to robotics : analysis, Systems, applications, 2nd Ed New Delhi, Prentice Hall of India, 2009. 978-81-203-2379-7 Paperback
2. Richard D. Klafter, Robotics Engineering: An integrated approach ,Prentice-Hall (4 April 1989), 978-0134687520
3. Fu K S; Gonzalez R C; Lee C S G, Robotics: Controls, Sensing, Vision and Intelligence 00710990107 , McGraw-Hill Education, 978-0071004213

REFERENCE BOOK

1. Rafael C. Gonzalez and Richard E. Woods. Digital Image Processing, Wesley, 2007. ISBN 13: 978813726952.
2. Prof. S. K. Saha. Introduction to robotics, Tata-McGraw-Hill, ISBN -13 9780070140011.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP401
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP401.CEO.1: To enable the students to understand the basic concepts of Economics

HP401.CEO.2: To impart knowledge, with respect to practical applications of Economics .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP401.CO.1: The students would have understood the basic concepts of Economics.

HP401.CO.2: The students would have acquired knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions

HP401.CO.3: The course is designed to improve critical thinking, problem solving skills by using economic models and theories and predict economic relationships

HP401.CO.4: Students entering any profession in the workforce today must be able to utilize these basic economic principles. The course expected to develop critical understanding of current topics in economics and able to formulate their own opinions on economic issues

THEORY

UNIT 1	Introduction to Economics	6 HOURS

Economic Issues and Concepts; How Economist Work ; Theory of Demand & Supply; Meaning, Determinants, Law of Demand and Supply, Equilibrium between Demand & Supply; Elasticity of demand, price elasticity, income elasticity, cross elasticity.

UNIT 2	Micro Economics	6 HOURS

Revenue Concepts; Cost Concepts, Short run & Long run cost Concepts and curves, opportunity cost. Break even analysis; meaning, explanation, numerical. Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Competition , Oligopoly).

Further Reading:

UNIT 3	Macro Economy	5 HOURS

National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP,NDP, Personal income, disposal income. Inflation; meaning, types, causes, measures to control.

Further Reading:

UNIT 4	Indian Economy	5 HOURS

Characteristics of an Indian Economy; Human Development Index(HDI); Concepts of Foreign Trade, Goods and Services Tax(GST); Micro Small and Medium Enterprise(MSME) ; Foreign Direct Investment(FDI);Unemployment: meaning, types, causes, remedies.

Further Reading:

UNIT 5	Introduction to Banking & Money Market	6 HOURS

Banking; meaning, types, functions, Commercial Banks- Instruments in Operation of an Account, Central Bank- RBI; its functions, Concepts- CRR, Bank Rate, Repo Rate, Reverse Repo rate, SLR; Introduction to Money and Capital Market , Introduction to Fiscal policy- meaning and tools.

Further Reading:

REFERENCE BOOKS

1. R.Paneerselvam :Engineering Economics, , PHI publication ISBN : 978-81-203-5172-1
2. Robbins S.P. and Decenzo David A :Fundamentals of Management: Essential Concepts and Applications, Pearson Education, ISBN-13: 9780133499919
3. N Gregory Mankiw : Economics: Principles of Economics, Cengage Learning ISBN-10: 1305585127
4. L.M. Prasad: Principles and Practices of Management ISBN-10: 9351610500; ISBN-13: 978-9351610502
5. Tripathy and Reddy :Principles of Management ISBN, 1259050572, 9781259050572
6. Dr. K. K. Dewett & M. H. Navalur, S. Chand :Modern Economic Theory ISBN, : 9788121924634 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Bussiness Strategies
	COURSE CODE	HP403
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
-	2	-	-	25	-	25	50

PRE-REQUISITE : HP303 : Basics of Entrepreneurship

COURSE OBJECTIVES :

HP403.CEO.1: To understand the importance of growth and to be able to chart a path towards growth.
HP403.CEO.2: To revisit your business model
HP403.CEO.3: To give a growth orientation your customer acquisition, operations, revenue and sales strategy
HP403.CEO.4: To list and comply with the requirements relating to regulatory compliance
HP403.CEO.5: To be able to effectively pitch your venture to potential stakeholders .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP403.CO.1: Rephrase business model and Identify additional customer segments
HP403.CO.2: Identify channels and strategy for budgeting and planning.
HP403.CO.3: Make use of Legal aspect, Mentors, Advisors, and Experts in startups
HP403.CO.4: Analyze the growing revenues, sales planning, strengthening sales, improving margins
HP403.CO.5: Estimate customer lifetime value, competitor and peer's financial models for venture growth
HP403.CO.6: Formulate the all procedure for new venture ; Product market fit and A Pitch Deck

PRACTICALS:		
PRACTICAL NO.01	**Orientation to Growth**	**3 HOURS**
Getting Ready for Growth Why growth stage is different compared to startup phase, Why Product-Market fit is not enough, Case study, To assess readiness for growth, To chart a growth path .		
PRACTICAL NO.02	**Customers**	**3 HOURS**
Expanding Customer Base Revisit your business model and develop few variants (more business model types). Identify additional customer segments that your solution can address. Evaluate business models for the new customer segments. Relook at the Problem Statement (can you expand the scope and scalability of your business by repositioning your problem statement?) Explore additional ways to monetize.		
PRACTICAL NO.03	**Traction**	**12 HOURS**
Scaling How to gain traction beyond early customers. Defining traction (in quantifiable terms) and identifying the most important metrics to measure traction. Calculate cost of new customer acquisition. Estimate your customer lifetime value (LTV). Identifying waste in your operations and focusing your team on what is important for traction. **Channels and Strategies** The Bulls eye framework, Identify Channels using Bulls Eye Framework, Measuring the effectiveness of selected channels, Budgeting and planning.		
PRACTICAL NO.04	**Money**	**20 HOURS**
Growing Revenues. Stabilizing key revenue streams. Developing additional revenue streams (licensing, franchising). Exploring new channels and partnerships. Sales Planning. Understanding why customers buy and how buying decisions are made; Listening skills. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale. Strengthening Sales. Building a professional sales team. Sales compensation and incentives. Sales planning, setting targets Improving Margins. Testing price elasticity. Optimizing costs and operational expenses. Advanced concepts of unit costing. Financial Modeling. Financial modeling of your venture's growth. Analyzing competitor and peer's financial models.		
PRACTICAL NO.05	**Support**	**5 HOURS**
Legal Overview of legal issues and their impact on entrepreneurs. Importance of getting professional help (legal and accounting). Importance of being compliant and keeping proper documentation. Patents and Intellectual property. Trademarks. Mentors, Advisors, and Experts. The importance of a Mentor and how to find one. Role of business advisors and experts for specific targets in your growth plan.		
PRACTICAL NO.06	**Capstone Project: Pitch Your Venture**	**2 HOURS**

REFERENCE BOOKS

1. Zero to One: Note on Start Ups, or How to Build the Future, Peter Thiel and Blake Masters, Virgin Books,ISBN: 9780753555194
2. Tools of Titans: The Tactics, Routines, and Habits of Billionaires, Icons, and World-Class Performers, Timothy Ferriss, Random House,ISBN: 9781785041273.
3. Disrupted: My Misadventure in the Start-Up Bubble, Dan Lyons, Penguin Publishers, ISBN: 9781786491022
4. Unshakeable: Your Financial Freedom Playbook, Tony Robbins, Simon & Schuster Publishers,ISBN: 9781471164934
5. Grit: The Power of Passion and Perseverance, Angela Duckworth, Vermilion Publishing,ISBN: 9781785040207
6. Big Magic: Creative Living 4BEyond Fear, Elizabeth Gillbert, Penguin Publishers,ISBN: 9781408886182
7. Pivot: The Only Move That Matters Is Your Next One, Jernny Blake, Random House,ISBN: 9780241975466
8. Financial Management; Text and Problems, 7th Ed., A Khan and P. K. Jain, TataMacGraw Hill, ISBN: 9789353162184
9. Financial Management; Theory and Practice, 4th Ed., Prasanna Chandra, TataMacGraw Hill, ISBN: 9789339222574
10. Essentials of Management : An International and Leadership Perspective, 10th Ed., Harold Koontz and Heinz Weihrich, MGH, ISBN: 9789339222864
11. Kites in a Hurricane: Startups from Cradle to Fame, Rishi Kapal, SAGE Publishing, ISBN: 9789352807895
12. Wadhwani Foundation Advanced Course in Entrepreneurship

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Programming in Java
	COURSE CODE	ET403
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ISE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	2	20	40	30	50	-	50

PRE-REQUISITE : Basic knowledge of any programming language

COURSE OBJECTIVES :

ET403.CEO.1: familiarize basic concepts of object oriented programming with Java.
ET403.CEO.2: implement classes and objects of Java.
ET403.CEO.3: emphasize on inheritance and package, IO package and GUI.
ET403.CEO.4: cognize exception handling and multithreading in Java.

COURSE OUTCOMES :

The students after completion of the course will be able to,

1. ET403.CO.1: : Map data in the form of class and objects .
1. ET403.CO.2: Link the data and dataset in terms of inheritance and multithreading.
1. ET403.CO.3: Implement Simple projects using Java.

PRACTICAL		
PRACTICAL NO.01	**Creation of classes and its instances in Java**	**4 HOURS**
To declare a class, making objects. Implement simple codes to understand Class-Object Relationship. At least two different examples.		
PRACTICAL NO.02	**Different types of functions in Java**	**4 HOURS**
Implementing functions (methods) in Java for example factorial, finding area, finding average etc. or similar type		
PRACTICAL NO.03	**Inheritance in Java**	**1 HOURS**
Declare a player class. Inherit the classes Cricket player, Football player and Hockey player from player class to understand all terms of inheritance.		
PRACTICAL NO.04	**Constructor and destructor in Java**	**1 HOURS**
Declare class and object. Implement at least 2 types of constructors and destructors. Different ways of parameter passing to be implemented.		
PRACTICAL NO.05	**Function/Operator overloading in Java**	**1 HOURS**
Declare class and object. Implement at least 2 Function/Operator overloading, so that student understands polymorphism.		
PRACTICAL NO.06	**Packages in Java**	**1 HOURS**
Declare class and object. Understanding packages by defining methods/functions within a package and outside the package. Using import instruction to use these methods/functions.		
PRACTICAL NO.07	**Interfaces in Java**	**1 HOURS**
Declare class and object. Implement at least 2 different types of interfaces.		
PRACTICAL NO.08	**Exception handling mechanism in Java**	**1 HOURS**
Define Class. Write a java program which use try and catch for exception handling.		
PRACTICAL NO.09	**Multi-Threading in Java**	**1 HOURS**
Write a program to create multiple threads and demonstrate how two threads communicate with each other.		
PRACTICAL NO.10	**Validation Exercise**	**1 HOURS**
An exersize in Java: A group of 4 students can develop a small application in Java. Small projects like: Calculator, Dialog box, Chat box, GUI based music selection, GUI based Image display, GUI based bank database system, GUI based online shopping based on choice, E-learning system, GUI based Admission management system etc A part from above, student can choose any other topic with the approval of the course instructor.		

TEXT BOOK

1. HervertSchildt, The Complete Reference: JAVA2, McGraw Hill, 2011. ISBN: 9781259002465
2. E. Balaguruswamy, Programming with Java: A Primer, McGraw Hill,2009. ISBN: 9780070141698

REFERENCE BOOK

1. John P. Flynt, Java Programming, Thomson 2007. ISBN: 9781598632750
2. Ken Arnold, Programming Language, Pearson 2008. ISBN: 9788131702215

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Major Project - I
	COURSE CODE	ET402
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	8	NIL	NIL	NIL	100	50	150

PRE-REQUISITE : Mini Project

COURSE OBJECTIVES :

ET402.CEO.1: Implement the idea/ real time industrial problem/ current application from engineering domain.

ET402.CEO.2: Evaluate an alternative approaches and justify the use of selected tools and methods.

ET402.CEO.3: Inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.

ET402.CEO.4: Understand the roles and responsibility, accountability and learn team work ethics.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET402.CO.1: Solve real life problems by applying the knowledge and problem solving ability.

ET402.CO.2: Analyze alternative approaches, find feasible solution and apply most appropriate one.

ET402.CO.3: Use standard engineering tools and processes for analysis, design, simulation, testing, Implementation and deployment of idea into practice.

ET402.CO.4: Participate effectively in multidisciplinary and heterogeneous teams exhibiting team work, inter-personal Relationship, conflict management and leadership quality.

PREAMBLE:

The objective of this Major Project-I course is to understand the Product Development through team work. The students will able to shoulder the roles and responsibility and activity distribution amongst them. The students will learn designing, budgeting, planning, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards while developing the application/ product. The students will deliver a presentation on the advancement in Technology pertaining to the selected project topic and able to understand importance of document design and professional ethics.

GUIDELINES:

Project work stage I is an integral part of Project work. In this, the student shall complete the partial work of project, consist of problem statement, literature survey, Project specification and planning. The students expected to complete the project at least up to the design phase. As a part of project phase-I, candidate shall appear for two reviews and delivered the presentation on the advancement of selected project topic. The student shall submit the duly certified project report in standard format for satisfactory completion of work by the concern Advisor and Dean of the School. The examinee will be assessed by panel of examiner of which one is necessarily as a external examiner. The assessment will be broadly based on work undergone, content delivery, presentation skills, documentation, question answer and report. Preparation of the Literature survey paper and communicating and publishing in relevant publishing agency agency is recommended. Bonus 10 marks will be awarded. Follow the guideline and formats as mentioned in guideline document Annexure-I.

TIMELINE:

1. Formation of Project Group: 2 Weeks (1st ,2nd week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (3rd, 4th week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (7th, 8th week)
4. Preparation of Project Progress Report I (week 9th and 10th)
5. Project Phase-I Evaluation by external examiner (End Semester by 12th, 13th week)

ASSESSMENT:

1. Internal Assessment (TW)

a. Project Review -1 Project Approval -30 Marks
b. Project Review -2 Analysis and Design- -30 Marks
c. Project Review -3 Project progress Report-I and Presentation - 40 Marks
d. Paper publication/IPR -10 marks (Bonus)

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks
b. Project design / execution / demonstration : 20 Marks
c. Project Report preparation and documentation: 15 Marks

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Advanced Communication Systems
	COURSE CODE	ET431
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Analog Communication, Digital Communication

COURSE OBJECTIVES :

ET431.CEO.1: Apply concepts on wireless channels and MIMO systems.
ET431.CEO.2: Apply knowledge related to spread spectrum techniques and multiple access schemes.
ET431.CEO.3: Apply knowledge related to orthogonal frequency division multiplexing
ET431.CEO.4: Build understanding about Fiber optics communication technology.
ET431.CEO.5: Build understanding and application in the domain of Satellite communication

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET431.CO.1: Solve problems related to wireless channels and systems.
ET431.CO.2: Apply domain knowledge in multiple access techniques.
ET431.CO.3: Solve problems based on microwave devices.
ET431.CO.4: Solve problems based on Power dividers and directional couplers.
ET431.CO.5: Design satellite link with given parameters

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Wireless Communication and MIMO Systems**	**10 HOURS**
Introduction to wireless 3G, 4G standards and protocols. Wireless propagation mechanism: multipath, propagation losses, wireless channel modelling, concepts of fading and diversity, channel capacity, delay spread etc, Introduction to MIMO Systems, MIMO channel capacity, MIMO transmitter techniques, MIMO receiver techniques.		
UNIT 2	**Multiple Access Techniques**	**06 HOURS**
Multiple access techniques in wireless communication: contention-free multiple access schemes (FDMA TDMA, CDMA, SDMA and Hybrid), contention-based multiple access schemes (ALOHA and CSMA). **Self-Study:** Applications in GPS, mobile communications, digital broadcasting, wireless LAN.		
UNIT 3	**Introduction to OFDM**	**08 HOURS**
Introduction to multicarrier systems and OFDM, OFDM system model, mathematical representation of OFDM signal, Cyclic prefix in OFDM, concept of MIMO-OFDM, Application of OFDM WiMAX, 5G		
UNIT 4	**Overview of Satellite Communication**	**10 HOURS**
Introduction to satellite communication, Earth station components and Satellite orbits, Satellite microwave link budget calculations. Satellite Access techniques: FDMA, TDMA and packet switched systems; Applications: Global Positioning System (GPS), Very Small Aperture Terminal (VSAT) system, Direct to Home (DTH)		
UNIT 5	**Introduction to Optical communication**	**10 HOURS**
Elements of an optical fiber transmission link, Optical fibers : optical fiber modes and configurations, Step Index and Graded Index (GI) fiber, numerical aperture, V number and modes supported by step index fiber, concept of signal degradation in Optical Fibers; Link power budget and rise time budget methods for design of optical link, BER calculation. Principles of WDM, DWDM, SONET/SDH.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Plot various path loss models: log normal shadowing, Okumura Hata, free space, IEEE 802.16d path loss model		
PRACTICAL NO.02		**2 HOURS**
Write a MATLAB code for Rayleigh fading channel and Riccian fading channel		
PRACTICAL NO.03		**2 HOURS**
Write a MATLAB code for Generation of Correlated MIMO Fading Channel (Channel Coeff)		

PRACTICAL NO.04		**2 HOURS**
Write a MATLAB code simulate an OFDM-QAM transceiver system and plot the BER for varying Guard Interval.		
PRACTICAL NO.05		**2 HOURS**
Write a MATLAB code to implement Alamouti Space time block -codes.		
PRACTICAL NO.06		**2 HOURS**
Estimation of Numerical Aperture of fiber		
PRACTICAL NO.07		**2 HOURS**
Plot characteristics of source and detector		
PRACTICAL NO.08		**2 HOURS**
Generation of PN Sequence and verification of its properties.		
PRACTICAL NO.09		**2 HOURS**
BER MATLAB		
PRACTICAL NO.10		**2 HOURS**
Voice communication through fiber optic link		
PRACTICAL NO.11		**2 HOURS**
Communicate voice signal through satellite link		

TEXT BOOK

1. Aditya Jagannatham, Principles of Modern Wireless Communication Theory and Practice, Mc-Graw Hill, ISBN 1-259-02957-3
2. Pratt Bostian, Satellite Communication Wiley publication, ISBN-10: 8177583530
3. Kaiser, Fiber Optic Communication, McGraw Hill

REFERENCE BOOK

1. Theodre Rapaport, Foundations for microwave engineering, Wiley publication , ISBN- 0-7803-6031-1

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Biomedical Engineering
	COURSE CODE	EX441
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : ET202: Analog Electronics, ME201: Material Engineering

COURSE OBJECTIVES :

EX441.CEO.1: Study the anatomy and bio-signals related to heart, brain and muscles
EX441.CEO.2: Learn about biomedical & radiological Instruments and their electrical safety.
EX441.CEO.3: Study the biotelemetry and telemedicine concepts of biomedical engineering.
EX441.CEO.4: Know about the field of biomechanics and biomaterials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

Ex441.CO.1: Elaborate the origin of various bio-signals and the electrodes used to measure them.
Ex441.CO.2: Illustrate the various biomedical and radiological instruments
Ex441.CO.3: Apply the knowledge of electrical safety while designing.
Ex441.CO.4: Apply the knowledge of biotelemetry and telemedicine in the fields of biomedical.
Ex441.CO.5: Apply the concept of biomechanics and biomaterial in biomedical Engineering.

THEORY COURSE CONTENT		
UNIT 1	**Human Anatomy & Bio-signals**	**7 HOURS**
Structure of cell, Physiological systems of the Body, Nervous System, Cardiovascular System. Bio-signals: Action & Resting potential, Propagation of action potential, Bioelectric Potentials / Bio-signals - ECG, EEG, EMG. Electrode Theory, Biopotential Electrodes, Biochemical Electrodes. **Self Study:** ERG, EOG & EGG. **Case Study:** Anatomy and physiology of Auditory System		
UNIT 2	**Biomedical Instruments**	**7 HOURS**
Medical standards IEEE 11073, JCIA, JCAHO, Introduction of Biomedical Instrumentation, Bio Amplifiers, Biometrics, Components of Man-Instruments System, Life Saving Devices- Pacemakers, Defibrillators, ECG: Amplifiers, Electrodes & Leads, Einthoven Triangle, ECG Block diagram. EEG: Measurement, 10-20 Electrode System. **Self Study:** EMG building blocks, Amplifier and Electrodes **Case Study:** Camera Pill		
UNIT 3	**Measurement of non-Electrical Parameters**	**7 HOURS**
Temperature, respiration rate and pulse rate measurements. Blood Pressure: indirect methods - auscultatory method, oscillometric method, direct methods: electronic manometer, Pressure amplifiers - systolic, diastolic, mean detector circuit. Blood flow and cardiac output measurement: Indicator dilution, thermal dilution and dye dilution method. **Self Study:** Electromagnetic and ultrasound blood flow measurement. **Case study:** Kidney Dialysis		
UNIT 4	**Noninvasive Diagnostic instrumentation and electrical safety**	**7 HOURS**
Principles of ultrasonic measurement, X-Ray Machine & Digital Radiography, X-Ray Computed Tomography, MRI System., Elements of intensive care monitoring Physiological effects of Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention. Grounding and Shielding, Biomedical Ethics. **Self Study:** Thermography **Case Study:** fMRI		
UNIT 5	**Biotelemetry and Telemedicine**	**6 HOURS**
Introduction to Biotelemetry, Physiological Parameters adaptable to biotelemetry, components of Biotelemetry system, Application of Telemetry in Patient Care. Basic Telemedicine System, Picture Archiving and Communication System, Telemedicine by Mobile Communication. **Self Study:** Medical Information System **Case Study:** Online Medical Health App		
UNIT 6	**Biomaterials**	**6 HOURS**
Three Basic Quantifiable Features of Biomaterials, Body response to wounding, Immune System Defense, Examples: Role of Mechanical Properties of Biomaterials, Immune System Links. **Self Study:** Biomaterials Engineering Strategies **Case study:** Engineering solutions to foot drop.		

TEXT BOOK

1. L. Cromwell, F. J. Weibell and E. A. Pfeiffer, Biomedical Instrumentation and Measurements, Pearson Education, 2nd edition, ISBN: 81-317-0315-0.
2. R. S. Khandpur, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2nd edition, ISBN: 02-07-047355-2.
3. M. M. Domach, Introduction to Biomedical Engineering, Pearson, 2nd edition, ISBN: 978-93-325-5526-6.

REFERENCE BOOK

1. G. S. Sawhney, Fundamentals of Biomedical Engineering, New Age International, 2007, ISBN-13 : 978-81-224-2549-9
2. J. Enderle, S. Blanchard and J. Bronzino, Introduction to Biomedical Engineering, Elsevier Academic Press Series, 2nd edition, Indian Reprint ISBN-13: 978-81-312-0002-5.

MIT Academy of Engineering (An autonomous Institute Affilated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Artificial Intelligence
	COURSE CODE	ET442
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	–	30	40	30	–	–	100

PRE-REQUISITE : ET414 Machine Learning

COURSE OBJECTIVES :

ET442.CEO.1: To describe the rationale for different real time applications of AI
ET442.CEO.2: To apply the concept of Fuzzy systems
ET442.CEO.3: To understand deep learning over neural networks
ET442.CEO.4: To outline natural language processing fundamentals

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET442.CO.1: Articulate fuzzy logic to solve problems.
ET442.CO.2: Use deep learning model for data classification
ET442.CO.3: Explain use of transfer learning for suitable applications
ET442.CO.4: Describe natural language processing techniques

THEORY COURSE CONTENT		
UNIT 1	**Introduction to AI and Fuzzy logic**	**8 HOURS**
Definition of artificial intelligence, importance of artificial intelligence in real world applications. Introduction to fuzzy logic, classical sets, fuzzy sets, cartesian product of relation, classical relation, fuzzy relations.		
UNIT 2	**Introduction to deep learning**	**8 HOURS**
Feed forward perceptron Model, multilayer perceptron (MLP), back propagation algorithm, various activation functions, deep learning process. Deep learning using convolutional neural networks (CNN). The importance of striding, dilation, pooling used in CNN.		
UNIT 3	**Further steps in deep learning**	**8 HOURS**
Transfer learning using LeNet. Principles of deep learning image classification topologies like AlexNet, VGG-16/VGG-19, Inception and ResNet, GoogLeNet. Introduction to recurrent Neural nets (RNN).		
UNIT 4	**Introduction to natural language processing (NLP)**	**8 HOURS**
The concept of syntax, semantics, and wrapping. Basic applications: Word2Vec based on Skip-Gram Model, Distributed representations of words and phrases and their compositionality.		
UNIT 5	**Real world applications of artificial intelligence/ learning**	**8 HOURS**
Understanding and analyzing AI applications in real world. Few applications like: Face recognition, Suspicious activity recognition, Object detection and classification, Text analysis, Sentiment analysis / Feedback analysis, Recommender systems, Online shopping System, Music signal classification, Speech recognition / Speaker recognition.		

TEXT BOOKS

1. S N Sivanandan and S N Deepa, Principles of Soft computing, Wiley, 2013 edition, ISBN: 9788126527410
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016, ISBN: 9780262035613
3. Edward Loper, Ewan Klein, Steven Bird, Natural Language Processing with Python, O'Reilly Media Inc, June 2009, ISBN: 9780596803346

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Wireless Sensor Networks
	COURSE CODE	ET443
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	-	30	40	30	-	-	100

PRE-REQUISITE : ET302 – Analog Communication, ET321 – Digital Communication

COURSE OBJECTIVES :

ET443.CEO.1: Learn the various applications of WSNs
ET443.CEO.2: Study different protocols for WSNs
ET443.CEO.3: Understand concept of routing protocol and network management for WSNs
ET443.CEO.4: Study various operating systems used for WSNs

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET443.CO.1: Apply knowledge of wireless sensor networks(WSN) to various application areas
ET443.CO.2: Identify communication protocols employed in WSNs.
ET443.CO.3: Understand and explain protocol design issues (especially energy-efficiency) and protocol designs for wireless sensor networks
ET443.CO.4: Conduct performance analysis of WSN.

THEORY COURSE CONTENT		
UNIT 1	**Wireless Sensor Networks Concepts and Applications**	**08 HOURS**
Introduction, Types of WSNs, Performance Metrics of WSNs, WSNs Standards		
UNIT 2	**Protocol Stack of Wireless Sensor Networks**	**08 HOURS**
Physical Layer, Data Link Layer, Network Layer, Transport Layer, Application Layer, Cross-Layer Protocols for WSNs		
UNIT 3	**Routing Protocols for Wireless Sensor Networks**	**10 HOURS**
Data Dissemination and Gathering, Routing Challenges and Design Issues in WSNs, Routing Strategies in WSNs-WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing.		
UNIT 4	**Network Management for Wireless Sensor Networks**	**09 HOURS**
Network Management Requirements, Traditional Network Management Models, Network Management Design Issues, Other Issues Related to Network Management- Naming, Localization		
UNIT 5	**Operating Systems for Wireless Sensor Networks**	**10 HOURS**
Operating System Design Issues, Examples of Operating Systems- TinyOS, Mate, MagnetOS, SenOS, etc.		

TEXT BOOK

1. Hossam Mahmoud Ahmad, Wireless Sensor Networks, 1st Edition, Springer Singapore, 2016 (ISBN: 978-981-10-0412-4)
2. Ian F. Akyildiz and Mehmet Can Vuran, Wireless Sensor Networks, 1st Edition, Wiley, 2010 (ISBN: 978-0-470-03601-3)

REFERENCE BOOK

1. Kazem Sohraby, Daniel Minoli and Taieb Znati, Wireless Sensor Networks, John Wiley Publication, 2007 (ISBN: 978-0-471-74300-2)
2. Waltenegus Dargie abd Christian Poellabauer, Fundamentals Of Wireless Sensor Networks, 1st Edition, A John Wiley and Sons, Ltd., Publication, 2010 (ISBN: 978-0-470-99765-9)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Speech Signal Processing
	COURSE CODE	ET444
	COURSE CREDITS	3
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : EX322 - Digital Signal Processing

COURSE OBJECTIVES :

ET444.CEO.1: Interpret the anatomy and physiology of speech organs.
ET444.CEO.2: Illustrate the theory of speech production
ET444.CEO.3: Infer the linear predictive loading (LPC) analysis
ET444.CEO.4: Appraise the Noise estimation and analysis.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET444.CO.1: Illustrate vocal tract, practical vocal tract model for speech analysis and synthesis
ET444.CO.2: Analyze the Principles of speech synthesis
ET444.CO.3: Explain Multidimensional voice profile (MDVP), Pratt, Dr. speech software
ET444.CO.4: Discrete Circuits in speech information processing

THEORY COURSE CONTENT		
UNIT 1	**Speech production, Acoustic and Phonetics Hearing**	**6 HOURS**
Introduction, Anatomy and physiology of speech organs, Articulatory phonetics, Acoustic phonetics, Acoustic Theory of speech production, Acoustic of vocal tract, practical vocal tract model for speech analysis and synthesis, speech perception, separating sound sources, speech sounds and features-vowels, voice, unvoiced fricatives.		
UNIT 2	**Speech Signal Analysis**	**8 HOURS**
Short time speech analysis, spectrogram(wide and narrow band), Time domain analysis of speech signals, short time avg, zero crossing rate, Frequency domain analysis of speech-(short time fourier transform, Forman ant estimation and tracking), Linear predictive loading (LPC) analysis, spectral estimation via LPC, Lattice LPC model, pole zero LPC model, Cepstral analysis, mel scale spectrum.		
UNIT 3	**Coding of Speech Signals.**	**6 HOURS**
Speech coding techniques, waveform approximating coders, synthesis LPC Coding, Harmonic speech coding, multimodel speech coding, speech vocoders, spectral coders, Non LP source voice codes, vectors quantization codes, Low rate and high rate vocoders.		
UNIT 4	**Noise Estimation Analysis in Speech Signal**	**8 HOURS**
Influence of noise in speech application, noise properties, methodologies of noise removal, normalized least means square[NLMS] algorithm, Time varying LMS algorithm, Noise cancelling and its effectiveness, additive white noise and quantized noise. Audio Amplifiers, Types of audio amplifier, audio amplifier Vs RF amplifiers,Controls in audio amplifiers, microphones-working principle, types,		
UNIT 5	**Speech Enhancement and Synthesis.**	**6 HOURS**
Introduction, Interfacing sounds, speech enhancement techniques, Echo Cancellation, Spectral subtraction, method involving fundamental frequency tracking, enhancement by resynthesis, Principles of speech synthesis, synthesis methods, voice response system, synthesis of intonation, speech synthesis for different speakers, speech synthesis in other languages, synthesis model. Text to speech synthesis.		
UNIT 6	**Design with programmable logic devices**	**6 HOURS**
Introduction, ASR Speech, Segmenting speech, Preprocessing, HMM Model for speech recognition, Language model in speech recognition, feature extraction, speaker recognition by Human, speaker verification Vs Recognition, speaker recognition techniques, Features that distinguish speakers, spectral features, prosodic features, Language and account identification. Electroglottography, speech signal of voice in spectral domain, impedance matching technique, analysis of speaking, Multidimensional voice profile (MDVP), Pratt, Dr. speech software, MATLAB Toolbox for speech processing.		

TEXT BOOK

1. Lawrence Rabiner,Biing H wangJuang ,Fundamentals of speech recognition, Pearson publication, ISBN-978-81-775-8560-5
2. ShailajaApte, Speech Signal Processing, Willy India Publication

REFERENCE BOOK

1. Daniel and James H. Martin.Speech and Language processing,Pearson Education-ISBN-81-7808-594-1
2. Douglas OShaughnessy Speech Communication, Wiley India edition, ISBN-978-81-265-3610-8
3. A. M.Kondos,Digital Speech,Wiley student edition ISBN-9812-53-172-6
4. Shrikant Narayanan, Abeer Alwan Text to speech synthesis, Pearson Education,ISBN -81-297-1078-1

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Real-Time Embedded System
	COURSE CODE	ET451
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : ET331: Embedded Processor, ET413: RISC Processors

COURSE OBJECTIVES :

ET451.CEO.1: Explore the real-time scheduling algorithms
ET451.CEO.2: Perform computation required for the real-time embedded systems.
ET451.CEO.3: Focus on the management of real-time resources

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET451.CO.1: Analyze the scheduling algorithms for real-time computing,
ET451.CO.2: Apply the techniques to evaluate worst-case delays and utilization bounds.
ET451.CO.3: Design embedded systems with real-time constraints

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Real-Time Systems**	**8 HOURS**
Overview of real-time applications and concepts with emphasis on the distinguishing characteristics of real-time systems and the constraints that they must satisfy		
UNIT 2	**Real-Time operating systems**	**8 HOURS**
Differences between General purpose and Real-Time Operating Systems. Basic operating-system functions needed for real-time computing.		
UNIT 3	**Real-Time schedulers**	**8 HOURS**
Real-time scheduling and schedulers ability analysis, including clock-driven and priority-driven scheduling		
UNIT 4	**Real-Time Resource Management**	**8 HOURS**
Resource management in real-time systems, including potential problems and their resolution as well as practical issues in building real-time systems. Resource sharing in real-time systems		
UNIT 5	**Applications**	**8 HOURS**
Applications: multimedia, VoIP/VoWLAN, VoD, info and home appliances, medical devices, sensors & actuators, virtual reality, automotive electronics (powertrain controls and infotainment systems, ITS), automated manufacturing, I large embedded systems (ships, planes)		

PRACTICAL		
PRACTICAL NO.01		**6 HOURS**
Implementation of Real-time scheduling algorithms		
PRACTICAL NO.02		**4 HOURS**
Implementation of Real-time operating system services viz. Semaphores		
PRACTICAL NO.03		**8 HOURS**
Implement the Inter-task communication and synchronization mechanisms		
PRACTICAL NO.04		**8 HOURS**
Building an RTOS Kernel from Scratch. How better to learn about task scheduling, resource management and synchronization issues in real-time systems than making your own real-time operating system from scratch. We will focus on developing the kernel for a RTOS and investigate different task scheduling policies to better understand scheduling theory and how to develop predictable systems for safety-critical applications.		

PRACTICAL NO.05		6 HOURS
Building Real-Time applications		
PRACTICAL NO.06		**6 HOURS**
Capstone Projects		

TEXT BOOK

1. Rajib Mall, Real-Time Systems: Theory and Practice, Pearson Education, 2007, ISBN: 9788131700693
2. C. Siva Ram Murthy and G. Manimaran, 'Resource Management in Real Time Systems and Networks', the MIT Press, 2001. ISBN:0262133678

REFERENCE BOOK

1. Jane Liu, Real-time Systems, Prentice Hall; ISBN: 0130996513.
2. Giorgio C. Buttazzo, Hard Real-Time Computing Systems, 2nd Edition, Springer, 2004. ISBN: 9781441935786
3. Edward A. Lee and Sanjit A. Seshia, Introduction to Embedded Systems, A Cyber-Physical Systems Approach, http://LeeSeshia.org, ISBN 978-0-557-70857-4, 2011.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Energy Management for IoT Devices
	COURSE CODE	ET452
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	-	125

PRE-REQUISITE : IoT Network & Protocols, Privacy and Security in IoT

COURSE OBJECTIVES :

ET452.CEO.1: Understand the various energy sources and energy harvesting based sensor networks
ET452.CEO.2: Learn about the various Piezoelectric materials and Non-linear techniques
ET452.CEO.3: Understand the various Power sources for WSN
ET452.CEO.4: Learn about the applications of Energy harvesting systems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET452.CO.1: Identify various energy sources and energy harvesting based sensor networks
ET452.CO.2: Explain the various piezoelectric materials and Non-linear techniques.
ET452.CO.3: Analyze various Power sources for WSN.
ET452.CO.4: Develop applications of Energy harvesting systems.

THEORY COURSE CONTENT		
UNIT 1	**Energy Harvesting Systems**	**09 HOURS**
Introduction - Energy sources - energy harvesting based sensor networks - photovoltaic cell technologies - generation of electric power in semiconductor PV cells - types		
UNIT 2	**Piezo-Electric Energy Harvesting and Electromechanical Modeling**	**09 HOURS**
Piezoelectric materials transducers harvesters microgenerators strategies for enhancing the performance of energy harvesters. Electromechanical modeling of Lumped parameter model and coupled distributed parameter models and closed-form solutions		
UNIT 3	**Electromagnetic Energy Harvesting and Non-Linear Techniques**	**08 HOURS**
Basic principles micro fabricated coils and magnetic materials scaling power maximations micro and macro scale implementations. Non-linear techniques vibration control & steady state cases		
UNIT 4	**Energy Harvesting Wireless Sensors**	**09 HOURS**
Power sources for WSN Power generation conversion examples case studies. Harvesting microelectronic circuits power conditioning and losses		
UNIT 5	**Selected Applications of Energy Harvesting Systems**	**08 HOURS**
Case studies for Implanted medical devices Bio-MEMS based applications harvesting for RF sensors and ID tags powering wireless SHM sensor nodes		

PRACTICAL		
PRACTICAL NO.01	**Design of Power Management Algorithms**	**4 HOURS**
Power management algorithms for energy harvesting sensing systems		
PRACTICAL NO.02	**Design of Low Power Node**	**4 HOURS**
Design of low power node using ultra power MCU and signal conditioning		
PRACTICAL NO.03	**Design of Low Power Network**	**4 HOURS**
Design of low power connectivity in network using low power protocols		
PRACTICAL NO.04	**Design of Energy-efficient Application**	**4 HOURS**
Design of an energy efficient application using low power IoT devices		

TEXT BOOK

1. Carlos Manuel Ferreira Carvalho, Nuno Filipe Silva VerssimoPaulino, CMOS Indoor Light Energy Harvesting System for Wireless Sensing Applications, springer
2. Danick Briand, Eric Yeatman, Shad Roundy ,Micro Energy Harvesting, Willey

REFERENCE BOOK

1. Yen Kheng Tan, Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage, and Power Management, 1st Edition, CRC PRESS

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Intelligent and high performance Robotics
	COURSE CODE	EX451
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	–	50	150

PRE-REQUISITE : EX314 - Fundamentals of Robot & Design, EX414 - Robotics Vision

COURSE OBJECTIVES :

EX451.CEO.1: Describe methods of solving problems using Artificial Intelligence.
EX451.CEO.2: Percolate the concepts of optimal control for obtaining high performance.
EX451.CEO.3: Illustrate the concepts of Expert Systems and machine learning.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX451.CO.1: Classify different types of learning, planning and reasoning under AI methods.
EX451.CO.2: Identify appropriate AI methods to solve a given problem.
EX451.CO.3: Formalize a given problem in the language/framework of different AI methods.
EX451.CO.4: Explore and analyze diverse fields in robotic applications.

THEORY COURSE CONTENT		
UNIT 1	**ARTIFICIAL INTELLIGENCE FOR ROBOTICS**	**08 HOURS**
History, state of the art, Need for AI in Robotics. Thinking and acting humanly, intelligent agents, structure of agents. PROBLEM SOLVING: Solving problems by searching Informed search and explorationConstraint satisfaction problemsAdversarial search, knowledge and reasoningknowledge representation first order logic.		
UNIT 2	**Planning**	**08 HOURS**
Planning with forward and backward State space search Partial order planning Planning graphsPlanning with propositional logic Planning and acting in real world.		
UNIT 3	**Reasoning**	**08 HOURS**
Uncertainty Probabilistic reasoningFiltering and predictionHidden Markov modelsKalman filters-Dynamic Bayesian Networks, Speech recognition, make decisions. Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.		
UNIT 4	**Learning**	**08 HOURS**
Forms of learning Knowledge in learning Statistical learning methods reinforcement learning, communication, perceiving and acting, Probabilistic language processing, perception.		
UNIT 5	**AI in Robotics**	**08 HOURS**
Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics Ariel robots- Collision avoidance-Robots for agriculture, mining, exploration, underwater, civilian and military applications, nuclear applications, Space applications		

PRACTICAL: Perform following experiments using		
PRACTICAL NO.01	**Capstone Project Development**	**18 HOURS**
Power management algorithms for energy harvesting sensing systems		

TEXT BOOK

1. Stuart Russell, Peter Norvig, Artificial Intelligence: A modern approch, Pearson Education, India2003. , ISBN : 978-0136042594.
2. Negnevitsky, M, Artificial Intelligence: A guide to Intelligent Systems,. Harlow: Addison-Wesley, 2002., ISBN : 978-1408225745.

REFERENCE BOOK

1. David Jefferis, Artificial Intelligence: Robotics and Machine Evolution, Crabtree Publishing Company, 1992. , ISBN : 978-0778700463

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Sociology
	COURSE CODE	HP402
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP402.CEO.1: The course focuses on the society in India with an attempt to acquaint students with sociology as a social science and the distinctiveness as a social science.

HP402.CEO.2: It displays the relevance and significance of sociology in understanding the society and in attempting to solve its problems.

HP402.CEO.3: Many of the Sociological Changes are an answer to the age-old social norms and practices giving rise to a solution which is critical to social issues and problems.

HP402.CEO.4: The course sensitizes students to the emerging social issues and enables them to acquire sociological understanding of these issues with an ability to answer the problems.

HP402.CEO.5: Projects in Sociology are tools that facilitate the construction of knowledge in imparting the right attitude towards social issues .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP402.CO.1: Get acquainted to sociology as a social science.

HP402.CO.2: Explain the significance of sociology in solving problems.

HP402.CO.3: Derive solutions to critical social issues.

HP402.CO.4: Change their attitude towards social issues.

THEORY

UNIT 1	Introduction to Sociology	6 HOURS

The nature of Sociology, meaning of Sociology: Origin, Definition, Scope, Culture, meaning, components, beliefs, values, norms, technology, diversity, towards a global culture.

UNIT 2	Sociolization	5 HOURS

Socialization, Agents of Socialization, Heredity and Environment, Group, Social structure, Status and role, family, school, peer group, media, adult socialization, resocialization, Role of Social moments, Illustrations: Women, Tribal & Dalit Movements .

Further Reading:

UNIT 3	Nature and factors of Social Change	5 HOURS

Change: Meaning. Nature and factors of Social Change: Biological Factors. Demographic Factors, Technological Factors, Economic Factors Cultural Factors, Info-tech factors, Meaning of Gender sensitization, Discrimination, violence and Abuse.

Further Reading:

UNIT 4	Visions of Social Change in India	4 HOURS

Idea of development planning and mixed economy, Constitution, law and social change, Education and social change.

Further Reading:

UNIT 5	Works and Economic Life	4 HOURS

Social organization of work in different types of society- slave society, feudal society, industrial /capitalist society. Formal and informal organization of work. Labour and society.

Further Reading:

UNIT 6	Introduction to Applied sociology	4 HOURS

The use of Sociology: Introduction to applied Sociology-Sociology and social problems, Ecology and Environment: Pollution, Global warming and Greenhouse effect. Impact of Industrialization and Urbanization on Environment.

REFERENCE BOOKS

1. T.B. Bottomore, Sociology: A Guide to Problems and Literature, Blackie and Sons Publishers, 1978, ISBN:978-0043000267
2. Sociology: A guide to problems and literature. Bombay: George Allen and Unwin (India): Harlambos, M.1998. ISBN: 978-0043000267
3. Sociology: Themes and perspectives. New Delhi Oxford University Press.: Inkeles, Alex, 1987
4. What is Sociology, Madras: Macmillan, India: Johnson, Harry M. 1995.
5. Sociology: A Systematic Introduction. New Delhi, Allied Publishers. ISBN: 978-8170231370 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Major Project - II
	COURSE CODE	ET432
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	8	NIL	NIL	NIL	100	50	150

PRE-REQUISITE : Major Project-I

COURSE OBJECTIVES :

ET432.CEO.1: Follow the standard guideline to meet the objective for development of Project.
ET432.CEO.2: Test rigorously before deployment of Systems.
ET432.CEO.3: Verify and Validate the work Undertaken.
ET432.CEO.4: Consolidate the work and preparation of final report.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET432.CO.1: Show the evidence of independent evaluation.
ET432.CO.2: Critically analyzed the result and their implementation methodology.
ET432.CO.3: Validate the results with standard tools and techniques.
ET432.CO.4: Understand the importance of documentation and report writing.

PREAMBLE:

The objective of this Major Project-II to implement the full and final project and the report. After The remaining project work which consist of selection of approach / methodology / tools and techniques, Designing, installation, results and performance evaluation. Also includes the comparative analysis and validation of result. Should prepare the Project report as per format for satisfactory completion of work certified by concern project advisor and dean.

GUIDELINES:

In Project Work Stage-II, the student shall complete the remaining project work which consists of Selection of Methodology, Tools and Technology, Installations, Design, Implementations, testing, Results, performance analysis if applicable (discussions using data tables per parameter considered for the improvement with existing/known algorithms/systems) and comparative analysis and validation of results and conclusions. The student shall prepare and submit the report of Project work in standard format for satisfactory completion of the work that is the duly certified by the concerned advisor and Dean of the school. It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded. Follow the guideline and formats as mentioned in guideline document.(Annexure-II).

TIMELINE:

1. Presentation of Project Review- 3 Project Progress Monitoring DRC review (Week 5th)
2. Presentation of Project Review 4 Project Progress Monitoring and Report Preparation (Week-8th)
3. Internal Examination/ Project Expo: Project-2 Demonstration and presentation- (Week 10th)
4. External Examination: Project-2 Demonstration and Presentation- (End semester-Week 12th or 13th)

ASSESSMENT:

1. Internal Assessment (TW)

a. Project Review -3 Progress Monitoring - 30 Marks

b. Project Review -4 Progress Monitoring and Report Preparation -30 Marks

c. Project Expo/ Examination- Evaluation Presentation and Demonstration- 30 Marks

d. Paper publication/presentation/IPR -10 Marks

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Final Year

Bachelor of Technology in

Electronics & Telecommunication Engineering

(Amendments for Semester Long Internship)

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering **(An Autonomous Institute Affiliated to SPPU)**	**SEMESTER LONG INTERNSHIP** **Rules and Regulations** **(2016 - 2020)**

1. ELIGIBILITY:

1. No live backlogs
2. CGPA of 8.50 and above
3. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student)

Only students satisfying the above criteria can be permitted for semester-long internship in any MNCs / R&D laboratories such as DRDO, NCL, NEERI, CDAC and Institutions like IITs/ NITs / International institutes of repute.

2. DEADLINES:

For the current batch, the applications must be submitted by 30, November 2019 by all students desired to go for the semester long internship.

3. APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including details of the organization along with the details of the project in brief, copy of their CV and copies of mark sheet to the respective school Corporate Relations (CR) coordinator. The application must be as per the format given below.

Application for Internship Program

Sr. No.	Particulars	
1	Name of the applicant (in bold letters)	
2	Gender	
3	School	
4	Date of Birth & Age (as on date)	
5	Roll Number & PRN	
6	Address for correspondence with mobile / telephone number and email-id	
7	Name & address of the Institute / Industry	
8	Core Domain of Institute / Industry	
9	Contact details Supervisor / HR Mobile / Telephone number and email-id	
10	Period of internship	24-26 weeks
11	Details of the Project proposed	

Signatures

Student	**School Internship Coordinator**
Approved by:	
No. of credits proposed	6 / 10
Dean --- School of _____ Engineering	MIT AOE Seal
Date:	

4. RULES & CONDITIONS:

I. Sponsored project should be along the same track of the minor (Open Elective) chosen by the student. (desirable)

II. Semester long internship is applicable only in the 8th semester. The distribution of credits for the VIII semester is as follows;

DC	Department Core	4 Credits
DE	Department Elective	3 Credits
OE	Open Elective	4 Credits
HSS	Humanities & Social science	2 Credits
SDP	Skill development and Project	4 Credits

III. For a student who is going for a semester long internship, 10 credits (OE, HSS and SDP) will be awarded if OE is part of the internship otherwise 6 credits will be awarded.

IV. The equivalence courses for the DC, DE and OE must be floated by the Schools.

V. The credits of DC, DE and OE should be earned through MOOC courses.

VI. If a student is not able to successfully earn the credits of the DC / DE / OE within the stipulated time, they will not be eligible for the graduation in the same academic year.

5.1 ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel.

I. The Panel for the evaluation should be 3 members (if 3 credits) or 4 members (if 5 credits).
The composition of the team would be as follows.
   i. Dean, Respective School
   ii. CR Coordinator / Project Coordinator / Project Guide
   iii. Project Guide (Industry)
   iv. The domain expert (In case of 5 credits, as per the minor specialization)

II. Presentation I at the end of 45th day and presentation II at the end of 90th day from the start of the project combined to a total weightage of 5 credits **(3 credits if OE is exempted).** It can be possible to do through Skype, if acceptable to the panel. **In Grade card it will be mentioned as SLIP – Project Design.**

III. Presentation at the end of the Internship Work and Final Internship Report after the completion of the Internship Work combined for a total weightage of 5 credits **(3 credits if OE is exempted)** and should be as per the template). **In Grade card it will be mentioned as SLIP – Project Implementation.**

5.2 ASSESSMENT METHOD FOR OTHER COURSES RUN THROUGH INSTITUTE LMS:

Credits for the courses run through Go-Webinar will be assessed using the following methods.

I. There will be SIX assignments (one per unit) to be submitted through the moodle. This will have a weightage of 30% of the total score. This contributes to the IA for the course.

II. There will be SIX quizzes (one per unit) to be conducted through moodle. This will have a weightage of 30% of the total score. This contributes to the ISE for the course.

III. One FINAL presentation to be done at the end and evaluated by a team of THREE members including the Course Champion, Instructor and any other nominated member by the respective School Dean. This will have a weightage of 40% of the total score. This contributed for the ESE of the course.

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	01/06/2019
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ET401	VLSI Design	3	2	4
2.	DE1	ET41#	Department Elective	3	-	3
3.	OE3	ET42#	Open Elective	3	2	4
4.	HSS7	HP401	Engineering Economics	2	-	2
5.	HSS8 / SDP7	HP403 / ET403	Business Strategies / Programming in Java	-	2	1
6.	SDP8	ET402	Project – I	-	8	4
7.	SDP9	ET404	Summer Internship	-	-	4
TOTAL				**11**	**14**	**22**

SEMESTER: VIII (Semester Long Internship not inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ET431	Advanced Communication Systems @	4	-	4
2.	DE2	ET44#	Department Elective	3	-	3
3.	OE4	ET45#	Open Elective @	4	-	4
4.	SEMESTER LONG INTERNSHIP – Project Design			-	6	3
5.	SEMESTER LONG INTERNSHIP – Project Implementation			-	6	3
TOTAL				**11**	**12**	**17**

MIT | Academy of Engineering (An Autonomous Institute)	**CURRICULUM STRUCTURE (2016 - 2020)**		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**RELEASE DATE**	**:**	01/06/2019
	REVISION NO.	**:**	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ET401	VLSI Design	3	2	4
2.	DE1	ET41#	Department Elective	3	-	3
3.	OE3	ET42#	Open Elective	3	2	4
4.	HSS7	HP401	Engineering Economics	2	-	2
5.	HSS8 / SDP7	HP403 / ET403	Business Strategies / Programming in Java	-	2	1
6.	SDP8	ET402	Project – I	-	8	4
7.	SDP9	ET404	Summer Internship	-	-	4
TOTAL				**11**	**14**	**22**

SEMESTER: VIII (Semester Long Internship inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ET431	Advanced Communication Systems[@]	4	-	4
2.	DE2	ET44#	Department Elective	3	-	3
4.	SEMESTER LONG INTERNSHIP – Project Design			-	10	5
5.	SEMESTER LONG INTERNSHIP – Project Implementation			-	10	5
TOTAL				**7**	**20**	**17**

@ - Courses run through institute LMS.

DEPARTMENT ELECTIVE ON MOOCS PLATFORM			
SR. NO.	**COURSE DETAILS**	**MOOC DETAILS**	**NO. OF WEEKS**
1.	Electronic Systems for Cancer Diagnosis (IISc)	SWAYAM	12
2.	AI: Knowledge Representation and Reasoning (IIT M)	SWAYAM	12
3.	Block-chain Architecture Design and Use Cases	NPTEL	8

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Bachelor of Technology

In

Information Technology

(Choice Based Credit System)

2016-2020

BoS Chairman
(Dean, SCET)

DEAN
School of Computer Engineering
& Technology
MIT Academy of Engineering
Alandi (D.), Pune-412 105.

Member Secretary
Academic Council
(Dean, Academics)

Chairman
Academic Council
(Director, MITAoE)

MIT ACADEMY OF ENGINEERING ALANDI (D), DIST. PUNE

MIT Academy of Engineering

An autonomous institute affiliated to SavitribaiPhule Pune University

CURRICULUM FRAMEWORK (Information Technology)

The BTECH Program shall be based on the following type of courses

SL. NO.	TYPE OF COURSE	ABBREVIATION
1.	Natural Science	NSC
2.	Engineering Science	ESC
3.	Program Core	PC
4.	Discipline Core	DC
5.	Department Elective	DE
6.	Open Elective	OE
7.	Humanities and Social Science	HSS
8.	Skill Development and Project	SDP

The Course and Credit Distribution shall be as under,

SL. NO.	TYPE OF COURSE	NO. OF COURSES	TOTAL CREDITS	
			NO.	%
1.	Natural Science	**4**	**18**	**10.98**
2.	Engineering Science	**4**	**16**	**9.76**
3.	Program Core	**5**	**20**	**12.20**
4.	Discipline Core	**12**	**48**	**29.26**
5.	Department Elective	**2**	**6**	**3.66**
6.	Open Elective	**4**	**16**	**9.76**
7.	Humanities and Social Science	**8/9**	**16**	**9.76**
8.	Skill Development and Project	**10/9**	**24**	**14.62**
TOTAL		**49**	**164**	**100**

COURSE DISTRIBUTION: SEMESTER WISE										
SL. NO.	TYPE OF COURSE	NO. OF COURSES/SEMESTER								TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science	2	2							**4**
2.	Engineering Science	2	2							**4**
3.	Program Core			3	2					**5**
4.	Discipline Core			2	2	3	3	1	1	**12**
5.	Department Elective							1	1	**2**
6.	Open Elective					1	1	1	1	**4**
7.	Humanities & Social Science	1	1		1	1	2	1/2	1	**8/9**
8.	Skill Development & Project	1	1	1	1	1	1	3/2	1	**10/9**
TOTAL		**6**	**6**	**6**	**6**	**6**	**7**	**7**	**5**	**49**

CREDIT DISTRIBUTION: SEMESTER WISE										
1 Lecture hour =1Credit **2 Lab Hours =1 Credit** **1 Tutorial Hour = 1Credit**										
SL. NO.	TYPE OF COURSE	NO. OF CREDITS/SEMESTER								TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science	9	9							**18**
2.	Engineering Science	8	8							**16**
3.	Program Core			12	8					**20**
4.	Discipline Core			8	8	12	12	4	4	**48**
5.	Department Elective							3	3	**6**
6.	Open Elective					4	4	4	4	**16**
7.	Humanities & Social Science	2	2		2	2	3	3	2	**16**
8.	Skill Development & Project	2	2	2	2	2	2	8	4	**24**
TOTAL		**21**	**21**	**22**	**20**	**20**	**21**	**22**	**17**	**164**

MIT Academy of Engineering	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2016-17
FIRST YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	RELEASE DATE	:	01/06/2016
	REVISION NO.	:	0.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	NSC1	AS101	Mathematics – 1	4	1	5
2.	NSC2	AS102 / AS103	Physics / Chemistry	3	2	4
3.	ESC1	EX101 / CV101	Electrical & Electronics Engg. / Applied Mechanics	3	2	4
4.	ESC2	ME101 / IT101	Engineering Graphics/Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – 1	1	2	2
6.	SDP1	ME102 / ME103	Engineering Tools & Techniques / Design Thinking	---	4	2
TOTAL				**13**	**15**	**21**

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	NSC3	AS104	Mathematics – 2	4	1	5
2.	NSC4	AS103 / AS102	Chemistry / Physics	3	2	4
3.	ESC3	CV101 / EX101	Applied Mechanics / Electrical& Electronics Engg.	3	2	4
4.	ESC4	IT101 / ME101 /	Computer Programming / Engineering Graphics	2	4	4
5.	HSS2	HP102	Language & Communication – 2	1	2	2
6.	SDP2	ME103 / ME102	Design Thinking / Engineering Tools & Techniques	---	4	2
TOTAL				**13**	**15**	**21**

L: Lecture, P: Practical, T: Tutorial; *Applicable for FY BTech

MIT Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2017-18
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	RELEASE DATE	:	01/06/2017
	REVISION NO.	:	0.0

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS202	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	IT202	Object Oriented Technology	3	2	4
5.	DC2	IT203	Computer Network Technology	3	2	4
6.	SDP3	ET206	Prototyping	--	4	2
TOTAL				**14**	**14**	**21**

SEMESTER:IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	--	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	IT211	Data Structures and Applications	3	2	4
5.	DC4	IT212	Database Systems	3	2	4
6.	SDP4	IT213	Minor Project	--	4	2
TOTAL				**15**	**12**	**21**

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	RELEASE DATE	:	01/12/2017
	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	IT301	Computability Theory	3	2	4
2.	DC6	IT302	Operating System	3	2	4
3.	DC7	IT303	Web Technology	3	2	4
4.	OE1	IT311 CS311 CS312	Open Elective - Refer Annexure.	3	2	4
5.	HSS4	HP301	Project Management	1	2	2
6	HSS6	HP303	Basics of Entrepreneurship	--	2	1
7	SDP5	CS305 CS306 CS307	Skill Development Lab	--	4	2
TOTAL				**13**	**16**	**21**

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	IT321	Computational Intelligence	3	2	4
2.	DC9	IT322	Cloud Services and Applications	3	2	4
3.	DC10	IT323	Mobile Application Development	3	2	4
4.	OE2	IT331 CS331 CS332	Open Elective - Ref er Annexure.	3	2	4
5.	HSS5	HP302	Prof essional Skills	1	2	2
6.	SDP6	IT324	Mini Project		4	2
TOTAL				**13**	**14**	**20**

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	RELEASE DATE	:	01/12/2017
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	DC – 11	CS401	Software Engineering, Testing and Quality Assurance	3	2	4
2.	DE – 1	IT41#	Department (Program) elective - Ref er Annexure	3	--	3
3.	OE – 3	IT421 CS421 CS422	Open elective - Ref er Annexure	3	2	4
4.	HSS – 7	HP401	Engineering Economics	2	--	2
5.	HSS – 8 /SDP–7	HP403/CS40#	Business Strategies / Advance skill development lab (Adv. Java/ R programming/Python with kali Linux)	--	2	1
6.	SDP – 8	IT402	Project - I	--	8	4
7.	SDP-9	CS406	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	DC – 12	CS431	Human Computer Interactions	3	2	4
2.	DE – 2	IT44#	Department (Program) elective - Ref er Annexure	3	--	3
3.	OE – 4	IT451 CS451 CS452	Open elective - Ref er Annexure	3	2	4
4.	HSS – 9	HP402	Sociology	2	--	2
5.	SDP –10	IT432	Project - II	--	8	4
TOTAL				11	12	17

		CREDITS		
		1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour		
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	21	21	**42**
2.	Second Year	21	21	**42**
3.	Third Year	21	20	**41**
4.	Final Year	22	17	**39**
TOTAL				**164**

CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	28	28	**56**
2.	Second Year	28	27	**55**
3.	Third Year	29	27	**56**
4.	Final Year	25	23	**48**
TOTAL				**215**

ANNEXURE

Natural Science (NSC) : 4 Courses		
1.	AS101	Mathematics – 1
2.	AS102	Mathematics – 2
3.	AS103	Physics
4.	AS104	Chemistry

Engineering Science (ESC) : 6 Courses		
1	EX101	Electrical and Electronic Engineering
2	CV101	Applied Mechanics
3	ME101	Engineering Graphics
4	IT101	Computer Programming

Program Core (PC) : 5 Courses		
1.	CH201	Environmental Science
2.	AS201	Applied Mathematics
3.	ET201	System Engineering
4.	IT201	Engineering Informatics
5.	ME201	Material Engineering

Discipline Core (DC) : 12 Courses		
1.	IT202	Object Oriented Technology
2.	IT203	Computer Network Technology
3.	IT211	Data Structures and Applications
4.	IT212	Database Systems
5.	IT301	Computability Theory
6.	IT302	Operating System
7.	IT303	Web Technology
8.	IT321	Computational Intelligence
9.	IT322	Cloud Services and Applications
10.	IT323	Mobile Application Development
11.	CS401	Software Engineering Testing & Quality Assurance
12.	CS431	Human Computer Interaction

Department Elective (DE) : 6 Courses	
IT411	Operating System Administration
CS412	Wireless and Mobile Network
CS413	Information Retrieval
CS441	Distributed System
IT442	IoT and Wireless Sensor Network
IT443	Computer Graphics & Multimedia Techniques

Open Elective (OE) : 4 Courses		
Sl. No.	**Course Code**	**Course**
1	IT311	Cryptography and System Security
2	IT331	Cyber Security
3	IT421	Ethical Hacking & Cyber Laws
4	IT451	Digital Forensics
5	CS311	Descriptive Analytics
6	CS331	Predictive Analytics
7	CS421	Big Data Analytics
8	CS451	Practitioner's approach for Data Analytics
9	CS312	Artificial Intelligence & Neural Network
10	CS332	Machine Learning
11	CS422	Deep Learning
12	CS452	Pattern Learning

Open Elective (OE) :Term - I (List of courses for Academic Year 2018-19)		
Chemical		
1	CH311	Process Modeling and Simulation.
2	CH312	Piping Engineering
Civil		
3	CV311	Construction Planning & Management
Computer		
4	CS311	Descriptive Analytics
5	CS312	Artificial Intelligence & Neural Network
Electronics		
6	EX311	Fundamentals of Robotics
E & TC		
7	ET311	Embedded System Programming (ESP)
8	ET312	IoT Architecture and Sensors
IT		
9	IT311	Cryptography & System Security
Mechanical		
10	ME311	Geometric Modeling & Design
11	ME312	Fundamentals of Robotics
12	ME313	Work Process Assessment

Open Elective (OE) :Term - II (List of courses for Academic Year 2018-19)		
Chemical		
1	CH331	Process Engineering.
2	CH332	Piping Layout
Civil		
3	CV331	Operation Research
Computer		
4	CS331	Predictive Analysis
5	CS332	Machine Learning
Electronics		
6	EX331	Kinematics and Dynamics of Robotics
E & TC		
7	ET331	Embedded Processor
8	ET332	IoTNetworks & Protocols
IT		
9	IT331	Cyber Security
Mechanical		
10	ME331	Finite Element Analysis
11	ME332	Kinematics & Dynamics of Robots
12	ME333	Facility Planning & Design

Open Elective (OE) :Term - I (List of courses for Academic Year 2019-20)		
Chemical		
1	CH421	Process Optimization
2	CH422	Piping Design & Engineering
Civil		
3	CV421	Financial Management
Computer		
4	CS421	Big Data Analytics
5	CS422	Deep Learning
Electronics		
6	EX421	Robotics Vision and Control
E & TC		
7	ET421	Low-Power SoC Architecture & Applications (SoC&A)
8	ET422	Privacy and Security in IoT
IT		
9	IT421	Ethical Hacking & Cyber Laws
Mechanical		
10	ME421	Computational Fluid Dynamics
11	ME422	Robotics Vision and Control
12	ME423	Operations Management

Open Elective (OE) :Term - II (List of courses for Academic Year 2019-20)		
Chemical		
1	CH451	Process Intensification & Integration
2	CH452	Pipeline Engineering
Civil		
3	CV451	Visualization and Information Exchange
Computer		
4	CS451	Practitioner's approach for Data analytics
5	CS452	Pattern Recognition
Electronics		
6	EX451	Intelligent and High-Performance Robotics
E & TC		
7	ET451	Real-Time Embedded System (RES)
8	ET452	Energy Management for IoT Devices
IT		
9	IT451	Digital Forensics
Mechanical		
10	ME451	Advanced Analysis
11	ME452	Intelligent and High Performance Robotics
12	ME453	Supply Chain Management

Humanities and Social Science (HSS) : 9 Courses		
Sl. No.	**Course**	
1.	HP101	Language & Communication – I
2.	HP102	Language & Communication – II
3.	HP201	Psychology
4.	HP301	Project Management
5.	HP302	Professional Skills
6.	HP303	Basics of Entrepreneurship
7.	HP401	Engineering Economics
8	HP402	Sociology
9	HP403	Business Strategies / Programming in Java

Skill Development and Project (SDP) : 9 Courses		
Sl. No.	**Course Code**	**Course**
1.	ME102	Engineering Tools and Techniques
2.	ME103	Design Thinking
3.	ET206	Prototyping
4.	IT 213	Minor Project
5.	IT 302	Skill development Lab.
6.	IT 324	Mini Project
7.	CS 402	Skill development Lab 2
8.	IT 403	Project - I
9.	IT 432	Project - II

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

First Year

Bachelor of Technology

2016-2020

(With Effect from Academic Year: 2016-2017)

MIT | Academy of Engineering
(An Autonomous Institute)

CURRICULUM STRUCTURE (2016 - 2020)

SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**:**	**2016-2017**
FY BTECH- INFORMATION TECHNOLOGY	**RELEASE DATE**	**:**	**1/06/2016**
	REVISION NO.	**:**	**1.0**

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS 101	Mathematics -1	4	1	5
2.	NSC2	AS 102/ AS 103	Physics/Chemistry	3	2	4
3.	ESC1	EX 101/ CV 101	Electrical & Electronics Engg/Applied Mechanics	3	2	4
4.	ESC2	ME 101/ IT 101	Engineering Graphics/Computer programming.	2	4	4
5.	HSS1	HP 101	Language &Communication -1	1	2	2
6.	SDP1	ME 102/ ME 103	Experimental Tools &Techniques/Design Thinking	--	4	2
TOTAL				13	15	21

SEMESTER:II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC3	AS 104	Mathematics -2	4	1	5
2.	NSC4	AS 103/ AS 102	Chemistry/ Physics	3	2	4
3.	ESC3	CV 101/ EX 101	Applied Mechanics/ Electrical & Electronics Engg	3	2	4
4.	ESC4	IT 101/ ME 101	Computer programming/ Engineering Graphics	2	4	4
5.	HSS2	HP 102	Language &Communication -2	1	2	2
6.	SDP2	ME 103/ ME 102	Design Thinking/ Experimental Tools &Techniques	--	4	2
TOTAL				13	15	21

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics I
	COURSE CODE	AS101
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII

COURSE OBJECTIVES :

AS101.CEO.1:To recall and apply the methods of solving system of equations using matrices.
AS101.CEO.2:To find nth derivative and expansion of different functions.
AS101.CEO.3:To classify and solve first order ordinary differential equations.
AS101.CEO.4:To categorize and inspect the applications of first order differential equations.
AS101.CEO.5:To apply the concepts of partial differentiation.
AS101.CEO.6:To demonstrate an understanding towards the applications of partial differentiation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS101.CO.1:Inspect system of equations using matrices. [L4]
AS101.CO.2:Illustrate problems based on nth derivative and expansion of functions. [L2]
AS101.CO.3:Solve first order ordinary differential equations. [L3]
AS101.CO.4:Analyze simple real world phenomenon governed by first order ordinary differential equations. [L4]
AS101.CO.5:Infer the problems based on properties of partial differentiation. [L2]
AS101.CO.6:Examine the applications of partial differentiation. [L4]

THEORY		
UNIT 1	**Matrices**	**12 HOURS**
Rank, Solutions of system of linear equations: Homogeneous and Non Homogeneous systems,Linear dependence and independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem		
UNIT 2	**Successive Differentiation**	**8 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative, Taylors and Maclaurins theorem for expansion of functions .		
UNIT 3	**First order ordinary differential equations**	**10 HOURS**
Exact differential equations, Differential equations reducible to exact by finding integrating factors, linear differential equations, Differential equations reducible to linear form .		
UNIT 4	**Applications of ftrst order ordinary differential equation**	**10 HOURS**
Newtons law of cooling, Electrical circuits, rectilinear motion, one dimensional heat conduction, Chemical applications- Mixing problems .		
UNIT 5	**Partial Differentiation**	**8 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative and differential, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 6	**Applications of Partial Differentiation**	**8 HOURS**
Jacobian, properties of Jacobian, Jacobian of Implicit functions, Finding partial derivative using Jacobians, Functional dependence, maxima and minima of functions of two variables.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Rank, System of Linear equations: Homogeneous and Non Homogeneous systems.		
TUTORIAL NO.02		**1 HOURS**
Linear Dependence and Independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem.		
TUTORIAL NO.03		**1 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative.		
TUTORIAL NO.04		**1 HOURS**
Expansion of functions using Taylors and Maclaurins theorems.		
TUTORIAL NO.05		**1 HOURS**
Finding solutions to exact differential equations, Differential equations reducible to exact by finding integrating factors		
TUTORIAL NO.06		**1 HOURS**
Linear differential equations,Differential equations reducible to linear.		
TUTORIAL NO.07		**1 HOURS**
Newtons law of cooling, Kirchoffs law of electrical circuits, rectilinear motion		
TUTORIAL NO.08		**1 HOURS**
One dimensional heat conduction, Chemical applications Mixing Problems		
TUTORIAL NO.09		**1 HOURS**
Examples on Partial Differentiation and Chain rule,Total derivative and differential		
TUTORIAL NO.10		**1 HOURS**
Examples on Eulers Theorem, Differentiation of an implicit function		
TUTORIAL NO.11		**1 HOURS**
Examples on Jacobian, properties of Jacobian, Functional dependence		
TUTORIAL NO.12		**1 HOURS**
Examples on Functional dependence,Maxima and minima of functions of two variables		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Thomas Calculus by G.B. Thomas, Maurice D. Weir, Joel R. Hass (ISBN:9789332519091, Pearson Education, 12th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig(ISBN-13: 9788126554232, Wiley Eastern Ltd., 10th edition)
3. Advanced Engineering Mathematics by R.K. Jain& S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)
5. Advanced Engineering Mathematics by Dennis G. Zill& Warren S.Wright (ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5, Jones and Bartlett Publishers, 4th edition)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Physics
	COURSE CODE	AS102
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS102.CEO.1:To make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.(L3).

AS102.CEO.2:To analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.(L4).

AS102.CEO.3:To apply the concept of behavior of light and understand the polarization phenomena.(L3) .

AS102.CEO.4:To classify and understand the difference of classical mechanics and quantum mechanics.(L2).

AS102.CEO.5:To derive the basic laws governing the motion of quantum particles.(L4).

AS102.CEO.6:To apply the concept of quantum mechanics to different applications and supplement the reasoning vis--vis understanding of different branches of Physics.(L3).

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS102.CO.1:Evaluate the importance of order of all physical quantities and compare the order of size of different objects.(L5).

AS102.CO.2:Apply the theoretical knowledge of optics to understand the physics behind engineering applications.(L3).

AS102.CO.3:Apply that light is transverse in nature. (L3) .

AS102.CO.4:Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.(L2).

AS102.CO.5:Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.(L5) .

AS102.CO.6:Apply the concepts of Quantum Physics in different branches of engineering.(L3) .

THEORY

UNIT 1	**Measurement and importance of span (order) of physical quantities**	**7 HOURS**

Concept of (i)significant numbers, (ii) accuracy versus precision (iii)error versus uncertainty (iv)systematic error versus random error (v) quantifying the uncertainty. Least-count of an apparatus, Methods to measure least-count with specific examples of vernier-calipers, screw-gauge, travelling microscope and spectrometer. Span (orders of magnitude) of prominent physical parameters with specific examples of Gravitational constant(G), Speed of light(c),Planks constant(h), Boltzmann constant(k) and wavelengths of electromagnetic spectrum. Importance of the orders of G, c, h and k alongwith hypothetical picture of world in case of their order becomes unity (1). Length-scale and time-scale of specific physical phenomenon.

UNIT 2	**Optics (Interference and diffraction of Light)**	**7 HOURS**

Particle nature and wave-nature with examples of wave and particle behavior of light, Introduction to wave nature, Concept of thin film, Stokes law of phase-change on reflection from a thin film, Thin film interference, Coating of lenses as an application of thin film interference, Interference in films of uniform and non-uniform thickness (with derivation), Applications of thin-film interference, Newton Ring Experiment and its applications, Diffraction as a particular case of interference.

UNIT 3	**Polarization of Light**	**6 HOURS**

Polarization of light, Production and analysis of polarized light (Brewsters law, Law of Malus), Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.

UNIT 4	Quantum Mechanics-I .	8 HOURS
Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Plancks quantum law of blackbody radiation, Matter-waves, De-Broglies concept of matter waves, Heisenbergs Uncertainty Principle, Operators, Eigen values and Eigen functions, Expectation Values, Wave-function, Physical significance of wave function.		
UNIT 5	**Quantum Mechanics-II .**	**8 HOURS**
Schrodingers equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohrs atomic model.		
UNIT 6	**Applications of Quantum Mechanics-LASER .**	**6 HOURS**
Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einsteins coefficients), Principle and working of LASER with example, Application of LASER in optical fibre communication.		

PRACTICALS		
PRACTICAL NO.01		**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02		**2 HOURS**
Determination of the refractive index of a given liquid using Newton Rings Experiment.		
PRACTICAL NO.03		**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04		**2 HOURS**
Determination of the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05		**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06		**2 HOURS**
Verification of Bohrs atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07		**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08		**2 HOURS**
Determination of wavelength of a laser beam using Lloyds mirror arrangement.		
PRACTICAL NO.09		**2 HOURS**
Determination of Radius of Curvature of a given planoconvex lens using Newtons Rings apparatus.		
PRACTICAL NO.10		**2 HOURS**
Determination of wavelength of different colours present in a white light.		

TEXT BOOK

1. The Feynman Lectures on Physics: Volume-1-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-82-8.(Narosa Publisher)
2. The Feynman Lectures on Physics: Volume-3-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-84-2. (Narosa Publisher)

REFERENCE BOOK

1. Measurement and Instrumentation Principles: Alan S Morris, Butterworth Heinemann, ISBN 07506508184
2. AjoyGhatak ,Optics, Tata Mc Graw Hill Publishing Company. Ltd., 2nd Edition, ISBN- 0-07058583-0
3. Jenkins White, Fundamentals of Optics, Mc Graw Hill Science, ISBN-0070853460.
4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-, Mc Graw Hill Education (India) Pvt. Ltd., 6th Edition, ISBN-10- 0070151555,
5. L. I. Schiff ,Quantum Mechanics, Tata Mc Graw Hill Education (India) Pvt. Ltd., 3rd Edition, ISBN-10- 0070856435, ISBN- 13- 9780070856431.
6. PAM Dirac,Principles of Quantum Mechanics Cbs publishers and Distributors, ISBN-10-0195671074, ISBN- 13- 978019567107
7. D J Griffiths, Introduction to Quantum Mechanics, Pearson Prentice Hall Publishers.
8. Serway and Jewett, University Physics for Scientists and Engineers, Cengage Learning Publishers.
9. K. Thyagarajan and AjoyGhatak, Lasers: Fundamentals and applications, Springer, ISBN 9781441964410.
10. Worsnop and Flint; Advanced Practical Physics, Little Hampton book service Ltd., ISBN-10: 0423738909, ISBN-13: 978-0423738902.
11. Robert Eisberg and Robert Resnick; Quantum Mechanics: Of Atoms, Molecules, Solids, Nuclei and Particles; Wiley

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical & Electronics Engineering
	COURSE CODE	EX101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	40	50	10	25	Nil	125

PRE-REQUISITE :

COURSE OBJECTIVES :

EX101.CEO.1:To impart knowledge of energy scenario and use of renewable energy systems.
EX101.CEO.2:To explain the fundamentals of single-phase and three-phase systems.
EX101.CEO.3:To explain power supply components, electronic devices.
EX101.CEO.4:To summarize various Digital systems and application.
EX101.CEO.5:To build the knowledge of measuring system and signal conditioning circuits.
EX101.CEO.6:To get acquainted with different electrical machines.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX101.CO.1:Develop the Renewable energy system (PV) as per given specifications [L3]
EX101.CO.2:Illustrate behavior of single phase A.C. circuits and three phase A.C. circuits. [L2]
EX101.CO.3:Analyze analog circuit applications.[L3]
EX101.CO.4:Design Digital applications.[L5]
EX101.CO.5:the use of Instrumentation system in various fields.[L2]
EX101.CO.6:Identify electrical machines used in typical domestic and industrial sector based on application. [L2]

THEORY		
UNIT 1	**Energy Resources & Technology**	**6 HOURS**
Energy Scenario, Energy Resources, Basic concepts about thermal, hydro and nuclear power stations (block diagram approach only).Energy conversion from thermal and mechanical energy, Energy Conservation, Use of Energy Efficient Technologies, Application of Renewable Energy Systems, Battery technology, Introduction to power quality: Definition, causes, effects, Introduction to energy audit.		
UNIT 2	**A.C. Circuits**	**7 HOURS**
A.C. fundamentals, RMS and average value, R-L,R-C,RLC series parallel circuits, phasor diagram, power and power factor. Three phase voltage generation and their waveforms, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, Difference between neutral and ground conductors.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply. BJT - structure and operation, CE, CB, CC configurations, Transistor as a switch and Amplifier. MOSFET- structure (enhancement), operation and application as a switch. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Digital: Logic gates, Boolean algebra, SOP representation, Combinational circuit Design: Half Adder, Full Adder, MUX, DMUX, Comparator, Code converter, Decoder Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor based systems, Embedded systems		
UNIT 5	**Measuring System**	**6 HOURS**
Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, IR, Speed & LVDT. Op-Amp IC 741 pin configuration, Op-amp parameters, Inverting, Non- Inverting & Differential configuration Applications: Summing & Difference amplifier, Comparator, Voltage follower.		
UNIT 6	**Electrical Machines**	**7 HOURS**
Construction of Transformer, principle of operation, EMF equation. Construction, principle of operation and types of three-phase Induction motor and DC motor, PMDC, BLDC, servo motor, stepper motor, Universal motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICALS : Total 8 Experiments from two groups.		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test it.		
PRACTICAL NO.02	**Single Phase Energy (Watt-hour) measurement.**	**2 HOURS**
To measure energy and power factor. To examine improvement in the power factor. To estimate and compare energy consumption with energy meter.		
PRACTICAL NO.03	**R-L-C series A.C. circuit**	**2 HOURS**
To calculate exact values of R, L and C for lagging and leading power factor To find power losses in R, L and C.		
PRACTICAL NO.04	**Veriftcation of relation between Line and Phase quantities in Star and Delta circuits**	**2 HOURS**
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation. To connect Bulb load in Delta connection and verify the relation.		
PRACTICAL NO.05	**Open circuit & Short circuit test on a Single Phase transformer**	**2 HOURS**
To find iron loss and no load current To find full load copper loss and winding parameters To determine efficiency and regulation of transformer		
PRACTICAL NO.06	**Load test on D.C. Shunt Motor.**	**2 HOURS**
To find the torque and output power of motor To calculate the efficiency of motor.		
PRACTICAL NO.07	**Step angle control of Stepper motor.**	**2 HOURS**
To gain familiarity with the properties of stepper motors. To calculate the step angle of motor.		
PRACTICAL NO.08	**Speed control of BLDC/PMDC Motor.**	**2 HOURS**
To find the relation between voltage and speed of motor To develop any small application.		
PRACTICAL NO.09	**Electronics Components and Measuring instruments:**	**2 HOURS**
To study Passive components Resistors, Capacitors & Inductor. To test semiconducting components Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		
PRACTICAL NO.10	**DC Regulated Power Supply:**	**2 HOURS**
To design 12V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	**BJT as a switch and Amplifter.**	**2 HOURS**
To adapt BJT as a switch On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		

PRACTICAL NO.12	**Combinational Digital Circuits:**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	**Sequential Digital Circuits:**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	**OP-AMP Applications**	**2 HOURS**
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OPAMP as summing and difference amplifier. To verify the application of OPAMP as voltage follower.		
PRACTICAL NO.15	**Sensors and Transducer**	**2 HOURS**
To study and verify operation of LVDT. To study and verify the operation of Temperature sensors. (PT100, LM35)		
PRACTICAL NO.16	**Design and Simulate using MULTISIM(Minimum 2)**	**2 HOURS**
To design a counter to display 2-digit Decimal Number (00 to 99) on 7-Segment Display. To design a Flashing LED Display for a specific Pattern using MUX. To design of Inverting/Non-Inverting Amplifier using Op-Amp IC-741 for a specific gain.		

TEXT BOOK

1. B. H. Khan,Non-Conventional Energy Resources, Tata McGraw Hill, 2nd Edition, 2009, 978-0070142763.
2. Edward Hughes, Electrical and Electronic Technology Pearson India, 10th Edition, 2011, ISBN-978-8131733660
3. Neil Storey, Electronics A Systems Approach, Pearson Education Asia, 5th Edition,2013, ISBN-978-0273773276

REFERENCE BOOK

1.1. V. N. Mittle and ArvindMittal, Basic Electrical Engineering, McGraw Hill Education, 2ndEdition,2005,ISBN- 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, McGraw Hill, 4th Edition, 2010, 978-0070699670.
3. Thomas L. Floyd, Electronics Devices & Circuits, Pearson Education India, 5th Edition, 1998, 978-0136491385.
4. Paul Horowitz, Winfield Hill, The Art of Electronics, Cambridge University press, 3rd Edition, 978-0521809269.
5. Thomas E. Kissell, Industrial Electronics, Prentice Hall of India, 3rd Edition, 2003, 9788120322608

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	4	40	50	10	50	Nil	150

PRE-REQUISITE :

COURSE OBJECTIVES :

ME101.CEO.1:To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.

ME101.CEO.2:To develop & apply visualization skill to simple Objects.

ME101.CEO.3:To expose students to computer aided drafting tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME101.CO.1:Recall fundamentals of projections (L1)

ME101.CO.2:Interpret engineering drawings (L2)

ME101.CO.3:Apply visualization skill to draw various views of object (L3)

ME101.CO.4:Analyzeengineeringdrawings (L4)

ME101.CO.5:Decide annotations for two dimensional drawings (L5)

ME101.CO.6:Develop and/or comprehend a simple engineeringdrawing in both First and Third angle orthographic projections(L4)

THEORY		
UNIT 1	**Visual Thinking & Solid Geometry**	**5 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections & Sectional Views**	**5 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views.		
UNIT 3	**Isometric Projections**	**5 HOURS**
Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of isometric View of Pyramid, Cone, Sphere.		
UNIT 4	**Interpretation of given view/ missing view**	**5 HOURS**
Identification of lines/ edges and surfaces, visualization of given orthographic views, adding missing/ third view, adding a sectional view, to convert a given view into sectional view.		
UNIT 5	**Auxiliary Projections**	**4 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View.		
UNIT 6	**Freehand Sketching & Technical Drawing**	**4 HOURS**
Free hand sketching- FV & TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles.		

PRACTICALS : Each Assignment contains 2 questions.		
PRACTICAL NO.01		**10 HOURS**
Projection of Lines, Plane, Solids		
PRACTICAL NO.02		**8 HOURS**
Orthographic Projections, Missing Views		
PRACTICAL NO.03		**6 HOURS**
Isometric Projections		
PRACTICAL NO.04		**4 HOURS**
Auxiliary View		
PRACTICALS : Assignments to be drawn on modelling software package.		
PRACTICAL NO.05		**4 HOURS**
Absolute and Incremental drawing.		
PRACTICAL NO.06		**6 HOURS**
Draw commands, Modify commands, Array, fillet, offset commands		
PRACTICAL NO.07		**2 HOURS**
Project drafting		
PRACTICAL NO.08		**12 HOURS**
Sketching, Solid Modeling, Assembly		
PRACTICAL NO.09		**4 HOURS**
Project modeling		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to Auto CAD, TMH Publishing co Ltd, 5th Edition, 2012, (ISBN 13: 9780070648371)
2. Basant Agarwal and C M Agarwal, Engineering Drawing, TMH Publishing co Ltd, 2nd Edition 2013, (ISBN13: 978-1-259-06288-9)
3. K C John, Engineering Graphics for Degree, PHI learning pvt. Ltd. New Delhi,2009, (ISBN: 97881-203-3788-6)
4. R. K. Dhavan, A Text Book of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

1. Luzadder, Warren J., Duff, John M, Fundamentals of Engineering, Prentice Hall of India,11th Edition, 2010, (ISBN: 978-81-203-0885-5)
2. Basudev Bhattacharya, Machine Drawing includes Autocad Supplements, Oxford University Press India, First Edition, 2011, (ISBN 13: 9780198070771)
3. K. Venugopal, Prabhu Raja V., Engineering Drawing and Graphics, New age Publications, First Edition, 2008, (ISBN: 978-81-224-2457-7)
4. N B Shaha and B C Rana, Engineering Drawing, Pearson Education, 2012, (ISBN: 9788131798058)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 1
	COURSE CODE	HP101
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level

COURSE OBJECTIVES :

HP101.CEO.1:To introduce a variety of English texts to the students.
HP101.CEO.2:To teach basic English grammar.
HP101.CEO.3:To guide the students to write in English coherently and formally.
HP101.CEO.4:To improve the students overall communicative competence in English through activities like group discussions and debates.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP101.CO.1:Interpret texts written in English. [L2, L5]
HP101.CO.2:Apply English grammar rules correctly. [L3]
HP101.CO.3:Develop sentences and texts in English coherently and formally. [L3, L6]
HP101.CO.4:Demonstrate overall improvement in communication skills. [L 2]

THEORY		
UNIT 1	**Functional Grammar**	**4 HOURS**
Use of tenses in day to day communication and academic writing, Direct and Indirect Speeches, Active and Passive voices, Degrees of comparison, Use of the parts of speech in sentence composition, Verb forms and Modal auxiliaries		
UNIT 2	**Communication**	**8 HOURS**
Concept of communication, Types-verbal and non-verbal, principles of effective communication, barriers to communication, cross-cultural communication		
UNIT 3	**Academic Writing**	**6 HOURS**
Essentials of good writing, Review writing, Letter writing, Report writing, Prcis writing, and Essay writing		

PRACTICALS		
PRACTICAL NO.01	**Common Errors in Communicative English**	**6 HOURS**
A task of identifying and correcting the common errors in general as well as academic English by using audios and relevant academic texts; tips on punctuation.		
PRACTICAL NO.02	**Debate**	**4 HOURS**
Concept, Dos & Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos & Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.04	**Role Play**	**4 HOURS**
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation		
PRACTICAL NO.05	**Review and Letter Writing**	**4 HOURS**
How to write a review, characteristics and essentials of a good review, writing a review on a book or short story, types of letters- formal, informal; layout of business letters		
PRACTICAL NO.06	**Report Writing and Prcis Writing**	**4 HOURS**
Types of reports, format and writing a report, What is prcis writing? Rules of prcis writing		
PRACTICAL NO.07	**Essay Writing**	**2 HOURS**
What is an essay? Tips to write a good essay, Types of essays		

REFERENCE BOOK

1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Raymund Murphy: Essential Grammar in Use, Cambridge, 3rd Edition, ISBN-13: 9780521133890
3. William Sanborn Pfeiffer: Technical Communication A Practical Approach, 6th Edition, Pearson Education, ISBN-13: 978-8131700884
4. Dutt et.al. : A Course in Communication Skills, Foundation, 1st Edition
5. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
6. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
7. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
8. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques- I
	COURSE CODE	ME102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	30	-	20	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME102.CEO.1:To introduce different tools and study the various measurement techniques.
ME102.CEO.2:To study different parts of the system along with its functions and applications.
ME102.CEO.3:To list various tools used for the said application.
ME102.CEO.4:To identify the function of various parts of system.
ME102.CEO.5:To impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME102.CEO.6:To apply the knowledge to find the solutions for basic engineering problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME102.CO.1:Recall the tools required for measurements. (L1)
ME102.CO.2:Summarize the applications of various engineering tools used. (L2)
ME102.CO.3:Identify the right tool for selected purpose. (L3)
ME102.CO.4:Inspect various parts of the system .(L4)
ME102.CO.5:Justify the most appropriate technique which can be compatible with the existing environment. (L5)
ME102.CO.6:Develop the system which will give appropriate solution to the identified problem. (L6)

PRACTICALS		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Minimum 6 practicals from the following**	**12 HOURS**
1. Study and analysis of various components on the motherboard of a standard desktop computer. 2. Installation of various components like hard disk drive on the motherboard and check the system setup for verification. 3. Formatting the hard disk drive and installation of Windows and Linux operating system making the system dual boot 4. Study of various network components like switch, Router and configure the devices. 5. Crimping of Unshielded Twisted Pair cable. (Cat-6) 6. Study of TCP/IP Stack, and configure as well as develop a Local Area Network. 7. Configuration of Network Monitoring tool and checking the results 8. Installation of DHCP server and checking the results. 9. Installation of web server and checking the results. 10. Configuration of MS Access and Deploying Access 2007 Runtime-Based Solutions 11. Study and usage of Google Tools (creating Forms, Blog). 12. Using the Google form with add on, create a PDF file of the form. 13. Designing a static HTML page 14. Uploading the pages using FTP server on a web site 15. Deploy a simple web site using LAMP server creation of a web site using Google sites.		
PRACTICAL NO.02	**Electronics Engineering (Minimum 6 practicals from the following**	**12 HOURS**
1. Basic electronics component and switches 2. PCB and Soldering Tools And Technique 3. Relay and application 4. Manufacturing of extension board/Spike Guard 5. Series and parallel connection of Electrical Load 6. Actuators and application (Electrical and Mechanical). 7. PCB Wizard 8. Proteus 9. Virtual Instrumentation. 10. Cathode Ray Oscilloscope 11. Power Supply		

PRACTICAL NO.03	Mechanical Engineering Laboratories (Minimum 6practicals from the following	12 HOURS

1. Linear and angular measurements.
2. Types of mechanism and making any one mechanism containing four links using card board.
3. Open a household component and explain it with free hand sketches.
4. Draw the outline of the problem identified for project on software package.
5. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
6. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
7. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
8. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
9. Measurement of Relative humidity of air in the lab.
10. Measurement of hardness of Steel and Aluminum.
11. Measurement of stiffness of helical spring (compression or tension). Open IT
12. Mixer or kitchen machine/ Printer.
13. Refrigerator/ Window Air Conditioner.
14. Boiler and accessories / thermal power plant (Mini).
15. Two stroke or four stroke engine.
16. Assembly and Disassembly of parts in any software package.
17. Introduction to threaded fasteners and joints using threaded fasteners.

PRACTICAL NO.04	Chemical Engineering (Minimum 3 practicals from the following	06 HOURS

1. Determination of specific gravity of liquid
2. Study of molecular diffusion
3. Liquid liquid extraction: Separation of one liquid component from the solution.
4. Solid-liquid separation from filtration
5. Membrane Separation process
6. Fuel from Plastic
7. Demonstration of mechanical operation models.
8. Production of Biodiesel
9. Open and Study Heat Exchangers.
10. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Mimimum 3 Practicals from the following)	06 HOURS

1. To find the area and included angle of given plot and fix boundary from given plan.
2. To determine the level difference between 5 points with level tube and determine height of tower with trigonometry.
3. To draw the plan of given housing to a given scale.
4. To draw line diagram of household water supply line and sewage line with list of materials used.
5. To draw line diagram of rain water harvesting unit with all details and its importance.
6. To make report on daily water requirement in public building and its waste water disposal, and reuse.
7. To identify and make report on the earthquake resisting structural members of building and its role.
8. To demonstrate the lifesaving dos and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

TEXT BOOK

1. Bruce Hallberg, Networking A Beginners Guide , 4th edition, Tata McGraw-Hill,2005, ISBN 0-07-060791-5
2. R.S. Khandpur, Printed Circuit Boards Design, Fabrication, Assembly and Testing, Tata McGraw-Hill Education, 2005, ISBN 0070588147, 9780070588141.
3. S R Dara, Engineering Chemistry, 5th edition, S.Chand , ISBN 81-219-0359-9

REFERENCE BOOK

1. Mackenzie L. Davis, Water and Wastewater Engineering, 13th edition, Tata McGraw- Hill, ISBN 978-1-25-906483-8
2. R. S. Khurmi, J. K. Gupta, Theory of Machines, 14th edition, S. Chand, ISBN 81-219-2524-X
3. Philip Wankat, Seperation Process Engineering , 3rd edition, Pearson, ISBN 978-93-325-2484-2
4. N.V. Ragvendra, L. Krishnamurthy, Engineering Metrology and Measurements, Oxford University Press, ISBN 978-0-19-808549-2.
5. Dr. Vinod Hosur, Earthquake- Resistant Design of Building Structures, Wiley, ISBN 978-81265-3859-1
6. M. S. Shetty, Concrete Technology, S. Chand, 2008, ISBN 9788121900034.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics II
	COURSE CODE	AS104
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII, Mathematics I

COURSE OBJECTIVES :

AS104.CEO.1:To identify different methods to evaluate integrals.
AS104.CEO.2:To classify and solve linear differential equations of higher order
AS104.CEO.3:To demonstrate an understanding towards evaluating multiple integrals.
AS104.CEO.4:To relate and examine the applications of multiple integrals.
AS104.CEO.5:Analyse different probability distribution functions.
AS104.CEO.6:To study different statistical methods for solving problems

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS104.CO.1:Distnguish different methods to evaluate integrals.(L4)
AS104.CO.2:Conclude solutions for higher order lineardifferential equations(L4)
AS104.CO.3:Evaluate the multiple integrals(L5)
AS104.CO.4:Apply the knowledge of multiple integrals wherever required(L3)
AS104.CO.5:Solve the probability distribution problems(L3)
AS104.CO.6:Assess statistical problems(L5)

THEORY COURSE CONTENT		
UNIT 1	**Integral Calculus**	**8 HOURS**
Reduction Formulae , Beta - Gamma functions and Differentiation under integral sign.		
UNIT 2	**Linear Differential Equations of higher order**	**8 HOURS**
General solution of Linear Differential equations with constant coefficients, Method of Variation of parameters, Equations reducible to Linear Differential equation with constant coefficients: Cauchy&Legendres linear differential equations		
UNIT 3	**Multiple Integrals**	**8 HOURS**
Tracing ofCurves: Cartesian curves, Polar curves, Parametric curves ,Double Integration, Evaluation of Double Integration, Change of order of integration, Integration by transforming Cartesian to Polar Coordinate system, Triple integration, Integration by transforming to spherical and cylindrical polar coordinates		
UNIT 4	**Applications of Multiple Integrals**	**8 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		
UNIT 5	**Probability**	**8 HOURS**
Probability, probability density function, probability distribution:Binomial, Poisson, Normal .		
UNIT 6	**Statistics**	**8 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Examples on Reduction Formulae, Beta and Gamma functions. Examples on Differentiation under integral sign		
TUTORIAL NO.02		**1 HOURS**
General solution of Linear Differential equations with constant coefficients , Method of Variation of parameters.		
TUTORIAL NO.03		**1 HOURS**
Equations reducible to Linear Differential equation with constant coefficients: Cauchy- Euler equations		
TUTORIAL NO.04		**1 HOURS**
Tracing of Cartesian curves .Tracing of Polar and Parametric curves .Double Integration, Evaluation of Double Integration, Change the order of integration.		
TUTORIAL NO.05		**1 HOURS**
Integration by transforming Cartesian to Polar Coordinate system, Triple integration,Integration by transforming to spherical and cylindrical polar coordinates.Applications of multiple integrals:To find Area, Volume		
TUTORIAL NO.06		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.07		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		
TUTORIAL NO.08		**1 HOURS**
Probability, probability density function, Probability distribution:Binomial		
TUTORIAL NO.09		**1 HOURS**
Probabilitydistribution :Poisson, Normal. Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.10		**1 HOURS**
Moments, skewness and kurtosis,correlation and regression.		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Calculus by G.B. Thomas &R.L.Finney (ISBN:81-7758-325-5, Pearson Education, 9th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig, Volume I & II (ISBN-10: 8126543132, ISBN-13: 978-8126543137, Wiley Eastern Ltd.)
3. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)
5. Advanced Engineering Mathematics by Dennis G. Zill& Warren S. Wright; Jones and Bartlett Publishers, 4th edition, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.
6. Higher Engineering Mathematics by B.S. Grewal (ISBN:81-7409-195-5,Khanna Publications,39 th edition)
7. Applied statistics and probability for engineers fourth edition by Douglas C. montgomery , George C runger(ISBN No:978-81-265-2315-3 wiley)
8. Miller& Freunds Probability and statistics for engineers by richard A johnson, irwin-miller,johnfreund(ISBN no:978-93325-5041-4,Pearson)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Chemistry
	COURSE CODE	AS103
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : Basic Chemistry of XI and XII

COURSE OBJECTIVES :

AS103.CEO.1:To summarize the basic chemistry and classic methods of analysis, which includes solution, concentrations and indicators.

AS103.CEO.2:To outline the technology involved in improving quality of water for its industrial use.

AS103.CEO.3:To illustrate the basic concepts of analytical techniques that facilitates rapid and reliable measurements.

AS103.CEO.4:To demonstrate the use of ultra violet visible spectroscopy as invaluable tools in synthetic chemistry.

AS103.CEO.5:To list and explain the principle & techniques of separation methods.

AS103.CEO.6:To define the basic aspects of advanced materials & their applications.

COURSE OUTCOMES :

On successful completion of the course the student will be able to

AS103.CO.1:Relate classic methods of analysis by preparing solutions of desired concentrations & carrying out quantitative analysis by volumetric methods. (L1)

AS103.CO.2::Identify different methodologies for water quality analysis for industrial application. (L3)

AS103.CO.3:Apply basic concepts of electro-analytical techniques for analysis of various chemical compounds and solutions. (L3)

AS103.CO.4:Extend the knowledge of calculating wavelength of absorption of various chemical compounds using UV-Visible spectroscopy. (L2)

AS103.CO.5:Outline the different methods for separation of mixtures of various chemical compounds.(L2)

AS103.CO.6:Categorize the different engineering materials and to solve engineering problems.(L4)

THEORY

UNIT 1	**Instrumental volumetric analysis**	**7 HOURS**

Introduction, methods of expressing concentrations (Self-study), primary and secondary standard solutions. Instrumental & non instrumental analysis principles & types; Types of Titrations based on reaction, AcidBase titrations: Indicatorstheory of indicators, acid base indicators, mixed and universal indicators; Titration curve for Strong acidStrong base type, Introduction to Weak acidStrong base, Strong acid-Weak base titration, Precipitation titration, Applications in quantitative analysis.

UNIT 2	**Water treatment and effluent management**	**7 HOURS**

Introduction to conventional water treatment: Complexometric titrations: Principle, EDTA titrations, choice of indicators, Hardness of water & Alkalinity of water, causes, types, numerical, internal methods of water softening, Advanced wastewater & water Treatment: i) filtration method: Carbon adsorption ii) ion-exchange method iii) membrane techniques: reverse osmosis and electro-dialysis & their applications in water purification.

UNIT 3	**Electroanalytical Techniques**	**7 HOURS**

Introduction to electrodes, pH metry: Standardization of pH meter, titration curve for the mixture of acids Vs strong base, differential plots, Conductometry: Introduction, Kohlrauschs law, measurement of conductance, Application of conductometer in Acid-Base titrations & Precipitation titrations. Potentiometry: Introduction, application in redox titrations example of Fe/Ce titration.

UNIT 4	Ultra Violet Spectroscopy	7 HOURS
Introduction, nature of UV, Beers law, absorption of UV radiation by organic molecule leading to different excitation, Terms used in UV Spectroscopy- Chromophore, Auxochrome, Bathochromic shift(Red shift), hypsochromic shift(Blue shift), hyperchromic and hypochromic effect. Instrumentation,Effect of conjugation on position of UV band. Calculation of max by Woodward and Fisher rules for dienes and enone systems, Applications of UV Spectroscopy- Determination of structure, Determination of stereo chemistry (Cis and trans)		
UNIT 5	**: Chromatography**	**6 HOURS**
Introduction and classification of chromatographic methods, Theory, Principle, technique and applications of-Column Chromatography, Thin layer Chromatography, Paper Chromatography, Gas Chromatography. Applications of chromatographic techniques		
UNIT 6	**: Engineering Materials.**	**8 HOURS**
Introduction to Material Sciences, Polymers: Introduction, Specialty polymers, Applications in electronic gadgets, housing & construction, automobiles etc. Biomaterials: Introduction, characteristics, examples, challenges, Carbon nano materials: Introduction, types & applications. Smart materials: Introduction, types, examples like piezo materials, shape memory, thermo responsive etc..		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Preparation and Standardization of solutions		
PRACTICAL NO.02		**2 HOURS**
Estimation of ions from given solution by Redox titration		
PRACTICAL NO.03		**2 HOURS**
Determination of the total hardness of a given water sample by EDTA method		
PRACTICAL NO.04		**2 HOURS**
Adsorption: Removal of organic dyes by activated charcoal		
PRACTICAL NO.05		**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.06		**2 HOURS**
Conduct metric titrations		
PRACTICAL NO.07		**2 HOURS**
Verification of Beers law & colorimetric estimation		
PRACTICAL NO.08		**2 HOURS**
Determination of max of organic/ inorganic compound using UV-visible spectrophotometer		
PRACTICAL NO.09		**2 HOURS**
Separation of mixture of two organic compounds by Thin Layer Chromatography		
PRACTICAL NO.10		**2 HOURS**
Separation of two cations by paper chromatography		
PRACTICAL NO.11		**2 HOURS**
Separation & purification of chemical compounds by Gas chromatography		

TEXT BOOK

1.Jain & Jain, Engineering Chemistry, 15th Edition, Dhanpat Rai Publications company

2.S.M. Khopkar , Basic Concept of Analytical Chemistry,2nd edition, New Age Science Ltd ISBN-10: 1906574006 ISBN-13: 978- 1906574000

3.Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, Laxmi Publications Pvt. Ltd.

REFERENCE BOOK

1.V.M.Parikh , Absorption Spectroscopy of Organic Molecules, Addison Wesley Longman Publishing Co, ISBN 10: 0201057085,ISBN 13: 9780201057089.

2. Skoog, Fundamentals of Analytical Chemistry, Cengage Learning, ISBN-13: 978-0495558286, ISBN-10: 0495558281

3. Willard, Merritt, Dean and Settle, Instrumental Methods of chemical analysis, 6th edition, Wadsworth Publishing Co. ISBN-10: 0534081428, ISBN-13: 978-0534081423.

4. Donald R. Askeland, Pradeep Fulay, W. J. Wright, The Science & Engineering of Materials, 6th Edition, Cengage Learning, 2010

5. O. P. Virmani & A. K. Narula , Applied Chemistry: Theory and Practice , New Age International Pvt. Ltd. Publishers, ISBN-10: 8122408141, ISBN-13: 978-8122408140

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	40	50	10	25	Nil	125

PRE-REQUISITE : Physics and Mathematics of XI & XII

COURSE OBJECTIVES :

CV101.CEO.1:To classify force systems and explain the conditions of equilibrium.
CV101.CEO.2:To illustrate laws of friction.
CV101.CEO.3:To demonstrate the concepts of centroid and moment of inertia.
CV101.CEO.4:To describe kinematic parameters of motion.
CV101.CEO.5:To make use of laws of motion for kinetics.
CV101.CEO.6:To explain energy and momentum methods.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV101.CO.1:Determine the resultant and support reactions.(L5)
CV101.CO.2:Analyze bodies involving frictional forces. (L4)
CV101.CO.3:Evaluate centroids of bodies and moment of inertia of sections. (L5)
CV101.CO.4:Identify the type of motion and its kinematic parameters. (L3)
CV101.CO.5:Analyze the motion under action of constant and variable forces. (L4)
CV101.CO.6:Apply energy and momentum methods for kinetics. (L3)

THEORY		
UNIT 1	**Fundamentals of statics**	**8 HOURS**
Basic concepts and fundamental principles, force, moment of a force, couple, resolution and composition of forces, Free body diagrams, equations of equilibrium, equilibrium of coplanar and non-coplanar force system, applications to jib crane, beams, and cables.		
UNIT 2	**Friction**	**6 HOURS**
Introduction, types of friction, laws of friction, angle of friction, angle of repose, cone of friction, engineering applications - blocks and wedges, ladder friction, screw jack, pulley and belt drives, band brakes.		
UNIT 3	**Properties of surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity, centroids of composite 1D and 2D objects. Introduction to moment of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, MI of composite objects. Distributed loading, fluid pressure-application to dams and gates.		
UNIT 4	**Kinematics**	**8 HOURS**
Basic concepts in kinematics, Motion with uniform and variable acceleration, Motion curves, Curvilinear Motion in Rectangular coordinates, path coordinates, polar coordinates. Kinematic Link and Kinematic Pair, Kinematic Chain, Mechanisms and its inversions, instantaneous centre of rotation, Kennedy's Theorem, Applications- slider and crank mechanism, Railway engine and its supporting flywheel motions, Linkage mechanism of excavator and its system.		
UNIT 5	**Kinetics**	**6 HOURS**
Kinetics of rectilinear and circular motion of a particle acted upon by a constant and variable force system, Newtons second laws of Motion, Equations of motion, concept of dynamic equilibrium, and motion of connected bodies. Basic principles of vehicle dynamics, Forces acting on a vehicle, tire mechanics, Dynamics of linear and lateral motion.		
UNIT 6	**Applications of Partial Differentiation**	**8 HOURS**
Work, power and energy, Principles of work and Energy,Motion under a ConservativeCentral Force. Application to Space Mechanics. Impulse, momentum, Principle of Impulse and Momentum, Collisions-elastic and plastic, Direct central impact, coefficients of restitution.Applications-vehicle collisions, sports viz. cricket, tennis, billiard.		

PRACTICALS		
PRACTICAL NO.01	**Group 1] Basic principles/laws**	**2 HOURS**
1. To verify triangle law/ Lami's theorem 2. To verify polygon law of forces. 3. To verify law of moments. 4. To verify equilibrium of parallel forces. (Beam Reactions) 5. To verify equilibrium of concurrent forces in space.		
PRACTICAL NO.02	**Group 2] Friction**	**2 HOURS**
1. To verify laws of friction. 2. To determine angle of repose for a given block and surface. 3. To determine static coefficient of friction for a block on horizontal plane. 4. To determine static coefficient of friction for a block on inclined plane. 5. To determine static coefficient of friction for flat belt and drum.		
PRACTICAL NO.03	**Group 3] Centroid/centre of gravity**	**2 HOURS**
1. To determine centroid of irregular triangular lamina. 2. To determine centroid of polygonal lamina. 3. To determine centre of gravity of a wire bend. 4. To determine centroid of a composite lamina. 5. To find the shift of centroid after cutting some part of lamina.		
PRACTICAL NO.04	**Group 4] Motion(Dynamics)**	**2 HOURS**
1. To study curvilinear motion of a particle. 2. To verify value of g using compound pendulum. 3. To determine coefficient of restitution. 4. To determine mass moment of inertia of a fly wheel. 5. To verify law of conservation of momentum.		
PRACTICAL NO.05	**Group 5] Graphical Exercises**	**2 HOURS**
1. To determine resultant of concurrent forces. 2. To determine resultant of parallel/general forces. 3. To determine reactions for a simple beam. 4. To draw motion curves for given kinematics problem. 5. To determine relative velocity by graphical method. Part B] Students will have to complete a task/activity after each practical which will be based on the theme of that group. (10 Hrs)		

TEXT BOOK

1. A. Nelson ”Engineering Mechanics: Statics and Dynamics”, Tata McGraw-Hill Education, ISBN: 978-0-07-014614-3
2. R.C Hibbeler ”Engineering Mechanics”, Pearson Education, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston ”Vector Mechanics for Engineers Vol.I and II”, Tata Mc-Graw, ISBN: 978-0077402327
2. Ferdinand Singer, Harper and Row ”Engineering Mechanics Statics and Dynamics”, ISBN:0063506610
3. Manoj K Harbola ”Engineering Mechanics”, Cengage Learning, ISBN:8131509907

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Computer Programming
	COURSE CODE	IT101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	4	40	50	10	25	NIL	125

PRE-REQUISITE : Knowledge of computer system.

COURSE OBJECTIVES :

IT101.CEO.1:To define and summarize the basic terminologies used in computer programming.
IT101.CEO.2:To develop and demonstrate logic for a given problem using algorithms and Flowcharts.
IT101.CEO.3:To evaluate solutions for the given problem using problem solving tools.
IT101.CEO.4:To identify and analyze different control structures.
IT101.CEO.5:To understand and use of simple data structures using Python.
IT101.CEO.6:To demonstrate and understand different computer applications in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT101.CO.1:Analyze a problem and identify and define the computing requirements appropriate to its solution[L3][L4].
IT101.CO.2:Apply the knowledge and strategies for structuring code, dividing problems up into pieces that can be solved independently, then integrating the pieces into a whole to solve a large problem [L3].
IT101.CO.3:Analyze when to select the different types of data structures such as arrays and lists as a framework for solving a problem [L4].
IT101.CO.4:Design, correctly implement and document solutions to problems using Python [L6].
IT101.CO.5:Analyze and compare alternative solutions to computing problems [L2][L4]
IT101.CO.6:Adapt to new developments in the field of computer science [L6].

THEORY		
UNIT 1	**Problem Solving Concepts**	**6 HOURS**
General Problem Solving Concepts-types of problems, problem solving with computers, difficulties with problem solving, Problem solving concepts for the computer: Constants, Variables, Data types, operators, Expressions, Equations, Problem solving tools.Programming structure-Modules and their functions, Cohesion and Coupling, Local and Global Variables, Parameters, return values		
UNIT 2	**Problem solving and Logic structure**	**8 HOURS**
Logic structures, Problem solving with sequential logic structure - The sequential logic structure, solution development. Problem Solving with Decisions decision logic structure, multiple Decision instructions, straight-through logic, positive logic, negative logic, logic conversion, Problem solving with loops and case logic structures.		
UNIT 3	**Arrays, Strings and File Processing**	**8 HOURS**
One dimensional, multidimensional array,finding maximum number in a set, Partitioning of array, finding smallest element, searching an array for a range. String Handling Operations: Concatenation, Copy, Substring, Compare, Length, Case Change, and Reverse. File handling and file handling operations, File Handling Modes.		
UNIT 4	**Programming Applications**	**6 HOURS**
Programming applications, Predictive analysis with examples, Graphics and animation, working with matrices, Graphics & Visualization, Differential Equation: Linear Differential Equations, Digital Signal Processing: Plotting different waveforms.		

PRACTICALS		
PRACTICAL NO.01		**6 HOURS**
1. Find the result of allthe arithmetic operations (Addition,Subtraction,Multiply, Division and modulo) in Python. 2. Show the distance in miles per gallon with respect user defined value in Python. 3. Find the kinetic energy of an object.		
PRACTICAL NO.02		**6 HOURS**
1. Write a Python program for printing result of five subjects for five students. 2. Choose any value and find whether the number is even or odd. 3. Identify whether the number entered by user is prime or not.		
PRACTICAL NO.03		**6 HOURS**
1. Solve the Fibonacci sequence using recursive function in Python. 2. Illustrate factorial of non-negative numbers in Python. 3. Build asterisk (*) graph in Python		
PRACTICAL NO.04		**6 HOURS**
Electric circuits, Chemical applications- Mixing problems.		
PRACTICAL NO.05		**6 HOURS**
1. Select the number from the entered list and find its position in Python (use Linear Search). 2. Select the number and find its position of in Python (use Binary search). 3. Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain)		
PRACTICAL NO.06		**6 HOURS**
1. Select a text file and count number of words, repeated words in a file. 2. Choose the words from the file, store in the list and sort the list is ascending order. 3. Create duplicate the file from an original file.		
PRACTICAL NO.07		**6 HOURS**
1. Predict whether the entered string is palindrome or not. 2. Compare two strings and convert in opposite case in Python. 3. Select any two words and perform concatenation operation		
PRACTICAL NO.08		**14 HOURS**
1. Create a simple picture in python using graphics package. 2. Construct 2D and 3D plotting the Objects. 3. Create Sine waveform, Cosine waveform, Square waveform, Saw-tooth waveform, using MATLAB and discrete the same. 4. Solve the matrix operations (Addition, Multiplication, and Transverse) in MATLAB. 5. Design an application to display student result using predictive analysis		

TEXT BOOK

1.1. Problem Solving and Programming Concepts ,Maureen Sprankle , Pearson Publication, Seventh Edition, ISBN 81-317-0711-3.

2.How to think like a Computer Scientist, Learning with Python Allen Downey, Jeffrey Elkner, Chris Meyers, Green Tea Press ISBN: 0-9716775-0-6.

REFERENCE BOOK

1.1. Learning Python Mark Lutz Oreilly Publication 5th Edition ISBN-13: 978-1449355739.

2. A MATLAB Exercise Book LudmilaKuncheva, Cameron Gray, Perfect-bound Paperback, ISBN 9781291784794.

3. How to solve it by Computer, R.G.Dromey, First Edition, Pearson Publication, ISBN 978-81-315-0562-9.

4. Introduction To Computation And Programming Using Python ”Guttag John V, PHI(2014), ISBN-13 : 978-8120348660.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 2
	COURSE CODE	HP102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level; Language and Communication- 1

COURSE OBJECTIVES :

HP102.CEO.1:To familarise the students with sounds in English and introduce phonemic transcription.
HP102.CEO.2:CEO.2: To enrich the vocabulary of the students with AWL and NAWL.
HP102.CEO.3:To acquaint the students with public speaking, presentation and interview skills in English.
HP102.CEO.4:To develop the students reading and listening skills with the use of written audio and video texts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP102.CO.1:Recognise and reproduce the sounds in English effectively. [L1]
HP102.CO.2:Choose and employ appropriate words from AWL and NAWL in communication. [L1, L3]
HP102.CO.3:Express their ideas effectively and demonstrate skills in interpersonal communication. [L2, L3]
HP102.CO.4:Analyse and infer from written, audio and video texts. [L 2, L4]

THEORY		
UNIT 1	**Phonetics and Vocabulary**	**3 HOURS**
Phonemes in English and phonemic transcription; Essential academic vocabulary (Academic Word List and New Academic Word List); Dictionary Skills; Phrasal verbs and collocations		
UNIT 2	**Oral Communication**	**4 HOURS**
Public Speaking; Presentation Skills; Interview Skills and telephonic communication; Meetings (types, agenda and minutes)		
UNIT 3	**Active Listening and Reading with Comprehension**	**5 HOURS**
Concept and types of listening; Steps in listening with comprehension; Essentials of good listening; Concept and types of reading; Guidelines for reading with comprehension; Analytical reading		

PRACTICALS		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**2 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Vocabulary Enrichment**	**2 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills		
PRACTICAL NO.03	**Phrasal Verbs and Collocations**	**2 HOURS**
Use of phrasal verbs and collocations; reading literary pieces, essays to identify phrasal verbs in context; story-telling		
PRACTICAL NO.04	**Public Speaking**	**2 HOURS**
Attributes of a good public speaker; prepared and extemporaneous speech; Listening to and Reading famous speeches		
PRACTICAL NO.05	**: Presentations**	**2 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.06	**Interview Skills and Telephonic Communication**	**2 HOURS**
Etiquettes of attending interviews; Preparation; Telephonic communication; Mock Interviews		
PRACTICAL NO.07	**Mock Meetings**	**2 HOURS**
Importance of effective interpersonal communication; working in teams; Mock Meetings		
PRACTICAL NO.08	**Active Listening**	**6 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		

PRACTICAL NO.09	Reading with Comprehension	4 HOURS
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1.Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2.Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
3.Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
4.Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
5.Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
6.S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
7.Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME103
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	25	-	25	50

PRE-REQUISITE : -

COURSE OBJECTIVES :

ME103.CEO.1:Disseminate the philosophy of design thinking.
ME103.CEO.2:Impart the information regarding User centric approach.
ME103.CEO.3:Give exposure to information collection tools to clearly define user centric problem.
ME103.CEO.4:Enhancethinking in order to inspect diverse solutions.
ME103.CEO.5:Sensitize about the feasibility, desirability and viability criterias for selection of appropriate solution.
ME103.CEO.6:Educate about different types of prototyping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME103.CO.1:Recall fundamental principles of design thinking (L1)
ME103.CO.2:Explain all the dimensions of user and his needs using design thinking approach (L2)
ME103.CO.3:Identify user centric problem by using information gathering techniques (L3)
ME103.CO.4:Compare multiple solutions through ideation process (L4)
ME103.CO.5:Justify most appropriate solution for defined user centric problem (L5)
ME103.CO.6:Develop the most optimum solution (L6)

SESSION		
SESSION 1		**2 HOURS**
Design thinking Methodology General Problem Statement, Random check list, mind mapping, Categorization of random check list.		
SESSION 2		**2 HOURS**
Brainstorming of problem areas, Research Methodology Information gathering Primary, Secondary Sources, data presentation, Preparation of survey forms		
SESSION 3		**2 HOURS**
SWOT analysis, drawing inferences, translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of cuboids, cylinders, simple form products (Isometric views) Ideation sketches, Ergonomic and aesthetic consideration in design		
SESSION 4		**2 HOURS**
Concept validation, evaluation and detailing, prototyping		

PROJECT		
PHASE NO.01		**4 HOURS**
General Problem Statement and problem background		
PHASE NO.02		**4 HOURS**
Research methodology		
PHASE NO.03		**4 HOURS**
Design Brief		
PHASE NO.04		**8 HOURS**
Ideation		
PHASE NO.05		**4 HOURS**
Concept Evaluation, Validation and Concept detailing		
PHASE NO.06		**8 HOURS**
Prototyping		
PHASE NO.07		**8 HOURS**
Report Writing		

TEXT BOOK

1. Engineering Design Process, Second Edition Yousef Haik and Tamer ShahinPublisher, Global Engineering. Cengage Learning. ISBN-13: 978-0-495-66814-5.
2. Product Design and Development, Kevin Otto and Kristin Wood, Product Design: Techniques in Reverse Engineering and New Product Development, Pearson Education Inc. ISBN-10: 0130212717.
3. Product Lifecycle Management, Grieves, Michael, McGraw-Hill, 2006. ISBN 0071452303.
4. Lateral Thinking: Creativity Step by Step Harper Perennial; Reissue edition (24 February 2015) (Perennial Library) Six Thinking Hats by Edward de Bono Paperback ISBN-10: 0060903252.
5. Design Methods, John Chris Jones., John Wiley & Sons, David Fulton Publishers, London, ISBN 0-471-28496-3.

Web references

1. www.designcouncil.org.uk
2. www.surveymonkey.com
3. http://en.red-dot.org

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MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

Second Year

Bachelor of Technology in Information Technology

2016-2020

(With Effect from Academic Year: 2017-2018)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2017-18
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	RELEASE DATE	:	01/06/2017
	REVISION NO.	:	0.0

SEMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS202	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	IT202	Object Oriented Technology	3	2	4
5.	DC2	IT203	Computer Network Technology	3	2	4
6.	SDP3	ET206	Prototyping	--	4	2
TOTAL				**14**	**14**	**21**

SEMESTER:IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	HSS3	HP201	Psychology	3	--	3
2.	PC4	IT201	Engineering Informatics	3	2	4
3.	PC5	ME201	Material Engineering	3	2	4
4.	DC3	IT211	Data Structures and Applications	3	2	4
5.	DC4	IT212	Database Systems	3	2	4
6.	SDP4	IT213	Minor Project	--	4	2
TOTAL				**15**	**12**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Environmental Science
	COURSE CODE	CH201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	20	40	15	-	50	125

PRE-REQUISITE : AS103: Chemistry

COURSE OBJECTIVES :

CH201.CEO.1:Give an overview of exploitation of various natural resources and its impact on the environment.
CH201.CEO.2:Understand the ecosystem and biodiversity.
CH201.CEO.3:Understand the importance of environment and its conservation.
CH201.CEO.4:Learn about the environmental pollution sources, effects and control measures.
CH201.CEO.5:Make aware of the national and international issue for the environment.
CH201.CEO.6:Make aware about the social and environmental responsibility.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH201.CO.1:Identify the various human activities adversely affecting the natural resources and the balance ecosystem.
CH201.CO.2:Observe the various aspects of ecosystems and suggest ways to protect them.
CH201.CO.3:Experiment the pollution of given locality and suggest steps to mitigate pollution.
CH201.CO.4:Record the sources of pollution and their controls.
CH201.CO.5:Compare laws and standards for pollution.
CH201.CO.6:Categorize the social and professional responsibility towards environment.

THEORY COURSE CONTENT		
UNIT 1	**Environment**	**5 HOURS**
Importance of environment, Biosphere, Structure and function of an ecosystem, ecological pyramids, effects of population growth on environment. Natural cycles: hydrologic, carbon, nitrogen, phosphorus and Sulphur cycle. Understanding carbon foot prints, Role of the environmental engineer. Need of environmental legislations and environmental Acts in India. Functions of central and state pollution control boards.		
UNIT 2	**Resources**	**4 HOURS**
Natural, conventional and non-conventional, Natural and manmade disasters on environment. Case studies on use and Impact of overutilization of natural resources: Food, forest, water, energy, land.		
UNIT 3	**Pollution**	**4 HOURS**
Structure and composition of atmosphere, Pollution, types of pollution, causes of pollution effects, control and prevention. Air, solid and water waste management Pollution prevention and control act.		
UNIT 4	**Pollution Impact**	**5 HOURS**
Case study on Nuclear Accidents; floods; land slid; climate change; air pollution in cities, water pollution; noise pollution. Case study on drought situation in Vidarbha-Marathwada.		
UNIT 5	**Social Issues**	**5 HOURS**
Case study on Plastic waste management, domestic waste issue, food problem in India & globally. Modernization of agriculture, traffic and pollution, e-waste disposal.		
UNIT 6	**Sustainable Development**	**5 HOURS**
Concept of sustainable development. Utilization and conservation of natural resources. Rainwater harvesting & Water management techniques. Role of an individual in environment protection. Energy audit, disaster management.		

PRACTICAL		
PRACTICAL NO.01	**Title: Fukushima Japan Nuclear Accident**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.02	**Title: Malin Land Slide**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.03	**Title: Drought Situation in Vidarbha & Marathwada**	**2 HOURS**
Details of the drought situation will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of situations.		
PRACTICAL NO.04	**Title: River water pollution case study**	**2 HOURS**
Details of the River pollution of Ganga, Indrayani etc. will be discussed with the students. Students are supposed to write a case study report on the various causes of river pollution, preventive measures to avoid this & water treatment methodologies forriver water treatment.		
PRACTICAL NO.05	**Title: Project**	**16 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		

TEXT BOOKS

1. Rao C.S. Environmental Pollution Control Engineering, Wiley Eastern Publications. ISBN: 9780470217634.
2. Kamaraj. P & Arthanareeswari .M, Environmental Science Challenges and Changes, 4th Edition, Sudhandhira Publications, 2010.
3. Sharma. B.K. and Kaur, Environmental Chemistry, Goel Publishing House, Meerut, 1994 ISBN:8182830125.
4. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. ISBN-10: 1111988935 ISBN: 9781111988937
5. Metcalf Eddy Wastewater engineering: Treatment and reuse, McGraw Hill, ISBN: 007041878.

REFERENCE BOOKS

1. Garg, S.K and Garg, R., Ecological and Environmental Studies, Khanna Publishers, Delhi, 2006.ISBN: 9788174092182.
2. H. S. Peavy, D. R. Rowe, G. Tchobanoglous, Environmental Engineering, McGraw Hill, ISBN: 8428204470.
3. Helen Kavitha. P Principles of Environmental Science, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
4. Henry J.G. and Heinke G.W., Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
5. Masters G.M., Introduction to Environmental Engineering and Science, 2nd Edition, Prentice Hall of India, New Delhi, 2004. ISBN: 0131481932 ISBN: 9780131481930.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY IT/Comp/ETC/ETX ENGG	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	50	20	50	-	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS202.CEO.1:To find the Laplace transform of continuous time signals (functions).
AS202.CEO.2:To determine the Fourier constants and construct the Fourier series.
AS202.CEO.3:To construct the integral representation of functions using Fourier transform.
AS202.CEO.4:To find the Z transform of discrete time signals (functions).
AS202.CEO.5:To apply numerical methods for constructing functions and solving Differential Equations.
AS202.CEO.6:To write and execute the program on problems of Laplace, Fourier and numerical methods using MATLAB.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS202.CO.1:Analyze the output response of given linear system using Laplace Transform.
AS202.CO.2:Analyze the frequency response of the system using appropriate Fourier transform.
AS202.CO.3:Determine the stability of discrete system and the solution of difference equation using Z-Transform .
AS202.CO.4:Justify the selection of appropriate transform for a given system.
AS202.CO.5:Determine the solution of ordinary differential equations using Eulers, Runge-Kutta 4th order and the interpolation using Newtons and Lagranges interpolating methods.
AS202.CO.6:Implement Laplace Transform, Fourier transform and Numerical methods to find the solution of given problem using MATLAB.

THEORY		
UNIT 1	**Laplace Transform I**	**6 HOURS**
Introduction of Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication by t, Division by t. Laplace Transform of derivatives, integration, Unit Step function, Impulse Function and Periodic Functions.		
UNIT 2	**Laplace Transform II**	**6 HOURS**
Introduction of Inverse Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication bys, Division bys. Inverse Laplace Transform of elementary functions, Derivatives, Integration. Use of partial fractions to find Inverse Laplace Transform. Solution and analysis of linear differential equation to linear system.		
UNIT 3	**Fourier Series**	**6 HOURS**
Periodic functions, Fourier series, Dirichlets conditions, determination of Fourier constants, Half ranges series, Even function series, odd function series, arbitrary period functions series.		
UNIT 4	**Fourier Transform**	**6 HOURS**
Introduction of Fourier Transform, Complex exponential form of Fourier series, Fourier Integral Theorem (without proof), Fourier transform and its properties, Fourier Sine Transform, Fourier Cosine Transform, and Inverse Fourier transforms, Fourier Transform of derivatives of a function, Analysis of frequency response.		
UNIT 5	**Z- Transform and Inverse Z-Transform**	**6 HOURS**
Z-transform: Introduction, Definition, Z-transform of standard functions, Properties of Z- transform: Linearity, change of scale, shifting, multiplication by k, division by k. One sided Z-transform, Pole-zero plot and stability of a system. Inverse Z- transform: Introduction, Basic results, Partial fraction method, Inversion integral method, Solution to the difference equation.		
UNIT 6	**Numerical Methods**	**6 HOURS**
Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method and Ordinary differential equations by Eulers, Modified Eulers, Runge-Kutta 4th order methods.		

PRACTICAL: Any 10 practicals are performed as per the requirement of a branch.		
PRACTICAL NO.01		**2 HOURS**
Introduction to MATLAB: Syntax, keywords, matrices, polynomials, loops.		
PRACTICAL NO.02		**2 HOURS**
Introduction to MATLAB: In-built functions, 2D/3D plots, creating simple programs.		
PRACTICAL NO.03		**2 HOURS**
Finding Laplace transforms of functions, solution of differential equations using Laplace transforms.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms.		
PRACTICAL NO.05		**2 HOURS**
Numerical Integration: Trapezoidal, Simpsons 1/3rd and Simpsons 3/8th rule.		
PRACTICAL NO.06		**2 HOURS**
Interpolation techniques: Lagranges Interpolation.		
PRACTICAL NO.07		**2 HOURS**
Interpolation techniques: Newtons Interpolation.		
PRACTICAL NO.08		**2 HOURS**
Solution of differential equation by modified Eulers method.		
PRACTICAL NO.09		**2 HOURS**
Solution of differential equation by Runge-Kutta method.		
PRACTICAL NO.10		**2 HOURS**
Curve Fitting: Linear, Quadratic.		
PRACTICAL NO.11		**2 HOURS**
Solution of algebraic equations: Newton- Raphson method.		
PRACTICAL NO.12		**2 HOURS**
Solution of algebraic equations: Bisection method.		
PRACTICAL NO.13		**2 HOURS**
Curve Fitting: Cubic, Exponential.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2003, ISBN-13: 9788126537204, 8126537205.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	System Engineering
	COURSE CODE	ET201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	NIL	25	125

PRE-REQUISITE :

1:ME102 Engineering Tools and Techniques
2:ME103 Design Thinking

COURSE OBJECTIVES :

ET201.CEO.1:To describe the rationale for using systems thinking for complex adaptive systems
ET201.CEO.2:To prioritize with stakeholders in a participatory way for research study
ET201.CEO.3:To design system engineering frame work
ET201.CEO.4:To apply system engineering tools
ET201.CEO.5:To evaluate the system

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET201.CO.1:Explain the rationale for using systems thinking for complex adaptive systems.
ET201.CO.2:Analyze interaction with stakeholders in a participatory way for research study.
ET201.CO.3:Design System Engineering framework.
ET201.CO.4:Apply system engineering tools.
ET201.CO.5:Evaluate the system.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Systems Thinking**	**4 HOURS**
Introduction to Systems Thinking and Understanding simple systems, Complex and Complex Adaptive Systems, Stakeholders and their engagement. **Further Reading :** Case studies - Public health system, transportation system, solid waste management system.		
UNIT 2	**System Dynamics Simulation**	**6 HOURS**
Standard test system conceptualization and mapping: an introduction to causal loop diagrams (Systems Thinking Diagrams; Influence Diagrams), principles of stock-and-flow diagrams, Application of stock and flow diagrams to engineering problems, Analysis using agent-based models, Application of systems thinking to policy decision making. **Further Reading :** Case studies - Understand how to use Vensim PLE / Netlogo (Free academic version) to develop causal loop diagrams. Application of Stock and Flow Diagram to Public Health.		
UNIT 3	**Introduction to Systems Engineering**	**8 HOURS**
History and definitions, mission of system, types of system, system and its environment, System as a product, Systems Engineering as a profession, System Engineering Process and Management, Life cycle Integration. **Further Reading:** Case studies - London Walkie-Scorchie Skyscraper, BRT system, garbage collection, Unmanned aerial vehicle, Washing machine etc.		
UNIT 4	**System Engineering Design**	**8 HOURS**
System development process - Systems engineering method, Systems testing through out development. Requirement Engineering - Inputs, requirement types, purpose, Requirement analysis, requirement outputs. Case studies – Unmanned Aerial System. Functional Analysis - Schematic, Functional block diagram. Design Synthesis - Process, Product realization, Product implementation, Product Integration, Product verification, product validation, product transition. **Further Reading:** Development approaches–Waterfall, incremental spiral, evolutionary acquisition.		
UNIT 5	**System Engineering Tools**	**8 HOURS**
Context diagrams, QFD (Quality function deployment), House of quality, Timeline analysis sheet and requirement allocation sheet, Functional flow diagrams, Design synthesis tools- Concept description sheet (CDS), Functional matrix diagram, Requirement break down structure, N2 diagrams, data flow diagrams, control flow diagrams, behavioral diagrams. **Further Reading:** Popular System Life Cycle models (DoDMIL STD 499B, IEEE1220 SEP,EIA 632 SEP, ISO/IEC 15288, Professional Engineering Model, NASA Model, Software Life Cycle model)		
UNIT 6	**Partial Differential equations.**	**7 HOURS**
Verifying and validating the system, managing the configuration of the system, managing technical risk, project management, ILS (Integrated logistic support). **Further Reading:** Case studies - Aircraft system.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Community based causal mapping – Developing causal loop diagrams for health care using Vensim.		
PRACTICAL NO.02		**2 HOURS**
Developing stock-and-flow diagrams for health care system using Vensim.		
PRACTICAL NO.03		**2 HOURS**
(Any 02) 1. Unmanned aerial vehicle 2. Conduct some research into the London building known as the Walkie Scorchie. Identify what circumstances led to the building earning that unfortunate name and suggest which aspects of the systems engineering process may not have been followed correctly (at least as the issues have been reported in the media).The following links may assist in your investigations. http://www.dezeen.com/2013/09/06/we-made-a-lot-of-mistakes-with-this-building-says-walkie-scorchie- architect-vinoly/ http://www.ibtimes.co.uk/walkie-scorchie-talkie-building-sunlight-london-reflects-504342. 3. Examine in detail the BRT of New Delhi,Identify what circumstances led to the failure of the system. 4. Garbage collection 5. Washing machine		
PRACTICAL NO.04		**2 HOURS**
Determine the typical structure and contents of the system requirements specification (SyRS) for any one of the case study.		
PRACTICAL NO.05		**2 HOURS**
Choose an example related to your own discipline and then list and describe three detailed design tools to come up with a satisfactory design for anyone of the case study.		
PRACTICAL NO.06		**2 HOURS**
We want to modify our house (or from any one of the case studies) by for futuristic requirement to accommodate your children after marriage.Explain how accurate technical data on the house (as confirmed by PCA and FCA) supports this modification. Explain how the early design stages could have assisted with this modification if expandability/ future growth had been accounted for.		
PRACTICAL NO.07		**2 HOURS**
Mini project based on society, science and technology problem clubbed with Field visit and presentation (Define problem, data collection, requirement analysis,functional analysis.Design solution, progressive presentation of solution and final presentation). Note: The group of students should be from different program (Multidisciplinary group).		

PRACTICAL NO.08		2 HOURS
Watch the movie The Pentagon wars and write a two page report to assess what aspects System Engineering went wrong. (https://www.youtube.com/watch?v=iDYpRhoZqBY) .		
PRACTICAL NO.09		**2 HOURS**
Field visit / Industrial visit from system engineering point of view.		
PRACTICAL NO.10		**2 HOURS**
Working model case study of Quad copter/ aero modeling from system engineering point of view.		

TEXT BOOK

1. John D Sterman, "Business dynamics- Systems Thinking and modelling for a complex world", McGrawHill, ISBN: 007238915X.
2. Weinberg, G.M., An Introduction to General Systems Thinking, New York, NY: Dorset House Publishing, 2001, ISBN-13: 978-0932633491.
3. Alexander Kossiakoff, William N.Sweet, Systems Engineering: Principles and Practice, Wiley, 2009, ISBN-13: 978-8126524532.

TEXT BOOK

1. R. C. Dorf Dennis M Buede,The Engineering Design of systems, Wiley; 2nd edition, 2002, ISBN-13: 978-0070530393.
2. International Council of Systems Engineering, Systems Engineering Handbook, A guide for System Life Cycle Processes and Activities, version 3.2.1, January 2011.
3. Department of defense, systems engineering fundamentals, defense acquisition university press (Free e-book), https://www.scribd.com/document/321957824/SEFGuide-01-01.
4. Michael Ryschkewitsch, The Art and Science of Systems Engineering, (free e-book), https://www.nasa.gov/pdf/311198main-Art-and-Sci-of-SE-LONG-1-20-09.pdf
5. EIA 632 standard - www.psconsultech.com/yahoo-site-admin/assets/docs/EIA632.9212432.pdf
6. MIL standard - www.product-lifecycle-management.com/download/mil-std-499b-draft1993.pdf.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Object Oriented Technology
	COURSE CODE	IT202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	30	20	150

PRE-REQUISITE :

IT101 Computer Programing

COURSE OBJECTIVES :

IT202.CEO..1:To understand the basic concept of Object-Oriented programing technique.
IT202.CEO..2:To do best-practices of Object-Oriented programing.
IT202.CEO..3:To understand the use of OOT in other application software.
IT202.CEO..4:To build applications using object oriented concept.
IT202.CEO..5:To provide team collaboration and programing experience.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT202.CO.1:Determine the domain object with its properties and behavior.
IT202.CO.2:Discover the relationship among the objects.
IT202.CO.3:Importance of polymorphism and explain usage of it.
IT202.CO.4:Inspect the type of exception occurred and how to handle them.
IT202.CO.5:Analyze the algorithm and determine the time complexity.

THEORY :		
UNIT 1	**Classes and Objects**	**8 HOURS**
Application: Google Script Introduction to object oriented approach, procedure V/s object oriented programming, features of Object-Orientedprogramming, object oriented design principle, defining a class, data members, instance of class, instantiation, state, behavior and identity of object, static data member and method. **Self-Study:** Functional Procedural Programming. **Further-Reading:** Class Objects in Java.		
UNIT 2	**Inheritance**	**8 HOURS**
Case Study: C++ IOStreamClasses Concept of Inheritance, types of Inheritance, Base Class Derived Class, derived class constructors, class hierarchies, public and private inheritance, association, aggregation composition, abstract base class, abstract methods. **Self-Study:** Functional Procedural Programing. **Further-Reading:** Classes Objects in Java.		
UNIT 3	**Polymorphism**	**8 HOURS**
Application: Function used in C++ Concept of polymorphism, types of polymorphism, overloading overriding of methods, operators overloading. Virtual function, Runtime polymorphism, dynamic binding. **Self-Study:** Introduction to polymorphism.		
UNIT 4	**Exception Handling AND File IO**	**7 HOURS**
Application: Creation of Multiple files like generation of Mark sheets Basics of Exception handling, Exception generation, type of exception, handling the exception, exception throw, catch, finally. File concept, performing I/O operation in the file, binary file read/write operation. **Further-Reading:** Working with directories, exception handling in Java		
UNIT 5	**Introduction to Algorithms**	**8 HOURS**
Application: Sorting and Searching of File and Data Introduction to algorithm, characteristics of an algorithm, Time and space complexity, Asymptotic notation, performance analysis, Best, average and worst case. **Self-Study:** Sorting Algorithms: like bubble sort, insertion sort etc. **Further-Reading:** Sorting searching strategies		

PRACTICAL		
PRACTICAL NO. 01	**Object and class creation**	**6 HOURS**
Create a class for storing the student information like, rollno, prn, name, dob, email, contact etc. define getter and setter method, constructor and destructor. Write a menu driven program to simulate the following information: 1. Add new student 2. Delete student by rollno, or prn give both the choice 3. Search student by prn, or name, or contact 4. Update the student information 5. List all the student Store the student objects in a list		
PRACTICAL NO. 02	**Static data and method**	**2 HOURS**
Modify the program created in practical no. 1 add new option total no of student or instance of student class created. Make use of static data and method concept		
PRACTICAL NO.03	**Inheritance**	**4 HOURS**
Extend the practical no 2 student class by Mark class where mark class used to store the marks of student in a dictionary which is private data, key-value pair is used to store the marks for example 'OOT':45, 'CN':40. Define getter and setter method with constructor and destructor.		
PRACTICAL NO. 04	**Inheritance**	**4 HOURS**
Modify the practical no. 3 add new option to find out the topper of the class by declaring the static method used to in marks class and another option to find out the top three student.		
PRACTICAL NO.05	**Method overriding**	**4 HOURS**
Override the display method of practical no 4, and display the grades of student with other information, Grade will be assigned as follows: 1. A for 100 to 75 2. B for 74 to 65 3. C for 64 to 55 4. D for 54 to 45 5. Fail if less than 44		
PRACTICAL NO.06	**Operator overloading**	**4 HOURS**
Write a menu driven program for converting the currency display at least 4 currency options for conversion, make use of operator overloading for doing the following operation: 1. 6 +50*Rs* 2. 3 + 1 −100*Rs* 3. 20 + 5 **£** Consider the rupees as default currency or provide an option to set the default currency, all your result will be converted in to default currency.		
PRACTICAL NO.07	**Exception AND File handling**	**4 HOURS**
Handle the various type of exception which you have studied, for the practical no 5. Also store the student in formation in file, whenever your program start it will fetch the student information from the file and whenever your program terminate store the student information in a file or for every update, delete or insert option update the data file.		

TEXT BOOK

1. Dusty Phillips ”Python 3 Object Oriented Programming”, Packt Publishing ISBN: 978-1-849511-26-1, 1849511268
2. Michael T. Goodrich “Data Structures and Algorithms in Python Wiley Student Edition ISBN: 978812652176

REFERENCE

1.Mark Lutz “Learning Python” O’reilly Publication 5th Edition, ISBN-13: 978-1449355739

2.Allen Downey, Jeffrey Elkner, Chris Meyers “How to think like a Computer Scientist, Learning with Pyhton” Green Tea Press, ISBN: 0-9716775-0-6

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Computer Network Technology
	COURSE CODE	IT203
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	50	20	30	20	150

PRE-REQUISITE :

1. ME102- Engineering Tools and Techniques

COURSE OBJECTIVES :

IT203.CEO.1: Introduce the fundamentals of a computer network.

IT203.CEO.2: To provide a conceptual foundation for the study of data transmission using the open system interconnection (OSI) layered architecture model.

IT203.CEO.3: Deploy the skills of network designing in the students which should enable exposure to solve real-life problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT203.CO.1:Explain the core concepts of a computer network.

IT203.CO.2:Classify the network components on the basis of the services they provide.

IT203.CO.3:Measuring the performance of various protocols used in network designing.

IT203.CO.4:Compare the different architectures of a computer network for their performance.

IT203.CO.5:Articulate an enterprise network employing the common LAN technologies and be able to evaluate the advantages and disadvantages.

IT203.CO.6:Configure a PC to work as a host in a TCP/IP network and to use the IP based commands to facilitate the troubleshooting process.

THEORY		
UNIT 1	**Fundamentals of Network**	**7 HOURS**
Application: Case Study of Enterprise Network **Contents:** Use of Computer Network: Business Application, Home Application, Mobile Users, Social Issues. Type of Networks: Local Area Network, Metropolitan Area Network, Wide Area Network, Personal Area Network, Intranet. Network Performance: Bandwidth, Latency, Delay, Capacity, Bits Baud. Basic Administration Commands for Linux/Windows: IfConfig/IPConfig, PING, Traceroute/Tracert, NETSTAT, NSLOOKUP, ROUTE, HOST, OSI Reference Model, TCP/IP Protocol Suite **Self-Study:** Analog Digital Modulation **Further Study:** Multiplexing De-Multiplexing		
UNIT 2	**Physical Access**	**7 HOURS**
Application: Case Study Physical Layer Services: Framing, Bit Oriented, Byte-Oriented, Clock-Based Error Detection: Two-dimensional parity, Checksum, Cyclic Redundancy Check Reliable Transmission: Stop Wait, Sliding Window Protocols, Go-Back-N Protocol, Selective Repeat Protocol Guided Transmission Media Devices: Unshielded Shielded Twisted Pair, Coaxial Cable, Optical Cable, Hub, and Repeater. **Self-Study:**Circuit-Switched Network, Packet Switched Network **Further Study:** Access Protocols		
UNIT 3	**Link Layer**	**7 HOURS**
Application: Case Study of a College Network Bridges LAN Switches: Datagram, Learning Bridges, Spanning Tree Algorithm, Broadcast Multicast, Layer-2 Switch. LAN Protocol Stack: Media Access Control, Logical Link Control Wireless LAN-802.11/Wi-Fi, 802.15.1, (Bluetooth): Bluetooth Architecture, Bluetooth Protocol Stack, Frames, Bluetooth Operations Controlled Access: CSMA/CD, CSMA/CA **Self-Study:** IEEE 802.X Standards **Further Study:** Cell Phone Technologies		
UNIT 4	**Internetworking**	**7 HOURS**
Application: Case Study Network Address, IP Address Format, Characteristics of IP, IP Packet Format: IPv4 IPv6, IP Addressing, CIDR, ARP, Proxy-ARP, Sub-netting, Fragmentation Routing Algorithms: Distance Vector Routing, Link State Routing Routing Protocols: Routing Information Protocol, Open Shortest Path First Protocol Network layer devices:Routers, Layer-3 switch. **Self-Study:** Extended Interior Gateway Routing Protocol **Further Study:** Network Address Translation		

UNIT 5	Transport Layer	7 HOURS
Application: Chat Server System End-to-End packet delivery Issues TCP: Header Format, Connection establishment Termination, Handshaking TCP Sliding Window, TCP Sliding Window, Silly Window Syndrome, Nagle's Algorithm, Adaptive Retransmission Algorithms UDP: Header Format, UDP Encapsulation Multiplexing Port Addresses: Port, Socket **Self-Study:**State Transition Diagram **Further Reading:** TCP/UDP Socket primitives		
UNIT 6	**Application Layer and Network Design**	**7 HOURS**
Application: Email System Domain Name System (DNS), TELNET, DHCP File Transfer: FTP, TFTP Electronic Mail: SMTP, POP3 The principle of Network Design Fundamental design goals: Scalability, Reliability, Maintainability, Availability. Requirement Analysis, Architecture design (Two-Tier Design Architecture, Three-Tier Design Architecture) Network Security: Firewall: Type of Firewalls, Packet Filters, Proxy servers, **Self-Study:**IMAP, MIME **Further Study:** Firewall Configurations, Restricting user access.Firewall Filtering policies		

PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
Study of basic network utility commands: Help, Hostname, IPCONFIG, PING, ARP, GETMAC, NETSTAT, TRACERT, NSLOOKUP, ROUTE		
PRACTICAL NO.02		**4 HOURS**
Basic network cabling and router configurations: Create a basic topology in packet tracer using various media and configure a router with all basic configurations through the command line.		
PRACTICAL NO.03		**4 HOURS**
Simulate a small topology in using spanning tree and trunk protocol. Use packet tracer as a simulation tool.		
PRACTICAL NO.04		**4 HOURS**
Write a socket program in python to establish communication between multiple devices within the same network.		
PRACTICAL NO. 05		**6 HOURS**
Create a topology with minimum 3 networks and configurerouting protocols to enable network communication among all the networks. Analyze the routing table created on various devices and draw necessary conclusions.		
PRACTICAL NO.06		**4 HOURS**
Configure a Wireless LAN and enable static IP and DHCP to allocate IP addresses. Apply the various security filters to keep the WLAN secure.		
PRACTICAL NO.07		**2 HOURS**
Study of application layer protocols: FTP, EMAIL, SMTP, POP3, IMAP, MIME		

Project	Mini Project	8 HOURS

Project Guidelines:

Follow the below guidelines for completing the mini project- Students have to complete a mini-project in a group of 4 students. Students can select their own problem statements after discussion with the course instructor. The finalization of the project statement has to be done in the first week of the semester. All the group must implement their project in python, however, students are free to use any simulation tool for simulating their work. Every group will have to prepare the project report based on the template given to them and the report must be submitted to the instructor before the final examination.

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1

REFERENCE BOOK

1. G.B. Thomas, Maurice D. Weir, Joel R. Hass, Thomas' Calculus, 12 th edition, Pearson Education, 2002, ISBN: 9789332519091
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house , 2010, ISBN: 8173194203.
4. Peter V. O'Neil, Advanced Engineering Mathematics, 7 th edition, Cenage Learning, 2012, ISBN: 13: 9788131503102.
5. Dennis G. Zill & Warren S. Wright, Advanced Engineering Mathematics, 4 th edition,Dennis G. Zill & Warren S. Wright, Advanced Engineering Mathematics, 2011, ISBN: 10: 0-7637-7966-0, ISBN: 13: 978-0-7637-7966-5.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Prototyping
	COURSE CODE	ET206
	COURSE CREDITS	02
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
-	4	-	-	-	-	75	75

PRE-REQUISITE :

1. ME101 - Engineering Graphics
2. ME102 - Engineering Tools and Techniques
3. ME103 - Design Thinking
4. EX101 - Electrical and Electronics Engineering
5. CV101 - Applied Mechanics
6. IT101 - Computer Programming

COURSE OBJECTIVES :

ET206.CEO.1:Learn about materiality and techniques.
ET206.CEO.2:Justify the product development cycle through prototype project.
ET206.CEO.3:Inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET206.CEO.4:Develop abilities to transmit technical information clearly and test the same by delivery of presentation based on the prototype Project.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET206.CO.1:Consolidate the techniques, skills and modern engineering tools.
ET206.CO.2:Apply acquired skills to the construction of a prototype project.
ET206.CO.3:Develop a prototype project by performing tasks in team.
ET206.CO.4:Demonstrate the work carried out in a team.

PRACTICAL:

Course Introduction:

This course is aiming at a Project Based Learning methodology. Through a series of projects, students will learn to design, build, and debug engineering prototype systems. They will cover multiple aspects of the prototyping process.

Students will complete four modules in rotational manner,

1.Mechanical Prototyping (MP)

2.Electronic Prototyping (EP)

3.Software Prototyping(SP)

4.Civil Prototyping(CP)

Each module will have on an average six laboratory sessions. The students will complete them in rotational manner. Every module will award for 75 marks.

Marks of all four course modules will be averaged and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

MODULE: 1/4	**Mechanical Prototyping (MP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to prototyping**	**02 HOURS**

1. Introduction to Prototyping, traditional prototyping vs. advance rapid Prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Suitable materials and their properties.
3. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.
4. Formation of a group of 5 students per project team.

PRACTICAL NO. 02	**Design of models**	**04 HOURS**

1.Introduction of CAD software and its interaction with prototype machine.

2.3D Modeling using CAD software package.

3.Identify physical constraints of prototyping

PRACTICAL NO. 03	Preprocessing of prototype	06 HOURS

1.Generating STL files from the 3D models & working on STL files.

2.Pre-Processing the 3D Model in KISslicer / Cuba software.

3.Suitable filament selection and its properties.

PRACTICAL NO. 04	Orientation and support generation	04 HOURS

1. Operate Repeater / Cuba software, Selection of Orientation, Supports generation.
2. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Assembly of model	08 HOURS

1. Complete machine setup.
2. Hands on experience of rapid prototype machine for part/object, assembly manufacturing.
3. Material selection, cost benefit analysis for prototyping, financial aspect.

PRACTICAL NO. 06	Project presentation	04 HOURS

1.Final Presentation and report submission (assessment).

REFERENCE BOOK

1. Rapid Prototyping: Principles and Applications in Manufacturing, Chua C K, Leong K F, Chu S L, World Scientific, ISBN-13: 978-9812778987.
2. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Gibson D W Rosen, Brent Stucker, Springer, ISBN: 978-1-4419-1119-3.
3. Rapid Prototyping: Principles and Applications in Manufacturing,Noorani R, John Wiley & Sons, ISBN: 978-0-471-73001-9.
4. Rapid Tooling: Technologies and Industrial Applications, Hilton P, Jacobs P F, CRC press. ISBN:978-0824787882
5. Rapid Prototyping and Engineering applications: A tool box for prototype development, Liou W L, Liou F W, CRC Press, ISBN: 978-0849334092.
6. Rapid Prototyping: Theory & practice, Kamrani A K, Nasr E A, Springer, ISBN: 978-0-387-23291-1.
7. Kenneth Cooper, Rapid Prototyping Technology: Selection and Application, Marcel Dekker, Inc. New York, ISBN: 082470261.

MODULE: 2/4	Electronic Prototyping (EP)	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to design and construction of electronic prototyping**	**02 HOURS**

1.Gain familiarity with basic stages; Conceptualization, Detailed Design and Implementation.

2.Acquire concepts of basic processes in electronic prototyping.

3.Form a group of students. (03 max)

4.Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span.

5.Develop a plan for construction of electronic proto from a concept.

PRACTICAL NO. 02	Basic electronic prototyping skills	02 HOURS

1.Soldering

- Demonstrate structure of solder wire, soldering temperature, soldering station and gun.
- Highlight Industrial safety norms, use of lead free solder, extractor fan etc.
- Use of flux, desoldering gun, desoldering techniques, removing components/wires.
- Fix Solder defects and inspect quality of solder joints.

2.Wiring

- Cleaning, stripping and tinning the wires.
- Connections and protections for wires.
- Using cable ties , heat shrink tubes, sleeves and other wire dressing techniques.

3.Breadboard

- Bending wires and making connections on breadboards.
- Placing components on breadboards.
- Testing circuits using breadboards.

4.Perfboards

- Wire connections and component assembly on perfborads.
- Debugging assembled circuit and increasing stability.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	04 HOURS

1.Gain familiarity with PCB Design software.

2.Draw schematics for PCB design.

3.Make PCB layout as per circuit diagram.

4.Learn PCB design standards.

5.Export PCB files like gerber (.gbr), .pdf etc.

PRACTICAL NO. 04	PCB fabrication	08 HOURS

1.Develop negative imprints of top and bottom sides and expose to PCB.

2.Perform etching process for PCB.

3.Perform cleaning and shearing for required size.

4.Check continuity of tracks.

5.Use drilling machine to make drills.

PRACTICAL NO. 05	Assembly and testing of electronic proto	08 HOURS

1.Make assembly of electronic prototype as per IPC 610 D.

2.Insert components, perform lead cutting with standard clearance.

3.Review mechanical fitment of PCB with component insertion.

4.Solder components and make wiring.

5.Test prototype for electrical functionality, to perform rework if required.

6.Assemble PCB with mechanical fitments and assemblies.

7.Analyze performance and compare with specifications.

PRACTICAL NO. 06	Final project presentation	04 HOURS

1.Demonstrate an electronic prototype in a team.

2.Write a report on implementation of prototype. (10-15 pages max)

3.Present prototype implementation in a team by Power Point presentation.

4.Enumerate proposed specifications of electronic prototype.

5.Highlight financial aspects including proposed cost and bill of material.

REFERENCE BOOK

1. Printed Circuit Boards: Design and Technology, Walter C. Bosshart, Tata McGraw-Hill Education, 1983, ISBN: 978-0074515495.
2. Electronic Assembly Fabrication, Charles A. Harper, 1st ed.,McGraw-Hill Education, 2002 ISBN: 978-0071378826.
3. Soldering in Electronics Assembly, Frank Riley, 1st ed., Springer, 2013, ISBN: 978-3-662-13163-3.
4. Electronic Techniques: Shop Practices and Construction, R. S. Villanucci, A. W. Avtgis, W.F. Megow, 6th ed., Practice-Hall, 1999. ISBN: 978-0130195661.
5. Printed Circuit Boards: Design, Fabrication, and Assembly, R. S. Khandpur, 1st ed. McGraw-Hill Education, 2005, ISBN: 978-0071464208.
6. Practical Electronics for Inventors, Paul Scherz , Simon Monk ,3rd Edition, McGraw-Hill Education, 2013, ISBN 978-0071771337 (Available on TAB edition, Kindle)
7. IPC-J-STD-001E-2010, Requirements for Soldered Electrical and Electronic Assemblies, IPC. , ISBN: 9781580986922.
8. IPC-A-610 D-2014, Acceptability of Electronic Assemblies, IPC. ISBN: 9781611931549.

MODULE: 3/4	**Software Prototyping (SP)**	**28 HOURS**
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to software engineering**	**04 HOURS**
Concepts, Software development life cycle (SDLC). Student need to use AEIOU Framework (Design Thinking) to decide the problem statement. Students will work in group of three on AEIOU framework		
PRACTICAL NO. 02	**Design UML Diagrams for given problem statement**	**04 HOURS**
Students have to work in group on Project Development canvas and then design following, 1.Creation of data Flow diagram 2.Creation of block diagram 3.Design a Activity Diagram		
PRACTICAL NO. 03	**Requirement analysis**	**04 HOURS**
1.Find the requirement specification of given problem statement and formulate the feasible solution. 2.Paper (low-fidelity) prototype: choose the interface intend to develop, giving the reasons (pros and cons) and describing it summarily - choose the similar interface, indicating its key characteristics.		

PRACTICAL NO. 04	Design analysis	06 HOURS

1. Make an Inspiration board.
2. Start an inspiration board by listing 5-10 words that relate to your design idea or point of view. These words can be anything – from similar designs to feelings that the idea evokes.
3. Once you've listed your words, come up with at least five inspirations, and share them by providing links or images within your assignment submission. For each inspiration, give a brief (1-2 sentences) and insightful explanation of why you chose it (What did you take away from it? What did you learn from it. In other words, why did it inspire you?). Each of these inspirations should offer a different perspective to the design you are working on.

PRACTICAL NO. 05	Design analysis	06 HOURS

1. Create Storyboards
2. A storyboard is a comic-strip-like set of drawings about what interface does and how it is used to accomplish tasks in a real usage scenario. A good storyboard should clearly demonstrate who the user is, the usage situation, and the user's motivations for using the interface. It should show what the user can accomplish with interface, but it needn't (and often shouldn't) show a specific user interface design. For a storyboard including an app screen, the details of the screen are not relevant, but what those screens enable you to accomplish is. Each storyboard should comprise 5-8 panels and will provide all details of end product.

PRACTICAL NO. 06	Presentation	04 HOURS

1. Each group will be given 10 min to present their work.

REFERENCE BOOK

1. Software Engineering A practitioner's Approach, Roger S, Pressman, 7th Edition, ISBN:
2. 978–0–07–337597–7
3. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital
4. Library,ISBN-13:978-0120885688
5. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F.
6. (1997). New York: Wiley, ISBN: 978-9812778987.
7. Fab - The coming revolution on your desktop - from personal computer to personal fabrication,
8. Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
9. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN:
10. 978-0-471-73001-9.
11. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling,
12. Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
13. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek
14. D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN:
15. 978-0471456360

MODULE: 4/4	Civil Prototyping (CP))	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**04 HOURS**
Introduction of bamboo as a construction material, its physical, mechanical properties, selection, seasoning and treatment, testing, joinery, case studies of bamboo buildings.		
PRACTICAL NO. 02	**Analysis of determinant trusses.**	**04 HOURS**
Study of different types of trusses, analysis of determinant trusses by method of joint and method of section		
PRACTICAL NO. 03	**Design bamboo trusses**	**04 HOURS**
Design of different bamboo trusses (span more than 3m), Hands on for different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo truss**	**08 HOURS**
Making of bamboo truss		
PRACTICAL NO. 05	**Testing bamboo truss**	**04 HOURS**
Testing of different bamboo truss		
PRACTICAL NO. 06	**Final project presentation**	**04 HOURS**
Comparative study of analytical and test results of forces in truss members, final project presentation.		

REFERENCE BOOK

1.Vector mechanics for Engineers: statics and dynamics by Beer Johnston 10th edition, McGraw Hill Education , ISBN: 978-0073398242

2.Bamboo Architecture Design (Architecture Materials), by Chris van Uffelen, , ISBN: 978-3037681824

3.Designing and Building with Bamboo ,Jules J.A. Janssen Technical University of Eindhoven Eindhoven, The Netherlands, ISBN 978-8186247464

4.Codes and standards

IS 1902:1993.Code of Practice for preservation of bamboo and cane for non-structural purposes.

IS 6874:1973 Methods of test for round bamboos

IS 7344:1974 Specification for bamboo tent bamboos.

IS 8242:1976 Methods of tests for split bamboos

IS 8295 (Part 1): 1976 Specification for bamboo chicks

ISO 22157 Standard guidelines for tensile, compressive, shear and bending Strength Parallel to grain and Perpendicular to grain.

REFERENCE

1.Paris Agreement(http://unfccc.int/paris agreement/items/9485.php)

2. Kyoto Protocol(http://unfccc.int/kyoto_protocol/items/2830.php)

3. Green Building Objectives Checklist, Auroville Bamboo Centre, Pudducherry, Tamil-nadu.(http://aurovillebamboocentre.org/)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Psychology
	COURSE CODE	HP201
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	NIL	20	40	15	NIL	NIL	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP201.CEO.1:To introduce the basic concept and scope of Organizational Behavior.
HP201.CEO.2:To teach the theory of personality and its implications in the organization.
HP201.CEO.3:To evince types and styles of Leadership and the impact of values on the same.
HP201.CEO.4:To guide learners through a decision making process.
HP201.CEO.5:To enhance participants skills when practicing team work concepts through business games.
HP201.CEO.6:To introduce the concept of Motivation and constructive ways of coping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP201.CO.1:Explain human behavior in the workplace from an individual, group, and Organizational perspective.
HP201.CO.2:Develop an ability to analyze ones own personality and that of others in Organizations.
HP201.CO.3:Compare different leadership styles with an understanding of how core values affect Leadership.
HP201.CO.4:Demonstrate decision making ability
HP201.CO.5:Identify the problems associated with organizing and managing teams.
HP201.CO.6:Comprehend the correlation amongst stress, motivation and personality.

THEORY		
UNIT 1	**Organizational Behaviour**	**6 HOURS**
Meaning of Psychology and Organizational Behaviour, Psychology in Organization: History of Organizational Psychology; Scope and Research in Organizational Behaviour, Structure of Organization, Organizational culture, Strong vs Weak culture, Culture vs Formalization.		
UNIT 2	**Perception and Decision Making**	**6 HOURS**
Meaning, process and determinants of Perception, Process of Decision Making, The link between Perception and Individual Decision Making, Influences on Decision Making: Individual Differences & Organizational constraints, Process and ethics of decision making.		
UNIT 3	**Personality, Values and Leadership**	**6 HOURS**
What is Personality, The Big Five Personality Model, The importance of values; values and ethical behavior, Leadership, Understanding Personality, values and Leadership, Emotional Intelligence-Personal and Social Competence.		
UNIT 4	**Understanding Team Work and Conflict Resolution**	**6 HOURS**
Difference between groups and teams, Types of teams, Turning Individuals into Team players, Team building and Team based work, Team dynamics, Types of conflict and conflict resolution.		
UNIT 5	**Motivation & Stress**	**4 HOURS**
Motivation and its types, Content and Process Theories of Motivation, Concept and reactions to stress, Potential effects of stress, Coping with and managing stress.		

TEXT BOOK

1.S. P. Robbins, Organizational Behavior Prentice-Hall India, 1995, ISBN-11:81-203-2875-2.

2.F. Luthans, Organizational Behavior. McGraw-Hill, 1995, ISBN-13: 0072873876.

3.U. Sekarn, Organizational Behavior: Text and Cases, Tata McGraw Hill, 1996, ISBN: 0074603663.

4.Furnham, The Psychology of Behavior at Work, Psychology Press, 1997, ISBN: 1841695041 .

REFERENCE BOOK

1.M. D. Dunnett, Handbook of Industrial-Organizational Psychology, Jaico Press, 1990, ISBN: 978089106-041-3.

2.M. A. - Ansari, Managing people at work: Leadership styles and influence strategies, Sage, 1990, ISBN: 0803996500.

3.J. B. P. Sinha, Work Culture in Indian Context, Sage, 1990, ISBN: 0019-5286.

4.D.M. Pestonjee, Stress and Coping: The Indian Experience, 2nd ed., Sage Publications, 1999, ISBN: 0761993126.

5.L. N. Jewell & M. Siegall, Contemporary Industrial/Organizational Psychology, West Publishing Company, 1990, ISBN: 0314715991.

6.D. Katz and-R. L. Kahn, The Social Psychology of Organizations, Wiley, 1966, ISBN: 978-0-471-023553.

7.M.L. Blum, and J.C. Naylor, Industrial Psychology, CBS Publishers & Distributors, 1984, ISBN: 8123908601.

8.K. H. Blanchard and P. Hersey, Management of Organizational Behavior: Utilizing Human Resources, Prentice-Hall India, 1993, ISBN: 0-13-5512868-9.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	30	20	150

PRE-REQUISITE : IT101 – Computer Programming, ME102 – Engineering Tools and Techniques

COURSE OBJECTIVES :

IT201.CEO.1:To introduce facts, concept and theory of an information system.
IT201.CEO.2:To understand evolution of an information system.
IT201.CEO.3:To explain an information life cycle.
IT201.CEO.4:To develop IoT based information system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT201.CO.1:Interpretation of Data, Information and Knowledge. [Apply]
IT201.CO.2:Make use of data acquisition techniques for an information system. [Apply]
IT201.CO.3:Categories different storage techniques. [Analyze]
IT201.CO.4:Develop dashboard for effective communication of information. [Apply]
IT201.CO.5:Determine components of Human computer interaction. [Evaluate]
IT201.CO.6:Design IoT based information system. [Analyze].

THEORY COURSE CONTENT		
UNIT 1	**Evolution Of Information**	**6 HOURS**
Data, Types of Data: Primary data, Secondary data, Meta data, Operational data and Derived data Information: Life Cycle, Semantics of information, Knowledge Data forms: Analog and Digital (Telephone and Stenography) ADC, DAC Evolution of Information- Man Machine Interaction Self-Study: Grade Sheet Generation system **Further Reading: Railway reservation, Inventory machine**		
UNIT 2	**Information Generation**	**6 HOURS**
Data Acquisition, Human interface, Hardware Interface: Input / Output devices Data Transformation: Rearranging, Classifying, Calculating, Summarizing; Self-Study: Weather forecasting System **Further Reading:Data Acquisition Applications**		
UNIT 3	**Information Storage And Transmission**	**4 HOURS**
Need of data storage, Types of storage: stand alone, centralized, distributed, and cloud. Encryption and decryption (define and need) Transmission Type, Synchronous, Asynchronous, Serial, Parallel, Satellite, radio **Case Study:**Dial up, Broadband **Self-Study:**Stand Alone and Disk storage **Further Reading:**Wireless–(Bluetooth, XBEE)		
UNIT 4	**Information Visualization**	**4 HOURS**
Representations: Graphs and Charts: Pi Chart, Scatter plot, Histogram, Heat map, Maps, Geo maps Case Study: Dynamic dashboard **Further Reading:**		
UNIT 5	**Human Computer Interface**	**4 HOURS**
Introduction of HCI, Types – mobile, stand-alone, computer etc, Interactive devices – touch screen, mic, keys, keyboard, scanner, camera etc., HCI design principles- standards, Usability principles –portability, scalability, GUI design and evaluation, Interactive Multimedia document search- image, audio, video, animation Case study: Ticket Generation Kiosk Self-Study: Web based systems interactivity **Further Reading:** Usable GUI Design		
UNIT 6	**Internet Of Things**	**4 HOURS**
IoT: Overview, Characteristics and Architecture Embedded Devices: Sensors, Actuators, Arduino and RaspberryPI IOT Ecosystem: Basic elements / building blocks of IOT application, Systematic method to design IOT application Applications: Asset management, Industrial automation, Smart cities Self-Study:IoT Essentials. **Further Reading:**IOT and big Data		

PRACTICAL		
PRACTICAL NO.01	**Data Acquisition , Storage and Retrieval Systems**	**8 HOURS**

In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow:

Identification of an interdependent elementary data items which have facts and figures

Data collection through sensors

Processing using Arduino

Data Storage using MySQL in an accessible form

Data visualization using graphs

PRACTICAL NO.02	**Dashboard Design**	**8 HOURS**

Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system.

Create a graph showing how revenue evolves throughout the year for each of the sales channels

Create an interactive chart that can be used to switch between different sales channels.

Create three different views of the data: monthly sales revenue, sales revenue by category, and revenue by the top five distributors..

PRACTICAL NO.03	**IoT Application**	**8 HOURS**

Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi. Identify the home appliances that require human interaction for its operations and state the need of automation.

Identify system component

Design circuit diagram

Assemble system components

Program the interface

System Testing

System Deployment

TEXT BOOK

1. Ralph M Stair, George W Reynolds, ”Fundamentals of Information Systems”, Course Technology Inc; 5th edition, 2008, ISBN 978-1423925811.
2. Benny Raphael, Ian F. C. Smith, ”Engineering Informatics: Fundamentals of Computer-Aided Engineering”, Wiley-Blackwell; 2nd Revised edition, 2013, ISBN-13: 978-1119953418.
3. Paul Mcfedries, “Excel Data Analysis: Your Visual Blueprint for Analyzing Data, Charts and Pivot Tables”, Wiley; Fourth edition 2013, ISBN-13 978-8126544004

REFERENCE

1. Gerard Jounghyun Kim, "Human–Computer Interaction: Fundamentals and Practice", CRC Press, Auerbach Publications, 1 edition, 2015 ISBN 9781482233896
2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley, 2013 ISBN-13: 978-1118430620

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	50	20	Nil	25	125

PRE-REQUISITE : AS102/AS103 - Physics, Chemistry

COURSE OBJECTIVES :

ME201.CEO.1:To select material for engineering application.
ME201.CEO.2:To classify the available materials.
ME201.CEO.3:To utilize available material for specified purpose.
ME201.CEO.4:To compare desired quality of materials from standard data.
ME201.CEO.5:To measure useful properties of materials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME201.CO.1:Select material for engineering application.
ME201.CO.2:Classify the available materials.
ME201.CO.3:Utilize available material for specified purpose.
ME201.CO.4:Compare desired quality of materials from standard data.
ME201.CO.5:Measure useful properties of materials.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**8 HOURS**
Classifications and specifications of steels and cast iron. Heat treatment of steels, Defects due to heat treatment and remedial measures. Classification of surface hardening treatments. Classification, Composition, Properties & applications of: Copper and Its alloys, Nickel and Its alloys, Aluminum and Its alloys. Specific alloys: soldering & brazing alloy, Precipitation hardening alloys. Bearing materials and their applications.		
UNIT 2	**Engineering Polymers, Ceramics and Glass**	**6 HOURS**
Classification of polymers, Polymer types-thermoplastics-thermoset-Elastomers, Polymer synthesis and processing-injection moulding-extrusion-blow moulding-calendaring, Degradation of polymers-chemical, thermal, -biological-mechanical. Polymer recycling methods Introduction to Advanced Ceramics-Barium Titanate, Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications, Introduction to Cermets and its application. HIGH PERFORMANCE POLY-MERS:Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation		
UNIT 3	**Composite Materials**	**6 HOURS**
Need of composites. Particle-reinforced composites, large-particle composites, dispersion-strengthened composites. Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic-matrix composites, carbon–carbon composites, fiber-reinforced composites, structural composites, laminar composites.		
UNIT 4	**Electronic and Photonic materials**	**6 HOURS**
Electronic Materials: Intrinsic and extrinsic semiconductors-p-n junction, Bandgap diagrams for conductor, semiconductor and insulator, IR detectors, Hall effect Superconducting Materials: Normal and High temperature superconductivity, Applications. Photonic Materials: LED, LCD, Photo conducting materials, Photo detectors, Photonic crystals and applications. Advancements in electronic materials: Smart materials		
UNIT 5	**Testing of Engineering Materials**	**8 HOURS**
Need and Comparison of destructive and non-destructive tests, Study of destructive testing: Engineering stress-strain curve, true stress-strain curve, Jominy End Quench Test for hardenability, Izod and Charpy Impact Test. Vickers, Rockwell hardness tests. Non –Destructive Testing Non-Destructive testing: Principles & procedure, advantages, disadvantages and Industrial applications of NDT like Sonic & Ultrasonic testing and Radiography tests. Brief overview of another NDT test- Eddy current test, Magnetic Particle Test		
UNIT 6	**Nanomaterials.**	**6 HOURS**
Basic concepts of Nano science and Nanotechnology, Carbon nanotubes, Principle of SEM, TEM and AFM, X ray diffraction Fundamentals principles of SEM, SE and BSE imaging modes, Fracture mode analysis and failure analysis using SEM. Potential uses of nonmaterial's' in electronics, robotics, sports equipment, mobile electronic devices, Medical applications of nanomaterials-Cancer, AIDS treatment.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Jominy End Quench Test**	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO.02	**Izod / Charpy Impact Test**	**2 HOURS**
Izod / Charpy Impact Test.		
PRACTICAL NO.03	**Hardness Test**	**4 HOURS**
Vickers,/ Rockwell, Brinell/Durometers & Poldi Hardness Test.		
PRACTICAL NO.04	**Magnetic Particle & Dye Penetrant Test**	**4 HOURS**
Magnetic Particle & Dye Penetrant Test.		
PRACTICAL NO.05	**Ultra-sonic Test**	**4 HOURS**
Ultra sonic test for detection of flaws in materials.		
PRACTICAL NO.06	**Determination of Hall coefficient**	**4 HOURS**
Determination of Hall coefficient for a semiconducting material.		
PRACTICAL NO.07	**Soldering**	**4 HOURS**
Hard and Soft soldering using soldering materials.		
PRACTICAL NO.08	**Industrial Visit**	
Visit to advanced materials characterization laboratory.		

TEXT BOOK

1. Material Science & Metallurgy for Engineers, Dr. V.D. Kodgire & S. V. Kodgire, Everest Publications.31st Edition, ISBN No: 8186314008
2. Mechanical Behavior & Testing of Materials, A. K. Bhargava, C.P. Sharma P H I Learning Private Ltd. 2011 edition, ISBN No 13-9788120342507

REFERENCE BOOK

1. Engineering Metallurgy, Higgins R. A., Viva books Pvt. Ltd., 2004 ISBN No 13-9788176490276
2. Material Science & Engineering, Raghavan V., Prentice Hall of India, New Delhi. 2003 ISBN No 13-9788120324558
3. Materials Science & Engineering, W. Callister, Wiley Publications,2013, ISBN No 13-9788126521432
4. Physical Metallurgy for Engineers, Clarke D.S. & Varney W.R. Affiliated East-West Press, New Delhi ISBN No 13-978-8176710350

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Data Structures and Application
	COURSE CODE	IT211
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	30	20	150

PRE-REQUISITE :

1. ESC4- Computer Programming,
2. IT202 –Object Oriented Technology

COURSE OBJECTIVES :

IT211.CEO.1: To Learn and understand linear and nonlinear data structures.
IT211.CEO.2: Explain fundamentals of data structures and their applications essential for Programming /problem solving..
IT211.CEO.3: Assess appropriate data structure during program development/Problem Solving.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT211.CO.1:Select the appropriate data structure for a specified application.
IT211.CO.2:Illustrate linear, Non-linear data structure and various operations on it.
IT211.CO.3:Apply appropriate data structures for solving computing problems.
IT211.CO.4:Analyze the performance of Stack, Queue, Trees and Graphs.
IT211.CO.5:Evaluate the performance of the application based on the data structures.
IT211.CO.6:Design and Implement various data structures in more than one manner.

THEORY :		
UNIT 1	**Fundamentals of Data Structures**	**6 HOURS**
Introduction: Data Structures, Classifications (Primitive Non Primitive), Data structure Operations, Types of Data Structures - Linear Non Linear Data Structures, searching and sorting techniques. Applications: Searching, sorting algorithm..		
UNIT 2	**Linked Lists**	**6 HOURS**
Introduction: Linked List, Types of Linked list: Singly Linked List , Circular Linked List, Doubly Linked List and implementation of Linked List, representation and Implementation of polynomial using Circular Linked List. Applications: Maintaining Access Frequencies..		
UNIT 3	**Stack**	**8 HOURS**
Introduction: Definition, Stack Operations, Representation of Stacks, stack as an ADT, array based Stack implementation, Recursion: Factorial, GCD, Fibonacci sequence, Tower of Hanoi, English Ruler, examples. Application: Reversing data, Matching Parentheses and HTML Tags.		
UNIT 4	**Queue**	**8 HOURS**
Queues: Definition, Array and Linked list Representation, Queue Operations, Circular Queue, Circular queue using array, Double-Ended queue, Priority Queue and implementation. Application: Sorting with Priority Queue.		
UNIT 5	**Trees**	**8 HOURS**
Introduction to Tree: Tree Terminology, Representation of Trees Binary Tree: Binary Tree ADT, Properties of Binary Tree and Implementing Trees: Linked Structure of Binary Tree, Linked Structure of General Tree,Tree Traversal Algorithm: Preorder and Post order of Traversal of General Tree, Breadth First Tree Traversal, In order Traversal of Tree. Application: Expression Tree..		
UNIT 6	**Graph.**	**8 HOURS**
Graph: Definitions, Terminologies, Matrix and Adjacency List Representation of Graphs, Data structures for graphs, Traversal methods: Breadth First Search and Depth First Search, shortest path: weighted graph Dijkastra's Algorithm, Minimum Spanning Tree (MST): Prim's and Kruskal's Algorithm. Applications: Routing tables for the nodes in a computer network.		

PRACTICAL:Practical's will be performed using Python Programming.		
PRACTICAL NO.01	Create a queue which will maintain the list of customer at restaurant/ Bank	**8 HOURS**
Functions: 1. Add a Customer to list. 2.Delete a Customer from list. 3. Show all the Customer list of particular day. 4. Calculate time complexity of each module. 5. Exit.		
PRACTICAL NO.02	Create a Word Dictionary using suitable data structure	**8 HOURS**
Functions: 1. Add a word into dictionary 2. Search a word from Dictionary. 3. Show the Dictionary. 4. Calculate time complexity of search module. 5. Exit.		
PRACTICAL NO.03	Simulate an air traffic controller using a Priority Queue.	**8 HOURS**
Functions: 1. Adding information about planes with priority. 2. Landing plane with highest priority.		
PRACTICAL NO.04	Ticket Checker	**8 HOURS**
Functions: 1. Insert the data about seat details of particular coach. 2. Search the seat in the coach. 3. Mark present or absent to seat. 4. Allocate new seat to vacant place.		

TEXT BOOK

1. Michael T. Goodrich, Roberto Tamassia, Michael H. GoldWasser, "Data Structures and Algorithms in Python", 1st Edition December 2016,Wiley, ISBN 978-8126562176.
2. Jean-Paul Tremblay, Paul. G. Soresan, "An introduction to data structures with Applications", Paperback, December 2001, ISBN 007-4624717.

REFERENCE

1. Bradley N Miller, David L Ranum," Problem Solving with Algorithms and Data Structures Using Python", 2nd edition August 2011,Franklin, Beedle Associates,ISBN-13: 978-1590282571
2. Horowitz, SartajSahni, SanguthevarRajasekran," Fundamentals of Computer Algorithms",December 2004,Galgotia, ISBN 817-5152575
3. NarasimhaKarumanchi,"Data Structure and Algorithmic Thinking with Python", 1st Edition January 2015,CareerMonk,ISBN 10: 8192107590

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	DATABASE SYSTEMS
	COURSE CODE	IT212
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	30	20	150

PRE-REQUISITE :

IT201 – Object Oriented Technology

COURSE OBJECTIVES :

IT212.CEO.1:Understand how the data is stored and processed
IT212.CEO.2:Know the various types of Data models for Database systems.
IT212.CEO.3:Learn the SQL and No SQL for processing all types of data.
IT212.CEO.4:Learn different types of database architectures.
IT212.CEO.5:Understand the concept of Big Data and learn various frameworks for handling it.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT212.CO.1:Experiment the basic concepts of database system using the various data models.
IT212.CO.2:Construct a structured database and execute SQL queries on it.
IT212.CO.3:Identify the data transfer script used in various databases for transferring data over the network.
IT212.CO.4:Examine the need of unstructured database and execute NoSQL queries on it.
IT212.CO.5:Test the selection of database by connecting it to some database application.
IT212.CO.6:Design a database application by considering the requirements of some existing system.

THEORY :		
UNIT 1	**Introduction to Database Systems**	**7 HOURS**
Application: Case Study on Trivago Hotel Booking System Content: Introduction and purpose of DBMS, DIKW pyramid, Data Abstraction, Data Independence, Data Models, ER Modeling, Integrity Constraints, Keys concept, , Database Architectures. Self-Study: Data, Types of data: Structured, Semi-structured and Unstructured Further Reading: Data Representation Techniques		
UNIT 2	**Structured Data**	**8 HOURS**
Application: Bank Database System, Student Portal, Social Networketc Content: Introduction to Relational Model, SQL, DDL, DML, DCL, aggregate functions, Set operations, sub-queries, Group by, Having and Order by clauses, join operations. PL/SQL Concepts: Cursors, Stored Procedures, Stored Function, Database Triggers. Self-Study: SQL Functions Further Study: Exception Handling		
UNIT 3	**Semi-structured Data**	**7 HOURS**
Application: Data transportation, Application configuration, Data storage of Facebook posts. Content: Introduction to XML: Elements, Attributes, XML DTD, XML Schema, XPath Expressions, XQuery, XML Databases, JSON: Syntax, Data Types, Object, Schema. Self-Study: Comparison of XML and JSON Further Study: XML Web Services		
UNIT 4	**Unstructured Data**	**7 HOURS**
Application: Case Study of Social Networking Site Content: Introduction to Big Data, Introduction to Hadoop, Data Storage: HDFS,HBase, Data Processing: Map Reduce, YARN. Self-Study: Data Access: Hive, Pig, Mahout, Avro, Sqoop Further Study: Data Management: Oozie, Chukwa, Flume, Zoo Keeper		
UNIT 5	**No-SQL**	**8 HOURS**
Application: Case Study of Aadhar UIDAI No SQL Introduction, ACID vs BASE, SQL vs No-SQL, MongoDB: Data Types, Documents, Collections, Database, CRUD Operations, Aggregation Pipeline and Indexing. Self-Study: Types of No SQL Databases Further Study: Pipeline and Indexing		
UNIT 6	**Database Connectivity And Applications**	**5 HOURS**
Content: Basics of Database Connectivity: Drivers, Connection Object, Connection URL, Result Set, Database Connectivity through JDBC/ODBC using Python, Real Time Applications of Mongo DB and Hadoop. Self-Study: SQLite Databases Further Study: Multimedia Databases: characteristics, architecture		

PRACTICAL:		
PRACTICAL NO. 1	**Study of various Database systems and their architecture**	**4 HOURS**
For a complex system follow the below steps: Students should form a group of minimum 5 members and visit different systems like Social Networking Site, Banking Systems, Management Systems, ERP etc. Each group has to do the following task. 1. Study the system architecture and identify the database used at the backend. 2. Should justify the need of such database system in that application. 3. Identify whether the database used is structured or Un-structured. 4. List down the advantages/disadvantages of using that database for that application. 5. Using text books and literature study the architecture of database used in your application. 6. Group has to present the report in form of poster then present it to the whole class.		
PRACTICAL NO. 2	**Explore database design using EER to achieve a better understanding of conceptual schema design, as well as address key issues in conceptual modeling.**	**4 HOURS**
A property management company has approached you to build a system that will help it keep track of its properties, tenants, and employees. Consider the following requirements and design a database conceptual schema to support such an application. The property management company owns several buildings, each at a distinct address. Each of the buildings contains several apartments. All apartments in a given building are assigned an apartment number that is unique within that building (but not necessarily across different buildings). The system should keep track of the number of bedrooms and number of bathrooms that each apartment has. The system also needs to handle different kinds of people. A person is identified by a unique Aadhar ID, and has a name consisting their first name and last name. Each person may have several phone numbers. People handled by the application fall into two disjoint categories: tenants and employees. For each tenant, it is necessary to record their bank account number for the purposes of deducting their rent. The application also needs to store the name and phone number of their next-of-kin for contact purposes in case of an emergency. For each employee, the application needs to keep track of their monthly salary. Employees can be managers or technicians (or both). Each manager has an office located in one of the apartments, and is in charge of managing at least one building. All buildings must have a manager. For technicians, the application should keep a record of their skills, which is one or more of the following: "carpentry", "plumbing", "electrical". To rent an apartment from the property management company, tenants must sign a lease agreement. A lease agreement is a formal contract by one or more tenants (as may be the case with roommates) to lease an apartment; it includes the start date and expected duration of occupation of the apartment, as well as the amounts for security deposit and monthly rent. The lease agreement is also countersigned by the manager in charge of the building, on behalf of the company. Students has to perform the following tasks: Design an EER conceptual schema based on the above specification, which accurately captures as much of the semantics of the application as possible. You should use the standard notation shown in the course textbook. Your EER diagram should include all relevant entities, attributes, relationships, cardinalities and specialization and generalization hierarchies.		

PRACTICAL NO. 3	Database implementation based on a given relational schema within the MySQL database management system.	6 HOURS

The tasks that you will accomplish in this assignment area as follows:
Create a database using DDL statements in the mysql command line tool
Populate the database row-by-row from provided raw data using JDBC
Write SQL queries to the database to be executed from the mysql command line tool
Query and manipulate the database programmatically using JDBC
Generate reports based on some basic analysis. The project will be divided into different part as follows:
Part 1: Creating the database Identify the keys and constraints for your system and design a database schema containing required tables having columns and its attributes.
Part 2: Populating the database Download the provided dataset from moodle and populate your database using respective commands.
Part 3: SQL queries on the database Write the queries in SQL and run them on your MySQL database via the mysql command line tool. Prepare and submit them as separate files.
Part 4: Querying the database using JDBC You are required to implement a Java program Hw3.java that provides the capability to run queries on the system from the Windows command line or Linux/Mac shell environment.
Part 5: Report Generation Generate the report in the form of either a receipt or bill or an analysis report for general prediction of total sales, profit etc. Interpolation techniques: Lagrange's Interpolation.

PRACTICAL NO. 4	Design and implementation of XML Schemas, XML Stylesheets and the use of the XML query language XQuery to query XML data.	4 HOURS

An independent bookseller would like to stay competitive in the market by using sales information from their competitors for items in their inventory. You would like to represent this data in XML. Given the information shown below about the data, create a valid XML Schema: Each Author has: ID (1 occurrence, required. Format: three alphanumeric characters followed by a number [0-9]) Name (1 occurrence, required. Format: first name [space] last name or first name [space] middle initial [space] last name) Email (1 occurrence, required. A valid email4) Phone (1 occurrence, required. Format: "(xxx) xxx-yyyy" where x and y are numbers and xxx does not start with a "0") Each Book has: ISBN (1 occurrence, required. Format: 10 numbers, where the last number may be replaced with an 'X'. Does not start with a "0") Title (1 occurrence, required) Author (1 or more occurrences, required. Type: Author/ID) Formats (1 or more occurrences, required) an occurrence of this element consists of: Format (1 occurrence, required. The only permitted values are eBook, Paperback, Hardcover) MSRP5 (1 occurrence, required, Format: zero or positive value) WeeksBSL (1 occurrence, optional. Format: positive integer) Each SalesInfo has: Book (1 occurrence, required. Type: Books/ISBN) BookSales (1 or more occurrences, required) an occurrence of this element should have: Format (1 occurrence, required. Type: Books/Formats/Format) Sales (1 or more occurrence, required) an occurrence of this element should have: Retailer (1 occurrence, required) Price (1 occurrence, required. Format: Books/Formats/MSRB) UnitsSold (1 occurrence, required. Format: zero or positive integer) On the above XML File execute the queries using XQuery.

List the ISBN, title and the name(s) of the author(s) for each book. Order the results according to the number of weeks the book was on the bestseller list, with the longest duration first.

Show the author(s) of the eBook with the cheapest MSRP price (amongst all eBooks). Give the author(s)' ID, name, email and phone number.

For each book, list the book title and the total number of units sold. The sum should include all formats sold by all retailers. Sort the answer by the ascending value of the total units sold.

For each format of a book that is not sold by any retailer, list the book's ISBN, title, format and the name(s) of its' author(s).

For each retailer, list each format of a book (ISBN, title, format and retailer's price) that are being sold at half of the MSRB price or less.

PRACTICAL NO. 5	Design of Unstructured Database	6 HOURS
For the same problem statement as mentioned in project 3 designs and implement an un structured database and perform all the tasks as per project 3. In addition to this write a Map Reduce program for generating the analysis report.		
MINI PROJECT		**8 HOURS**
Project Guidelines: Students have to complete a mini project in a group of minimum 3 and maximum 4 students. The problem statement for the project will be given to each group by the instructor in the first week of semester. Students can use either of the database systems (structured or unstructured)for completing their project.		

TEXT BOOK

1. Abraham Silberschatz, Henry F. Korth S. Sudarshan "Database System Concepts" McGraw Hill. 6th edition, ISBN: 0-07-352332-1.
2. Tom White "Hadoop: The Definitive Guide", O'Reilly Pubications, 4th Edition, ISBN: 978-1- 491-90163-2.
3. Kristina Chodorow "MongoDB: The Definitive Guide", O'Reilly Media,2ndEdition, ISBN: 978-1-4493-4468-9.k

REFERENCE

1. 1. Begg C. "Database Systems", Connally T., Pearson Education, 3rd Edition, 2002, ISBN 81-7808-861-4.
2. C.J.Date, A.Kannan, S.Swamynathan "An Introduction to Database Systems", Pearson Education, Eighth Edition, ISBN: 8177585568.
3. Elmasri R., Navathe S. "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2003, ISBN 8129702282.
4. Pramod J. Sadalage, Martin Fowler "NoSQL Distilled", Addison Wesley, ISBN 978-0-321-82662-6.
5. V. S. Subrahmanian, Morgan Kaufmann "Principles of Multimedia Database Systems", Publishers, ISBN-13: 978-1558604667.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 – 2018
SECOND YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Minor Project
	COURSE CODE	CS213
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTUES	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
--	4	–	--	–	–	75	75

PRE-REQUISITE :

1) ME102 – Engineering Tools and Techniques,
2) ME103 – Design Thinking,
3) ET206 – Prototyping

COURSE OBJECTIVES :

CS213.CEO.1:To identify and define a problem to be solved.
CS213.CEO.2:To develop a design for the solution of the problem using engineering tools available.
CS213.CEO.3:To prepare prototype/working model for solving the problem
CS213.CEO.4:To evaluate the model built for its functionality, reliability, sustainability, maintainability and affordability

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS213.CO.1:Define the problem to be solved.
CS213.CO.2:Apply knowledge of various engineering tools to develop the solution to the problem.
CS213.CO.3:Critically analyze the options available to solve the problem and select the one identified most effective.
CS213.CO.4:Justify the selection of the method to solve the problem is-a-vis other options considered.
CS213.CO.5::Build the working model of the solution to solve the problem.

PREAMBLE : It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

GUIDELINES:

1. Every student shall undertake the Minor Project in semester IV.
2. Every student shall work on an approved project, a group of 03 students (maximum) shall be allotted for each minor project
3. The group members could be from different departments to support the interdisciplinary functioning
4. The students have to identify the social problem by discussion with various stakeholders, site visits and expert-opinions
5. Collect the sufficient data to establish the criticality of the problem to be solved.
6. Define the actual problem
7. Enumerate various approaches and solutions to solve the problem
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use
9. Develop prototype or model for its testing before implementation
10. The three-member committee of jury members will be appointed to monitor the progress and continuous evaluation of each project. One of the members will be the project guide. Assessment of the project for award of grade shall be done jointly by the guide and committee of jury members

TIMELINES:

1. Project group formation: 1 Week.
2. Identification of the problem to be solved: 2 Weeks.
3. Data collection to prove the validity of the problem: 2 Weeks
4. Identification of the various approaches to solve the problem: 2 weeks.
5. Justification of the approach selected to solve the problem: 1 week
6. Building the solution to the problem using prototype or implementation: 6 Weeks
7. Report writing: 2Weeks

ASSESSMENT:

Presentation 1: Motivation and need for the selected problem to be solved

Presentation 2: To prove the validity of the problem to be solved using data collected

Presentation 3: Identified approaches to solve the problem and justification of approach selected

Presentation 4: Progress towards the prototyping or implementation of the solution to the problem

Presentation 5: Final demonstration

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MIT ACADEMY OF ENGINEERING, ALANDI

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Curriculum

For

Third Year

Bachelor of Technology in Information Technology

2016-2020

(With Effect from Academic Year: 2018-2019)

MIT Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	RELEASE DATE	:	01/12/2017
	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	IT301	Computability Theory	3	2	4
2.	DC6	IT302	Operating System	3	2	4
3.	DC7	IT303	Web Technology	3	2	4
4.	OE1	IT311 CS311 CS312	Open Elective - Refer Annexure.	3	2	4
5.	HSS4	HP301	Project Management	1	2	2
6	HSS6	HP303	Basics of Entrepreneurship	--	2	1
7	SDP5	CS305 CS306 CS307	Skill Development Lab	--	4	2
TOTAL				**13**	**16**	**21**

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	IT321	Computational Intelligence	3	2	4
2.	DC9	IT322	Cloud Services and Applications	3	2	4
3.	DC10	IT323	Mobile Application Development	3	2	4
4.	OE2	IT331 CS331 CS332	Open Elective - Ref er Annexure.	3	2	4
5.	HSS5	HP302	Prof essional Skills	1	2	2
6.	SDP6	IT324	Mini Project		4	2
TOTAL				**13**	**14**	**20**

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 19
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Computability Theory
	COURSE CODE	IT301
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		**EVALUATION SCHEME :**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	30	20	150

PRE-REQUISITE :

1. AS202 – APPLIED MATHEMATICS

COURSE OBJECTIVES :

IT301.CEO.1:To study computing machines by describing, classifying and comparing different types of computational models.

IT301.CEO.2:To study develop fundamentals for 'computational theory'..

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT301.CO.1:Construct a finite state machine and inter conversion between them.

IT301.CO.2:Construct the regular expressions and regular language

IT301.CO.3:Develop a language, grammar and inter conversion between them

IT301.CO.4:Design the push down automata and Turing machine.

IT301.CO.5:Classify the automata's, language and grammar.

IT301.CO.6:Distinguish a decidable and un decidable problems, P and NP class problems

THEORY		
UNIT 1	**Finite Automata**	**8 HOURS**
Definition of Automata, Types of Automata, Languages, Finite Automata, Deterministic Finite Automata, Non Deterministic Finite Automata, Non Deterministic Finite Automata with epsilon transition, Conversion between NFA to DFA, Conversion between epsilon NFA to NFA, **Self-Study:** Finite Automata with output: Mealy and Moore Machine and their Conversion.		
UNIT 2	**Regular Expression and Languages**	**6 HOURS**
Language classification, Regular Languages, Closure Properties of Regular Language, Regular Expression, Properties of Regular Expression. Conversion between RE and Finite Automata, Relation between Languages. **Self-study:** Pumping Lema for Regular Language.		
UNIT 3	**Grammars and Context free Grammar.**	**8 HOURS**
Formal Definition of Grammar, Phrase structure grammar, Chomsky hierarchy, context free grammar, Parse Trees, Ambiguity in grammars and their removal, Simplification of Grammar-removal of unit production, useless production, useless symbol, **Self- study:**Normal forms-Chomsky normal form and greibach normal form.		
UNIT 4	**Pushdown automata and Context free Language**	**8 HOURS**
Definition, deterministic, pushes down automata(DPDA), non-deterministic push down automata(NPDA), the language of PDA. Equivalence of PDA's and CFG's, Concept of post machines. CFL- Properties, normal forms, Pumping lemma of CFL, **Self- study:** Post Machine		
UNIT 5	**Turing Machine.**	**7 HOURS**
Definition and example of TM, computing a partial function with TM, combining TM's variations of TM: Multi-tape TM's, universal TM, model of computation and church's turing hypothesis, unsolvable problem, **Self- study:** TM's halting problem.		
UNIT 6	**Decidability and Un Decidability**	**7 HOURS**
Church's Thesis, Decidable Problems Concerning Regular and Context-Free Languages, Un decidability of the Halting Problem, Formal Definition of Reducibility as Many-One Reducibility, Examples of Many-One Reducibility between Problems. **Self-study:**Diagonalization.		

PRACTICAL: Perform following experiments using C, C++, and Python.		
PRACTICAL NO.01	**Vending Machine**	**6 HOURS**
Design and Develop the DFA for the vending machine which accepts Rupees, and charges 100Rs per soda. Once the machine receives at least 100Rs, it will allow the user to select a soda. Self-loops represent ignored input: the machine will not dispense a soda until at least 100Rs has been deposited, and it will not accept more money once it has already received greater than or equal to 100Rs.To express the DFA as a 5-tuple, the components are defined as follows: 1. Q = 00Rs,25Rs,50Rs,75Rs,100Rs,125Rs,150Rs,175Rs,200Rs are the states 2. = 25Rs,100Rs,select is the alphabet 3. , the transition function, is described by the state diagram. 4. q0 = 00Rs is the start state 5. F = is the set of accept states		
PRACTICAL NO.02	**Word Recognition**	**6 HOURS**
Design and Develop DFA for word recognizer takes a string of characters as input and returns “yes” or “no” according as the word is or is not in a given set. It Solves the membership problem for the below statements. 1. All strings of a’s and b’s in which equal no of a’s followed by b’s. 2. All strings of a’s and b’s in which first and last symbols are same. 3. All strings of a’s and b’s in which no of a’s are divisible by 2.		
PRACTICAL NO.03	**Dictionary lookup**	**6 HOURS**
Dictionary lookup takes a string of characters as input and returns “yes” or “no” according as the word is or is not in a given set and returns information about the word. Students needs to create the files of words		
PRACTICAL NO.04	**Compiler for Calculator**	**4 HOURS**
Design and develop (Grammar, Regular expression) for Calculator using Lex and Yacc.		
PRACTICAL NO.05	**Compiler for conditional statements**	**6 HOURS**
Design and develop (Grammar, Regular expression) for any Conditional statements of C Programming Language usingLex and Yacc.		
PRACTICAL NO.06	**2’s Complement**	**4 HOURS**
Design and develop Automata to find 2’s complement of binary number..		

TEXT BOOK

1. John C. martin, "Introduction to Language and Theory of Computation", TMH, Third Edition. ISBN: 978-0-07- 066048-9.
2. Michel Sipser "Introduction to Theory of Computation" Thomson Course Technology, Second Edition, ISBN: 0- 534-95097-3.

REFERENCES:

1.1. Hopcroft, Ullman, "Introduction to automata theory, languages and computations", Pearson education Asia, 3rd edition, 2007,ISBN-9780321455369
2. Erwyn Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 8th edition, 2011, ISBN: 9971- 51-283-1.
3. Daniel I.A. Cohen, "Introduction to Computer Theory" Wiley-India, 2007, ISBN: 978-81-265-1334-5.
4. K.L.P Mishra,N.Chandrasekaran," Theory of computer science(automata, languages and computation)", Prentice hall india, 2nd edition,2006,ISBN-81-203-2968-6.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Operating System
	COURSE CODE	IT302
	COURSE CREDITS	4
RELEASED DATE : 01-06-2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	30	20	150

PRE-REQUISITE :

1. ME102:Engineering Tools and Technique
2. IT211:Data Structures Application

COURSE OBJECTIVES :

IT302.CEO.1:To introduce basic concepts of operating systems.
IT302.CEO.2:To explain goals functions of operating systems.
IT302.CEO.3:To provide solutions to challenges in interacting processes, and use them.

COURSE OUTCOMES :

The students after completion of the course will be able to

IT302.CO.1:Describe, contrast and compare different structures and types of operating system.
IT302.CO.2:Analyze theory and implementation of process, resource control in OS.
IT302.CO.3:Realize the concept of I/O and storage management.
IT302.CO.4:Implement various algorithms required for management, scheduling, allocation and Communication used in operating system.
IT302.CO.5:Implement an application using multiple processes.

THEORY:		
UNIT 1	**Introduction to Operating System**	**6 HOURS**
Introduction to Operating Systems, Hardware support for Operating System, Resource management, operating system architectures. Case Study: History Architecture of operating system		
UNIT 2	**Shell Programming**	**6 HOURS**
Introduction, Role of Shell, Types of Shells ,File and Directory-related Commands, communication in Unix,Vi Editor, Shell Scripts, Programming Constructs in Shell.		
UNIT 3	**Process Management**	**6 HOURS**
Fundamentals of Process management, Process Scheduling, Process communication and Synchronization, Deadlock, Multithreading		
UNIT 4	**Memory Management**	**8 HOURS**
The Buffer Cache: Buffer Headers, Structure of the Buffer Pool, Scenarios for Retrieval of a buffer, Reading Writing Disk Block, Advantages Disadvantages of Buffer Cache. Files: Inodes, Structure of Regular File, Directories, Conversion of a Path Name to an Inode.		
UNIT 5	**I/O Management**	**8 HOURS**
Driver Interfaces, Disk Drivers, Terminal Drivers, Streams, Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, Disk Scheduling Management		
UNIT 6	**Advanced Operating Systems**	**6 HOURS**
Distributed Operating System, Multi-processor Operating System, Real Time Operating System, Mobile operating System, Multimedia Operating System, Virtualization.		

PRACTICAL: Perform following experiments using Open source software.		
PRACTICAL NO. 01		**4 HOURS**
Given the list of processes, their CPU burst times and arrival times, Display /print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.		
PRACTICAL NO. 02		**4 HOURS**
Develop Application using Inter Process communication (using shared memory, pipes or message queues)		
PRACTICAL NO.03		**4 HOURS**
Multi-threaded coin flipping: You have 20 coins on the table lying in a row.P persons flip all coins on the table N times. Write a program that emulates this by using threads, one thread emulating one person. By default, there are P= 100 persons and each person flips each coin N = 10000 times. Provide command line options that allow controlling the number of persons and the number of coin flips per person.		
PRACTICAL NO. 04		**6 HOURS**
Develop Application to simulate producer - consumer problem using Semaphores.		
PRACTICAL NO. 05		**6 HOURS**
Design and Implementation of a File system.		

TEXT BOOK

1. Naresh Chauhan, "Principles of Operating Systems", Oxford University Press,2014, ISBN10: 0198082878
2. Maurice Bach, "The Design of Unix Operating System", Prentice Hall, 2015, ISBN: 978-93-325- 4957-9
3. Silberschatz, Galvin and Gagne ,"Operating System Concepts", 8th ed., John Wiley Publishers,ISBN-13: 9780470128725

REFERENCE BOOK

1. William Stallings," Operating System: Internals and Design Principles", Prentice Hall, 8th Edition, 2014, ISBN10: 0133805913
2. Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, Inc., 1st Edition, 2007, ISBN: 9780596009526

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Web Technology
	COURSE CODE	IT303
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	30	20	150

PRE-REQUISITE :

IT202: Object Oriented Technology

IT212: Database System

COURSE OBJECTIVES :

IT303.CEO.1:To understand the concepts principles of Web applications and development.

IT303.CEO.2:To apply current Web technologies and Web business models.

IT303.CEO.3:To understand and apply Web development processes.

IT303.CEO.4:To understand the engineering aspect of web technology.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT303.CO.1:Apply the principles and protocols of web engineering.

IT303.CO.2:Construct responsive web pages using HTML CSS.

IT303.CO.3:Apply the basic of scripting language to provide interactivity and validation.

IT303.CO.4:Build the single page web application using AngularJS.

IT303.CO.5:Create dynamic web pages using any client server side programming.

THEORY COURSE CONTENT		
UNIT 1	**Web Basics**	**7 HOURS**
Content: Introduction to World Wide Web: Introduction to WAP, DNS, Email, HTTP and FTP. Concepts of effective web design, Good bad web design and website Design issues. Client-Server architecture. History of WWW **Further Study:** Semantic Web.		
UNIT 2	**HTML & CSS**	**7 HOURS**
Application: Internet web pages of any web application **Content:** Basics of HTML, List of Tags in html, hyperlink, forms, Meta tags, character entities, frames, introduction to HTML5.Cascading style sheet, internal, external and inline style sheet, basic syntax and structure. **Self-Study:** Layout Design **Further Study:** HTML5,CSS Preprocessor Less and Sass.		
UNIT 3	**Client Side Scripting**	**9 HOURS**
Application: Data validation and Dynamic interactive web pages. **Content:** JavaScript: variables, functions, conditions, loops, array, JavaScript object, properties, methods, the DOM and web browsers, forms validations, DHTML: Combining HTML, CSS and JavaScript, Events and buttons. **Self-Study:** Ajax J Query. **Further Study:** Node JS.		
UNIT 4	**SPA with AngularJS**	**9 HOURS**
Application: Hybrid mobile applications **Content:** Introduction to Single Page Applications (SPA), Introduction to AngularJS, Core concepts: Module, Controller, Scope and view, Services, Filters, Form validation, Directive, Routing. **Self-Study:** SPA frameworks. **Further Study:** React JS.		
UNIT 5	**Server Side Scripting: PHP**	**10 HOURS**
Application: Facebook **Content:** Introduction and basic syntax of scripting language, Arrays, Functions, String, Form processing, Files, Cookies and Sessions, MVC Framework, Database Connectivity, Introduction to NodeJS. **Self-Study:** Introduction to server side scripting various scripting languages. **Further Study:** Java Servlet JSP: Java Server Pages, API's.		

PRACTICAL: Perform following experiments using Open source software.		
PRACTICAL NO.01		**2 HOURS**
HTML: Create a static website for any organization or portfolio of yourself using HTML, you can include images, also provide navigation for other pages and make use of all possible formatting.		
PRACTICAL NO.02		**4 HOURS**
Cascading Style Sheet Apply the CSS on the pages created in practical no. 1, include margin, border, padding etc. properties to design the pages.		
PRACTICAL NO.03		**4 HOURS**
JavaScript Create event registration website having home, about and registration page, use CSS to design the website and JavaScript for validating the registration form.		
PRACTICAL NO.04		**4 HOURS**
Ajax using J Query For the registration form in practical no. 3, write a J Query code to fetch the information from server for drop own fields.		
PRACTICAL NO.05		**4 HOURS**
Create a single page application using Angular JS Write a single page application of practical no 4 using Angular JS.		
PRACTICAL NO.06		**6 HOURS**
Dynamic website using server side script Add database connectivity for the practical no 4 for storing the registration information in database and fetching the information from database using j Query.		
Mini projects		**8 HOURS**
Student will work in a group of 3 or 4, build a web application using any third party API. Use MVC framework in your project.		

TEXT BOOK

1.Ralph Moseley, M.T. Savaliya, "Developing Web Applications ", Willy India, Second Edition, 2013,ISBN:9788126538676

REFERENCE BOOK

1.Kogent Learning Solutions Inc , "Web Technology Black Book", Wiley, 2009, ISBN: 9788177229974

2.B. M. Harwani, "Developing Web Applications in PHP and AJAX", Tata McGraw-Hill, 2010,ISBN: 9780070707108

MIT Academy of Engineering (An Autonomous Institute) (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Cryptography and System Security
	COURSE CODE	IT311
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	30	40	30	25	–	125

PRE-REQUISITE : IT203: Computer Network

COURSE OBJECTIVES :

IT311.CEO 1:To understand fundamentals of cryptography, authentication and emerging security standards.

IT311.CEO 2:Determine basics of network security protocols.

IT311.CEO 3:Identify the possible threats to each mechanism and ways to protect against these threats.

IT311.CEO 4:Understand cryptographic techniques that provide information and network security

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT311.CO.1:Explain symmetric cryptography, asymmetric cryptography, and digital signatures.

IT311.CO.2:Implement security algorithms in computer network.

IT311.CO.3:Identify the different security technology and devices.

IT311.CO.4:Outline the requirements and mechanisms for identification and authentication.

IT311.CO.5:List the security threats, and the security services and mechanisms to counter them.

IT311.CO.6:Comprehend security services and mechanisms in the network protocol stack.

THEORY:		
UNIT 1	**Basics of Security**	**8 HOURS**
Attacks on Computer and Computer Security: Introduction, The Need for Security, Security Approaches, Principles of Security, Types of Attacks Cryptography Techniques: Introduction, Plaintext and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography. Self-Study: Key Range and Key Size Further Studies : Possible Type of Attacks		
UNIT 2	**Symmetric Key Algorithms**	**8 HOURS**
Introduction, Algorithms types and modes, Overview of Symmetric key cryptography, Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA),RC5, Blowfish, Advanced Encryption Standard (AES). Further Studies : RC4		
UNIT 3	**Asymmetric Key Algorithms**	**8 HOURS**
Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm, Symmetric and Asymmetric key cryptography together, Digital Signatures. Further Studies: Knapsack Algorithm		
UNIT 4	**Digital Signature and Key Management**	**6 HOURS**
Introduction, Digital Signature, Digital certificates, Digital Envelop, classification of security measures with digital signature, digital certificate and digital envelop, private key management, the PKIX model, Public key cryptographic standards (PKCS). Self-Study: Key Management Further Studies: XML, PKI and Security		
UNIT 5	**Security Protocols and Tools**	**6 HOURS**
Introduction to security protocols, concept behind secure socket layer, Transport layer security, Secure Hypertext Transfer Protocol, Time stamping protocol, secure electronic transaction (SET). Self-Study: SSL vs SET Further Studies: E-mail Security		
UNIT 6	**User Authentication and Kerberos**	**6 HOURS**
The Kerberos Authentication Service, provides a trusted third-party authentication to verify users' identity Authentication basics, Passwords, Authentication Tokens, Certificate-based Authentication, Biometric Authentication, Kerberos, Key Distribution Center (KDC) , Security Handshake Pitfalls. Self-Study: Single Sign On (SSO) Approaches Further Studies: IP Security		

PRACTICAL: Perform following experiments using open source software.		
PRACTICAL NO.01		**4 HOURS**
Write a program to encrypt and decrypt the message using encryption decryption techniques.		
PRACTICAL NO.02		**4 HOURS**
Develop a program in C++/Java/Python on Extended Euclidean Algorithm .		
PRACTICAL NO.03		**6 HOURS**
Develop a program in C/C++/Java to implement RSA algorithm for key generation and cipher verification		
PRACTICAL NO.04		**4 HOURS**
Implement Diffie -Hellman key exchange algorithm using an open source language.		
PRACTICAL NO.05		**6 HOURS**
Cryptography Library (API): Write a program in C++/Java/Python to implement RSA algorithm using Libraries (API).		
PRACTICAL NO.06		**8 HOURS**
Security Tools : 1:Configure and demonstrate use of IDS tool such as snort standards. 2:Configure and demonstrate use of traffic monitoring tool such as wire shark with security perspective. 3:Configure and demonstrate use of vulnerability assessment tool such as NESSUS.		

TEXT BOOK

1. Atul Kahate, "Cryptography and Network Security", The McGraw Hill Publication Second Edition, ISBN – 13: 978-0-07-064823-4.
2. Eric Maiwald , "Network Security: A Beginners' Guide" , ISBN: 978-0-07-179571-5

REFERENCES:

1. William Stallings , "Cryptography and Network Security", Prentice Hall, Fourth Edition ISBN-13: 978-0-13- 187316-2
2. Bernard Menezes ," Network Security and Cryptography: Bernard Menezes ", CENGAGE Learning.
3. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security - Private Communication in a Public World", Pearson/PHI..
4. Stallings , "Cryptography and network Security", Third edition, PHI/Pearson.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Descriptive Analytics
	COURSE CODE	CS311
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE :

1. IT101: Computer Programming
2. CS212: Database Management System

COURSE OBJECTIVES :

CS311.CEO.1:To understand the data warehouse architecture.
CS311.CEO.2:To outline the various preprocessing operations on data warehouse.
CS311.CEO.3:To apply the various operations on OLAP cubes and schema modeling.
CS311.CEO.4:To elaborate the need of Data Science.
CS311.CEO.5:To apply regression methods for a given dataset.
CS311.CEO.6:To summarize the basic concepts frequent item sets.

COURSE OUTCOMES :

The students after completion of the course will be able to

CS311.CO.1:Outline the data warehouse architecture.
CS311.CO.2:Apply the various data preprocessing techniques for making data marts for a given application.
CS311.CO.3:Apply the various operations of OLAP cube.
CS311.CO.4:Apply regression and Correlation on real datasets
CS311.CO.5:Generate frequent item sets for given datasheet

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Data Warehouse**	**6 HOURS**
App/System/Case study: Retail-Industry Case Study **Content:** Overview, need of its components, architecture, characteristics, goals, models, knowledge discovery, challenges, importance of meta data repositories. Introduction to Business Intelligence (BI), Significance of BI **Self-Study:** Data Warehouse Security Measures : User access, Data load, Data movement, Query generation **Further Reading:** Advancement Data Collection Security.		
UNIT 2	**Operations of Data Warehouse**	**6 HOURS**
App/System/Case study: Retail-Industry Case Study **Content:** Data preprocessing: data cleansing, data integration, data reduction, data transformation and discretization, concept hierarchy, data quality, data warehouse design process, distributed data warehouse, real time data warehouse architecture. **Self-Study:** Outlier Analysis **Further Reading:** Real Time ETL		
UNIT 3	**Data Warehouse Modeling**	**8 HOURS**
App/System/Case study: Retail-Industry Case Study **Content:** Data modeling, OLAP vs OLTP, MOLAP, ROLAP, HOLAP, Dimensions and facts and types, granularity of facts, measures and categorization of measures, Data mart, OLAP cubes , Cube operations, scheme modeling (star, snowflake, star constellation schema) **Self-Study:** Analyze OLAP cube with Microsoft Excel, Cross Table Cube **Further Reading:** Cubing Service Security, Multidimensional Data Analysis		
UNIT 4	**Introduction to Data Science and Statistical techniques.**	**6 HOURS**
App/System/Case study: Retail-Industry Case Study **Content:** Introduction to Data Science and Data Mining, Descriptive, Predictive and Prescriptive data analysis techniques, Descriptive Statistics, Probability Distributions, Inferential Statistics through hypothesis tests. **Self -Study:** Permutation Randomization Test		

UNIT 5	Regression and Correlation	8 HOURS

App/System/Case study:
Real Estate Case Study

Content:
Simple, Multiple regression, Linear-Logistic Regression, Poisson Regression, Non linear regression. Correlation coefficient, ANOVA, Measuring performance of a model, Accuracy, ROC curves, precision-recall curves.

Self-Study: Regression Models using Excel 2013

Further Reading:Correlation Mining for Massive data

UNIT 6	Frequent Item-set Mining	6 HOURS

App/System/Case study:
Retail-Industry Case Study

Content:
Market Basket Analysis, Support and Confidence, Frequent Item-sets, Closed Item-sets, and Association Rules Frequent Pattern Mining

Self-Study: Applications of Frequent Item-sets Mining.

Further Reading: Multilevel Association Rules Generation

PRACTICAL : Perform following experiments using prescribed tools		
PRACTICAL NO.01		**10 HOURS**

Data Preprocessing exercise using R

Suppose that the data for analysis includes the attribute age. The age values for the data tuples are (in increasing order) 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70.

(a) What is the mean of the data? What is the median?

(b) What is the mode of the data? Comment on the data's modality (i.e., bimodal, trimodal, etc.).

(c) What is the midrange of the data?

(d) Can you find (roughly) the first quartile (Q1) and the third quartile (Q3) of the data?

(e) Give the five-number summary of the data.

(f) Show a boxplot of the data.

(g) How is a quantile- quantile plot different from a quantile plot?

(a) Use smoothing by bin means to smooth the data, using a bin depth of 3.Illustrate your steps. Comment on the effect of this technique for the given data.

(b) How might you determine outliers in the data?

(c) What other methods are there for data smoothing? Plot an equal-width histogram of width 10.

(d) Sketch examples of each of the following sampling techniques: SRSWOR, SRSWR, cluster sampling, stratified sampling. Use samples of size 5 and the strata "youth,""middle-aged," and "senior." Suppose a group of 12 sales price records has been sorted as follows: 5, 10, 11, 13, 15, 35, 50, 55, 72, 92, 204, 215 Partition them into three bins by each of the following methods:

(a) equal-frequency (equidepth) partitioning

(b) equal-width partitioning

(c) clustering

OR

Demonstration of preprocessing operations on given dataset (Retail Big Bazar, Health System, Banking System, Sales, Fast Food Industry System).Using ETL tool like Talend /Pentaho/or any proprietary tool.

Note: The above assignment is for the reference, Similar level assignment can be taken lab.

PRACTICAL NO.02		12 HOURS

Dimensional Modeling, Data Mart, Cube Analysis

The Leisure Hotel chain is a small chain with properties throughout Pennsylvania, Arizona, Florida, and New York. They have a central database to store and track guest reservations. In 2008, they put cafes in many of their hotels, called "Café in the Hotel." They have an order-tracking system that relays customer orders from the wait staff to the kitchen.

Leisure Hotels would like to use the data they have collected to better understand the performance of their hotels and cafes. They also have access to a database from the online review site "Hotel Complainer.com." Your task is to design two dimensional data marts using data from those three databases. You will plan the star schema for each data mart by choosing the dimensions, facts, and attributes from the data contained in those databases. The relational schemas of those databases are on the following page.

The questions to be addressed by each data mart are listed in the table below. You should include only the data fields you need in each data mart, but the data marts can contain some of the same data (i.e., the same fields can appear in both data marts). To complete the exercise, you'll need to perform the following steps:

1) Identify the main business event for each data mart. This will be the fact.Ask yourself, "What is the basic business event that generates the performance metric (revenue)?"

2) Identify the attributes associated with the fact. Ask yourself, "How is the business event quantified (measured)?"

3) Identify the dimensions and their attributes. Ask yourself, "What data characterizes the various aspects of that business event?"

4) Either sketch the star schema or make a list of the dimensions and the fact and their attributes. You can use the examples in the slides as a guide.

Following Descriptive Analysis –Cube Analysis is expected from data mart

. During which month are the most rooms rented?

- Identify the "off season" (if any) for our hotels in Arizona, Florida,Pennsylvania, and New York.

. Which hotel generates the most (non-restaurant) revenue?

. What is the average length of stay in hotels with 4.5 or more stars?

. Do smokers stay longer than non-smokers?

. For a given hotel, how many customers come from out of state?

. Which hotel restaurant generates the most revenue?

. Do the best rated hotels generate more restaurant revenue?

. What is the most frequently ordered item in the Philadelphia metropolitan area?

Note: Above case study is just for reference any other Case study with similar level can be taken in lab.

PRACTICAL NO.03		8 HOURS

Project on Descriptive analytics (Data –preprocessing, Dimensional modeling, Cube Analysis) using R/ Cognos /Pentaho /Talend /Power BI.

TEXT BOOK

1. Jiawei Han, MichelineKamber, Jian Pei Professor, "Data Mining: Concepts and Techniques", The Morgan Kaufmann Series in Data Management Systems, ISBN 978-9380931913
2. Rick Sherman, Business Intelligence Guidebook: From Data Integration to Analytics,The Morgan Kaufmann Series in Data Management Systems, ISBN 012411461X

REFERENCE BOOK

1. Paulraj Ponniah,Data Warehousing: Fundamentals for IT Professionals, 2nd Edition, Paperback, McGraw Hill Publishers, 2006, ISBN 978-0-07-352332-3
2. Ralph Kimball, "Data Warehouse Lifecycle Toolkit", Willey, ISBN 0471200247
3. Maria Sueli Almeida, Missao Ishikawa, Joerg Reinschmidt, Torsten Roeber, Getting Started with Data Warehouse and Business Intelligence, IBM
4. Ramesh Sharda, Dursun Delen, Efraim Turban, "Business Intelligence, Analytics and Data Science: A Managerial Perspective", Pearson Publication, 4th Edition ISBN 0134633288
5. Grolemund, Garrett "R for Data Science", O'Reilly
6. Murrey R Spiegal, Larry Stifens, Statistics, 4th edition, Schaum's Series, McGraw Higher Ed ISBN: 9780070151536, 0070151539

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 – 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Artificial Intelligence and Neural Networks
	COURSE CODE	CS312
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	30	40	30	50	–	150

PRE-REQUISITE:

1.CS201 – Data and File Structures

COURSE OBJECTIVES :

CS312.CEO.1:Gain a historical perspective of AI and its foundations.

CS312.CEO.2:Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation and learning.

CS312.CEO.3:Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

CS312.CEO.4:Explore the current scope, potential, limitations and implications of intelligent system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS312.CO.1:Analyze the variations in agents and environments behavior and major functions implemented in a general agent.

CS312.CO.2:Evaluate agents using search algorithms such as uninformed search, informed search or local search.

CS312.CO.3:Illustrate adversarial search mechanism and game-playing agents.

CS312.CO.4:Identify capabilities of specific knowledge representation formalisms for specific tasks.

CS312.CO.5:Apply the methodology to transfer human knowledge into an expert system.

CS312.CO.6:Explain the learning and adaptation capability of neural systems.

THEORY :		
UNIT 1	**Introduction**	**7 HOURS**
App/System/Case study: Virtual Personal Assistants, Autonomous cruise control system. **Contents:** Introduction to Artificial Intelligence, The Foundations of Artificial Intelligence, Emergence of Intelligent Agents, PEAS Representation of Agents, Rationality, Environment, Problem Formulation. **Self Study:** Agent Oriented Design **Further reading:** A taxonomy of autonomous agents		
UNIT 2	**Search Strategies**	**7 HOURS**
App/System/Case study: GPS Navigation systems, Tile games. **Contents:** State space search, heuristic search, Uninformed Search Techniques- DFS, BFS, Iterative Deepening, Informed search Techniques- Greedy best first search, A* search. **Self Study:** Genetic Algorithms **Further reading:** Hill Climbing Search		
UNIT 3	**Constraint Satisfaction Problem**	**7 HOURS**
App/System/Case study: SICStus Prolog **Contents:** Constraint Satisfaction Problem, Backtracking search for CSPs, Adversarial search - Games, Optimal decisions in games, Mini Max Algorithm, Alpha-Beta pruning. **Self Study:** Deterministic games in practice **Further reading:** Map coloring problem		
UNIT 4	**Reasoning and Knowledge Representation**	**7 HOURS**
App/System/Case study: WebQR , Inquire an iPad app **Contents:** Introduction to Reasoning and Knowledge Representation, Knowledge-based reasoning-First- order Logic and theorem proving, Rules and rule-based reasoning, Knowledge representation –Production based system, Frame based system. **Self Study:** Propositional Logic **Further reading:** Uncertainty representation and management		
UNIT 5	**Expert Systems and Learning**	**7 HOURS**
App/System/Case study: MYCIN **Contents:** Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics, Expert systems shells. Learning from Observations, General Model of Learning Agents, Inductive learning. **Self Study:** Natural Language Processing **Further reading:** Statistical Learning		

UNIT 6	Neural Networks	7 HOURS
App/System/Case study: Architecture of Complex Pattern Recognition: ART/ART-1 **Contents:** Introduction to neural networks, Perceptrons, Single layered feed forward network, Applications of ANN, Neural Networks viewed as directed graphs, Feedback from neurons to ANN. **Self Study:** Multi-layered Feed- forward Networks. **Further reading:** Hebb's rule		

PRACTICAL:Perform 6 experiments (a or b) using python/specifted tools.		
PRACTICAL NO.01		**6 HOURS**
a) Elaborate uninformed search algorithm for any suitable real time application. b) Develop Vacuum Cleaner Agent Application.		
PRACTICAL NO.02		**6 HOURS**
a) Find the shortest path (by number of towns passed and by distance) for any particular source and destination using A* search. b) Elaborate hill climbing algorithm.		
PRACTICAL NO.03		**6 HOURS**
a) Develop 8-puzzle problem using appropriate search method. b) Develop 4 Queens or 8 Queens Problem using backtracking.		
PRACTICAL NO.04		**6 HOURS**
a) Design map coloring problem using backtracking. b) Make use of Natural Language Toolkit to count word frequency.		
PRACTICAL NO.05		**6 HOURS**
a) Develop game of tic-tac-toe using minimax algorithm. b) Build Fact, Rule, goal for family relationships and arithmetic operations using Prolog.		
PRACTICAL NO.06		**6 HOURS**
a) Design map coloring problem using backtracking. b) Make use of Natural Language Toolkit to count word frequency.		

TEXT BOOK

1. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", Third Edition, Pearson, ISBN-13: 978-0-13-604259-4.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw Hill, ISBN-13: 978-0-07-008770-5.
3. Simon Haykin, "Neural Networks and Learning Machines", Third Edition, Pearson, ISBN: 9789332570313.

REFERENCES

1. Nils Nilsson, "Artificial Intelligence: A New Synthesis ", Second Edition, Morgan Kaufmann Series, ISBN: 9780080948348.
2. Deepak Khemani, "A First course in Artificial Intelligence", First Edition, McGraw Hill Education, ISBN: 9781259029981.
3. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, ISBN:0201876868.
4. Yegna Narayanan, "Artificial Neural Networks", 8th Printing, PHI, ISBN: 9788120312531.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Management
	COURSE CODE	HP 301
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	15	25	10	NIL	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP301.CEO.1:To introduce the basic concept and scope of Project Management.
HP301.CEO.2:To teach the theory of project Initiation and its analysis with project vision.
HP301.CEO.3:To introduce the concept of risk analysis and different types of tools used in project planning.
HP301.CEO.4:To guide learners monitoring and controlling project progress.
HP301.CEO.5:To introduce the concept of System dynamics, project audit and reviews.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP301.CO.1:Explain the concept of project management.
HP301.CO.2:Develop an ability to analyze scope, objective and vision of project initiation.
HP301.CO.3:Able to analyze risk and different tools of project planning.
HP301.CO.4:Develop an ability to measure progress of project by monitoring and controlling
HP301.CO.5:Identify the problems associated with project and reviewing the same.

THEORY		
UNIT 1	**Introduction Project Management**	**5 HOURS**
Meaning of Project Management, Classifications of projects, The Triple Constraint, The PMBOK project management process framework, Standard project team roles and project organisation (Functional, matrix, projectised), System approach, Systems development, System analysis, Project feasibility, Product life cycle, Project appraisal, Project contracting, The phases of SDLC.		
UNIT 2	**Project Initiation**	**5 HOURS**
Determining the project business reason, creating a project charter (market and technical analysis), financial analysis evaluation of project proposals, risk analysis, sensitivity analysis and social cost benefits analysis, defining scope and objectives, define a project vision.		
UNIT 3	**Project Planning**	**6 HOURS**
Planning fundamentals, identifying the project team responsibilities, project master plan, work breakdown structure, and other tools of project planning, estimating the efforts and duration of tasks, Identifying and analyzing risks, PERT,CPM,GERT,SLAM,DPM and resource allocation.		
UNIT 4	**Project monitoring and controlling**	**4 HOURS**
Executingthe project on time, Measuring project progress, Identifying corrective actions, Internal & external project control, control process, variance limit, issues in project control.		
UNIT 5	**Project Learning**	**4 HOURS**
System dynamics, Project audit, Change management, Project reviews and reporting.		

PRACTICALS		
PRACTICAL NO.01	**SDLC**	**2 HOURS**
Preparing for managing and developing a perfect model of SDLC for a particular given problem.		
PRACTICAL NO.02	**PERT and CPM**	**2 HOURS**
Planning a project under PERT and CPM charts		
PRACTICAL NO.03	**GERT and SLAM**	**2 HOURS**
Planning a project under GERT and SLAM charts		
PRACTICAL NO.04	**DPM**	**2 HOURS**
Solving practical problems under DPM		
PRACTICAL NO.05	**Variance Limit**	**2 HOURS**
Project monitoring under variance and controlling according to the given situations.		
PRACTICAL NO.06	**System Dynamics**	**2 HOURS**
Understanding System dynamics by solving case studies		
PRACTICAL NO.07	**Change Management**	**2 HOURS**
Solving case studies for learning how change management works.		
PRACTICAL NO.08	**Project Reviewing**	**2 HOURS**
Solving many practical problems by reviewing projects as well as some case studies.		

TEXT BOOK

1. James P. Clements and Gido, Effective Project Management Cengage India 5th Edition , ISBN: 9781111824051
2. John Nicholas, Project Management for Business and Technology: Principles and Practice, PHI-Eastern economy 3rd Edition, ISBN: 0-7506-7824-0
3. Juana Clark Craig, Project Management Lite, 2nd Edition, ISBN-13: 9781478129226
4. Harold R. Kerzner, Project Management, 11th Edition, ISBN: 978-1-118-48322-0

REFERENCE BOOK

1. Erik Larson and Clifford Gray, Project Management: The Managerial Process, McGraw Hill ISBN-10: 0-07-340334-2
2. Enzo Frigneti, The Practice of Project Management, KOGAN PAGE INDIA PRIVATE LIMITED,ISBN: 9788175545397
3. Geogary M. Horine, Project Management, QUE 4th Edition, ISBN: 9780134653914
4. Cynthia Stackpole Snyder, A User manual to The PMBOK Guide, ISBN: 9781118546604
5. Brown, James T., The Handbook of Program Management: How to Facilitate Project Success with Optimal Program Management, Second Edition. The McGraw-Hill Companies, 2014, ISBN 978-0071837859
6. Frame, J. Davidson, Managing Projects in Organizations: How to Make the Best Use of Time, Techniques, and People, 3rd edition, Jossey-Bass, 2003, ISBN 0-787-96831-5
7. Kerzner, Harold, ProjectManagement: Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 10th edition, Wiley, 2009, ISBN 0-470-27870-6
8. Meredith, R. Jack and Mantel, Jr., Samuel J., Project Management: A Managerial Approach, 7th edition, Wiley, 2008, ISBN 0-470-22621-8
9. Stackpole, Cynthia Snyder, A Project Manager's Book of Forms: A Companion to the PMBOK Guide, Wiley, 2009, ISBN 978-0470389843
10. Weiss, Joseph and Wysocki, Robert, Five-phase Project Management: A Practical Planning And Implementation Guide, Basic Books, 1992, ISBN 0-201-56316-9

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Basic Entrepreneurship
	COURSE CODE	HP 303
	COURSE CREDITS	1
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : WF Orientation Course

COURSE OBJECTIVES :

HP303.CEO.1:To understand the fit between you and your entrepreneurialambitions
HP303.CEO.2:To find a problem worthsolving
HP303.CEO.3:To identify yourcustomers
HP303.CEO.4:To develop a solution for your customers' problems and problemsolution
HP303.CEO.5:To build and demonstrate anMVP
HP303.CEO.6:To structure a business model around the problem, customer, and solution and present your Business ModelCanvas.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP303.CO.1:Why entrepreneurship requires
HP303.CO.2:Outline the Problems Worth Solving by using various techniques like DT, JTBD
HP303.CO.3:Identify the Customer Segments and Early Adopters
HP303.CO.4:Develop the solution demo for identify problem.
HP303.CO.5:Create Business Model Canvas and Minimum Viable Product

PRACTICALS:		
PRACTICAL NO.01	**GET STARTED - Discover Yourself**	**2 HOURS**
Find your flow, Effectuation, Case Study: Tristan Walker: The extroverted introvert, Identify your entrepreneurial style.		
PRACTICAL NO.02	**IDEA/PROBLEM - Identify Problems Worth Solving**	**4 HOURS**
What is a business opportunity and how to identify it. Find problems around you that are worth solving. Methods for finding and understanding problems - (Observation, Questioning, DT, Jobs to be done (JTBD) How to run problem interviews to understand the customer's worldview Introduction to Design Thinking - Process and Examples Generate ideas that are potential solutions to the problem identified - DISRUPT GOOTB: Run problem interviews with prospects Class Presentation: Present the problem you "love" Form teams		
PRACTICAL NO.03	**CUSTOMER**	**6 HOURS**
Identify Your Customer Segments and Early Adopters The difference between a consumer and a customer (decision maker); Market Types, Segmentation and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns. Identify the innovators and early adopters for your startup.Craft Your Value Proposition Come up with creative solutions for the identified problems Deep dive into Gains, Pains and Jobs-To-Be-Done (using Value Proposition Canvas, or VPC) Identify the UVP of your solution using the Value Proposition section of the VPC Outcome-Driven InnovationClass Presentation: Communicating the Value Proposition- 1 min Customer Pitch		
PRACTICAL NO.04	**BUSINESS MODEL**	**4 HOURS**
Get Started with Lean Canvas Basics of Lean Approach and Canvas; Types of Business Models (b2b; b2c)		
PRACTICAL NO.05	**VALIDATION**	**9 HOURS**
Develop the Solution Demo Build solution (mockups) demo, How to run solution interviews, GOOTB: Run Solution interviews. Does your solution solve the problem for your customers: The problem-solution test. Sizing the Opportunity Differences between a Startup venture and a small business; Industry Analysis Understanding what is Competition and it's role, Analyze competition Case study: Blue Ocean Strategy Building an MVP Identify an MVP and build it - I; Document and validate your assumptions Build-Measure-Learn feedback loop and the MVP/Javelin Board How to do MVP Interviews GOOTB: Run MVP interviews Is there a market for your product –The product-market fit test Class Presentation: Present your MVP		
PRACTICAL NO.06	**MONEY**	**5 HOURS**
Revenue Streams Basics of how companies make money. Understand income, costs, gross and net margins. Identify primary and secondary revenue streams. Pricing and Costs Value, price, and costs; Different pricing strategies. Understand product costs and operations costs; Basics of unit costing Financing Your New Venture How to finance business ideas, Various sources of funds available to an entrepreneur and pros and cons of each, What investors expect from you, Practice Pitching to Investors and Corporates.		

PRACTICAL NO.07	TEAM	2 HOURS
Team Building Shared Leadership Role of a good team in a venture's success; What to look for in a team; How do you ensure there is a good fit? Defining clear roles and responsibilities. How to pitch to candidates to join your startup Explore collaboration tools and techniques - Brainstorming, Mind mapping, Kanban Board, #Slack.		
PRACTICAL NO.08	**MARKETING & SALES**	**2 HOURS**
Positioning Understand the difference between product and brand and the link between them. Define the positioning statement for your product/service and how it should translate into what your customers should see about that brand in the marketplace. Channels & Strategy Building Digital Presence and leveraging Social media, Creating your company profile page, Measuring the effectiveness of selected channels, Budgeting and planning. Sales Planning Understanding why customers buy and how buying decisions are made; Listening. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale.		
PRACTICAL NO.09	**SUPPORT**	**2 HOURS**
Planning & Tracking Importance of project management to launch and track progress Understanding time management, workflow, and delegation of tasks Business Regulation Basics of business regulations of starting and operating a business; Importance of being compliant and keeping proper documentation How to find help to get started		
PRACTICAL NO.10	**Capstone Project: Present Your BMC (Optional - and MVP)**	**2 HOURS**
BMC: Business Model Canvas. / MVP: Minimum Viable Product.		

REFERENCES

1. Read Forbes article and do Group Discussionhttps://www.forbes.com/sites/chrismyers/2015/12/16/find-your-flow-and-success-will-follow/
2. https://necrophone.com/2014/01/20/effectuation-the-best-theory-of-entrepreneurship-you-actually-follow-whether-youve-heard-of-it-or-not/
3. Use your self awareness to find out what motivates and drives Entrepreneurial activity - Ted Talk "What is your Entrepreneurial style - EntrepreneurKnow
4. Prof. ClayChristensen"IdentifyingCustomerNeeds"https://www.youtube.com/watch?v=yVCZ-7xSsCw
5. Understand the customer problem by GOOTB":byGOOTB":https://www.youtube.com/watch?v=sEENIZgscDw
6. https://www.forbes.com/sites/danschawbel/2013/12/17/geoffrey-moore-why-crossing-the-chasm-is-still-relevant
7. Value Proposition: https://www.youtube.com/watch?v=jZN6CUieuOQ&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
8. Value Proposition & Customer Need:https://www.youtube.com/watch?v=6FnG8pJL8yM&index=3&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
9. https://strategyn.com/turn-customer-input-into-innovation/ CASE STUDIES in ODI: https://jobs-to- be-done.com/tagged/case-study
10. TheLeanBMC https://www.youtube.com/watch?v=FjBe7UO1hc
11. Ash Maurya -Capture your BMC in 20
12. minuteshttps://www.youtube.com/watch?v=7o8uYdUaFR4&t=462s
13. Ash Maurya - How to Prioritize Risks on Your BusinessModel https://www.youtube.com/watch?v=01z7EPXS42k
14. https://pt.slideshare.net/bmorelean/dan-lemberg-lean-pitch
15. https://startups.fb.com/en-in/categories/development/
16. Designing Experiments: https://www.youtube.com/watch?v=WiMZWCg1Hu8&t=111s
17. Customer Development Process:https://www.youtube.com/watch?v=lLEebbiYIkI
18. Beating the Competition: https://www.youtube.com/watch?v=46uP6vOj5G0
19. Q&A with Garr :https://www.youtube.com/watch?v=SmJjjOrusyI
20. Basic Accounting Lingo for Entrepreneurs:https://www.youtube.com/watch?v=Y7Pm1jEEKE
21. Vinod Khosla : How Leaders can BUILDhttps://www.youtube.com/watch?v=bRCoBgCn1Q
22. Vinod Khosla: https://www.youtube.com/watch?v=VIrNLzTs9cw
23. How to Pitch the way VC's think, so you can convince co-founders : https://www.youtube.com/watch?v=fTgU7THoKCw
24. Tony Buzan:http://www.tonybuzan.com/about/mind-mapping/
25. Google : Think branding:https://www.youtube.com/watch?v=1l2CUjkg0ug
26. The Battle for your mind using Positioning:https://www.youtube.com/watch?v=jQrY8xRx-0 Design rules-https://www.igorinternational.com/, Web design course:https://www.coursera.org/specializations/web-designStrikingly Free : https://www.strikingly.com/online-resume/linkedin
27. https://certification.hubspot.com/inbound-sales-certification-course
28. https://www.udemy.com/courses/business/sales/
29. https://www.accountingtools.com/articles/2017/5/17/sales-budget-sales-budget-example

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Software Skill Development Lab
	COURSE CODE	CS305
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
–	4	–	–	–	–	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS305.CEO.1:To recognize the importance of and possess the skills necessary for life-long learning
CS305.CEO.2:To enhance the capacity to express programming concepts and choose among alternative ways to express things.
CS305.CEO.3:To improve the background for choosing appropriate programming languages for certain classes of programming problems.
CS305.CEO.4:To construct software solutions by evaluating alternate architectural patterns.
CS305.CEO.5:To apply integrated tool and techniques for building enterprise applications.
CS305.CEO.6:To implement application using IDLE tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS305.CO1:Acquire practical knowledge within the chosen area of technology for project development.
CS305.CO2:Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach.
CS305.CO3:Contribute as an individual or in a team in development of technical projects.
CS305.CO4:Incorporate best practices for building applications.
CS305.CO5:Test and validate developed prototype against the original requirements of the problem.
CS305.CO6:Express technical ideas, strategies and methodologies in written form.

Guidelines for Laboratory Conduction :

The assignments to be framed by understanding the prerequisites, technological as- pects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, in- structor can assign one real life application in the form of a mini project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed .The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module :

Module	**Python with Kali Linux**	**36 HOURS**

Prerequisite: Python Programming

Industry Expert: Mr. QaidJohar Jawadwala

Course Instructor: Mr. Santosh Warpe

Course Content

Kali linux, Installation, python programming, socket concept, variables, list, dictionaries, packet sniffer, IP spoofing, passive and active attacks, network attacks

Beneftts:

1. Mini Project implementation
2. Placement Opportunities

PRACTICAL		
Practical No.01		**4 HOURS**
Write a socket program to scan host vulnerabilities.		
Practical No.02		**4 HOURS**
Write a program to scan network for host active status.		
Practical No.03		**4 HOURS**
Creating a UNIX Password Cracker with Python.		
Practical No.04		**4 HOURS**
Writing a Zip File Password Cracker with Python.		
Practical No.05		**4 HOURS**
Writing a Packet Sniffer for monitoring network traffic.		
Practical No.06		**4 HOURS**
Writing a Python code for full host TCP Port Scanner		
Practical No.07		**4 HOURS**
Writing a Python code for Jamming a Wireless Network.		
Practical No.08		**4 HOURS**
Writing a Python program for sending packets with unknown Source IP (IP Spoofing).		
Practical No.09		**4 HOURS**
Writing a Python program for performing Man-in-the-Middle attack on Network for credential Harvesting.		
MINI PROJECT		

REFERENCE

1. TJ O'Connor," Violent Python: A Cookbook for Hackers, Forensic Analysts, Penetration Testers and Security Engineers", Syngress, 2012, ISBN 978-15974995761
2. Himanshu Sharma," Kali Linux - An Ethical Hacker's Cookbook", Packt Publishing Limited, 2017, ISBN 978-1787121829
3. Raphael Hertzog, Mati Aharoni," Kali Linux Revealed: Mastering the Penetration Testing Distribution", Offsec Press, 2017, ISBN 978-0997615609

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018-19
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Software Skill Development Lab
	COURSE CODE	CS306
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME		**EVALUATION SCHEME :**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
–	4	–	–	–	–	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS306.CEO.1:To play role of Business Intelligent Analyst and Data Scientist in Data Analytics Life Cycle.
CS306.CEO.2:To acquire the skills of Analytics in R Programming.
CS306.CEO.3:To perform graphical analysis using Data Visualization tools and techniques.
CS306.CEO.4:To perform analytics for improvement of Business Process.
CS306.CEO.5:To implement application using IDLE tools..

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS306.CO1:Perform the analytics in R on real time data sets.
CS306.CO2:Analyze the real time data with graphical visualization.
CS306.CO3:Generate the different types of analytics reports.
CS306.CO4:Develop the models using analytics for BI Process.
CS306.CO5:Test and validate developed prototype against the original requirements of the problem.
CS306.CO6:Use Tableau Visualization effectively for Data Analytics..

Guidelines for Laboratory Conduction

The assignments to be framed by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, instructor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed. The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module: R Programming

Prerequisite: Database Management System

Industry Expert: Ms. Shobha Mourya

Course Instructor: Ms. Shobha Mourya Mr.Jayvant Devare

Course Content

Basics of R Programming: Installation, Reading and Getting Data into R, Constructing Data Objects, Data:Descriptive Statistics and Tabulation, Data: Distribution, Simple Hypothesis Testing, Introduction to Graphical Analysis, Formula Notation and Complex Statistics, Manipulating Data and Extracting Components, Regression model, Advanced Graphs, Writing your scripts in R, Introduction of data science, Visualization, Introduction to Tableau, Navigating Tableau, Advanced Data Mining With Tableau, Creating bins Visualizing distributions, Modeling.

Beneftts:

1. Dell EMC Certification (optional)
2. Placement Opportunities.

PRACTICAL		
Practical No.01		**4 HOURS**
Installing and loading R packages, set/get working directory.		
Practical No.02		**4 HOURS**
Import datasets using readr package and explore datasets using dplyr functions.		
Practical No.03		**4 HOURS**
Creating subsets from datasets using filter conditions.		
Practical No.04		**4 HOURS**
Creating new variables using mutate.		
Practical No.05		**4 HOURS**
Analyzing factor variables using frequency and contingency table.		
Practical No.06		**4 HOURS**
Analyzing numeric variables using summary command.		
Practical No.07		**4 HOURS**
Visualization using ggplot2 package for Bivariate, Univariate and Multi-variate plots..		
Practical No.08		**4 HOURS**
Understanding ggplot layers for plotting graphs.		
Practical No.09		**4 HOURS**
Scatter plot, Histogram, Bar chart, Density Plot, Faceting and Scaling.		
Practical No.10		**4 HOURS**
Importing and exploring Titanic dataset.		
Practical No.11		**4 HOURS**
Data wrangling for Titanic case study.		
Practical No.12		**4 HOURS**
Feature engineering for Titanic case study.		
Mini Project :		**8 HOURS**
Note: Data sets should be real time data sets like heart disease, Airline, etc.		

REFERENCES

1. Mark Gardener, "Beginning R: The Statistical Programming Language", Wiley paperback edition 2013, ISBN: 978-1-118-16430-3.
2. Ohri, "R for Business Analytics", Springer, 2012, ISBN: 978-1-4614-4342-1.
3. Ashutosh Nandeshwar, "Tableau Data Visualization Codebook", Packt publishers, ISBN : 978-1-849-68-978-6.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Software Skill Development Lab
	COURSE CODE	CS307
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
—-	4	—-	—-	—-	— -	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS307.CEO.1:Plan Extraction, transformation, scraping, joining and cleaning of large data sets

CS307.CEO.2:Analyse large data sets to bring out insights to solve business problems.

CS307.CEO.3:Make use of machine learning libraries and apply established machine learning algorithms classes of programming problems.

CS307.CEO.4:Utilize Machine learning concepts in Python using problem solving approach by working on real time cases and in class programming assignments.

CS307.CEO.5:Develop code in support of Machine learning solutions in Python.

CS307.CEO.6:Evaluate and debug various learning algorithms.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS307.CO1:Apply python to build various machine learning application.

CS307.CO2:Interpret the fundamental issues and challenges of machine learning: data, model selection, model complexity.

CS307.CO3:Identify the strengths and weaknesses of many popular machine learning approaches.

CS307.CO4:Analyze the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

CS307.CO5:Design and implement various machine learning algorithms in a range of real-world applications.

Guidelines for Laboratory Conduction :

The assignments to be framed by understanding the prerequisites, technological as- pects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, in- structor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed .The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module	Python and Machine Learning	36 HOURS
Prerequisite: Python Course Content Understanding Data Analytics, Importance of data in business, Data analytics ecosystem, Basis of Python programming, Basics of Python, Variables and Operators, Data types, Lists, Dictio- nary and Functions, Programming in Python, Introduction to Machine learning, python Libraries, Numpy, Scikit, Pandas, Matplotlib, Data Visualization, Supervised learning, Linear Regression, Logistic Regression, Decision Tree, Naive Bayes, K Nearest Neighbor, Random Forest, Dimension- ality Reduction, Gradient Boosting algorithms, Support Vector Machine, Unsupervised learning, Clustering techniques – K means clustering , Association Rule Learning, Natural Language Pro- cessing **Benefits:** 1.Placement Opportunities		

PRACTICAL List		
Practical No.01		**4 HOURS**
Perform data processing and cleaning of dataset using Python.		
Practical No.02		**4 HOURS**
Create a machine learning model using Linear Regression (Example : Salary Prediction).		
Practical No.03		**4 HOURS**
Create a machine learning model using multiple linear regression (Example : Flight elay Data For July 2014.		
Practical No.04		**4 HOURS**
Create a machine learning model using Decision Tree (Example : Position of an Employee as per salary).		
Practical No.05		**4 HOURS**
Create a machine learning model using K Means Clustering Algorithm.		
Practical No.06		**4 HOURS**
Create a machine learning model using Market Basket analysis.		
Practical No.07		**4 HOURS**
Create a natural language processing model (Example : Customer purchasing). m		

Mini Project		8 HOURS
Note: Data sets should be real time data sets like heart disease, Airline, etc.		

REFERENCE

1. Daniel Nedal, "Python Machine Learning from Scratch", AI Sciences paperback edition 2016, ISBN-13: 9781720649496
2. Chris Albon, "Machine Learning with Python Codebook", O'REILLY Paperback, 2018, ISBN-13: 1491989388

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Computational Intelligence
	COURSE CODE	IT321
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	30	40	30	NIL	50	150

PRE-REQUISITE : 1.AS101:Mathematics I 2. IT301:Computability Theory

COURSE OBJECTIVES :

IT321.CEO.1:To introduce soft computing techniques that are different from conventional AI techniques.

IT321.CEO.2:To understand soft computing Techniques such as neural networks, fuzzy systems, and genetic algorithms.

IT321.CEO.3:To introduces case studies where soft computing techniques can be implemented.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT321.CO.1:Explain about the basics of soft computing techniques and also their use in some real life Situations.

IT321.CO.2:Solve the problems using neural networks techniques.

IT321.CO.3:Find the solution using different fuzzy logic techniques.

IT321.CO.4:Make use of genetic algorithms for different modeling.

IT321.CO.5:Test for various soft computing techniques.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**5 HOURS**
Introduction to Computational Intelligence. Self-Study: Application of Computational Intelligence		
UNIT 2	**Fuzzy Systems**	**7 HOURS**
Fuzzy Set Theory: Fuzzy set: Membership, Operations, Properties; Fuzzy Relations. Fuzzy Logic, Fuzzification, Fuzzy Inference, Fuzzy Rule Based System, Defuzzification, Application. Self-study: Study different Example of a Fuzzy Logic System.		
UNIT 3	**Artiftcial Neural Networks**	**7 HOURS**
Model of Artificial Neuron, Architectures, Learning Methods, Taxonomy of NN Systems, Single-Layer NN System, Applications. Case study: Retail case study /Retail segmentation using artificial neural networks		
UNIT 4	**Back Propagation Network**	**7 HOURS**
Background, Back-Propagation Learning, Back-Propagation Algorithm, Applications. case study of the back propagation algorithm Application of design reuse to artificial neural networks		
UNIT 5	**Genetic Algorithms**	**7 HOURS**
Encoding, Operators of Genetic Algorithm, Basic Genetic Algorithm, Applications. A case study on the application of a genetic algorithm for optimization of engine parameters		
UNIT 6	**Hybrid Systems.**	**7 HOURS**
Integration of Neural Networks, Fuzzy Logic and Genetic Algorithms, GA Based Back Propagation Networks, Fuzzy Back Propagation Networks, Fuzzy Associative Memories, Simplified Fuzzy ARTMAP. PV-wind hybrid system: A review with case study		

PRACTICAL		
Practical NO.01		**2 HOURS**
Write a program in MATLAB/PYTHON to implement Fuzzy Operations.		
Practical NO.02		**4 HOURS**
Write a MATLAB/PYTHON program to generate ANDNOT function using McCulloch-Pitts neural net.		
Practical NO.03		**4 HOURS**
Write a MATLAB/PYTHON program to generate XOR function using McCulloch-Pitts neural net.		
Practical NO.04		**4 HOURS**
Implementation Genetic Application – Match Word Finding.		
Practical NO.05		**4 HOURS**
Write a MATLAB/PYTHON program for Back Propagation Algorithm.		
Practical NO.06		**4 HOURS**
Write a MATLAB program for washing machine controller using Fuzzy Logic		
Practical NO.07		**4 HOURS**
Write a MATLAB program to plot various membership functions.		
Practical NO.08		**8 HOURS**
Mini Project		

TEXT BOOK

1. Rajasekaran S. and G.A.VijayalakshmiPai, 2003, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, New Delhi,ISBN 10: 8120321863.
2. David E. Goldberg "Genetic Algorithms in Search, Optimization, and Machine Learning, (1989), Addison- Wesley, Chapter 1-8, page 1- 432.

REFERENCE BOOK

1. Hakin, Simon 2003, "Neural Networks: A Comprehensive Foundation", PHI, New Delhi,ISBN: 9788120340008.
2. Kosko B.1997, "Neural Networks and Fuzzy Systems", PHI, New Delhi ,ISBN 0-13- 6 11 435-0 1.
3. Andries P. Engelbrecht, "Computational Intelligence An Introduction", Second Edition, University of Pretoria, South Africa, ISBN 978-0-470-03561-0.
4. N.P. Padhy, "Artificial Intelligence and Intelligent Systems", Oxford, ISBN-13: 978-0195671544.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY INFROMATION TECHNOLOGY	**COURSE NAME**	Cloud Services and Applications
	COURSE CODE	IT322
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	30	40	30	30	20	150

PRE-REQUISITE :

1:IT203 – COMPUTER NETWORK

COURSE OBJECTIVES :

IT322.CEO.1:To understand the current trend and basics of cloud computing.
IT322.CEO.2:To learn cloud services.
IT322.CEO.3:To understand the collaboration of cloud services.
IT322.CEO.4:To expose various ways to collaborate the cloud service online.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT322.CO.1:Virtualize Physical Machine[Apply]
IT322.CO.2:Apply basics of cloud computing for Creating Cloud services[Apply]
IT322.CO.3:Contrast the cloud services[Analyze]
IT322.CO.4:Measure and Monitor the Applications in Cloud environment[Analyze].
IT322.CO.5:Deploy the Applications in AWS Cloud[Apply].
IT322.CO.6:Outline the basics of Enterprise cloud computing[Understand].

THEORY:		
UNIT 1	**Introduction to Cloud Computing**	**8 HOURS**
Roots of Cloud Computing, Layers and types of cloud, Desired features of Cloud, Cloud Infrastructure Management, Infrastructure as service provider, Platform as Service provider, Challenges and risks. Broad Approaches to Migrating into the cloud. **Self-study: seven-step model of migration into a cloud.**		
UNIT 2	**Introduction to virtualization and Cloud Deployment Models**	**8 HOURS**
virtualization– Virtual Machine Monitor/Hypervisor. Different Cloud services and deployment models, the economics of Cloud, Cloud infrastructure components, and Cloud service creation processes. **Self-study: Cloud service management processes**		
UNIT 3	**The Enterprise Cloud Computing**	**6 HOURS**
Introduction, Background, issues for enterprise applications on the cloud, Transition challenges, Enterprise cloud technology and market evaluation, Business drivers for enterprise cloud computing. **Self-study: cloud supply chain**		
UNIT 4	**Cloud services**	**8 HOURS**
Infrastructure as a service: Introduction, Virtual Machines Provisioning and manageability, Virtual Machine Migration services, Cloud Storage: From LANs to WANs. Platform as a Service (Aneka): Introduction, Technologies and tools for cloud computing, Aneka Cloud platform, Aneka Resource provisioning service **Self-study: Hybrid Cloud Implementation**		
UNIT 5	**Monitoring and Management**	**6 HOURS**
Federated Cloud Computing: Model for federated cloud computing. SLA Management in cloud computing : Inspiration, Traditional approaches to SLA Management, Types of SLA, Life Cycles of SLA, SLA Management in cloud. **Self-study:** Automated Policy- Based Management		
UNIT 6	**Best Practices in architecting cloud Applications in the AWS Cloud**	**6 HOURS**
Introduction, Business and technical benefits of cloud computing, understanding the Amazon web service cloud, Cloud Concepts, Cloud best Practices **Self-study:** GREPTHEWEB case study.		

PRACTICAL: Perform following experiments		
PRACTICAL NO.01	**Virtual Machine**	**4 HOURS**
Creating a Virtual Machine (VM) on a Guest Operating System.		
PRACTICAL NO.02	**Bare metal Hypervisor**	**4 HOURS**
Running Multiple Concurrent operating system using a bare Metal Hypervisor		
PRACTICAL NO.03	**Virtual Network**	**2 HOURS**
Creating a Virtual Network to allow VM to VM communication		
PRACTICAL NO.04	**Infrastructure as a service**	**4 HOURS**
Creating of cloud Services to be hosted as either, Infrastructure as a service		
PRACTICAL NO.05	**Platform as a service**	**6 HOURS**
Using Platform as a Service to upload any application		
PRACTICAL NO.06	**VMware V Center Server**	**6 HOURS**
Install and Configure VMware V center Server.		
PRACTICAL NO.07	**OpenStack**	**6 HOURS**
Installation and configuration of OpenStack.		

TEXT BOOK

1. RajkumarBuyya, James Broberg, AndrzejGoscinski, "Cloud Computing: Principles and paradigms" WILEY, 2016, ISBN: 978-81-265-4125-6.
2. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008. ISBN-978-0-7897-3803-5

REFERENCE BOOK

1. David Marshall, Wade A. Reynolds, - Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach Publications, 2006, ISBN-978-0978-0-8493-3931-8
2. Kumar Reddy, Victor Moreno, - Network virtualization, Cisco Press, July, 2006. ISBN-9781587052484
3. Chris Wolf, Erick M. Halter, - Virtualization: From the Desktop to the Enterprise, APress 2005. ISBN-1-59059-495-9
4. Danielle Ruest, Nelson Ruest - Virtualization: A Beginner's Guide, TMH, 2009, ISBN-978-0-07-014719-5
5. Dr. Kumar Saurabh, "Cloud Computing – Insights into New Era Infrastructure", Wiley Indian Edition, 2011, ISBN-9788126528837
6. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for Ondemand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008, ISBN-9781921523199.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY INFROMATION TECHNOLOGY	**COURSE NAME**	Mobile Application Development
	COURSE CODE	IT323
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	30	40	30		50	150

PRE-REQUISITE :

1:IT303: Web Technology
2:IT212: Database System

COURSE OBJECTIVES :

IT323.CEO.1:To know about the mobile application development
IT323.CEO.2:To increase the productivity of mobile application
IT323.CEO.3:To strengthen the knowledge of student about mobile app development
IT323.CEO.4:To understand android web access of data.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT323.CO.1:Utilize the major components of Android API for developing the apps.
IT323.CO.2:Analyze the life cycles of Activities, Applications and Fragments.
IT323.CO.3:Build application logic using the Java programming language.
IT323.CO.4:Design UI-rich applications using all the major UI components.
IT323.CO.5:Identify the internal or external data storage of an application.
IT323.CO.6:Build cross platform (hybrid) mobile application.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Java**	**7 HOURS**
Native Android Application Basics of java programming, string processing, multi-threading, and input-output, object oriented concept: inheritance, encapsulation polymorphism. Interfaces, collections and Exception handling. **Further Reading:** JDK and JRE		
UNIT 2	**The Android Platform**	**7 HOURS**
Development Platform Introduction to the Android platform, Application framework, Basic Building blocks, Broadcast Receivers Content providers, UI Components, Intents Intent Filters, Android API levels, AVD and the Android Studio IDE. **Self-Study:** Android Student IDE **Further Reading:** API and SDK for Android		
UNIT 3	**User Interface design**	**7 HOURS**
UI UX Design of various type of application UI Design: Activities, Views, layouts and Common UI components, UI through code and XML, Activity life-cycle, Intents, communication among activities, Menus, Custom and compound Views, Notifications, UI Events, Event Listeners. **Self-Study:** Recourse file		
UNIT 4	**Intent, Broadcast Receivers and Sensors**	**7 HOURS**
Explicit Intents, Implicit intents, Role of filters, Intent-matching rules, Filters in manifest and in dynamic Broadcast Receivers, Creating Broadcast receiver, Receiving System Broadcast, Understanding Broadcast action, category and data, Sending Broadcast. Sensors: Finding sensors, Accelerometers, Gyroscopes, Other type. **Self-Study:** Introduction to intent		
UNIT 5	**Android Data Storage**	**6 HOURS**
Android File System, Internal storage, External storage, SQLite, Introducing SQLite, SQLite Open Helper and CRUD operations, Content Providers: Accessing built in content providers, and Content provider MIME types, searching, Adding, changing, and removing contents. **Self-Study:** Data Storage **Further Reading:** Google Firebase Database		
UNIT 6	**Hybrid App Development**	**6 HOURS**
Introduction to Hybrid Applications, Benefits, Challenges, Power of Hybrid over Mobile Web, Architectural approaches, Mobile Hybrid Application development framework. **Self-Study:** Web app using SPA		

PRACTICAL		
PRACTICAL NO.01	**Tic-Tac-Toe game**	**4 HOURS**
Create an android app for TIC-TAC-TOE Game and provide UI using android and run it in android virtual device.		
PRACTICAL NO.02	**Calculator APP**	**4 HOURS**
Create a simple calculator application in android and run it in real device.		
PRACTICAL NO.03	**Design Tab Layout**	**4 HOURS**
Design a tab layout for android device and show course infromation in each tab. (Exam Scheme, Content, Practical List)		
PRACTICAL NO.04	**Design List Layout**	**4 HOURS**
Extend the practical no. 3 and add list layout for different courses after clicking on course display the course information in tab layout.		
PRACTICAL NO.05	**Create database storage**	**4 HOURS**
For practical no. 4 provide the backend support for data storage and store all the course information in database, also provide a functionality to edit the course content in application.		
PRACTICAL NO.06	**Create a Hybrid app which can be run on any platform**	**6 HOURS**
Create a hybrid app for the practical no.5 using any hybrid app framework		

TEXT BOOK

1. Rajiv Ramnath, Roger Crawfis, and Paolo Sivilotti, "Android SDK 3 for Dummies", Wiley, 2011, ISBN: 9781118008256
2. Zigurd Mednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura, "Programming Android", O'Reilly Media Inc, 2012, ISBN: 9781449316648

REFERENCE BOOK

1. Meier Reto , "Professional Android 2 Application Development", Wiley India Pvt. Ltd. 2012, ISBN: 9788126525898.
2. Marko Gargenta, Masumi Nakamur, "Learning Android: Develop Mobile Apps Using Java and Eclipse", O'Reilly Media, Inc., 2014, ISBN: 9781449336257.
3. Lombardo John ; Rogers Rick ; Mednieks Zigurd, "Android Application Development", Shroff Publishers Distributors PvtLtd, 2010 ISBN: 9788184047332

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP 302
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
1	2	NIL	NIL	NIL	50	25	75

PRE-REQUISITE : Basic Communication Skills

COURSE OBJECTIVES :

HP302.CEO.1:To define the importance of professional skills in students life
HP302.CEO.2:To explain them necessary, specific professional skills
HP302.CEO.3:To appraise students for placements through acquisition of professional skills
HP302.CEO.4:To support them detect their present level in respect of each professional skill and show direction for improvement

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP302.CO.1:Relate the importance of professional skills(L2)
HP302.CO.2:Build necessary, specific professional skills (L3)
HP302.CO.3:Analyze the environment of employ-ability (L4)
HP302.CO.4:Develop various techniques of effective team building in their professional life(L6)

PRACTICALS: (SECTION A)		
PRACTICAL NO.01	**Self Awareness**	**2 HOURS**
Concept of Johari Window, Advantages and disadvantages of every quadrant, Identifying the proportion of each quadrant in respect of self, Using the tools of Feedback & Exposure for self-development		
PRACTICAL NO.02	**Personal Interviews**	**6 HOURS**
Preparing for Interviews, Typical expected questions & suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Parameters of assessment, Initiating the discussion, Effective listening, Own contribution, Paraphrasing, Arguing and counter-arguing, Giving direction to the discussion		
PRACTICAL NO.04	**Team building and Motivation**	**2 HOURS**
Hallmark of effective teams, Barriers to team work, Subjugation of Individual interests for achievement of teams goal, Leading & motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2 HOURS**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique, Collective and individual Brain Storming,		
PRACTICAL NO.06	**Decision Making**	**2 HOURS**
Levels of decisions, Process of decision-making, Types of criteria, Individual and collective decision-making, Barriers in decision making, Keys to sound decision-making		
SECTION B:	**Aptitude Training.**	
.		

REFERENCE BOOK

1. Stephen Covey: The Seven Habits of Highly Effective People, Simon and Schuster Ltd, ISBN: 0-671-71117-2
2. Krishna Mohan, Meera Banerji, Developing Communication Skills, Birla Institute of Technology and Science, ISBN: 033392-919-5
3. Charles Kepner and Benjamin Tregoe, The Rational Manager: A systematic Approach to Problem Solving and Decision Making , Tata McGraw-Hill Publishing Company Ltd., ISBN:13:978-0070341753
4. Priyadarshini Patnaik, Group Discussion and Interview Skills , Foundation Books, 1st Ed.- 2011, ISBN No.: 9788175967847, 8175967846.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Mini Project
	COURSE CODE	IT324
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA			
–	4	–	–	–	–	75	75

PRE-REQUISITE :

1. ET206 Prototyping,
2. CS213 Minor project.

COURSE OBJECTIVES :

IT324.CEO.1:To understand the Product Development Cycle through Mini project.

IT324.CEO.2:To undertake execute a mini Project through a group of students

IT324.CEO.3:To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices, aesthetics and ergonomics.

IT324.CEO.4:To understand the role of professional and ethical practices, management principles,Technical documentation and communication skills in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT324.CO.1:Execute an idea in a team as well as within constraints.

IT324.CO.2:Acquire knowledge of the techniques, skills and modern engineering tools necessary for engineering practices.

IT324.CO.3:Use standard engineering tools and processes for design, simulation, testing,analysis in implementation and deployment of theoretical idea into practice.

IT324.CO.4:Use standard documentation and presentation tools for a professional report and presentation of the work.

PREAMBLE : The main objective of this course is to understand the Product Development Cycle through mini Project, Where students will undertake execute a project through a group of students. They will plan for various activities of the project and distribute the work amongst team members. The students will learn budgeting, planning for the project, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards, significance of aesthetics ergonomics while designing a product. This course will develop students.abilities to transmit technical information clearly and delivery of presentation based on the Mini Project. They will understand the importance of document design standards by compiling technical report on the mini Project work carried out in a team.

PRACTICAL		
Stage- 1	**Formation of group and Allocation of project adviser**	**Week 1**
. Project group formation and project advisor allocation by the department . Project group shall consist of Minimum 02 and maximum 03 students per group (For detailed process please check Annexure-1 Mini project guidelines) . Selection of finalized topic from approved project topics by the department. . The project design idea shall be based on refereed papers, white papers, product, patent, application notes,industry problem, academic, institute or societal requirement, funded research, innovative thought,modification/ development in existing idea etc. . Each student will maintain a logbook/project diary. This diary will be utilized to monitor project progress throughout		
Stage- 2	**Project Review -1 Internal review by project adviser**	**Week-2,3**
. The project group will work on , 1. Conceptualization of an Idea 2. Literature review 3. Market survey 4. Finalizing the Specifications . Presentation of work progress to project adviser and proceed to project approval.		
Stage- 3	**Project Review -2 Project Approval**	**Week-4**
. Presentation of concept to Department Review Committee (DRC) or Committee appointed by department. . Review of concept and feasibility of project and necessary suggestions for implementation by the committee . The project group will make corrections and continue their work.		
Stage- 4	**Project Review -3 Internal review by project adviser**	**Week-5,6,7,8,9**
. The project group will work on , 1. System Architecture and Design 2. Simulation /software development (As applicable) 3. Manufacturing of project 4. Assembly 5. Testing6. Troubleshooting. . Presentation of work progress to project adviser and proceed to final project progress review.		

Stage- 5	Project Review -4 Final Project progress review	Week-10,11

.The project group will work on ,

1. Result analysis against specifications 2. Enclosure/Aesthetic design (As applicable) 3. Technical report generation (Draft copy) 4. User's manual (As applicable) 5. Bill of material etc.

. The technical report may incorporate following points,

1) Title
2) Introduction and Concept
3) Literature Market survey
4) Theory and relevance
5) Block diagram
6) Drawings (As applicable)
7) Specifications
8) Project plan
9) Bill of material
10) Enclosure/aesthetic design (As applicable)
11) Results
12) Results analysis
13) Conclusion
14) References

. Presentation of project work, draft copy of technical report , Final presentation etc. to DRC or Committee appointed by department.

. Review of project progress and necessary suggestions by DRC or Committee appointed by department for final presentation.

. The project group will make corrections. After clearing all comments from DRC; project can be presented to final l examination.

. Project must be approved by department to appear for final examination.

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Practical- 6	Examination: Final Demonstration and presentation	Week-12

. Final examination will be divided in three parts a) Demonstration b) Presentation c) Project documentation

. For final examination project must be demonstrated in front of examiner panel. For Industry sponsored projects or other installations examiner panel can visit the project venue.

. All students must be physically present in front of examiner panel at the time of examination.

. Only demonstrated projects can be evaluated for presentation and documentation.

. Mini Project demonstration: Demo of project works and validation of project results to examiners panel.

. Mini Project presentation: Presentation of overall project work form project idea to implementation and deployment of project to examiners panel.

. Mini Project documentation: Presentation of technical documentary report to examiners panel

Assessment :

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1. Internal Assessment:
   a. Project Review -2 Project Approval -05 Marks
   b. Project Review -3 Internal review by project adviser- -05 Marks
   c. Project Review -4 Final Project progress review- 10 Marks
2. Examination: Final Demonstration and presentation
   a. Mini Project demonstration: 20 Marks
   b. Mini Project presentation: 20 Marks
   c. Mini Project documentation: 15 Marks

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MIT ACADEMY OF ENGINEERING, ALANDI

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Curriculum

For

Final Year

Bachelor of Technology in Information Technology

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	RELEASE DATE	:	01/12/2017
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	DC – 11	CS401	Software Engineering, Testing and Quality Assurance	3	2	4
2.	DE – 1	IT41#	Department (Program) elective - Ref er Annexure	3	--	3
3.	OE – 3	IT421 CS421 CS422	Open elective - Ref er Annexure	3	2	4
4.	HSS – 7	HP401	Engineering Economics	2	--	2
5.	HSS – 8 /SDP–7	HP403/CS40#	Business Strategies / Advance skill development lab (Adv. Java/ R programming/Python with kali Linux)	--	2	1
6.	SDP – 8	IT402	Project - I	--	8	4
7.	SDP-9	CS406	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	DC – 12	CS431	Human Computer Interactions	3	2	4
2.	DE – 2	IT44#	Department (Program) elective - Ref er Annexure	3	--	3
3.	OE – 4	IT451 CS451 CS452	Open elective - Ref er Annexure	3	2	4
4.	HSS – 9	HP402	Sociology	2	--	2
5.	SDP –10	IT432	Project - II	--	8	4
TOTAL				11	12	17

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Software Engineering, Testing and Quality Assurance
	COURSE CODE	CS401
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	30	20	150

PRE-REQUISITE : ET206: Prototyping, ET201: System Engineering

COURSE OBJECTIVES :

CS401.CEO.1:To understand the basics of testing, test planning and design and test team organization
CS401.CEO.2:To study the various types of test in the life cycle of the software product.
CS401.CEO.3:To build design concepts for system testing and execution.
CS401.CEO.4:To learn the software quality assurance ,metrics, defect prevention techniques.
CS401.CEO.5:To learn the techniques for quality assurance and applying for applications.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS401.CO.1:To understand the basics of testing, test planning and design and test team organization.
CS401.CO.2:To study the various types of test in the life cycle of the software product.
CS401.CO.3:To build design concepts for system testing and execution.
CS401.CO.4:To learn the software quality assurance, metrics, defect prevention techniques.
CS401.CO.5:To learn the techniques for quality assurance and applying for applications.

THEORY COURSE CONTENT		
UNIT 1	**Basics Of Software Engineering**	**6 HOURS**

App/System/Case study:Learning Game Design and Software Engineering through a Game Prototyping Experience.

Content: Process Models - Waterfall Model, Prototyping, Incremental, Spiral, RAD. Software Requirement Specification: Requirement Process, SRS Components, Requirement Specifications with Use Cases Diagram, Requirements Validation. Software Project Planning: Project Planning objectives. Software Metrics: Size, Function Point, Staffing, Project Estimation Methods – Decomposition Techniques; Empirical Estimation Models – COCOMO Model.

Self-Study: The evolving role of software –characteristics, components and applications.

Further Reading: Software estimation techniques.

UNIT 2	System Testing	6 HOURS

App/System/Case study:

Manual Testing (Online Marketing Software Platform)

Content:

System Testing - System Integration, Techniques-Incremental, Top Down Bottom Up Sandwich and Big Bang, Software and Hardware Integration, Hardware Design Verification Tests, Hardware and Software Compatibility Matrix Test Plan for System Integration. Built-in Testing. Functional testing - Testing a Function in Context. Boundary Value Analysis, Decision Tables. acceptance testing - Selection of Acceptance Criteria, Acceptance Test Plan, Test Execution Test. software reliability - Fault and Failure, Factors Influencing Software, Reliability Models

Self-Study: Manual Testing Process Life Cycle.

Further Reading: Test Case Design and Execution

UNIT 3	Automatic Testing	7 HOURS

App/System/Case study:

Journey Boosts Revenue and Reduces Costs by Implementing TEST Co Software Test Automation Solutions

Content:

Introduction to Automation, Training of Application, Test Automation Process. Introduction to Selenium: Selenium IDE Interface, Replay Scripts, Locate the elements on a Web page, Shared UI Map, Functions in Web Driver, Configuration File, Synchronizing Web Driver scripts, Dynamic UI Objects, Reporting in Selenium.

Self-Study: Sample Naming Conventions, Coding Conventions.

Further Reading: Continuous Integration with Jenkins.

UNIT 4	Software Reliability Modeling	7 HOURS

App/System/Case study:

Software Reliability In Safety Critical Supervision And Control Of Nuclear Reactors

Content:

Historical Perspective and Implementation Exponential Failure Time Class of Model, Schneidewind's Model, Hyper exponential Model, Weibull and Gamma Failure Time Class of Models, Infinite Failure Category Models, Bayesian Model, Model Relationships.

Self-Study: Software Reliability Prediction in Early Phases of the Life Cycle.

Further Reading: Techniques for Prediction Analysis and Recalibration

UNIT 5	Software Quality Assurance	8 HOURS

App/System/Case study:

Successful Application of Software Reliability By Norman F. Chneidewind

Content:

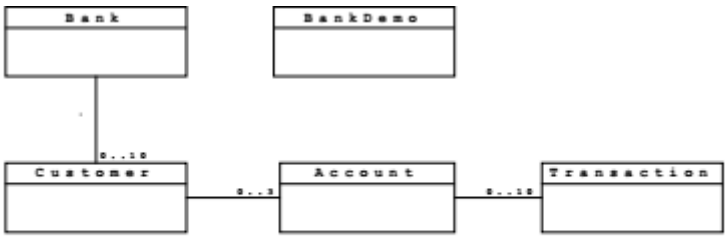
Quality concepts, Software quality assurance , SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and record keeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability ,The ISO 9000 Quality standards: The ISO approach to quality assurance systems, The ISO 9001 standard, Software Configuration Management.

Self-Study: Software Quality ISO Standards

Further Reading: ISO/IEC 9126 Software engineering

PRACTICAL		
PRACTICAL NO.01		**8 HOURS**

Perform following experiments using Open source tools. Note: Following are the reference case studies, can be changed with other appropriate examples with same level.



BankDemo

The BankDemo is the main class of the program. It has a main () method that will be used to test the functionality of the classes in the program.

Bank

A Bank has an array of Customers (maximum 10) and an addCustomer() method that adds a new Customer to the array.

Customer

A Customer has a name and an array of Accounts (maximum 3). Customer has an addAccount() method that adds a new Account to the array. Customer also has a printAccountsSummary() method that prints details of all of their Accounts.

Account

An Account has an accountNumber and a balance. It is possible to withdraw money from the Account using the withdraw() method and to deposit money using the deposit() method. An Account also has an array of Transactions (maximum 10). Each time a deposit or withdrawal is made, a new Transaction is created and added to the array. Note: For simplicity, only whole amounts of currency can be deposited or withdrawn.

Transaction

A Transaction has a numerical amount (negative or positive) and a description.

Exercise Steps

1. Start up a new project in Together and create the class diagram shown above. Add the specified attributes and methods to each class via the diagram.

Note 1: All attributes should be private. This means that you should supply public get. . . () methods for them.

Note 2: You will probably need to make the following Together configuration change to see the get. . . () methods you add. Go to Tools — Options — Project Level and a dialog box will appear. Expand the View Management item in the explorer view on the left and select the JavaBeans / C++ Properties item. In the panel on the right, make sure Recognize Java Beans is unchecked. Click OK to return to the project.

2. In the source code for Customer add a constructor that takes a name as a parameter. The constructor should set the Customer's name attribute and also create a new array of Accounts (with the maximum size as specified above). To create arrays of objects, use code like the following: Thing[] things = new Thing[200]; where Thing is the class name, things is the name you want to give the array and 200 is the size of the array.

3. In the source code for Account add a constructor that takes an account Number as a parameter. The constructor should set the Customer's account Number attribute, set the balance to zero and create a new array of Transactions (with the maximum size as specified above)

PRACTICAL NO.02		**8 HOURS**

Measure software cost and effort for a realistic project using COCOMO II tool.(Build small project and identify the cost of it)

PRACTICAL NO.03		**6 HOURS**

Test a program using manual testing :

1. Login a specific web page.
2. Update 10 student records into table into Excel file.
3. Total number of objects present / available on the page
4. Select the number of students who have scored more than 60 in any one subject (or all subjects).
5. To get the number of list items in a list /combo box and count number of check boxes on the page checked and unchecked count.

PRACTICAL NO.04		**8 HOURS**

Automate some Open Source CRM Software — Vtiger CRM and install locally and try automating few tests and Identify software quality by considering following test cases.

1. Data Quality and Conversion in CRM
2. Functionality of CRM
3. Reporting and Integration
4. Regression and User Acceptance Testing

TEXT BOOK

1. Roger Pressman, "Software Engineering: A Practitioner's Approach", McGraw-Hill Education; 8 edition ISBN 13: 9789339212087.
2. Srinivasan Desikan, "Software Testing Principals and practices", Pearson Publication ISBN-13 978-8-17-758295-6.

REFERENCE BOOK

1. Software Testing And Quality Assurance-Theory and Practice, Kshirasagar Nak, Priyadarshi Tripathy, John Wiley & Sons Inc,2008
2. Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement, Jeff Tian, John Wiley & Sons, Inc., Hoboken, New Jersey. 2005.
3. Software Quality Assurance - From Theory to Implementation, Daniel Galin, Pearson Education Ltd UK, 2004
4. Software Quality Assurance, Milind Limaye, TMH, New Delhi, 2011.
5. The Art of Software Testing, by Glenford J. Myers , Corey Sandler, Tom Badgett, 3rd Edition, Wiley; 3rd edition, ISBN-13: 978-1118031964.
6. Selenium Testing Tools Cookbook - Second Edition, Unmesh Gundecha , Publisher: Packt Publishing, ISBN:13 -9781784392512

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Operating System Administration
	COURSE CODE	IT411
	COURSE CREDITS	3
RELEASED DATE : 01-01-2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	–	30	40	30	–	–	100

PRE-REQUISITE :

1. IT302-Operating System
2. IT211- Data Structures and Applications
3. IT101-Computer Programming

COURSE OBJECTIVES :

IT411.CEO.1:To summarize various types of users and files on a computer system
IT411.CEO.2:To outline the administrative capabilities of linux and windows based systems.
IT411.CEO.3:To identify and show the security aspects while communicating over networks.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

IT411.CO.1:Administer (Demonstrate) the operating system using the internal commands.
IT411.CO.2:Organize the various users, files and applications on the computer system
IT411.CO.3:Utilize various command-line functions and utilities to control the access and support operating systems.
IT411.CO.4:Examine procedures for identifying and resolving common problems using operating system utilities and tools.

THEORY:		
UNIT 1	**Linux Operating System Kernel Concepts**	**8 HOURS**
App/System/Case study: Ubuntu operating system Content: Tasks of Kernel, Architecture of Kernel, Elements of Kernel: Processes, Threads, Address Space, Privileges Levels, Filesystems, Device Drivers, Character Devices, Block Devices, Kernel Modules. Self Study: Device Drivers in Linux: Loadable modules Further reading: Classes of Devices and Modules		
UNIT 2	**Process & File Management**	**8 HOURS**
App/System/Case study: Ext3 file system Contents: Overview, Internal Representation of Files, Systems calls for the files systems, Organization of file tree, File types, File Attributes, process management with top,ps, pstree,kill. Self Study: Filesystem mounting and Unmounting Further reading: File systems in embedded operating system		
UNIT 3	**Access Control & Powers to Users**	**6 HOURS**
App/System/Case study: Fedora linux operating system's Access Control Contents: File System Access Control, Role based Access Control, Real world Access Control , Root user Access Control, Pseudo user other than root. Self Study: Access Control Lists Further reading: Access Control Lists in Linux		
UNIT 4	**Windows Administration**	**4 HOURS**
App/System/Case study: Windows 10 Contents: Roles and Features, Storage, Active Directory, Remote Access, Tools. Self Study: Further reading: Remote Server Administration Tools		
UNIT 5	**User to user communication**	**6 HOURS**
App/System/Case study: Connecting to Apple Network. Contents: On-line Communication: write ,who , Instant Messaging Applications ,Off-line Communication, Apache Server Settings, Network Server Settings, Domain Name Server, Debugging , Logs and Backup. Self Study: Types of Network File Servers Further reading: Network File Server administration		

UNIT 6	System Services and Security	4 HOURS

App/System/Case study:
Security in Linux Mint
Contents:
Start and Stop services, Disable unwanted services, SSH, Protect SSH logins, Password Protection for Grub, Security auditing tools
Self Study: Firewall
Further reading: Internet Security with Firewalls

TEXT BOOK

1.The Design of the Unix Operating System, Maurice J. Bach, Pearson Education, ISBN: 81-7758-770-6
2.Evi Nemeth, Garth Snyder, Trent R. Hein - UNIX and Linux System Administration Handbook, 4th Edition - 2010, Prentice Hall, ISBN-13: 978-0-13-148005-6
3.John Muller, Windows administration at the command line: for Windows Vista, Windows 2003, Windows XP and Windows 2000, Indianapolis, Ind. : Sybex/Wiley Pub., §c 2007.
4.Wolfgang Mauerer, Professional Linux §R Kernel Architecture, Somerset : Wiley, 2010, ISBN 9780470343432

REFERENCE BOOK

1.Daniel J. Barrett, Richard E. Silverman, Robert G. Byrnes, SSH, The Secure Shell: The Definitive Guide, O'Reilly Media, Inc.
2.Terry Collings, Kurt Wall, Red Hat Linux Networking and System Administration, Indianapolis : Wiley, §c 2005, ISBN 0764599496
3.Sumitabha Das,"Unix Concepts Applications", Fourth Edition ,Tata McGraw Hill, ISBN:0-07-063546-3
4.Stephen Prata,"Advanced Unix –A Programmer's Guide", BPB, ISBN: 81-7029-107-0

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Wireless and Mobile Networks
	COURSE CODE	CS412
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	-	30	40	30	-	-	100

PRE-REQUISITE : CS323 : Computer Networks

COURSE OBJECTIVES :

CS412.CEO.1:To build an understanding of wireless network.
CS412.CEO.2:To understand architecture and types of Wireless Networks.
CS412.CEO.3:To identify design issues of Wireless Network.
CS412.CEO.4:To know the challenges of Wireless Network.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS412.CO.1:Determine issues and challenges in Wireless Network.
CS412.CO.2:Categories different types of wireless networks.
CS412.CO.3:Determine issues and challenges of Mobile Ad-Hoc Networks
CS412.CO.4:Assessing the features of Mobile Ad-Hoc Networks.
CS412.CO.5:Design and implement Wireless Sensor Network.
CS412.CO.6:Apply different security algorithms in wireless sensor network.

THEORY COURSE CONTENT		
UNIT 1	**Basics Of Wireless Networks**	**7 HOURS**

App/System/Case study: Smart phones, Wi-Fi, Hotspot, MANET, VANET, Wireless Mouse and Keyboard etc.

Content:

Wireless Network Architecture, Classification, Wireless Switching Technology, Wireless Communication Problems with examples, Wireless Network Reference Model, Wireless Networking Issues, Wireless Networking Standards.

Self Study: Evolution of Wireless Networking.

Further Reading: Trends in Wireless Networking.

UNIT 2	Types Of Wireless Networks	7 HOURS

App/System/Case study: Bluetooth, SHARE it, Internet Service Providers, WLAN in Inventory control, Publicly Shared Data Networks Provided by ISP, Privately Owned Networks.

Content:

Introduction, Properties, Network Architecture, Network Components, Protocols, Technologies and Applications of following wireless networks

1) Wireless Body Area Network (WBAN)
2) Wireless Personal Area Network (WPAN)
3) Wireless Local Area Network (WLAN / Wi-Fi)
4) Wireless Metropolitan Area Network (WMAN / Wi-Max)
5) Wireless Wide Area Network (WWAN)

Self Study: IEEE Standards for WBAN, WPAN, WLAN, WMAN and WWAN.

Further Reading: 1) A review on Wireless Body Area Network for Medical Applications. 2) Wireless Personal Area Networks Architecture and protocols for Multimedia Applications

UNIT 3	Basics Of Mobile Ad-Hoc Networks	7 HOURS

App/System/Case study: Military Communication, Virtual Classrooms, Multi user Games etc.

Content: Wireless ad-hoc Network: Introduction, Features, Advantages, Applications, Ad-Hoc Mobility Models (Indoor and outdoor) MANET: Historical Development, Basics, Features, Challenges, Deployment Issues, Technologies, Applications, Protocols and their classification. MAC Protocols: Design issues, goals and classification, Contention based protocols- with reservation, scheduling algorithms, IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

Self Study: DUCHA – Dual Channel MAC Protocol.

Further Reading: Attacks and Challenges in MANET.

UNIT 4	Routing Protocols And Transport Layer Protocol In MANET	7 HOURS

App/System/Case study: Use of MANET in Military.

Content:

Routing Protocols: Design issues, goals and classification, Proactive, reactive and hybrid routing, Uni cast routing algorithms, Multi-cast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, Transport layer: Issues in designing, Transport layer classification, Ad-Hoc transport protocols.

Self Study: QoS aware routing.

Further Reading: ZRP – Zonal Routing Protocol, DYMO – Dynamic MANET on Demand.

UNIT 5	Wireless Sensor Network	7 HOURS

App/System/Case study: Military, Health Care, Disaster Management, Home Control, Industrial Automation etc.

Content:

Introduction, Network Architecture, Sensing and Communication Ranges, Design Issues, Challenges, Energy Consumption, Clustering of Sensors, Protocols and their Classification, Applications.

Self Study: Routing in Wireless Sensor.

Further Reading: Operating Systems for Wireless Sensor Network.

UNIT 6	Security In Wireless Network	7 HOURS

App/System/Case study: Attack in Wireless Networks.

Content:

Wireless LAN Security, Wireless Application Protocol (WAP) Overview, Wireless Transport Layer Security, WAP End-to-End Security.

Self Study: Wireless Datagram Protocol (WDM), Wireless Transaction Protocol (WTP)

Further Reading: Extensible Authentication Protocol (EAP)

TEXT BOOK

1. Dr. Sunil kumar S. Manvi, Mahabaleshwar S. Kakkasageri, "Wireless and Mobile Networks Concepts and Protocols", Wiley India Pvt. Ltd., 2010, ISBN: 978-81-265-2069-5.
2. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007.
3. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000
4. KazemSohraby, Daniel Minoli, TaiebZanati, "Wireless Sensor Network Technology, Protocols and Applications", John & Wiley Sons INC., 2007, ISBN 978-0-471-74300-2. [Freely available on internet]
5. William Stallings, "Cryptography and Network Security – Principles and Practice", Fifth Edition, PEARSON Publication.

REFERENCE BOOK

1. Carlos de Morais Cordeiro, Dharma Prakash Agrawal, "AD HOC SENSOR NETWORKS", World Scientific Publishing Co. Pte. Ltd., 2006, ISBN : 13: 978-81-7596-792-2.
2. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad hoc networking, Wiley-IEEE press, 2004.
3. Mohammad Ilyas, " The handbook of adhoc wireless networks", CRC press, 2002
4. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobilead hoc networking, Wiley-IEEE press, 2004.
5. Mohammad Ilyas, The handbook of adhoc wireless networks, CRC press, 2002.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Information Retrieval
	COURSE CODE	IT413
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	-	30	40	30	-	-	100

PRE-REQUISITE :

1. CS201 Data and File Structure
2. CS321 Design and Analysis of Algorithms

COURSE OBJECTIVES :

IT413.CEO.1:Learn the information retrieval methods and models.
IT413.CEO.2:Be familiar with web search engine.
IT413.CEO.3:To Understand theoretical base behind standard IR models
IT413.CEO.4:Be exposed to evaluation analysis of IR models.
IT413.CEO.5:Introduce to modern IR methods.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT413.CO.1:Understand the process of representing, retrieving and analyzing IR models and advanced IR models.
IT413.CO.2:Understand structure of web and working of crawlers
IT413.CO.3:Develop IR models form standard IR models.
IT413.CO.4:Develop the standard methods for web indexing and evaluation
IT413.CO.5:To analyze optimization techniques various algorithms used in web search.

THEORY		
UNIT 1	**Introduction to Information Retrieval**	**6 HOURS**
App/System/Case study: logistic issues **Content:** Introduction: Information Retrieval, History of IR, Issues. Architecture of a Search Engine: Architecture, Basic Building Blocks, Components of building blocks: Text Acquisition, Text Transformation, Index Creation, User Interaction, Ranking, Evaluation **Self Study:** An example information retrieval problem **Further Reading:** The role of artificial intelligence (AI) in IR		
UNIT 2	**Web Crawlers**	**6 HOURS**
App/System/Case study: Web Crawlers **Content:** Deciding What to Search, Web structure , Crawling the Web, Web Search Architectures , Crawling Documents and Email, Document Feeds, The Conversion Problem, Storing the Documents, Meta Crawlers, Focused Crawling, Detecting Duplicates, Removing Noise **Self Study:** Google Bot, Bing Bot **Further Reading:** Open Source Web Crawlers		
UNIT 3	**Retrieval Models**	**8 HOURS**
App/System/Case study: Similarity Based IR Models **Content:** Processing Text: From Words to Terms, Text Statistics, Document Parsing, Document Structure and Markup, Boolean Model, Vector Space Model, Probabilistic Model. **Self Study:** Alternative Models **Further Reading:** learning-to-rank.		

UNIT 4	Indexing & Retrieval Evaluation	6 HOURS

App/System/Case study: Basic Indexing- Map Reduce

Content:

Indexing: Inverted Indexes, Compression, Index Construction, Retrieval Evaluation: Why Evaluate?, The Evaluation Corpus, Logging, Effectiveness Metrics, Efficiency Metrics, Training, Testing, and Statistics

Self Study: Query Processing

Further Reading: Query Interfaces

UNIT 5	Web-Search Optimization	6 HOURS

App/System/Case study: Google Search Engines

Content:

Web Search: History of Web, Indexing, Link Analysis (HITS, PageRank), Relevance Scoring and ranking for Web, Search Engine Optimization, On page Optimization, Off page optimization

Self Study: Personalized search, Handling "invisible" Web

Further Reading: Summarization, Question Answering, Reporting.

UNIT 6	Advanced Information Retrieval	8 HOURS

App/System/Case study: Information Retrieval of Images

Content:

Multimedia Information Retrieval, Parallel and Distributed IR, Meta-Ranking, Searching with Communities, Filtering and Recommending, Web data mining, Structure Revisited

Self Study: Economic, ethical, legal and political issues

Further Reading: Categorization algorithms

TEXT BOOK

1. W. Bruce Croft, Donald Metzler, Trevor Strohman, "Search Engines Information Retrieval in Practice" ©W.B. Croft, D. Metzler, T. Strohman, 2015, Electronic Copy Freely Available
2. C. Manning, P. Raghavan, and H. Schütze, "Introduction to Information Retrieval" Cambridge University Press, 2008 ISBN – 978-1107666399.

REFERENCE BOOK

1. Ricardo Baeza -Yates and Berthier Ribeiro – Neto, "Modern Information Retrieval: The Concepts and Technology behind Search" 2nd Edition, ACM Press Books 2011 ISBN - 978-0136072249.
2. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, "Information Retrieval: Implementing and Evaluating Search Engines", The MIT Press, 2010 ISBN - 978-0262528870.
3. Ophir Frieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series", 2nd Edition, Springer, 2004 ISBN - 978-1402030031.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Ethical Hacking and Cyber Laws
	COURSE CODE	IT421
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	30	20	150

PRE-REQUISITE :

IT321: Cyber Security

COURSE OBJECTIVES :

IT421.CEO.1:Understand Various types of footprinting, footprinting tools, and countermeasures

IT421.CEO.2:AnalyzeNetwork scanning techniques and scanning countermeasures.

IT421.CEO.3:Enumeration techniques and enumeration countermeasures.

IT421.CEO.4:Working of viruses, virus analysis, computer worms, malwareanalysis procedure, and countermeasures.

COURSE OUTCOMES: :

The students after completion of the course will be able to

IT421.CO.1: Identify and analyse the stages an ethical hacker requires to take in order to compromise a target system.

IT421.CO.2: Identify tools and techniques to carry out a penetration testing.

IT421.CO.3: Critically evaluate security techniques used to protect system and user data.

IT421.CO.4: Demonstrate systematic understanding of the concepts of security at the level of policy and strategy in a computer system.

IT421.CO.5: Classify different types of webserver attacks, attack methodology, and countermeasures.

IT421.CO.6: Understand Wireless Encryption, wireless hacking methodology, wirelesshacking tools, and wi-fi security tools

THEORY		
UNIT 1	**Introduction to Ethical Hacking**	**6 HOURS**
Introduction, Legal and Illegal part in Hacking, Network Hacking, Network Vulnerability, Route Protocol Hacking,Firewall Scanning, Application Proxy Vulnerabilities		
UNIT 2	**Foot printing and Social Engineering**	**6 HOURS**
Footprinting Concepts, Internet Footprinting,Different types of scanning, Using DNS Zone transfers, Introduction to Social Engineering		
UNIT 3	**Web and Password Hacking**	**9 HOURS**
Web Server Hacking, Web Application Hacking, Hacking a web platform, Cracking a password, E-mail Hacking,SSL Fraud, Internet relay chat Hacking		
UNIT 4	**Software Hacking**	**9 HOURS**
Remote Control Insecurities, Virtual Network computing, Terminal Server and Citrix, Session Hijacking, Trojans,Secure Shell (SSH) Attacks, Subverting the system environment		
UNIT 5	**Attacking the Web**	**6 HOURS**
Web Authentication threats, Bypassing Authentication, Attacking the Web Authorization, Attacking ACLs, Attacking Tokens, Case Studies		
UNIT 6	**Cyber Crimes and Cyber Laws**	**6 HOURS**
Introduction to IT laws Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Pornography,Software Piracy, Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits, and Cyber Security		

PRACTICAL:Perform following experiments using Open source software.		
PRACTICAL NO.01		**6 HOURS**
Setting up The Lab, Installing Kali 2018 As a Virtual Machine Installing Metasploitable As a Virtual Machine		

PRACTICAL NO.02		**6 HOURS**
Network Penetration Testing Connecting a Wireless Adapter To Kali		

PRACTICAL NO.03		**6 HOURS**
Network Penetration Testing - Pre Connection Attacks: Packet Sniffing Basics Using Airodump-ng, Creating a Fake Access Point (Honeypot) - Practical		

PRACTICAL NO.04		**4 HOURS**
Kali linux Information gathering practical: Server Location Finder- Recon-ng		

PRACTICAL NO.05		**4 HOURS**
Kali linux vulnerability analysis practical: Golimero Practicalm lynis practical, nikto practical		

TEXT BOOK:

1. An Unofficial guide to ethical Hacking, 2nd edition, by Ankit Fadia, Macmillan publishers, ISBN 1403-92964-5
2. Hacking Web Applications Exposed, Second Edition by Joel Scambray, Mike Shema, Caleb Sima, TATA McGraw hill edition, ISBN 0-07-061980-8
3. Hacking Exposed, 4th Edition by Stuart McClure, Joel Scambray, George Kurtz, TATA McGraw hill edition,ISBN 0-07-059696-4

REFERENCE

1. CEH Certified Ethical Hacker All-in-One Exam Guide 1st Edition, byMatt WalkerISBN-13: 978-0071772297
2. "Gray Hat Hacking: The Ethical Hackers Handbook, 3rd Edition" by Allen Harper and Shon Harris
3. "The Unrevealed Secrets of Hacking and Cracking – Hack Before You Get Cracked" by Prateek-Shukla and NavneetMehra
4. "How to Unblock Everything on the Internet" by AnkitFadia
5. Ethical Hacking and Network Defence by Michale Simpson, Cengage Learning, ISBN 978-81-315-0748-3

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Big Data Analytics Framework
	COURSE CODE	CS421
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	-	25	125

PRE-REQUISITE : 1. CS331. Predictive Analytics

COURSE OBJECTIVES :

CS421.CEO.1:To optimize business decisions and create competitive advantage with Big Data analytics

CS421.CEO.2:To introduce Java concepts required for developing map reduce programs

CS421.CEO.3:To derive business benefit from unstructured data

CS421.CEO.4:To impart the architectural concepts of Hadoop and introducing map reduce paradigm

CS421.CEO.5:To introduce programming tools PIG HIVE in Hadoop echo system

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS421.CO.1:Prepare for data summarization, query, and analysis.

CS421.CO.2:Apply data modeling techniques to large data sets.

CS421.CO.3:Create applications for Big Data analytics.

CS421.CO.4:Build a complete business data analytic solution

THEORY COURSE CONTENT		
UNIT 1	**Introduction To Big Data And Hadoop**	**6 HOURS**

App/System/Case Study:
Library Management Case Study

Contents:
Types of Digital Data, Introduction to Big Data, Big Data Analytics, , Apache Hadoop Features , Hadoop Echo System, Hadoop 2.x core components , Analysing Data with Hadoop, Hadoop Streaming

Self-study: Security of Hadoop

Further Reading: Hadoop Security Architecture

UNIT 2	**HDFS(Hadoop Distributed File System)**	**8 HOURS**

App/System/Case Study:
Library Case Study

Contents:
The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

Self-study: Performance Evaluation in HDFS

Further reading: HDFS architecture in cloud computing

UNIT 3	**Map Reduce Framework**	**6 HOURS**

App/System/Case Study:
Library Case Study

Contents:
Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features. MapReduce Use Cases. Input Splits, Relation between Input Splits and HDFS Blocks Combiner Partitioner

Self-study: Map reduce for desktop Grid Computing

Further reading: Map reduce in Cloud Computing

UNIT 4	Hadoop Eco System - Pig	8 HOURS

App/System/Case Study:

Library Case Study

Contents:

Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, User Defined Functions, Data Processing operators, Pig Data Types , Shell and Utility Commands Pig Latin : Relational Operators, File Loaders, Group Operator, COGROUP Operator, Joins and COGROUP Union, Diagnostic Operators, Specialized joins in Pig , Built In Functions (Eval Function, Load and Store Functions, Math function, String Function, Date Function, Pig UDF, Piggybank, Parameter Substitution (PIG macros and Pig Parameter substitution) Aviation use case in PIG, Pig Demo on Healthcare Data set

Self-study: Data Analysis using Pig

Further reading: Crime Data Analysis using Pig

UNIT 5	Hive and HBase	6 HOURS

App/System/Case Study:

Library Case Study

Contents:

Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : Introduction to NoSQL Databases and HBase ,HBasics, Concepts, Clients, Example, Hbase Versus RDBMS, HBase Data Model, HBase Shell, HBase Client API

Self-study: Difference in Pig and Hive

Further reading: MapR Hadoop Hive

UNIT 6	Spark Framework and Scala	6 HOURS

App/System/Case Study:

Library Case Study

Contents:

Introduction, components of spark, Resilient distributed databases(RDD), Spark core programming concepts, compilation and execution of spark program. Introduction to Scala ,bAsic Programming Constructs of Scala , Running the Average Friends by Age Example, Filtering RDD's, and the Minimum Temperature by Location Example, Running the Minimum Temperature Example, and Modifying it for Maximum , Counting Word Occurrences using Flatmap() , Improving the Word Count Script with Regular Expressions, Sorting the Word Count Results

Self-study: Hadoop Mapreduce Vs Apache Spark

Further reading: Mobile big data analysis using Apache Spark

PRACTICAL		
PRACTICAL NO.01		**8 HOURS**

Install the Hadoop Distribution of Cloudera (http://www.cloudera.com/hadoop/) in Pseudo-Distributed Mode or use the VMWare Image provided by Cloudera to familiarize yourself with Hadoop, especially with the distributed file system HDFS and the implementation of MapReduce programs in Java. For the following tasks use the file 'twain.txt' as input which contains a collection of the works of Mark Twain. You will find the file on the course website.

a) Implement a MapReduce program that outputs all words of the input in a sorted order. Your program should not distinguish between upper and lower case and duplicates should be preserved. Example: From *{*To be or not to be*}* into *{*be be not or to to*}*

b) Extend your program from part (a) such that every word occurs only once in the output together with the corresponding frequency of the word. Your program should not distinguish between upper and lower case. Example: From To be or not to be to (be,2) (not,1) (or,1) (to,2)

c) Extend your word count implementation from part (b) with an additional Combiner. Therefore you should familiarize yourself with the function of a Combiner and think about how to usefully integrate a Combiner into your implementation. Characterize advantages and disadvantages of a Combiner.

d) Implement a MapReduce program that computes the inverted index for the given input, i.e. for every word in the input it should output a list of (byte) offsets. The offset should be the byte offset of the row that contains the word. However, typical stop words should not be part of the index. Stop words are frequently occuring words like 'and' that do not have a substantial relevance. You can find a list of typical english stop words in the file 'english.stop.txt' from the course website.

PRACTICAL NO.02		**8 HOURS**

Pig Exercise: Using the census data (path), compute the number of records for each state.

PRACTICAL NO.03		**6 HOURS**

HIVE DDL AND DML

Description

We will be creating several hive tables using different file formats, delimiters and partitioning strategy. Also we will be loading data into these hive tables

Data Location

HDFS – /public/retail_db

Local – /data/retail_db

To get data types visit mysql database retail_db using user retail_dba

Problem Statement- Make sure you have 2 databases with your OS User name and then stage and final as suffix

Example: ujjwal_stage, ujjwal_final

ujjwal_stage – Create external tables in ujjwal_stage pointing to HDFS location /public/retail_db

ujjwal_stage – Make sure at least one table point to different location and use load command to load data from local file system into the hive table

ujjwal_final – Create all 6 tables in hive as managed tables, delimiter is vertical line. Also use gzip compression while storing the data.

Also create 2 additional tables for orders and order_items where both tables are bucketed by order_id. Create another table for orders where data is partitioned by order_month.

PRACTICAL NO.04		6 HOURS

Apache Spark Programming Exercise :Twitter Analysis using Spark

- Find all the tweets by user
- Find how many tweets each user has
- Find all the persons mentioned on tweets
- Count how many times each person is mentioned
- Find the 10 most mentioned persons
- Find all the hashtags mentioned on a tweet
- Count how many times each hashtag is mentioned
- Find the 10 most popular Hashtags

TEXT BOOK

1.Big Data, Black Book(covers Hadoop 2, Mapreduce, Hive, Yarn, Pig, R And Data Visualization, Black Book, Dreamtech

REFERENCE BOOK

1. Tom White, "Hadoop: The Definitive Guide", O'reilly
2. Alan Gates, "Programming Pig: Dataflow Scripting with Hadoop", O'reilly
3. Stefano Baghino, Andrea Bessi, Bertrand Bossy, "Scala and Spark for Big Data Analytics", Packt
4. Bill Chambers, "Spark: The Definitive Guide: Big Data Processing Made Simple", O'reilly

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2019 – 2023)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Deep Learning
	COURSE CODE	CS422
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : CS 312 Artificial Intelligence and Neural Network, CS 332 Machine Learning .

COURSE OBJECTIVES :

CS422.CEO.1:To present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data.

CS422.CEO.2:To learn the fundamentals of deep learning, and the main research activities in this field.

CS422.CEO.3:To learn implementation, training, and validation of neural network.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS422.CO.1:Illustrate the fundamentals of deep learning neural network.

CS422.CO.2:Identify various strategies for deep neural network model.

CS422.CO.3:Classify different data set using convolutional neural network.

CS422.CO.4:Examine the sequence modelling using different algorithms.

CS422.CO.5:Interpret deep learning concepts in real time applications.

CS422.CO.6:Explain the working of deep reinforcement learning model

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**8 HOURS**
App/System/Case study: Classification of Dogs. **Content:** Linear Algebra, Probability and Information Theory, Numerical Computation, Machine Learning Basics, Basics of Deep learning, Trends in deep learning, Deep learning vs Machine learning.		
UNIT 2	**Designing & Optimizing Deep Neural Network Model**	**6 HOURS**
App/System/Case study: House Prediction **Content:** Distribution of data set, Error Analysis, Bias and Variance, Data Augmentation Modern Deep Networks, Regularization for Deep Learning, Optimization for Training Deep Models, Deep Feed forward Networks		
UNIT 3	**Convolutional Neural Network**	**8 HOURS**
App/System/Case study: Cancer Detection. **Content:** Introduction to CNNs, CNN architecture Variability models, Properties of CNN representation, Covariance / invariance, Kernel filter, Principles behind CNNs, Multiple Filters, CNN applications.		
UNIT 4	**Sequence Modelling**	**8 HOURS**
App/System/Case study: Speech Recognition **Content:** Introduction to Dynamical systems: RNNs, Unfolded RNNs, Recurrent Neural network, Bidirectional RNNs, Encoder Decoder Sequence to sequence architecture, Basics of Recursive neural network and Long Short-Term Memory Network(LSTM), RNN applications.		
UNIT 5	**Deep Learning applications**	**6 HOURS**
App/System/Case study: Generate Faces, Text summarization, classification of images and Activity detection. **Contents:** Image Processing, Natural Language Processing, Speech Recognition, Video Analytics Self Study: Healthcare Application		
UNIT 6	**Deep Reinforcement Learning**	**6 HOURS**
App/System/Case study: Quad copter to Fly, Game and Robotics **Content:** Introduction to Deep Reinforcement Learning, Domain Selection for Reinforcement Learning, State-Action Pairs Complex Probability Distributions of Reward, Neural Networks and Deep Reinforcement Learning, Hierarchical RL, Multi-agent RL, Relational RL.		

PRACTICAL:Perform following experiments using Open source tools		
PRACTICAL NO.1		**4 HOURS**
Implement back propagation algorithm to train a neural network in Python.(Gradient Descent)		
PRACTICAL NO.2		**6 HOURS**
Implement and train a deep convolutional neural network in Tensorflow.		
PRACTICAL NO.3		**6 HOURS**
Implement simple audio recognition using RNN(tensorflow)		
PRACTICAL NO.4		**6 HOURS**
Keras and Tensorflow–Implement Applications of deep Learning to NLP		
PRACTICAL NO.5		**6 HOURS**
Keras and Tensorflow - Implement Applications of Deep Learning with Computer Vision		
MINI PROJECT		**10 HOURS**
The Course Mini Project work will be started in Semester VII. The work of the mini projects will be starting at beginning of term in alignment with laboratory assignments. It may be done by a groups of 3 students. However if project is done in groups, each student will be given a responsibility for a distinct module and the progress of individual modules is independent of others and performance of individual modules will be tracked periodically. The final evaluation will be done at the end of term through presentation, project demonstration and report.		

TEXT BOOK

1. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MIT Press book in preparation. (2015).
2. Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends in Machine Learning 2.1 (2009): 1127.

REFERENCE BOOK

1. Sutskever, Ilya, OriolVinyals, and Quoc V. Le. "Sequence to sequence learning with neural networks." Advances in neural information processing systems. 2014.
2. Kalchbrenner, Nal, EdwardGrefenstette, and Phil Blunsom. "A convolutional neural network for modelling sentences." ACL(2014).

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY **All Branches**	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP401
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP401.CEO.1:To enable the students to understand the basic concepts of Economics

HP401.CEO.2:To impart knowledge, with respect to practical applications of Economics .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP401.CO.1:The students would have understood the basic concepts of Economics.

HP401.CO.2:The students would have acquired knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions

HP401.CO.3:The course is designed to improve critical thinking, problem solving skills by using economic models and theories and predict economic relationships

HP401.CO.4:Students entering any profession in the workforce today must be able to utilize these basic economic principles. The course expected to develop critical understanding of current topics in economics and able to formulate their own opinions on economic issues

THEORY		
UNIT 1	**Introduction to Economics**	**6 HOURS**
Economic Issues and Concepts; How Economist Work ; Theory of Demand & Supply; Meaning, Determinants, Law of Demand and Supply, Equilibrium between Demand & Supply; Elasticity of demand, price elasticity, income elasticity, cross elasticity.		
UNIT 2	**Micro Economics**	**6 HOURS**
Revenue Concepts; Cost Concepts, Short run & Long run cost Concepts and curves, opportunity cost. Break even analysis; meaning, explanation, numerical. Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Competition , Oligopoly). **Further Reading:**		
UNIT 3	**Macro Economy**	**5 HOURS**
National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP,NDP, Personal income, disposal income. Inflation; meaning, types, causes, measures to control. **Further Reading:**		
UNIT 4	**Indian Economy**	**5 HOURS**
Characteristics of an Indian Economy; Human Development Index(HDI); Concepts of Foreign Trade, Goods and Services Tax(GST); Micro Small and Medium Enterprise(MSME) ; Foreign Direct Investment(FDI);Unemployment: meaning, types, causes, remedies. **Further Reading:**		
UNIT 5	**Introduction to Banking & Money Market**	**6 HOURS**
Banking; meaning, types, functions, Commercial Banks- Instruments in Operation of an Account, Central Bank- RBI; its functions, Concepts- CRR, Bank Rate, Repo Rate, Reverse Repo rate, SLR; Introduction to Money and Capital Market , Introduction to Fiscal policy- meaning and tools. **Further Reading:**		

REFERENCE BOOKS

1. R.Paneerselvam :Engineering Economics, , PHI publication ISBN : 978-81-203-5172-1
2. Robbins S.P. and Decenzo David A :Fundamentals of Management: Essential Concepts and Applications, Pearson Education, ISBN-13: 9780133499919
3. N Gregory Mankiw : Economics: Principles of Economics, Cengage Learning ISBN-10: 1305585127
4. L.M. Prasad: Principles and Practices of Management ISBN-10: 9351610500; ISBN-13: 978-9351610502
5. Tripathy and Reddy :Principles of Management ISBN, 1259050572, 9781259050572
6. Dr. K. K. Dewett & M. H. Navalur, S. Chand :Modern Economic Theory ISBN, : 9788121924634 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Business Strategies
	COURSE CODE	HP403
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : HP303 : Basics of Entrepreneurship

COURSE OBJECTIVES :

HP403.CEO.1:To understand the importance of growth and to be able to chart a path towards growth.
HP403.CEO.2:To revisit your business model
HP403.CEO.3:To give a growth orientation your customer acquisition, operations, revenue and sales strategy
HP403.CEO.4:To list and comply with the requirements relating to regulatory compliance
HP403.CEO.5:To be able to effectively pitch your venture to potential stakeholders .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP403.CO.1:Rephrase business model and Identify additional customer segments
HP403.CO.2:Identify channels and strategy for budgeting and planning.
HP403.CO.3:Make use of Legal aspect, Mentors, Advisors, and Experts in startups
HP403.CO.4:Analyze the growing revenues, sales planning, strengthening sales, improving margins
HP403.CO.5:Estimate customer lifetime value, competitor and peer's financial models for venture growth
HP403.CO.6:Formulate the all procedure for new venture ; Product market fit and A Pitch Deck

PRACTICALS:		
PRACTICAL NO.01	**Orientation to Growth**	**3 HOURS**
Getting Ready for Growth Why growth stage is different compared to startup phase, Why Product-Market fit is not enough, Case study, To assess readiness for growth, To chart a growth path .		
PRACTICAL NO.02	**Customers**	**3 HOURS**
Expanding Customer Base Revisit your business model and develop few variants (more business model types). Identify additional customer segments that your solution can address. Evaluate business models for the new customer segments. Relook at the Problem Statement (can you expand the scope and scalability of your business by repositioning your problem statement?) Explore additional ways to monetize.		
PRACTICAL NO.03	**Traction**	**12 HOURS**
Scaling How to gain traction beyond early customers. Defining traction (in quantifiable terms) and identifying the most important metrics to measure traction. Calculate cost of new customer acquisition. Estimate your customer lifetime value (LTV). Identifying waste in your operations and focusing your team on what is important for traction. **Channels and Strategies** The Bulls eye framework, Identify Channels using Bulls Eye Framework, Measuring the effectiveness of selected channels, Budgeting and planning.		
PRACTICAL NO.04	**Money**	**20 HOURS**
Growing Revenues. Stabilizing key revenue streams. Developing additional revenue streams (licensing, franchising). Exploring new channels and partnerships. Sales Planning. Understanding why customers buy and how buying decisions are made; Listening skills. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale. Strengthening Sales. Building a professional sales team. Sales compensation and incentives. Sales planning, setting targets Improving Margins. Testing price elasticity. Optimizing costs and operational expenses. Advanced concepts of unit costing. Financial Modeling. Financial modeling of your venture's growth. Analyzing competitor and peer's financial models.		
PRACTICAL NO.05	**Support**	**5 HOURS**
Legal Overview of legal issues and their impact on entrepreneurs. Importance of getting professional help (legal and accounting). Importance of being compliant and keeping proper documentation. Patents and Intellectual property. Trademarks. Mentors, Advisors, and Experts. The importance of a Mentor and how to find one. Role of business advisors and experts for specific targets in your growth plan.		
PRACTICAL NO.06	**Capstone Project: Pitch Your Venture**	**2 HOURS**

REFERENCE BOOKS

1. Zero to One: Note on Start Ups, or How to Build the Future, Peter Thiel and Blake Masters, Virgin Books,ISBN: 9780753555194
2. Tools of Titans: The Tactics, Routines, and Habits of Billionaires, Icons, and World-Class Performers, Timothy Ferriss, Random House,ISBN: 9781785041273.
3. Disrupted: My Misadventure in the Start-Up Bubble, Dan Lyons, Penguin Publishers, ISBN: 9781786491022
4. Unshakeable: Your Financial Freedom Playbook, Tony Robbins, Simon & Schuster Publishers,ISBN: 9781471164934
5. Grit: The Power of Passion and Perseverance, Angela Duckworth, Vermilion Publishing,ISBN: 9781785040207
6. Big Magic: Creative Living 4BEyond Fear, Elizabeth Gillbert, Penguin Publishers,ISBN: 9781408886182
7. Pivot: The Only Move That Matters Is Your Next One, Jernny Blake, Random House,ISBN: 9780241975466
8. Financial Management; Text and Problems, 7th Ed., A Khan and P. K. Jain, TataMacGraw Hill, ISBN: 9789353162184
9. Financial Management; Theory and Practice, 4th Ed., Prasanna Chandra, TataMacGraw Hill,
10. Essentials of Management : An International and Leadership Perspective, 10th Ed., Harold Koontz and Heinz Weihrich, MGH, ISBN: 9789339222864
11. Kites in a Hurricane: Startups from Cradle to Fame, Rishi Kapal, SAGE Publishing, ISBN: 9789352807895
12. Wadhwani Foundation Advanced Course in Entrepreneurship

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2019 – 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Software Skill Development Lab
	COURSE CODE	CS402
	COURSE CREDITS	2
RELEASED DATE : 01/01/2019	REVISION NO	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS402.CEO.1: Plan Extraction, transformation, scraping, joining and cleaning of large data sets

CS402.CEO.2: Analyse large data sets to bring out insights to solve business problems.

CS402.CEO.3: Make use of machine learning libraries and apply established machine learning algorithms classes of programming problems.

CS402.CEO.4: Utilize Machine learning concepts in Python using problem solving approach by working on real time cases and in class programming assignments.

CS402.CEO.5: Develop code in support of Machine learning solutions in Python.

CS402.CEO.6: Evaluate and debug various learning algorithms

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS402.CO.1: Apply python to build various machine learning application.

CS402.CO.2: Interpret the fundamental issues and challenges of machine learning: data, model selection, model complexity.

CS402.CO.3: Identify the strengths and weaknesses of many popular machine learning approaches.

CS402.CO.4: Analyze the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

CS402.CO.5: Design and implement various machine learning algorithms in a range of real-world applications.

Guidelines for Laboratory Conduction :

The assignments to be framed by understanding the prerequisites, technological as- pects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, in- structor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed .The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module	**Python and Machine Learning**	**36 HOURS**

Prerequisite: Python Course

Content

Understanding Data Analytics, Importance of data in business, Data analytics ecosystem, Basis of Python programming, Basics of Python, Variables and Operators, Data types, Lists, Dictio- nary and Functions, Programming in Python, Introduction to Machine learning, python Libraries, Numpy, Scikit, Pandas, Matplotlib, Data Visualization, Supervised learning, Linear Regression, Logistic Regression, Decision Tree, Naive Bayes, K Nearest Neighbor, Random Forest, Dimension- ality Reduction, Gradient Boosting algorithms, Support Vector Machine, Unsupervised learning, Clustering techniques – K means clustering , Association Rule Learning, Natural Language Pro- cessing

Beneftts: 1.Placement Opportunities

PRACTICAL List		
Practical No.01		**4 HOURS**
Perform data processing and cleaning of dataset using Python.		
Practical No.02		**4 HOURS**
Create a machine learning model using Linear Regression (Example : Salary Prediction).		
Practical No.03		**4 HOURS**
Create a machine learning model using multiple linear regression (Example : Flight elay Data For July 2014.		
Practical No.04		**4 HOURS**
Create a machine learning model using Decision Tree (Example : Position of an Employee as per salary).		
Practical No.05		**4 HOURS**
Create a machine learning model using K Means Clustering Algorithm.		

Practical No.06		**4 HOURS**
Create a machine learning model using Market Basket analysis.		
Practical No.07		**4 HOURS**
Create a natural language processing model (Example : Customer purchasing). m		

Mini Project		**8 HOURS**
Note: Data sets should be real time data sets like heart disease, Airline, etc.		

REFERENCE

1. Daniel Nedal, "Python Machine Learning from Scratch", AI Sciences paperback edition 2016, ISBN-13: 9781720649496
2. Chris Albon, "Machine Learning with Python Codebook", O'REILLY Paperback, 2018, ISBN-13: 1491989388

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Advanced Software Skill Development Lab
	COURSE CODE	CS403
	COURSE CREDITS	2
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME		**EVALUATION SCHEME :**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
–	4	–	–	–	–	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS403.CEO.1:To play role of Business Intelligent Analyst and Data Scientist in Data Analytics Life Cycle.
CS403.CEO.2:To acquire the skills of Analytics in R Programming.
CS403.CEO.3:To perform graphical analysis using Data Visualization tools and techniques.
CS403.CEO.4:To perform analytics for improvement of Business Process.
CS403.CEO.5:To implement application using IDLE tools..

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS403.CO1:Perform the analytics in R on real time data sets.
CS403.CO2:Analyze the real time data with graphical visualization.
CS403.CO3:Generate the different types of analytics reports.
CS403.CO4:Develop the models using analytics for BI Process.
CS403.CO5:Test and validate developed prototype against the original requirements of the problem.
CS403.CO6:Use Tableau Visualization effectively for Data Analytics..

Guidelines for Laboratory Conduction

The assignments to be framed by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, instructor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed. The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module: R Programming

Prerequisite: Database Management System

Industry Expert: Ms. Shobha Mourya

Course Instructor: Ms. Shobha Mourya Mr.Jayvant Devare

Course Content

Basics of R Programming: Installation, Reading and Getting Data into R, Constructing Data Objects, Data: Descriptive Statistics and Tabulation, Data: Distribution, Simple Hypothesis Testing, Introduction to Graphical Analysis, Formula Notation and Complex Statistics, Manipulating Data and Extracting Components, Regression model, Advanced Graphs, Writing your scripts in R, Introduction of data science, Visualization, Introduction to Tableau, Navigating Tableau, Advanced Data Mining With Tableau, Creating bins Visualizing distributions, Modeling.

Beneftts:

1. Dell EMC Certification (optional)
2. Placement Opportunities.

PRACTICAL List		
Practical No.01		**4 HOURS**
Installing and loading R packages, set/get working directory.		
Practical No.02		**4 HOURS**
Import datasets using readr package and explore datasets using dplyr functions.		
Practical No.03		**4 HOURS**
Creating subsets from datasets using filter conditions.		
Practical No.04		**4 HOURS**
Creating new variables using mutate.		
Practical No.05		**4 HOURS**
Analyzing factor variables using frequency and contingency table.		
Practical No.06		**4 HOURS**
Analyzing numeric variables using summary command.		
Practical No.07		**4 HOURS**
Visualization using ggplot2 package for Bivariate, Univariate and Multi-variate plots..		
Practical No.08		**4 HOURS**
Understanding ggplot layers for plotting graphs.		
Practical No.09		**4 HOURS**
Scatter plot, Histogram, Bar chart, Density Plot, Faceting and Scaling.		
Practical No.10		**4 HOURS**
Importing and exploring Titanic dataset.		
Practical No.11		**4 HOURS**
Data wrangling for Titanic case study.		
Practical No.12		**4 HOURS**
Feature engineering for Titanic case study.		
Mini Project :		**8 HOURS**
Note: Data sets should be real time data sets like heart disease, Airline, etc.		

REFERENCES

1. Mark Gardener, "Beginning R: The Statistical Programming Language", Wiley paperback edition 2013, ISBN: 978-1-118-16430-3.
2. Ohri, "R for Business Analytics", Springer, 2012, ISBN: 978-1-4614-4342-1.
3. Ashutosh Nandeshwar, "Tableau Data Visualization Codebook", Packt publishers, ISBN : 978-1-849-68-978-6.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	AY: 2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Advanced Software Skill Development Lab
	COURSE CODE	CS404
	COURSE CREDITS	2
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME		**EVALUATION SCHEME :**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
–	4	–	–	–	–	75	75

AIM:

To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS404.CEO.1:To play role of Web developer.
CS404.CEO.2:To acquire the skills of Advanced Java.
CS404.CEO.3:To implement application using IDLE tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS404.CO1:Identify advance concepts of java programming Servlet and JSP.
CS404.CO2:Design and develop platform independent applications using a variety of component based frameworks
CS404.CO3:Able to implement the concepts of Hibernate EJB for building enterprise applications.

Guidelines for Laboratory Conduction

The assignments to be framed by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. All problem statements or the assignments are based on real world problems/applications. In addition to these, instructor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed. The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Module	**Advanced JAVA**	**36 HOURS**

Prerequisite: CPP

Industry Expert: Mr. TusharKute

Course Instructor: Mr. TusharKute

Course Content

Basics of Servlets: ServletRequest, Servlet Collaboration, ServletConfig, ServletContext, Attribute, Session Tracking, Event and Listener, Filter, ServletInputStream and ServletOutputStream, Annotation Servlet

Basics of JSP: Scripting elements, Implicit Objects, Directive Elements, Exception Handling, Action Elements, Expression Language, MVC in JSP, JSTL, Custom tags, JavaMail API,

Java Server Faces2.0 Introduction to JSF, JSF request processing Life cycle, JSF Expression Language, JSF Standard Component, JSF Facelets Tag, JSF Convertor Tag, JSF Validation Tag, JSF Event Handling and Database Access, JSF Libraries: PrimeFaces

Basics of Struts2: Core Components, Struts 2 Architecture, Struts2 Action, Struts2 Configuration, Interceptors, Struts 2 Validation, Hibernate with Struts2, Spring with Struts2

Introduction to JavaEE : Introduction to EJB3, Developing Session Beans, Using Dependency Injection, JMS, Message Driven Beans, Persistence Introduction to JPA

Beneftts:

1. Placement Opportunities.
2. Project

PRACTICAL List		
Practical No.01		**4 HOURS**
Write a program using Servlet to display Visitor Count.		
Practical No.02		**4 HOURS**
Write a program for authentication, which validate the login-id and password by the servlet code.		
Practical No.03		**4 HOURS**
Write a program to read data send by the client (HTML page) using servlet.		
Practical No.04		**4 HOURS**
Write a program to read data send by a client (HTML page) using JSP		
Practical No.05		**4 HOURS**
Create an Enterprise application using Session Bean (Stateless) which convert the amount from Dollar to Rupees.		
Practical No.06		**4 HOURS**
Write a Entity bean to find a student record in student data base using primary key property.		
Practical No.07		**4 HOURS**
Write program to demonstrate Java Server Faces		
Practical No.08		**4 HOURS**
Write program to demonstrate Java Server Faces – event handling		
Practical No.09		**4 HOURS**
Write program to demonstrate EJB2		
Practical No.10		**4 HOURS**
Write program to demonstrate Struts2 and Spring		
Practical No.11		**4 HOURS**
Write a program to query record based on primary key using Hibernate.		
Practical No.12		**4 HOURS**
Write a program using Hibernate to develop classes and Hibernate configuration to persist an EventManager application. The classes in EventManager are		
Mini Project :		**8 HOURS**
Note: Mini Project Group of 2-3 students		

REFERENCES

1. Kogent Learning Solutions,"JAVA Server Programming JAVA EE7",DreamTech paperback edition 2014, ISBN: 978-1-118-16430-3.
2. Hans Bergsten, "Java Server Pages", Oreilly, 2012, ISBN: 978-1565927469.
3. Kahy Sierra, Bert Bates, "Head First EJB", Oreilly, Paperback 2017, ISBN : 978-8173665264

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Major Project - I
	COURSE CODE	IT402
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TERMWORK	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
-	8	–	–	–	100	50	150

PRE-REQUISITE :

1. IT213 : Minor Project
2. IT324 : Mini Project

COURSE OBJECTIVES :

IT402.CEO.1:To implement the idea/ real time industrial problem/ current application from engineering domain

IT402.CEO.2:To evaluate an alternative approaches and justify the use of selected tools and methods

IT402.CEO.3:To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.

IT402.CEO.4:To understand the roles and responsibility, accountability and learn team work ethics

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT402.CO1:Solve real life problems by applying the knowledge and problem solving ability.

IT402.CO2:Analyze alternative approaches, find feasible solution and apply most appropriate one.

IT402.CO3:Use standard engineering tools and processes for analysis, design, simulation, testing, Implementation and deployment of idea into practice.

IT402.CO4:Participate effectively in multidisciplinary and heterogeneous teams exhibiting team work, inter-personal Relationship, conflict management and leadership quality.

PREAMBLE:

objective of this Major Project-I course is to understand the Product Development through team work. The students will able to shoulder the roles and responsibility and activity distribution amongst them. The students will learn designing, budgeting, planning, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards while developing the application/ product. The students will deliver a presentation on the advancement in Technology pertaining to the selected project topic and able to understand importance of document design and professional ethics.

GUIDELINES:

Project work stage –I is an integral part of Project work. In this, the student shall complete the partial work of project, consist of problem statement, literature survey, Project specification and planning. The students expected to complete the project at least up to the design phase. As a part of project phase-I, candidate shall appear for two reviews and delivered the presentation on the advancement of selected project topic. The student shall submit the duly certified project report in standard format for satisfactory completion of work by the concern Advisor and Dean of the School.

The examinee will be assessed by panel of examiner of which one is necessarily as a external examiner. The assessment will be broadly based on work undergone, content delivery, presentation skills, documentation, question answer and report.

Preparation of the Literature survey paper and communicating and publishing in relevant publishing agency agency is recommended. Bonus 10 marks will be awarded.

Follow the guideline and formats as mentioned in guideline document Annexure-I.)

TIMELINE

1. Formation of Project Group: 2 Weeks (1st ,2nd week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (3rd, 4th week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (7th, 8th week)
4. Preparation of Project Progress Report – I (week 9th and 10th)
5. Project Phase-I Evaluation by external examiner (End Semester by 12th, 13th week)

ASSESSMENT

1. Internal Assessment (TW)

a. Project Review -1 Project Approval -30 Marks

b. Project Review -2 Analysis and Design- -30 Marks

c. Project Review -3 Project progress Report-I and Presentation - 40 Marks

d. Paper publication/IPR -10 marks (Bonus)

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

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SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Human Computer Interactions
	COURSE CODE	CS431
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ESE	IA			
3	2	30	40	30	–	50	100

PRE-REQUISITE :

1.IT201 Engineering Informatics

2.CS301 Operating System

COURSE OBJECTIVES :

CS431.CEO.1:To apply the foundations of Human Computer Interaction.

CS431.CEO.2:To Understand the design technologies for individuals and persons with disabilities.

CS431.CEO.3:To apply the guidelines for user interface.

COURSE OUTCOMES :

The students after completion of the course will be able to

CS431.CO.1:Design effective dialog for HCI.

CS431.CO.2:Design effective HCI for individuals and persons with disabilities.

CS431.CO.3:Understand the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.

CS431.CO.4:Develop meaningful user interface.

THEORY COURSE CONTENT		
UNIT 1	**Foundation of HCI**	**8 HOURS**
App/System/Case study: Automatic syringe: setting the dose to 1372. The effect of one key slip before and after user involvement **Content:** Why Human Computer Interaction, What is HCI,Design focus:Human input output channels, Skill acquisition, Design Focus: Machine I/O Channels and Skill acquisition, limitations of interactive performance, models of interactions **Self-Study:** Psychology and the design of Interactive systems		
UNIT 2	**Framework and HCI**	**8 HOURS**
App/System/Case study: ATM machine **Content:** Ergonomics, Interaction Styles, Interactivity, Context of Interaction, HCI Paradigm: Time sharing, video display unit, programming tool kits, Personal computing, The metaphor, sensor based and context aware interfaces **Self-Study:** Ubiquitous Computing **Further Reading:** Agent based Interfaces		
UNIT 3	**Design Process**	**8 HOURS**
App/System/Case study: Product prototype development **Content:** What is Design, Process of Design, User focus, Scenarios, Navigation Design, Screen design and layout, HCI in software process: interactive systems and SDLC, Design rules: golden rules and Heuristics, HCI pattern **Self-Study:** Interactive design and Prototyping **Further Reading:** Design rationale		

UNIT 4	Evaluation and Support	8 HOURS

App/System/Case study:

application development for users with disabilities

Content:

Implementation Support, UI management system, Evaluation Techniques: Goals, evaluation through experts, model based evaluation, user participation in evaluation, universal design: design principles, multimodal interactions: sound, touch, handwriting, gesture,

Self-Study: Heuristic evaluation

Further Reading: User support

UNIT 5	Models and Theories	8 HOURS

App/System/Case study:

Mobile User Interfaces

Content:

Cognitive model: model theory, linguistic models, Physical and device models, Communication and Collaborative models: face to face model, Text based model

Self-Study: Computer Mediated Communication

Further Reading: Modeling Rich Interactions

PRACTICAL:: Perform following experiments using Open source tools

Note: Following are the reference case studies, can be changed with other appropriate examples with same level.

PRACTICAL NO.1	Mini Project	22 Hrs
	1. Students need to work on user requirements, UI requirements	04
	2. Work on ergonomics and context interaction	04
	3. Development of prototype	10
	4. Evaluation of all sort of interfaces used in the project	04

TEXT BOOK

1. Alan Dix, Janet Finlay" Human Computer Interaction" 3rd Edition, Pearson publication, ISBN 0130461091

REFERENCE BOOK

1. Kent Norman, JurekKirakowski "Handbook of Human Computer Interaction" Wiley Publication, ISBN 9781118976135
2. Helen Sharp, Jenifer Preece" Interaction Design beyond Human Computer Interaction" 5th Edition, ISBN 978-1119547259

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Distributed System
	COURSE CODE	CS 441
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EVALUATION SCHEME**						
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION		TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA				
3		30	40	30			-	100

PRE-REQUISITE: :

1. CS301- Operating System
2. CS323-Computer Network

COURSE OBJECTIVES :

CS441.CEO.1:To Understand design issues of distributed system.

CS441.CEO.2:To Analyze algorithm for communication, security and synchronization in distributed system.

CS441.CEO.3:To Provide an exposure to commercial distributed applications / tools / technologies.

COURSE OUTCOMES :

After completion of the course, the students will be able to,

CS441.CO1:Classify distributed system models and architectures.

CS441.CO2:Explain design issues of distributed system.

CS441.CO3:Design distributed applications using distributed communication models.

CS441.CO4:Analyze different algorithms for concurrency and synchronization of distributed system.

CS441.CO5:Analyze the performance of distributed system based on fault tolerance, security, scalability.

THEORY		
UNIT 1	**Introduction of Distributed System**	**5 HOURS**
Application/ Case Study/ System: Distributed Reddening in Gaming, Online Gaming **Contents:** Distributed System Definition, Goals, Types, System Architecture, Trends in Distributed Systems **Self-Study:** Amoeba **Further Reading:** CODA		
UNIT 2	**Communication**	**6 HOURS**
Application/ Case Study/ System: SunRPC **Contents:** MPI, Message Oriented Communication, Stream Oriented Communication, Multicast Communication **Self-Study:** JavaRMI **Further Reading:** IBM's Web sphere Message Passing		
UNIT 3	**Synchronization**	**8 HOURS**
Application/ Case Study/ System: Distributed Camera System **Contents:** Clock Synchronization-Physical Clock, Clock Synchronization Logical Clock- lamport, Vector, Mutual Exclusion, Election Algorithm, Consensus and Agreement Algorithm **Self-Study:** Trace Synchronization **Further Reading:** Paxos		
UNIT 4	**Consistency Replication**	**8 HOURS**
Application/ Case Study/ System: Amazon's Dynamo **Contents:** Need of Replication, Replication as scaling techniques, Data centre consistency model, Client centre consistency model, Consistency Protocol **Self-Study:** Replica Management **Further Reading:** View Stamped Replication.		
UNIT 5	Fault Tolerance	**7 HOURS**
Application/ Case Study/ System: Fault tolerance in RAFT, Zookeeper **Contents:** Faulty System, Failure Models, Failure Techniques, Reliable Client Server Communication, Reliable Group Communication, Distributed Communication, Recovery. **Self-Study:**Fault Tolerance in Spark **Further Reading:** Handling Byzantine Failure		

UNIT 6	Distributed System Security	6 HOURS

Application/ Case Study/ System: Kerberos

Contents:

Design issue of Distributed System, Secure Channels, Access Control, Firewall, Secure Mobile Code, DOS

Self-Study: Secure Management , JINI

Further Reading: Security in Block Chain

TEXT BOOK

1. Andrew.S.Tanenbaum, Maarten Van Steen, Distributed Systems –Principles and Paradigms, Third Edition, Prentice Hall -2016. ISBN-9788120322158.
2. Coulouris, J. Dollimore, and T. Kindberg, Distributed Systems: Concepts and Designs, Fifth Edition, Addison Wesley, 2012.ISBN- 9780132143011.

REFERENCES:

1. Mukesh Singal, Advanced Concepts in operating System, Mcgraw Hill, ISBN-9780070472686.
2. Pradeep K. Sinha," Distributed Operating Systems: Concepts and Design", Prentice Hall India Learning Private Limited , ISBN-978-8120313804.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	IoT and Wireless Sensor Network
	COURSE CODE	IT442
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	-	30	60	10	-	-	100

PRE-REQUISITE : 1. ME103 : Design Thinking 2. IT203 : Computer Network Technology

COURSE OBJECTIVES :

IT442.CEO.1:Understand the Architectural overview of IoT and WSN.
IT442.CEO.2:Make use of suitable communication protocols
IT442.CEO.3:Analyze various design principles
IT442.CEO.4:Apply the IoT concepts in Real World problems.

COURSE OUTCOMES :

The Students after completing the course will be able to,

IT442.CO.1:Understand the concept of Internet of Things and Wireless Sensor Network
IT442.CO.2:Analyze basic protocols in Wireless Sensor Network
IT442.CO.3:Design IoT applications in different domain and able to analyze their performance.
IT442.CO.4:Implement IoT applications.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Internet of Things**	**6 HOURS**

Application/System/Case Study:

Introduction :- Internet of Things, characteristics of IoT, IoT conceptual framework, IoT architectural view, functional blocks of IoT, technology and sources of IoT M2M – difference between machine to machine (M2M) and IoT, M2M communication, modified OSI model of IoT/M2M systems, M2M and IoT analytics

Self-Study: Devices and gateways, LAN and WAN

Further Reading: Standard considerations IoT

UNIT 2	Overview of Wireless Sensor Network	7 HOURS

App/System/Case Study:

Wireless Sensor Network application in Agriculture use of various sensors

Introduction – Wireless Sensor Network, enabling technologies for Wireless sensor network, challenges for WSN Architecture – Single node architecture, Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture-Sensor Network Scenarios, Optimization Goals and Figures of Merit, Design principles for WSNs, Service interfaces of WSNs Gateway Concepts.

Self-Study: Difference between WSN and IoT

Further Reading: Wireless Sensor Network application in Healthcare.

UNIT 3	Architecture and Design Principles for IoT.	7 HOURS

App/System/Case Study:

Designing IoT based Home monitoring system for assisting diabetes patients.

Contents:

IoT System Architectures – Elements of IoT architecture, Device management, User management, Security monitoring Data Collection, Data Aggregation, Analyzing Data, Acting on Data, Storage and Computing using a Cloud Platform: Introduction, Cloud computing paradigm for data collection, storage and computing, Cloud service models, IoT Cloud- based data collection, storage and computing services using Nimbits

Self-Study: Various ways to collect data for IoT

Further Reading: Security issues in IoT

UNIT 4	Internet of Things Protocols and Standards.	8 HOURS

App/System/Case Study:

Architecture and Protocols in IoT (IEEE)

Contents:

Data Link Layer - IEEE 802.11, IEEE 802.15, IEEE 802.15-4, A-Wave, Bluetooth, Zegbee, Z-Wave, LoRaWAN, Wireless HART Network Layer Routing Protocols – IPv4, IPv6, 6LoWPAN Transport Layer Protocols, Transport Layer protocols – TCp, UDP, SCTP Session Layer Protocol – CoAP, XMPP, DDS, MQTT IoT management protocols, Security in IoT protocols – MAC 802.15.4, 6LoWPAN. **Self-Study:** Wi-Fi

Further Reading: Near Field Communication(NFC), Sigfox protocols

UNIT 5	Prototyping and Designing Software for IoT Applications	8 HOURS
App/System/Case Study: Case study - Home Automation using Arduino / Raspberry Pi **Contents:** Introduction, Prototyping Embedded device software, Programming Embedded Device Arduino Platform using IDE, Raspberry pi, Reading data from sensors and devices, Devices, Gateways, Internet and Web services software development. Programming MQTT clients and MQTT server. Introduction to IoT privacy and security. Vulnerabilities, security requirements and threat analysis, IoT Security Tomography and layered attacker model. **Self-Study:**Application for development of connected cars **Further Reading:**IoT Symmetric and non symmetric encryption standards+		
UNIT 6	**Recent Trends and Internet of Everything (IoE).**	**6 HOURS**
App/System/Case Study: Internet of Everything case study – Goldcorp by CISCO **Contents:**Recent Trends – IoT and Blockchain, IoT- Healthcare, IoT - Bigdata, IoT-Artificial Intelligence Introduction to IoE, Pillars of IoE, Difference between IoT and IoE, Impact of IoE on Business **Self-Study:** IoT in Various sectors **Further Reading:**Recent trends in IoT and IoE		

TEXT BOOK:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things - Hands-on Approach", Orient Blackswan, 2015, ISBN 978-8173719547.
2. Olivier Hersent, David Boswarthik "The Internet of Things – Applications and Protocols", Wiley Publications, 2015, ISBN – 9788126557653.
3. Rajkumar Buyya, Amir Dustjerdi, "Internet of Things – Principles and Paradigms" , Morgan Kaufmann, 2016, ISBN - 978-8173739564

REFERENCES:

1. DieterUckelmann, MarkHarrison "Architecting the Internet of Things", Springer
2. Peter Cocovic, Reinhold Behringer, "Emerging Trends and Application in Internet of Things", IGI Global, 2017, ISBN- 978-1522524373.
3. Hanes Divid, Salgueiro Gonzalo, "IoT Fundamentals – Networking Technologies, Protocols and use cases of IoT", Pearson, 2017, ISBN - 978-9386873743..

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Computer Graphics and Multimedia Technique
	COURSE CODE	IT 443
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EVALUATION SCHEME**						
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION		TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA				
3		30	40	30			-	100

PRE-REQUISITE: :

1. CS201- Data File Structures
2. CP-Computer Programming

COURSE OBJECTIVES :

IT443.CEO.1: To acquaint the learners with the basic concepts of Computer Graphics.
IT443.CEO.2: To learn the various algorithms for generating and rendering graphical figures
IT443.CEO.3: To get familiar with mathematics behind graphical transformations
IT443.CEO.4: To understand various methods of clipping and fractals.
IT443.CEO.5: To understand various methods of clipping and animation.
IT443.CEO.6: To understand multimedia system.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

1.IT443.CO.1:To apply mathematics to develop Computer graphics programs for elementary graphic operations. (Apply)

1.IT443.CO.2:To develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics. (Apply)

1.IT443.CO.3:To develop programs on 2D and 3D transformation(Apply).

1.IT443.CO.4:To apply various methods and techniques for projection (Apply).

1.IT443.CO.5:To Apply the logic to develop programs on clipping,and animation(understand).

1.IT443.CO.6:To understand Multimedia Techniques

THEORY		
UNIT 1	**Graphics primitives and Scan conversion**	**6 HOURS**

Application/ Case Study/ System: Display devices –Radar displays, LCD, LED, HDTV

Contents:

Introduction to Computer Graphics, Definition: Pixel, Frame buffer, Aspect ratio, Resolution Primitives: Lines, Line segments, vectors Display file: Display file structure, Display file interpreter Line drawing algorithms: Digital Differential Analyzer (DDA), Bresenham Circle drawing algorithm: Bresenham, Midpoint algorithm Character generating method: Stroke and bitmap method

Self-Study: Line styles: Thick, dotted and dashed, DDA circle drawing algorithm

Further Reading: Raster refresh Displays, CRT basics, Video basics, Flat panel Displays

UNIT 2	**Polygon, Windowing and Clipping**	**6 HOURS**

Application/ Case Study/ System: Application of clipping algorithm in video games

Contents:

Definition, Types of polygon, Convex and Concave, Representation of polygon, inside test of polygon, Polygon filling algorithms: Flood fill, Seed fill and scan fill algorithm Windowing: Definition of window, viewport, viewing transformation Clipping: Cohen Sutherland outcode algorithm, Sutherland Hodgeman algorithm

Self-Study: Self intersecting polygon

Further Reading: Cyrus-Beck Clipping

UNIT 3	**Graphics Programming using OPENGL**	**6 HOURS**

Application/ Case Study/System: Texture Filtering.

Contents:

Introduction to OpenGL, Features in OpenGL, OpenGL operations, Abstractions in OpenGL – GL, GLU GLUT, 3D viewing pipeline, viewing matrix specifications, a few examples and demos of OpenGL programs.

Self-Study: OpenGL Polygon Rasterization.

Further Reading:Illumination using OpenGL

UNIT 4	**Geometric Transformation**	**6 HOURS**

Application/ Case Study/ System: Animation

Contents:

2D transformation: Introduction, matrices of Translation, scaling and rotation, Homogeneous coordinates, Rotation about an arbitrary point, Shear transformation, Reflection about X axis, Reflection about Y axis and Reflection about X=Y axis 3D Transformation: Introduction, Translation, Rotation about X axis, Y axis and Z axis Projection: Parallel and Perspective projection

Self-Study: Classification of projection

Further Reading: 3D viewing, 3D clipping

UNIT 5	Segment and Animation	6 HOURS

App/System/Case study: Animation in medical, Architecture

Contents:

Segment table, Segment creation, closing a segment, deleting a segment, visibility Introduction to animation, Design of Animation sequences, Animation languages, Animation guidelines, Key frame, Computer based animation

Self Study: Morphing

Further Reading: Colour models RGB,CMY HSV

UNIT 6	**Multimedia Systems Design**	6 HOURS

App/System/Case study: Multimedia and web

Contents:

An Introduction, Multimedia applications , Multimedia System Architecture, Evolving technologies for Multimedia, Defining objects for Multimedia systems, Multimedia Data interface standards, Multimedia Databases.

Self Study: Multimedia I/O technologies

Further Reading: Distributed Multimedia Systems.

TEXT BOOK

1.D. Hearn and M. Baker "Compute Graphics",2nd Edition,Pearson Education,2002,ISBN-7808-794-4

2.D.Hearn, Computer Graphics with OpenGL",4th Edition,ISBN-139780136053583

REFERENCES:

1.S. Harrington, Computer Graphics", 2nd Edition, McGraw-Hill Publications,1987,ISBN 0-07-100472-6

2.D. Rogers, "Procedural Elements for Computer Graphics",2nd Edition, Tata McGraw-Hill publication,2001,ISBN 0-07-047371-4.

3.D.Rogers, J.Adams, Mathematical Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill publication,2002,ISBN 0-07-048677-8.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 – 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY All Branches	**COURSE NAME**	Sociology
	COURSE CODE	HP402
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP402.CEO.1:The course focuses on the society in India with an attempt to acquaint students with sociology as a social science and the distinctiveness as a social science.

HP402.CEO.2:It displays the relevance and significance of sociology in understanding the society and in attempting to solve its problems.

HP402.CEO.3:Many of the Sociological Changes are an answer to the age-old social norms and practices giving rise to a solution which is critical to social issues and problems.

HP402.CEO.4:The course sensitizes students to the emerging social issues and enables them to acquire sociological understanding of these issues with an ability to answer the problems.

HP402.CEO.5:Projects in Sociology are tools that facilitate the construction of knowledge in imparting the right attitude towards social issues .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP402.CO.1:Get acquainted to sociology as a social science.

HP402.CO.2:Explain the significance of sociology in solving problems.

HP402.CO.3:Derive solutions to critical social issues.

HP402.CO.4:Change their attitude towards social issues.

THEORY		
UNIT 1	**Introduction to Sociology**	**6 HOURS**
The nature of Sociology, meaning of Sociology: Origin, Definition, Scope, Culture, meaning, components, beliefs, values, norms, technology, diversity, towards a global culture.		
UNIT 2	**Sociolization**	**5 HOURS**
Socialization, Agents of Socialization, Heredity and Environment, Group, Social structure, Status and role, family, school, peer group, media, adult socialization, resocialization, Role of Social moments, Illustrations: Women, Tribal & Dalit Movements . **Further Reading:**		
UNIT 3	**Nature and factors of Social Change**	**5 HOURS**
Change: Meaning. Nature and factors of Social Change: Biological Factors. Demographic Factors, Technological Factors, Economic Factors Cultural Factors, Info-tech factors, Meaning of Gender sensitization, Discrimination, violence and Abuse. **Further Reading:**		
UNIT 4	**Visions of Social Change in India**	**4 HOURS**
Idea of development planning and mixed economy, Constitution, law and social change, Education and social change. **Further Reading:**		
UNIT 5	**Works and Economic Life**	**4 HOURS**
Social organization of work in different types of society- slave society, feudal society, industrial /capitalist society. Formal and informal organization of work. Labour and society. **Further Reading:**		
UNIT 6	**Introduction to Applied sociology**	**4 HOURS**
The use of Sociology: Introduction to applied Sociology-Sociology and social problems, Ecology and Environment: Pollution, Global warming and Greenhouse effect. Impact of Industrialization and Urbanization on Environment.		

REFERENCE BOOKS

1. T.B. Bottomore, Sociology: A Guide to Problems and Literature, Blackie and Sons Publishers, 1978, ISBN:978-0043000267
2. Sociology: A guide to problems and literature. Bombay: George Allen and Unwin (India): Harlambos, M.1998. ISBN: 978-0043000267
3. Sociology: Themes and perspectives. New Delhi Oxford University Press.: Inkeles, Alex, 1987
4. What is Sociology, Madras: Macmillan, India: Johnson, Harry M. 1995.
5. Sociology: A Systematic Introduction. New Delhi, Allied Publishers. ISBN: 978-8170231370 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2016 – 2020)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2019 – 2020
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**COURSE NAME**	Major Project – II
	COURSE CODE	IT432
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE		MSE	ESE	IA	TERMWORK	DEMONSTRATION	
-	8	–	–	–	100	50	150

PRE-REQUISITE : IT402 Major Project– I

COURSE OBJECTIVES :

IT432.CEO.1:To follow the standard guideline to meet the objective for development of Project.
IT432.CEO.2:To test rigorously before deployment of Systems
IT432.CEO.3:To Verify and Validate the work Undertaken
IT432.CEO.4:To Consolidate the work and preparation of final report

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT432.CO1:Show the evidence of independent evaluation.
IT432.CO2:Critically analyzed the result and their implementation methodology.
IT432.CO3:Validate the results with standard tools and techniques.
IT432.CO4:Understand the importance of documentation and report writing.

PREAMBLE:

objective of this Major Project-II to implement the full and final project and the report. After The remaining project work which consist of selection of approach / methodology / tools and techniques, Designing, installation, results and performance evaluation. Also includes the comparative analysis and validation of result. Should prepare the Project report as per format for satisfactory completion of work certified by concern project advisor and dean. .

It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded.:

Follow the guideline and formats as mentioned in guideline document.(Annexure-II):

GUIDELINES:

In Project Work Stage-II, the student shall complete the remaining project work which consists of Selection of Methodology, Tools and Technology, Installations, Design, Implementations, testing, Results, performance analysis if applicable (discussions using data tables per parameter considered for the improvement with existing/known algorithms/systems) and comparative analysis and validation of results and conclusions. The student shall prepare and submit the report of Project work in standard format for satisfactory completion of the work that is the duly certified by the concerned advisor and Dean of the school.

It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded.

Follow the guideline and formats as mentioned in guideline document.(Annexure-II)

TIMELINE

1. Presentation of Project Review- 3 Project Progress Monitoring DRC review – (Week 5th)
2. Presentation of Project Review – 4 Project Progress Monitoring and Report Preparation –(Week-8th)
3. Internal Examination/ Project Expo: Project-2 Demonstration and presentation- (Week 10th)
4. External Examination: Project-2 Demonstration and Presentation- (End semester-Week 12th or 13th)

ASSESSMENT

1. Internal Assessment

a. Project Review -3 Progress Monitoring - 30 Marks

b. Project Review -4 Progress Monitoring and Report Preparation -30 Marks

c. Project Expo/ Examination- Evaluation Presentation and Demonstration- 30 Marks

d. Paper publication/presentation/IPR -10 Marks

2. Examination: Final Demonstration and presentation a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Final Year

Bachelor of Technology in

Information Technology

(Amendments for Semester Long Internship)

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering **(An Autonomous Institute Affiliated to SPPU)**	**SEMESTER LONG INTERNSHIP** **Rules and Regulations** **(2016 - 2020)**

1. ELIGIBILITY:

I. No live backlogs
II. CGPA of 8.50 and above
III. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student)

Only students satisfying the above criteria can be permitted for semester-long internship in any MNCs / R&D laboratories such as DRDO, NCL, NEERI, CDAC and Institutions like IITs/ NITs / International institutes of repute.

2. DEADLINES:

For the current batch, the applications must be submitted by 30, November 2019 by all students desired to go for the semester long internship.

3. APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including details of the organization along with the details of the project in brief, copy of their CV and copies of mark sheet to the respective school Corporate Relations (CR) coordinator. The application must be as per the format given below.

Application for Internship Program

Sr. No.	Particulars	
1	Name of the applicant (in bold letters)	
2	Gender	
3	School	
4	Date of Birth & Age (as on date)	
5	Roll Number & PRN	
6	Address for correspondence with mobile / telephone number and email-id	
7	Name & address of the Institute / Industry	
8	Core Domain of Institute / Industry	

9	Contact details Supervisor / HR Mobile / Telephone number and email-id	
10	Period of internship	24-26 weeks
11	Details of the Project proposed	

Signatures

Student	School Internship Coordinator
Approved by:	
No. of credits proposed	6 / 10
Dean – School of _____ Engineering	MIT AOE Seal
Date:	

4. RULES & CONDITIONS:

I. Sponsored project should be along the same track of the minor (Open Elective) chosen by the student. (desirable)

II. Semester long internship is applicable only in the 8th semester.

The distribution of credits for the VIII semester is as follows

DC	Department Core	4 Credits
DE	Department Elective	3 Credits
OE	Open Elective	4 Credits
HSS	Humanities & Social science	2 Credits
SDP	Skill development and Project	4 Credits

III. For a student who is going for a semester long internship, 10 credits (OE, HSS and SDP) will be awarded if OE is part of the internship otherwise 6 credits will be awarded.

IV. The equivalence courses for the DC, DE and OE must be floated by the Schools.

V. The credits of DC, DE and OE should be earned through MOOC courses.

VI. If a student is not able to successfully earn the credits of the DC / DE / OE within the stipulated time, they will not be eligible for the graduation in the same academic year.

5.1 ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel.

i) The Panel for the evaluation should be 3 members (if 3 credits) or 4 members (if 5 credits). The composition of the team would be as follows.

i. Dean, Respective School ii. CR Coordinator / Project Coordinator / Project Guide iii. Project Guide (Industry)

iv. The domain expert (In case of 5 credits, as per the minor specialization)

ii) Presentation I at the end of 45th day and presentation II at the end of 90th day from the start of the project combined to a total weightage of 5 credits ***(3 credits if OE is exempted).*** Itcan be possible to do through Skype, if acceptable to the panel. **In Grade card it will be mentioned as SLIP – Project Design.**

iii) Presentation at the end of the Internship Work and Final Internship Report after the completion of the Internship Work combined for a total weightage of 5 credits ***(3 credits if OE is exempted)*** and should be as per the template).**In Grade card it will be mentioned as SLIP – Project Implementation.**

5.2 ASSESSMENT METHOD FOR OTHER COURSES RUN THROUGH INSTITUTE LMS:

Credits for the courses run through Go-Webinar will be assessed using the following methods.

I. There will be SIX assignments (one per unit) to be submitted through the moodle. This will have a weightage of 30% of the total score. This contributes to the IA for the course.

II. There will be SIX quizzes (one per unit) to be conducted through moodle. This will have a weightage of 30% of the total score. This contributes to the ISE for the course.

III. One FINAL presentation to be done at the end and evaluated by a team of THREE members including the Course Champion, Instructor and any other nominated member by the respective School Dean. This will have a weightage of 40% of the total score. This contributed for the ESE of the course.

MIT | Academy of Engineering (An Autonomous Institute)	**CURRICULUM STRUCTURE (2016 - 2020)**		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**:**	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**RELEASE DATE**	**:**	01/06/2019
	REVISION NO.	**:**	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 12	CS401	Software Engineering, Testing and Quality Assurance.	3	2	4
2.	DE 1	IT41#	Department (Program) elective - Ref er Annexure	3	0	3
3.	OE 3	IT42#	Open Elective – Refer Annexure	3	2	4
4.	HSS 6	HP402	Sociology	2	--	2
5.	HSS7/S DP7	HP403/CS 40#	Business Strategies/ Advance skill development lab(Adv. Java/R Programming/Python with kali Linux)	---	2	1
6.	SDP 8	IT402	Project – I	--	8	4
7.	SDP9	IT403	Summer Internship	--	--	4
			TOTAL	11	14	22

SEMESTER: VIII (SLIP not inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 13	CS431	Human Computer Interaction @	4	-	4
2.	DE2	CS44#	Department Elective	3	-	3
3.	OE4	CS45#	Open Elective @	4	-	4
4.	SEMESTER LONG INTERNSHIP – Project Design			-	6	3
5.	SEMESTER LONG INTERNSHIP – Project Implementation			-	6	3
TOTAL				**11**	**12**	**17**

MIT | Academy of Engineering (An Autonomous Institute)	**CURRICULUM STRUCTURE (2016 - 2020)**		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**:**	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY INFORMATION TECHNOLOGY	**RELEASE DATE**	**:**	01/06/2019
	REVISION NO.	**:**	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC 12	CS401	Software Engineering, Testing and Quality Assurance.	3	2	4
2.	DE 1	IT41#	Department (Program) elective - Ref er Annexure	3	0	3
3.	OE 3	IT42#	Open Elective – Refer Annexure	3	2	4
4.	HSS 6	HP402	Sociology	2	--	2
5.	HSS7/SDP7	HP403/CS40#	Business Strategies/ Advance skill development lab(Adv. Java/R Programming/Python with kali Linux)	---	2	1
6.	SDP 8	IT402	Project – I	--	8	4
7.	SDP9	IT403	Summer Internship	--	--	4
			TOTAL	11	14	22

SEMESTER: VIII (SLIP inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC13	CS431	Human Computer Interactions @	4	-	4
2.	DE2	CS44#	Department Elective	3	-	3
4.	SEMESTER LONG INTERNSHIP – Project Design			-	10	5
5.	SEMESTER LONG INTERNSHIP – Project Implementation			-	10	5
TOTAL				**7**	**20**	**17**

@ - Courses run through institute LMS.

DEPARTMENT ELECTIVE ON MOOCS PLATFORM			
SR. NO.	**COURSE DETAILS**	**MOOC DETAILS**	**NO. OF WEEKS**
1.	Distributed system (IIT)	NPTEL	8
2.	Introduction to industry 4.0 and industrial IOT (IIT)	NPTEL	12
3.	Virtual Reality Engineering (IIT)	NPTEL	12

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

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Savitribai Phule Pune University

Curriculum

For

Bachelor of Technology

In

Mechanical Engineering

(Choice Based Credit System)

2016-2020

BoS Chairman	Member Secretary	Chairman
(Dean, School of Mechanical & Civil Engineering)	Academic Council (Dean, Academics)	Academic Council (Director, MITAoE)

CHAIRMAN
BOS-Mechanical Engineering
MIT Academy of Engineering
(An Autonomous Institute)

MIT Academy of Engineering

An autonomous institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK- (MECHANICAL ENGINEERING)

The B. Tech Program shall be based on the following type of courses

SL. NO.	TYPE OF COURSE	ABBREVIATION
1.	Natural Science	NSC
2.	Engineering Science	ESC
3.	Program Core	PC
4.	Discipline Core	DC
5.	Department Elective	DE
6.	Open Elective	OE
7.	Humanities and Social Science	HSS
8.	Skill Development and Project	SDP

The Course and Credit Distribution shall be as under,

SL. NO.	TYPE OF COURSE	NO. OF COURSES	TOTAL CREDITS	
			NO.	%
1.	Natural Science	**4**	**18**	**10.96**
2.	Engineering Science	**4**	**16**	**9.76**
3.	Program Core	**5**	**19**	**11.59**
4.	Discipline Core	**12**	**48**	**29.27**
5.	Department Elective	**2**	**6**	**3.66**
6.	Open Elective	**4**	**16**	**9.76**
7.	Humanities and Social Science	**8/9**	**17**	**10.37**
8.	Skill Development and Project	**10/9**	**24**	**14.63**
TOTAL		**49**	**164**	**100**

COURSE DISTRIBUTION: SEMESTER WISE										
SL. NO.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	Natural Science	2	2							**4**
2.	Engineering Science	2	2							**4**
3.	Program Core			3	2					**5**
4.	Discipline Core			2	2	3	3	1	1	**12**
5.	Department Elective							1	1	**2**
6.	Open Elective					1	1	1	1	**4**
7.	Humanities & Social Science	1	1		1	1	2	1/2	2	**8/9**
8.	Skill Development & Project	1	1	1	1	1	1	2/3	1	**9/10**
TOTAL		**6**	**6**	**6**	**6**	**6**	**7**	**5**	**6**	**49**

CREDIT DISTRIBUTION: SEMESTER WISE										
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit										
SL. NO.	**TYPE OF COURSE**	**NO. OF CREDITS/SEMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	Natural Science	9	9							**18**
2.	Engineering Science	8	8							**16**
3.	Program Core			11	8					**19**
4.	Discipline Core			8	8	12	12	4	4	**48**
5.	Department Elective							3	3	**6**
6.	Open Elective					4	4	4	4	**16**
7.	Humanities & Social Science	2	2		3	2	3	2	3	**17**
8.	Skill Development & Project	2	2	2	2	2	2	8	4	**24**
TOTAL		**21**	**21**	**21**	**21**	**20**	**21**	**22**	**18**	**164**

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2016-17
FY BTECH	RELEASE DATE	:	01/06/2016
DEPARTMENT OF MECHANICAL ENGG	REVISION NO.	:	0.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS101	Mathematics – I	4	1	5
2.	NSC2	AS102/ AS103	Physics/ Chemistry	3	2	4
3.	ESC1	EX101/ CV101	Electrical & Electronics Engg/ Applied Mechanics	3	2	4
4.	ESC2	ME101/ IT101	Engineering Graphics/ Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – I	1	2	2
6.	SDP1	ME102/ ME103	Experimental Tools & Techniques/ Design Thinking	--	4	2
TOTAL				13	15	21

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T	CREDIT
1.	NSC3	AS101	Mathematics – II	4	1	5
2.	NSC4	AS103/ AS102	Chemistry/ Physics	3	2	4
3.	ESC3	CV101/ EX101	Applied Mechanics/ Electrical & Electronics Engg	3	2	4
4.	ESC4	IT101/ ME101	Computer Programming/ Engineering Graphics	2	4	4
5.	HSS2	HP101	Language & Communication – II	1	2	2
6.	SDP2	ME103/ ME102	Design Thinking/ Experimental Tools & Techniques	--	4	2
TOTAL				13	15	21

*L: Lecture, P: Practical, T:Tutorial; *Applicable for FY BTech*

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2017-18
S Y B TECH	RELEASE DATE	:	01/06/2017
DEPARTMENT OF MECHANICAL ENGG	REVISION NO.	:	0.0

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS201	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	ME202	Thermal Engineering	3	2	4
5.	DC2	ME203	Solid Mechanics	3	2	4
6.	SDP3	ET206	Prototyping	--	4	2
TOTAL				14	14	21

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC4	IT201	Engineering Informatics	3	2	4
2.	PC5	ME201	Materials Engineering	3	2	4
3.	DC3	ME211	Fluid Mechanics	3	2	4
4.	DC4	ME212	Manufacturing Technology	3	2	4
5.	HSS3	HP201	Psychology	3	--	3
6.	SDP4	ME213	Minor Project	--	4	2
TOTAL				15	12	21

L: Lecture, P: Practical

MIT Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2018-19
T Y B TECH	RELEASE DATE	:	01/12/2017
DEPARTMENT OF MECHANICAL ENGG	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	ME301	Machine Design	3	2	4
2.	DC6	ME302	Machines & Mechanisms	3	2	4
3.	DC7	ME303	Heat Transfer	3	2	4
4.	OE1	ME31#	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP302	Professional Skills	--	4	2
6.	SDP5	ME30#	Skill Development Lab - Refer Annexure	--	4	2
TOTAL				12	16	20

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	ME321	Turbomachines	3	2	4
2.	DC9	ME322	Quality Assurance	3	2	4
3.	DC10	ME323	Operations Research	3	2	4
4.	OE2	ME33#	Open Elective - Refer Annexure.	3	2	4
5.	HSS6	HP303	Basics of Entrepreneurship	--	2	1
6.	HSS4	HP301	Project Management	1	2	2
7.	SDP6	ME324	Mini Project	--	4	2
TOTAL				13	16	21

L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2019-20
B TECH	RELEASE DATE	:	01/12/2018
DEPARTMENT OF MECHANICAL ENGG	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ME401	Heating Ventilation & Air Conditioning	3	2	4
2.	DE1	ME41#	Discipline Elective - Refer Annexure.	3	--	3
3.	OE3	ME42#	Open Elective - Refer Annexure.	3	2	4
4.	HSS7	HP402	Sociology	2	--	2
5.	HSS8/ SDP7	HP403/ ME40#	Business Strategies / Piping Design/ Six Sigma/ Energy Audit	--	2	1
6.	SDP8	ME402	Project - I	--	8	4
7.	SDP9	ME404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ME431	Noise Vibration & Harshness	3	2	4
2.	DE2	ME44#	Discipline Elective - Refer Annexure	3	--	3
3.	OE4	ME45#	Open Elective - Refer Annexure	3	2	4
4.	HSS9	HP401	Engineering Economics	2	--	2
5.	SDP10	ME432	Project - II	--	8	4
TOTAL				11	12	17

L: Lecture, P: Practical

CREDITS				
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit				
SL. No.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	21	21	**42**
2.	Second Year	21	21	**42**
3.	Third Year	20	21	**41**
4.	Final Year	22	17	**39**
TOTAL				**164**

CONTACT HOURS				
SL. No.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	28	28	**56**
2.	Second Year	28	27	**55**
3.	Third Year	28	29	**57**
4.	Final Year	25	23	**48**
TOTAL				**216**

ANNEXURE

Natural Science (NSC): 4 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	AS101	Mathematics – 1
2.	AS104	Mathematics – 2
3.	AS102	Physics
4.	AS103	Chemistry

Engineering Science (ESC): 4 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	EX101	Electrical and Electronics Engineering
2.	ME101	Engineering Graphics
3.	CV101	Applied Mechanics
4.	IT101	Computer Programming

Program Core (PC): 5 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	CH201	Environmental Science
2.	AS201	Applied Mathematics
3.	ET201	System Engineering
4.	IT201	Engineering Informatics
5.	ME201	Materials Engineering

Discipline Core (DC): 12 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	ME202	Thermal Engineering
2.	ME203	Solid Mechanics
3.	ME211	Fluid Mechanics
4.	ME212	Manufacturing Technology
5.	ME301	Machine Design
6.	ME302	Machines & Mechanisms
7.	ME303	Heat Transfer
8.	ME321	Turbomachines
9.	ME322	Quality Assurance
10.	ME323	Operations Research
11.	ME401	Heating Ventilation & Air Conditioning
12.	ME431	Noise Vibration & Harshness

Department Elective (DE): 2 Courses		
	Course Code	**Name of Course**
1.	ME411	Mechatronics
	ME412	Pressure Vessel Design
	ME413	Power Plant Engineering
	ME414	Product Lifecycle Management
2.	ME441	Hydraulics & Pneumatics
	ME442	Mechanical System Design
	ME443	Non-Conventional Machining
	ME444	Enterprise Resource Planning

Open Elective (OE): 4 Courses			
Computer Aided Engineering	**Sl. No.**	**Course Code**	**Name of Course**
	1.	ME311	Geometric Modeling & Design
	2.	ME331	Finite Element Analysis
	3.	ME421	Computational Fluid Dynamics
	4.	ME451	Advanced Engineering Analysis
Robotics & Automation	1.	ME312	Fundamentals of Robotics
	2.	ME332	Kinematics & Dynamics of Robots
	3.	ME422	Robotics Vision and Control
	4.	ME452	Intelligent and High Performance Robotics
Industrial Engineering & Management	1.	ME313	Work Process Assessment
	2.	ME333	Facility Planning & Design
	3.	ME423	Operations Management
	4.	ME453	Supply Chain Management

Open Elective (OE): Term - I (List of courses for Academic Year 2018-19)		
Chemical		
1	CH311	Process Modeling and Simulation.
2	CH312	Piping Engineering
Civil		
3	CV311	Construction Planning & Management
Computer		
4	IT311	Cryptography & System Security
5	CS311	Descriptive Analytics
6	CS312	Artificial Intelligence & Neural Network
Electronics		
7	EX311	Fundamentals of Robotics
E & TC		
8	ET311	Embedded System Programming (ESP)
9	ET312	IoT Architecture and Protocols
IT		
10	IT311	Cryptography & System Security
11	CS311	Descriptive Analytics
12	CS312	Artificial Intelligence & Neural Network
Mechanical		
13	ME311	Geometric Modeling & Design
14	ME312	Fundamentals of Robotics
15	ME313	Work Process Assessment

Open Elective (OE): Term - II (List of courses for Academic Year 2018-19)		
Chemical		
1	CH331	Process Engineering.
2	CH332	Piping Layout
Civil		
3	CV331	Operation Research
Computer		
4	IT331	Cyber Security
5	CS331	Data Science-I
6	CS332	Machine Learning
Electronics		
7	EX331	Kinematics and Dynamics of Robotics
E & TC		
8	ET331	Embedded Processor
9	ET332	IoT Network & Protocols
IT		
10	IT331	Cyber Security
11	CS331	Data Science-I
12	CS332	Machine Learning
Mechanical		
10	ME331	Finite Element Analysis
11	ME332	Kinematics & Dynamics of Robots
12	ME333	Facility Planning & Design

Open Elective (OE): Term - I (List of courses for Academic Year 2019-20)		
Chemical		
1	CH421	Process Optimization
2	CH422	Piping Design & Engineering
Civil		
3	CV421	Financial Management
Computer		
4	IT421	Ethical Hacking & Cyber Laws
5	CS421	Data Science-II
6	CS422	Pattern Recognition
Electronics		
7	EX421	Robotics Vision and Control
E & TC		
8	ET421	Low-Power SoC Architecture & Applications (SoC&A)
9	ET422	Privacy and Security in IoT
IT		
10	IT421	Ethical Hacking & Cyber Laws
11	CS421	Data Science-II
12	CS422	Pattern Recognition
Mechanical		
13	ME421	Computational Fluid Dynamics
14	ME422	Robotics Vision and Control
15	ME423	Operations Management

Open Elective (OE): Term - II (List of courses for Academic Year 2019-20)		
Chemical		
1	CH451	Process Intensification & Integration
2	CH452	Pipeline Engineering
Civil		
3	CV451	Visualization & Information Exchange
Computer		
4	IT451	Cyber Forensics
5	CS451	Practitioner's approach for Data analytics
6	CS452	Reinforcement Learning
Electronics		
7	EX451	Intelligent and High Performance Robotics
E & TC		
8	ET451	Real-Time Embedded System (RES)
9	ET452	Energy Management for IoT Devices
IT		
10	IT451	Cyber Forensics
11	CS451	Practitioner's approach for Data analytics
12	CS452	Reinforcement Learning
Mechanical		
13	ME451	Advanced Analysis
14	ME452	Intelligent and High Performance Robotics
15	ME453	Supply Chain Management

Humanities and Social Science (HSS): 9 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	HP101	Language & Communication – I
2.	HP102	Language & Communication – II
3.	HP201	Psychology
4.	HP301	Project Management
5.	HP302	Professional Skills
6.	HP303	Basics of Entrepreneurship
7.	HP401	Engineering Economics
8	HP402	Sociology
9	HP403	Business Strategies

Skill Development and Project (SDP): 10 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	ME102	Engineering Tools and Techniques
2.	ME103	Design Thinking
3.	ET206	Prototyping
4.	ME213	Minor Project
5.	ME304	Skill Development Lab (Autodesk Inventor)
	ME305	Skill Development Lab (CATIA)
6.	ME403	Piping Design
	ME404	Six Sigma
	ME405	Energy Audit
7.	ME324	Mini Project
8.	ME402	Project - I
9.	ME406	Summer Internship
10.	ME432	Project - II

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2019-20** (PART B)
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**RELEASE DATE**	**:**	**01/12/2018**
	REVISION NO.	**:**	**0.0**

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ME401	Heating Ventilation & Air Conditioning	3	2	4
2.	DE1	ME41#	Discipline Elective	3	--	3
3.	OE3	ME42#	Open Elective	3	2	4
4.	HSS7	HP402	Sociology	2	--	2
5.	HSS8/ SDP7	HP403/ ME40#	Business Strategies / Piping Design/ Six Sigma/ Energy Audit	--	2	1
6.	SDP8	ME402	Project – I	--	8	4
7.	SDP9	ME404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII (SLIP not in line with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ME431	Noise Vibration & Harshness@	3	2	4
2.	DE2	ME44#	Discipline Elective	3	--	3
3.	OE4	ME45#	Open Elective@	3	2	4
4.	SEMESTER LONG INTERNSHIP – Project Design			--	6	3
5.	SEMESTER LONG INTERNSHIP – Project Implementation			--	6	3
TOTAL				7	20	17

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2019-20** (PART C)
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**RELEASE DATE**	**:**	**01/12/2018**
	REVISION NO.	**:**	**0.0**

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ME401	Heating Ventilation & Air Conditioning	3	2	4
2.	DE1	ME41#	Discipline Elective	3	--	3
3.	OE3	ME42#	Open Elective	3	2	4
4.	HSS7	HP402	Sociology	2	--	2
5.	HSS8/ SDP7	HP403/ ME40#	Business Strategies / Piping Design/ Six Sigma/ Energy Audit	--	2	1
6.	SDP8	ME402	Project – I	--	8	4
7.	SDP9	ME404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII (SLIP not inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ME431	Noise Vibration & Harshness@	3	2	4
2.	DE2	SWAYAM/ NPTEL	Discipline Elective	3	--	3
3.	SEMESTER LONG INTERNSHIP – Project Design			--	10	5
4.	SEMESTER LONG INTERNSHIP – Project Implementation			--	10	5
TOTAL				6	22	17

DEPARTMENT ELECTIVE ON MOOCS PLATFORM			
SR. NO.	**COURSE DETAILS**	**MOOC DETAILS**	**NO. OF WEEKS**
1.	Fundamentals of Industrial Oil Hydraulics and Pneumatics by Prof. R.N. Maiti, IIT Kharagpur	SWAYAM	8
2.	Design for Quality, Manufacturing and Assembly by Prof. Palaniappaan Ramu, IIT Madras	SWAYAM	12
3.	Non-Traditional Abrasive Machining Processes-Ultrasonic, Abrasive Jet and Abrasive Water Jet Machining by Prof. Asimava Roy Choudhury, IIT Kahragpur	SWAYAM	8
4.	Enterprise Resource Planning (ERP) BY Sara Behdad, The State University of New York	COURSERA	4

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An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

First Year

Bachelor of Technology

2016-2020

(With Effect from Academic Year: 2016-2017)

MIT | Academy of Engineering
(An Autonomous Institute)

CURRICULUM STRUCTURE (2016 - 2020)

SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2016-17**
FY BTECH	**RELEASE DATE**	**:**	**01/06/2016**
DEPARTMENT OF MECHANICAL ENGG	**REVISION NO.**	**:**	**0.0**

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T*	CREDIT
1.	NSC1	AS101	Mathematics – I	4	1	5
2.	NSC2	AS102/ AS103	Physics/ Chemistry	3	2	4
3.	ESC1	EX101/ CV101	Electrical & Electronics Engg/ Applied Mechanics	3	2	4
4.	ESC2	ME101/ IT101	Engineering Graphics/ Computer Programming	2	4	4
5.	HSS1	HP101	Language & Communication – I	1	2	2
6.	SDP1	ME102/ ME103	Experimental Tools & Techniques/ Design Thinking	--	4	2
TOTAL				13	15	21

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P/T	CREDIT
1.	NSC3	AS101	Mathematics – II	4	1	5
2.	NSC4	AS103/ AS102	Chemistry/ Physics	3	2	4
3.	ESC3	CV101/ EX101	Applied Mechanics/ Electrical & Electronics Engg	3	2	4
4.	ESC4	IT101/ ME101	Computer Programming/ Engineering Graphics	2	4	4
5.	HSS2	HP101	Language & Communication – II	1	2	2
6.	SDP2	ME103/ ME102	Design Thinking/ Experimental Tools & Techniques	--	4	2
TOTAL				13	15	21

*L: Lecture, P: Practical, T:Tutorial; *Applicable for FY BTech*

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics I
	COURSE CODE	AS101
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII

COURSE OBJECTIVES :

AS101.CEO.1: To recall and apply the methods of solving system of equations using matrices.
AS101.CEO.2: To find nth derivative and expansion of different functions.
AS101.CEO.3: To classify and solve first order ordinary differential equations.
AS101.CEO.4: To categorize and inspect the applications of first order differential equations.
AS101.CEO.5: To apply the concepts of partial differentiation.
AS101.CEO.6: To demonstrate an understanding towards the applications of partial differentiation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS101.CO.1: Inspect system of equations using matrices. [L4]
AS101.CO.2: Illustrate problems based on nth derivative and expansion of functions. [L2]
AS101.CO.3: Solve first order ordinary differential equations. [L3]
AS101.CO.4: Analyze simple real world phenomenon governed by first order ordinary differential equations. [L4]
AS101.CO.5: Infer the problems based on properties of partial differentiation. [L2]
AS101.CO.6: Examine the applications of partial differentiation. [L4]

THEORY		
UNIT 1	**Matrices**	**12 HOURS**
Rank, Solutions of system of linear equations: Homogeneous and Non Homogeneous systems,Linear dependence and independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem		
UNIT 2	**Successive Differentiation**	**8 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative, Taylors and Maclaurins theorem for expansion of functions .		
UNIT 3	**First order ordinary differential equations**	**10 HOURS**
Exact differential equations, Differential equations reducible to exact by finding integrating factors, linear differential equations, Differential equations reducible to linear form .		
UNIT 4	**Applications of first order ordinary differential equation**	**10 HOURS**
Newtons law of cooling, Electrical circuits, rectilinear motion, one dimensional heat conduction, Chemical applications- Mixing problems .		
UNIT 5	**Partial Differentiation**	**8 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative and differential, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 6	**Applications of Partial Differentiation**	**8 HOURS**
Jacobian, properties of Jacobian, Jacobian of Implicit functions, Finding partial derivative using Jacobians, Functional dependence, maxima and minima of functions of two variables.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Rank, System of Linear equations: Homogeneous and Non Homogeneous systems.		
TUTORIAL NO.02		**1 HOURS**
Linear Dependence and Independence of vectors, Eigen Values and Eigen vectors, Cayley Hamilton Theorem.		
TUTORIAL NO.03		**1 HOURS**
Finding nth derivative of functions, Leibnitz theorem for finding nth derivative.		
TUTORIAL NO.04		**1 HOURS**
Expansion of functions using Taylors and Maclaurins theorems.		

TUTORIAL NO.05		**1 HOURS**
Finding solutions to exact differential equations, Differential equations reducible to exact by finding integrating factors		
TUTORIAL NO.06		**1 HOURS**
Linear differential equations,Differential equations reducible to linear.		
TUTORIAL NO.07		**1 HOURS**
Newtons law of cooling, Kirchoffs law of electrical circuits, rectilinear motion		
TUTORIAL NO.08		**1 HOURS**
One dimensional heat conduction, Chemical applications Mixing Problems		
TUTORIAL NO.09		**1 HOURS**
Examples on Partial Differentiation and Chain rule,Total derivative and differential		
TUTORIAL NO.10		**1 HOURS**
Examples on Eulers Theorem, Differentiation of an implicit function		
TUTORIAL NO.11		**1 HOURS**
Examples on Jacobian, properties of Jacobian, Functional dependence		
TUTORIAL NO.12		**1 HOURS**
Examples on Functional dependence,Maxima and minima of functions of two variables		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Thomas Calculus by G.B. Thomas, Maurice D. Weir, Joel R. Hass (ISBN:9789332519091, Pearson Education, 12th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig(ISBN-13: 9788126554232, Wiley Eastern Ltd., 10th edition)
3. Advanced Engineering Mathematics by R.K. Jain& S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Physics
	COURSE CODE	AS102
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS102.CEO.1: To make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.(L3).

AS102.CEO.2: To analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.(L4).

AS102.CEO.3: To apply the concept of behavior of light and understand the polarization phenomena.(L3) .

AS102.CEO.4: To classify and understand the difference of classical mechanics and quantum mechanics.(L2).

AS102.CEO.5: To derive the basic laws governing the motion of quantum particles.(L4).

AS102.CEO.6: To apply the concept of quantum mechanics to different applications and supplement the reasoning vis--vis understanding of different branches of Physics.(L3).

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS102.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.(L5).

AS102.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.(L3).

AS102.CO.3: Apply that light is transverse in nature. (L3) .

AS102.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.(L2).

AS102.CO.5: Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.(L5) .

AS102.CO.6: Apply the concepts of Quantum Physics in different branches of engineering.(L3) .

THEORY

UNIT 1	**Measurement and importance of span (order) of physical quantities**	**7 HOURS**

Concept of (i)significant numbers, (ii) accuracy versus precision (iii)error versus uncertainty (iv)systematic error versus random error (v) quantifying the uncertainty. Least-count of an apparatus, Methods to measure least-count with specific examples of vernier-calipers, screw-gauge, travelling microscope and spectrometer. Span (orders of magnitude) of prominent physical parameters with specific examples of Gravitational constant(G), Speed of light(c),Planks constant(h), Boltzmann constant(k) and wavelengths of electromagnetic spectrum. Importance of the orders of G, c, h and k alongwith hypothetical picture of world in case of their order becomes unity (1). Length-scale and time-scale of specific physical phenomenon.

UNIT 2	**Optics (Interference and diffraction of Light)**	**7 HOURS**

Particle nature and wave-nature with examples of wave and particle behavior of light, Introduction to wave nature, Concept of thin film, Stokes law of phase-change on reflection from a thin film, Thin film interference, Coating of lenses as an application of thin film interference, Interference in films of uniform and non-uniform thickness (with derivation), Applications of thin-film interference, Newton Ring Experiment and its applications, Diffraction as a particular case of interference.

UNIT 3	**Polarization of Light**	**6 HOURS**

Polarization of light, Production and analysis of polarized light (Brewsters law, Law of Malus), Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.

UNIT 4	**Quantum Mechanics-I .**	**8 HOURS**

Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Plancks quantum law of blackbody radiation, Matter-waves, De-Broglies concept of matter waves, Heisenbergs Uncertainty Principle, Operators, Eigen values and Eigen functions, Expectation Values, Wave-function, Physical significance of wave function.

UNIT 5	Quantum Mechanics-II .	8 HOURS
Schrodingers equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohrs atomic model.		

UNIT 6	Applications of Quantum Mechanics-LASER .	6 HOURS
Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einsteins coefficients), Principle and working of LASER with example, Application of LASER in optical fibre communication.		

PRACTICALS		
PRACTICAL NO.01		**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02		**2 HOURS**
Determination of the refractive index of a given liquid using Newton Rings Experiment.		
PRACTICAL NO.03		**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04		**2 HOURS**
Determination of the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05		**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06		**2 HOURS**
Verification of Bohrs atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07		**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08		**2 HOURS**
Determination of wavelength of a laser beam using Lloyds mirror arrangement.		

PRACTICAL NO.09		2 HOURS
Determination of Radius of Curvature of a given planoconvex lens using Newtons Rings apparatus.		
PRACTICAL NO.10		**2 HOURS**
Determination of wavelength of different colours present in a white light.		

TEXT BOOK

1. The Feynman Lectures on Physics: Volume-1-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-82-8.(Narosa Publisher)
2. The Feynman Lectures on Physics: Volume-3-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-84-2. (Narosa Publisher)

REFERENCE BOOK

1. Measurement and Instrumentation Principles: Alan S Morris, Butterworth Heinemann, ISBN 07506508184
2. AjoyGhatak ,Optics, Tata Mc Graw Hill Publishing Company. Ltd., 2nd Edition, ISBN- 0-07058583-0
3. Jenkins White, Fundamentals of Optics, Mc Graw Hill Science, ISBN-0070853460.
4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-, Mc Graw Hill Education (India) Pvt. Ltd., 6th Edition, ISBN-10- 0070151555,
5. L. I. Schiff ,Quantum Mechanics, Tata Mc Graw Hill Education (India) Pvt. Ltd., 3rd Edition, ISBN-10- 0070856435, ISBN- 13- 9780070856431.
6. PAM Dirac,Principles of Quantum Mechanics Cbs publishers and Distributors, ISBN-10-0195671074, ISBN- 13- 978019567107
7. D J Griffiths, Introduction to Quantum Mechanics, Pearson Prentice Hall Publishers.
8. Serway and Jewett, University Physics for Scientists and Engineers, Cengage Learning Publishers.
9. K. Thyagarajan and AjoyGhatak, Lasers: Fundamentals and applications, Springer, ISBN 9781441964410.
10. Worsnop and Flint; Advanced Practical Physics, Little Hampton book service Ltd., ISBN-10: 0423738909, ISBN-13: 978-0423738902.
11. Robert Eisberg and Robert Resnick; Quantum Mechanics: Of Atoms, Molecules, Solids, Nuclei and Particles; Wiley

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Chemistry
	COURSE CODE	AS103
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	NIL	125

PRE-REQUISITE : Basic Chemistry of XI and XII

COURSE OBJECTIVES :

AS103.CEO.1: To summarize the basic chemistry and classic methods of analysis, which includes solution, concentrations and indicators.

AS103.CEO.2: To outline the technology involved in improving quality of water for its industrial use.

AS103.CEO.3: To illustrate the basic concepts of analytical techniques that facilitates rapid and reliable measurements.

AS103.CEO.4: To demonstrate the use of ultra violet visible spectroscopy as invaluable tools in synthetic chemistry.

AS103.CEO.5: To list and explain the principle & techniques of separation methods.

AS103.CEO.6: To define the basic aspects of advanced materials & their applications.

COURSE OUTCOMES :

On successful completion of the course the student will be able to

AS103.CO.1: Relate classic methods of analysis by preparing solutions of desired concentrations & carrying out quantitative analysis by volumetric methods. (L1)

AS103.CO.2: :Identify different methodologies for water quality analysis for industrial application. (L3)

AS103.CO.3: Apply basic concepts of electro-analytical techniques for analysis of various chemical compounds and solutions. (L3)

AS103.CO.4: Extend the knowledge of calculating wavelength of absorption of various chemical compounds using UV-Visible spectroscopy. (L2)

AS103.CO.5: Outline the different methods for separation of mixtures of various chemical compounds.(L2)

AS103.CO.6: Categorize the different engineering materials and to solve engineering problems.(L4)

THEORY

UNIT 1	**Instrumental volumetric analysis**	**7 HOURS**

Introduction, methods of expressing concentrations (Self-study), primary and secondary standard solutions. Instrumental & non instrumental analysis principles & types; Types of Titrations based on reaction, AcidBase titrations: Indicatorstheory of indicators, acid base indicators, mixed and universal indicators; Titration curve for Strong acidStrong base type, Introduction to Weak acidStrong base, Strong acid-Weak base titration, Precipitation titration, Applications in quantitative analysis.

UNIT 2	**Water treatment and effluent management**	**7 HOURS**

Introduction to conventional water treatment: Complexometric titrations: Principle, EDTA titrations, choice of indicators, Hardness of water & Alkalinity of water, causes, types, numerical, internal methods of water softening, Advanced wastewater & water Treatment: i) filtration method: Carbon adsorption ii) ion-exchange method iii) membrane techniques: reverse osmosis and electro-dialysis & their applications in water purification.

UNIT 3	**Electroanalytical Techniques**	**7 HOURS**

Introduction to electrodes, pH metry: Standardization of pH meter, titration curve for the mixture of acids Vs strong base, differential plots, Conductometry: Introduction, Kohlrauschs law, measurement of conductance, Application of conductometer in Acid-Base titrations & Precipitation titrations. Potentiometry: Introduction, application in redox titrations example of Fe/Ce titration.

UNIT 4	Ultra Violet Spectroscopy	7 HOURS
Introduction, nature of UV, Beers law, absorption of UV radiation by organic molecule leading to different excitation, Terms used in UV Spectroscopy- Chromophore, Auxochrome, Bathochromic shift(Red shift), hypsochromic shift(Blue shift), hyperchromic and hypochromic effect. Instrumentation,Effect of conjugation on position of UV band. Calculation of max by Woodward and Fisher rules for dienes and enone systems, Applications of UV Spectroscopy- Determination of structure, Determination of stereo chemistry (Cis and trans)		
UNIT 5	**: Chromatography**	**6 HOURS**
Introduction and classification of chromatographic methods, Theory, Principle, technique and applications of-Column Chromatography, Thin layer Chromatography, Paper Chromatography, Gas Chromatography. Applications of chromatographic techniques		
UNIT 6	**: Engineering Materials.**	**8 HOURS**
Introduction to Material Sciences, Polymers: Introduction, Specialty polymers, Applications in electronic gadgets, housing & construction, automobiles etc. Biomaterials: Introduction, characteristics, examples, challenges, Carbon nano materials: Introduction, types & applications. Smart materials: Introduction, types, examples like piezo materials, shape memory, thermo responsive etc..		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Preparation and Standardization of solutions		
PRACTICAL NO.02		**2 HOURS**
Estimation of ions from given solution by Redox titration		
PRACTICAL NO.03		**2 HOURS**
Determination of the total hardness of a given water sample by EDTA method		
PRACTICAL NO.04		**2 HOURS**
Adsorption: Removal of organic dyes by activated charcoal		
PRACTICAL NO.05		**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.06		**2 HOURS**
Conduct metric titrations		
PRACTICAL NO.07		**2 HOURS**
Verification of Beers law & colorimetric estimation		

PRACTICAL NO.08		**2 HOURS**
Determination of max of organic/ inorganic compound using UV-visible spectrophotometer		
PRACTICAL NO.09		**2 HOURS**
Separation of mixture of two organic compounds by Thin Layer Chromatography		
PRACTICAL NO.10		**2 HOURS**
Separation of two cations by paper chromatography		
PRACTICAL NO.11		**2 HOURS**
Separation & purification of chemical compounds by Gas chromatography		

TEXT BOOK

1. Jain & Jain, Engineering Chemistry, 15th Edition, Dhanpat Rai Publications company
2. S.M. Khopkar , Basic Concept of Analytical Chemistry,2nd edition, New Age Science Ltd ISBN-10: 1906574006 ISBN-13: 978- 1906574000
3. Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, Laxmi Publications Pvt. Ltd.

REFERENCE BOOK

1. V.M.Parikh , Absorption Spectroscopy of Organic Molecules, Addison Wesley Longman Publishing Co, ISBN 10: 0201057085,ISBN 13: 9780201057089.
2. Skoog, Fundamentals of Analytical Chemistry, Cengage Learning, ISBN-13: 978-0495558286, ISBN-10: 0495558281
3. Willard, Merritt, Dean and Settle, Instrumental Methods of chemical analysis, 6th edition, Wadsworth Publishing Co. ISBN-10: 0534081428, ISBN-13: 978-0534081423.
4. Donald R. Askeland, Pradeep Fulay, W. J. Wright, The Science & Engineering of Materials, 6th Edition, Cengage Learning, 2010
5. O. P. Virmani & A. K. Narula , Applied Chemistry: Theory and Practice , New Age International Pvt. Ltd. Publishers, ISBN-10: 8122408141, ISBN-13: 978-8122408140

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical & Electronics Engineering
	COURSE CODE	EX101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE :

COURSE OBJECTIVES :

EX101.CEO.1: To impart knowledge of energy scenario and use of renewable energy systems.
EX101.CEO.2: To explain the fundamentals of single-phase and three-phase systems.
EX101.CEO.3: To explain power supply components, electronic devices.
EX101.CEO.4: To summarize various Digital systems and application.
EX101.CEO.5: To build the knowledge of measuring system and signal conditioning circuits.
EX101.CEO.6: To get acquainted with different electrical machines.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX101.CO.1: Develop the Renewable energy system (PV) as per given specifications [L3]
EX101.CO.2: Illustrate behavior of single phase A.C. circuits and three phase A.C. circuits. [L2]
EX101.CO.3: Analyze analog circuit applications.[L3]
EX101.CO.4: Design Digital applications.[L5]
EX101.CO.5: the use of Instrumentation system in various fields.[L2]
EX101.CO.6: Identify electrical machines used in typical domestic and industrial sector based on application. [L2]

THEORY		
UNIT 1	**Energy Resources & Technology**	**6 HOURS**
Energy Scenario, Energy Resources, Basic concepts about thermal, hydro and nuclear power stations (block diagram approach only).Energy conversion from thermal and mechanical energy, Energy Conservation, Use of Energy Efficient Technologies, Application of Renewable Energy Systems, Battery technology, Introduction to power quality: Definition, causes, effects, Introduction to energy audit.		
UNIT 2	**A.C. Circuits**	**7 HOURS**
A.C. fundamentals, RMS and average value, R-L,R-C,RLC series parallel circuits, phasor diagram, power and power factor. Three phase voltage generation and their waveforms, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, Difference between neutral and ground conductors.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply. BJT - structure and operation, CE, CB, CC configurations, Transistor as a switch and Amplifier. MOSFET- structure (enhancement), operation and application as a switch. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Digital: Logic gates, Boolean algebra, SOP representation, Combinational circuit Design: Half Adder, Full Adder, MUX, DMUX, Comparator, Code converter, Decoder Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor based systems, Embedded systems		
UNIT 5	**Measuring System**	**6 HOURS**
Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, IR, Speed & LVDT. Op-Amp IC 741 pin configuration, Op-amp parameters, Inverting, Non- Inverting & Differential configuration Applications: Summing & Difference amplifier, Comparator, Voltage follower.		
UNIT 6	**Electrical Machines**	**7 HOURS**
Construction of Transformer, principle of operation, EMF equation. Construction, principle of operation and types of three-phase Induction motor and DC motor, PMDC, BLDC, servo motor, stepper motor, Universal motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICALS : Total 8 Experiments from two groups.		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test it.		
PRACTICAL NO.02	**Single Phase Energy (Watt-hour) measurement.**	**2 HOURS**
To measure energy and power factor. To examine improvement in the power factor. To estimate and compare energy consumption with energy meter.		
PRACTICAL NO.03	**R-L-C series A.C. circuit**	**2 HOURS**
To calculate exact values of R, L and C for lagging and leading power factor To find power losses in R, L and C.		
PRACTICAL NO.04	**Verification of relation between Line and Phase quantities in Star and Delta circuits**	**2 HOURS**
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation. To connect Bulb load in Delta connection and verify the relation.		
PRACTICAL NO.05	**Open circuit & Short circuit test on a Single Phase transformer**	**2 HOURS**
To find iron loss and no load current To find full load copper loss and winding parameters To determine efficiency and regulation of transformer		
PRACTICAL NO.06	**Load test on D.C. Shunt Motor.**	**2 HOURS**
To find the torque and output power of motor To calculate the efficiency of motor.		
PRACTICAL NO.07	**Step angle control of Stepper motor.**	**2 HOURS**
To gain familiarity with the properties of stepper motors. To calculate the step angle of motor.		
PRACTICAL NO.08	**Speed control of BLDC/PMDC Motor.**	**2 HOURS**
To find the relation between voltage and speed of motor To develop any small application.		
PRACTICAL NO.09	**Electronics Components and Measuring instruments:**	**2 HOURS**
To study Passive components Resistors, Capacitors & Inductor. To test semiconducting components Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		
PRACTICAL NO.10	**DC Regulated Power Supply:**	**2 HOURS**
To design 12V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	**BJT as a switch and Amplifier.**	**2 HOURS**
To adapt BJT as a switch On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		

PRACTICAL NO.12	Combinational Digital Circuits:	2 HOURS
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	**Sequential Digital Circuits:**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	**OP-AMP Applications**	**2 HOURS**
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OPAMP as summing and difference amplifier. To verify the application of OPAMP as voltage follower.		
PRACTICAL NO.15	**Sensors and Transducer**	**2 HOURS**
To study and verify operation of LVDT. To study and verify the operation of Temperature sensors. (PT100, LM35)		
PRACTICAL NO.16	**Design and Simulate using MULTISIM(Minimum 2)**	**2 HOURS**
To design a counter to display 2-digit Decimal Number (00 to 99) on 7-Segment Display. To design a Flashing LED Display for a specific Pattern using MUX. To design of Inverting/Non-Inverting Amplifier using Op-Amp IC-741 for a specific gain.		

TEXT BOOK

1. B. H. Khan,Non-Conventional Energy Resources, Tata McGraw Hill, 2nd Edition, 2009, 978-0070142763.
2. Edward Hughes, Electrical and Electronic Technology Pearson India, 10th Edition, 2011, ISBN-978-8131733660
3. Neil Storey, Electronics A Systems Approach, Pearson Education Asia, 5th Edition,2013, ISBN-978-0273773276

REFERENCE BOOK

1. 1. V. N. Mittle and ArvindMittal, Basic Electrical Engineering, McGraw Hill Education, 2ndEdition,2005,ISBN- 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, McGraw Hill, 4th Edition, 2010, 978-0070699670.
3. Thomas L. Floyd, Electronics Devices & Circuits, Pearson Education India, 5th Edition, 1998, 978-0136491385.
4. Paul Horowitz, Winfield Hill, The Art of Electronics, Cambridge University press, 3rd Edition, 978-0521809269.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	40	50	10	25	Nil	125

PRE-REQUISITE : Physics and Mathematics of XI & XII

COURSE OBJECTIVES :

CV101.CEO.1: To classify force systems and explain the conditions of equilibrium.
CV101.CEO.2: To illustrate laws of friction.
CV101.CEO.3: To demonstrate the concepts of centroid and moment of inertia.
CV101.CEO.4: To describe kinematic parameters of motion.
CV101.CEO.5: To make use of laws of motion for kinetics.
CV101.CEO.6: To explain energy and momentum methods.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV101.CO.1: Determine the resultant and support reactions.(L5)
CV101.CO.2: Analyze bodies involving frictional forces. (L4)
CV101.CO.3: Evaluate centroids of bodies and moment of inertia of sections. (L5)
CV101.CO.4: Identify the type of motion and its kinematic parameters. (L3)
CV101.CO.5: Analyze the motion under action of constant and variable forces. (L4)
CV101.CO.6: Apply energy and momentum methods for kinetics. (L3)

THEORY		
UNIT 1	**Fundamentals of statics**	**8 HOURS**
Basic concepts and fundamental principles, force, moment of a force, couple, resolution and composition of forces, Free body diagrams, equations of equilibrium, equilibrium of coplanar and non-coplanar force system, applications to jib crane, beams, and cables.		
UNIT 2	**Friction**	**6 HOURS**
Introduction, types of friction, laws of friction, angle of friction, angle of repose, cone of friction, engineering applications - blocks and wedges, ladder friction, screw jack, pulley and belt drives, band brakes.		
UNIT 3	**Properties of surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity, centroids of composite 1D and 2D objects. Introduction to moment of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, MI of composite objects. Distributed loading, fluid pressure-application to dams and gates.		
UNIT 4	**Kinematics**	**8 HOURS**
Basic concepts in kinematics, Motion with uniform and variable acceleration, Motion curves, Curvilinear Motion in Rectangular coordinates, path coordinates, polar coordinates. Kinematic Link and Kinematic Pair, Kinematic Chain, Mechanisms and its inversions, instantaneous centre of rotation, Kennedy's Theorem, Applications- slider and crank mechanism, Railway engine and its supporting flywheel motions, Linkage mechanism of excavator and its system.		
UNIT 5	**Kinetics**	**6 HOURS**
Kinetics of rectilinear and circular motion of a particle acted upon by a constant and variable force system, Newtons second laws of Motion, Equations of motion, concept of dynamic equilibrium, and motion of connected bodies. Basic principles of vehicle dynamics, Forces acting on a vehicle, tire mechanics, Dynamics of linear and lateral motion.		
UNIT 6	**Energy and Momentum**	**8 HOURS**
Work, power and energy, Principles of work and Energy,Motion under a ConservativeCentral Force. Application to Space Mechanics. Impulse, momentum, Principle of Impulse and Momentum, Collisions-elastic and plastic, Direct central impact, coefficients of restitution.Applications-vehicle collisions, sports viz. cricket, tennis, billiard.		

PRACTICALS		
PRACTICAL NO.01	**Group 1] Basic principles/laws**	**2 HOURS**
1. To verify triangle law/ Lami's theorem 2. To verify polygon law of forces. 3. To verify law of moments. 4. To verify equilibrium of parallel forces. (Beam Reactions) 5. To verify equilibrium of concurrent forces in space.		
PRACTICAL NO.02	**Group 2] Friction**	**2 HOURS**
1.To verify laws of friction. 2. To determine angle of repose for a given block and surface. 3. To determine static coefficient of friction for a block on horizontal plane. 4. To determine static coefficient of friction for a block on inclined plane. 5. To determine static coefficient of friction for flat belt and drum.		
PRACTICAL NO.03	**Group 3] Centroid/centre of gravity**	**2 HOURS**
1. To determine centroid of irregular triangular lamina. 2. To determine centroid of polygonal lamina. 3. To determine centre of gravity of a wire bend. 4. To determine centroid of a composite lamina. 5. To find the shift of centroid after cutting some part of lamina.		
PRACTICAL NO.04	**Group 4] Motion(Dynamics)**	**2 HOURS**
1. To study curvilinear motion of a particle. 2. To verify value of g using compound pendulum. 3. To determine coefficient of restitution. 4. To determine mass moment of inertia of a fly wheel. 5. To verify law of conservation of momentum.		
PRACTICAL NO.05	**Group 5] Graphical Exercises**	**2 HOURS**
1. To determine resultant of concurrent forces. 2. To determine resultant of parallel/general forces. 3. To determine reactions for a simple beam. 4. To draw motion curves for given kinematics problem. 5. To determine relative velocity by graphical method. Part B] Students will have to complete a task/activity after each practical which will be based on the theme of that group. (10 Hrs)		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", Tata McGraw-Hill Education, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics", Pearson Education, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II", Tata Mc-Graw, ISBN: 978-0077402327
2. Ferdinand Singer, Harper and Row "Engineering Mechanics Statics and Dynamics", ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics", Cengage Learning, ISBN:8131509907

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	40	50	10	50	Nil	150

PRE-REQUISITE:

COURSE OBJECTIVES:

ME101.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME101.CEO.2: To develop & apply visualization skill to simple Objects.
ME101.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES:

The students after completion of the course will be able to,

ME101.CO.1: Recall fundamentals of projections (L1)
ME101.CO.2: Interpret engineering drawings (L2)
ME101.CO.3: Apply visualization skill to draw various views of object (L3)
ME101.CO.4: Analyzeengineeringdrawings (L4)
ME101.CO.5: Decide annotations for two dimensional drawings (L5)
ME101.CO.6: Develop and/or comprehend a simple engineeringdrawing in both First and Third angle orthographic projections(L4)

THEORY		
UNIT 1	**Visual Thinking & Solid Geometry**	**5 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections & Sectional Views**	**5 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views.		
UNIT 3	**Isometric Projections**	**5 HOURS**
Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of isometric View of Pyramid, Cone, Sphere.		
UNIT 4	**Interpretation of given view/ missing view**	**5 HOURS**
Identification of lines/ edges and surfaces, visualization of given orthographic views, adding missing/ third view, adding a sectional view, to convert a given view into sectional view.		
UNIT 5	**Auxiliary Projections**	**4 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View.		
UNIT 6	**Freehand Sketching & Technical Drawing**	**4 HOURS**
Free hand sketching- FV & TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles.		

PRACTICALS : Each Assignment contains 2 questions.		
PRACTICAL NO.01		**10 HOURS**
Projection of Lines, Plane, Solids		
PRACTICAL NO.02		**8 HOURS**
Orthographic Projections, Missing Views		
PRACTICAL NO.03		**6 HOURS**
Isometric Projections		
PRACTICAL NO.04		**4 HOURS**
Auxiliary View		

PRACTICALS : Assignments to be drawn on modeling software package.		
PRACTICAL NO.05		**4 HOURS**
Absolute and Incremental drawing.		
PRACTICAL NO.06		**6 HOURS**
Draw commands, Modify commands, Array, fillet, offset commands		
PRACTICAL NO.07		**2 HOURS**
Project drafting		
PRACTICAL NO.08		**12 HOURS**
Sketching, Solid Modeling, Assembly		
PRACTICAL NO.09		**4 HOURS**
Project modeling		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to Auto CAD, TMH Publishing co Ltd, 5th Edition, 2012, (ISBN 13: 9780070648371)
2. Basant Agarwal and C M Agarwal, Engineering Drawing, TMH Publishing co Ltd, 2nd Edition 2013, (ISBN13: 978-1-259-06288-9)
3. K C John, Engineering Graphics for Degree, PHI learning pvt. Ltd. New Delhi,2009, (ISBN: 97881-203-3788-6)
4. R. K. Dhavan, A Text Book of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

1. Luzadder, Warren J., Duff, John M, Fundamentals of Engineering, Prentice Hall of India,11th Edition, 2010, (ISBN: 978-81-203-0885-5)
2. Basudev Bhattacharya, Machine Drawing includes Autocad Supplements, Oxford University Press India, First Edition, 2011, (ISBN 13: 9780198070771)
3. K. Venugopal, Prabhu Raja V., Engineering Drawing and Graphics, New age Publications, First Edition, 2008, (ISBN: 978-81-224-2457-7)
4. N B Shaha and B C Rana, Engineering Drawing, Pearson Education, 2012, (ISBN: 9788131798058)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Computer Programming
	COURSE CODE	IT101
	COURSE CREDITS	4
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
2	4	40	50	10	25	NIL	125

PRE-REQUISITE : Knowledge of computer system.

COURSE OBJECTIVES :

IT101.CEO.1: To define and summarize the basic terminologies used in computer programming.
IT101.CEO.2: To develop and demonstrate logic for a given problem using algorithms and Flowcharts.
IT101.CEO.3: To evaluate solutions for the given problem using problem solving tools.
IT101.CEO.4: To identify and analyze different control structures.
IT101.CEO.5: To understand and use of simple data structures using Python.
IT101.CEO.6: To demonstrate and understand different computer applications in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT101.CO.1: Analyze a problem and identify and define the computing requirements appropriate to its solution[L3][L4].
IT101.CO.2: Apply the knowledge and strategies for structuring code, dividing problems up into pieces that can be solved independently, then integrating the pieces into a whole to solve a large problem [L3].
IT101.CO.3: Analyze when to select the different types of data structures such as arrays and lists as a framework for solving a problem [L4].
IT101.CO.4: Design, correctly implement and document solutions to problems using Python [L6].
IT101.CO.5: Analyze and compare alternative solutions to computing problems [L2][L4]
IT101.CO.6: Adapt to new developments in the field of computer science [L6].

THEORY		
UNIT 1	**Problem Solving Concepts**	**6 HOURS**
General Problem Solving Concepts-types of problems, problem solving with computers, difficulties with problem solving, Problem solving concepts for the computer: Constants, Variables, Data types, operators, Expressions, Equations, Problem solving tools.Programming structure-Modules and their functions, Cohesion and Coupling, Local and Global Variables, Parameters, return values		
UNIT 2	**Problem solving and Logic structure**	**8 HOURS**
Logic structures, Problem solving with sequential logic structure - The sequential logic structure, solution development. Problem Solving with Decisions decision logic structure, multiple Decision instructions, straight-through logic, positive logic, negative logic, logic conversion, Problem solving with loops and case logic structures.		
UNIT 3	**Arrays, Strings and File Processing**	**8 HOURS**
One dimensional, multidimensional array,finding maximum number in a set, Partitioning of array, finding smallest element, searching an array for a range. String Handling Operations: Concatenation, Copy, Substring, Compare, Length, Case Change, and Reverse. File handling and file handling operations, File Handling Modes.		
UNIT 4	**Programming Applications**	**6 HOURS**
Programming applications, Predictive analysis with examples, Graphics and animation, working with matrices, Graphics & Visualization, Differential Equation: Linear Differential Equations, Digital Signal Processing: Plotting different waveforms.		

PRACTICALS		
PRACTICAL NO.01		**6 HOURS**
1. Find the result of allthe arithmetic operations (Addition,Subtraction,Multiply, Division and modulo) in Python. 2. Show the distance in miles per gallon with respect user defined value in Python. 3. Find the kinetic energy of an object.		
PRACTICAL NO.02		**6 HOURS**
1. Write a Python program for printing result of five subjects for five students. 2. Choose any value and find whether the number is even or odd. 3. Identify whether the number entered by user is prime or not.		

PRACTICAL NO.03		6 HOURS
1. Solve the Fibonacci sequence using recursive function in Python. 2. Illustrate factorial of non-negative numbers in Python. 3. Build asterisk (*) graph in Python		
PRACTICAL NO.04		**6 HOURS**
Electric circuits, Chemical applications- Mixing problems.		
PRACTICAL NO.05		**6 HOURS**
1. Select the number from the entered list and find its position in Python (use Linear Search). 2. Select the number and find its position of in Python (use Binary search). 3. Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain)		
PRACTICAL NO.06		**6 HOURS**
1. Select a text file and count number of words, repeated words in a file. 2. Choose the words from the file, store in the list and sort the list is ascending order. 3. Create duplicate the file from an original file.		
PRACTICAL NO.07		**6 HOURS**
1. Predict whether the entered string is palindrome or not. 2. Compare two strings and convert in opposite case in Python. 3. Select any two words and perform concatenation operation		
PRACTICAL NO.08		**14 HOURS**
1. Create a simple picture in python using graphics package. 2. Construct 2D and 3D plotting the Objects. 3. Create Sine waveform, Cosine waveform, Square waveform, Saw-tooth waveform, using MATLAB and discrete the same. 4. Solve the matrix operations (Addition, Multiplication, and Transverse) in MATLAB. 5. Design an application to display student result using predictive analysis		

TEXT BOOK

1. 1. Problem Solving and Programming Concepts ,Maureen Sprankle , Pearson Publication, Seventh Edition, ISBN 81-317-0711-3.
2. How to think like a Computer Scientist, Learning with Python Allen Downey, Jeffrey Elkner, Chris Meyers, Green Tea Press ISBN: 0-9716775-0-6.

REFERENCE BOOK

1. 1. Learning Python Mark Lutz Oreilly Publication 5th Edition ISBN-13: 978-1449355739.
2. A MATLAB Exercise Book LudmilaKuncheva, Cameron Gray, Perfect-bound Paperback, ISBN 9781291784794.
3. How to solve it by Computer, R.G.Dromey, First Edition, Pearson Publication, ISBN 978-81-315-0562-9.
4. Introduction To Computation And Programming Using Python "Guttag John V, PHI(2014), ISBN-13 : 978-8120348660.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 1
	COURSE CODE	HP101
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level

COURSE OBJECTIVES :

HP101.CEO.1: To introduce a variety of English texts to the students.
HP101.CEO.2: To teach basic English grammar.
HP101.CEO.3: To guide the students to write in English coherently and formally.
HP101.CEO.4: To improve the students overall communicative competence in English through activities like group discussions and debates.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP101.CO.1: Interpret texts written in English. [L2, L5]
HP101.CO.2: Apply English grammar rules correctly. [L3]
HP101.CO.3: Develop sentences and texts in English coherently and formally. [L3, L6]
HP101.CO.4: Demonstrate overall improvement in communication skills. [L 2]

THEORY		
UNIT 1	**Functional Grammar**	**4 HOURS**
Use of tenses in day to day communication and academic writing, Direct and Indirect Speeches, Active and Passive voices, Degrees of comparison, Use of the parts of speech in sentence composition, Verb forms and Modal auxiliaries		
UNIT 2	**Communication**	**8 HOURS**
Concept of communication, Types-verbal and non-verbal, principles of effective communication, barriers to communication, cross-cultural communication		
UNIT 3	**Academic Writing**	**6 HOURS**
Essentials of good writing, Review writing, Letter writing, Report writing, Prcis writing, and Essay writing		

PRACTICALS		
PRACTICAL NO.01	**Common Errors in Communicative English**	**6 HOURS**
A task of identifying and correcting the common errors in general as well as academic English by using audios and relevant academic texts; tips on punctuation.		
PRACTICAL NO.02	**Debate**	**4 HOURS**
Concept, Dos & Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos & Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal & analytical skills		
PRACTICAL NO.04	**Role Play**	**4 HOURS**
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation		
PRACTICAL NO.05	**Review and Letter Writing**	**4 HOURS**
How to write a review, characteristics and essentials of a good review, writing a review on a book or short story, types of letters- formal, informal; layout of business letters		

PRACTICAL NO.06	Report Writing and Prcis Writing	4 HOURS
Types of reports, format and writing a report, What is prcis writing? Rules of prcis writing		
PRACTICAL NO.07	**Essay Writing**	**2 HOURS**
What is an essay? Tips to write a good essay, Types of essays		

REFERENCE BOOK

1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Raymund Murphy: Essential Grammar in Use, Cambridge, 3rd Edition, ISBN-13: 9780521133890
3. William Sanborn Pfeiffer: Technical Communication A Practical Approach, 6th Edition, Pearson Education, ISBN-13: 978-8131700884
4. Dutt et.al. : A Course in Communication Skills, Foundation, 1st Edition
5. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
6. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
7. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
8. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques- I
	COURSE CODE	ME102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	30	-	20	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME102.CEO.1: To introduce different tools and study the various measurement techniques.
ME102.CEO.2: To study different parts of the system along with its functions and applications.
ME102.CEO.3: To list various tools used for the said application.
ME102.CEO.4: To identify the function of various parts of system.
ME102.CEO.5: To impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME102.CEO.6: To apply the knowledge to find the solutions for basic engineering problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME102.CO.1: Recall the tools required for measurements. (L1)
ME102.CO.2: Summarize the applications of various engineering tools used. (L2)
ME102.CO.3: Identify the right tool for selected purpose. (L3)
ME102.CO.4: Inspect various parts of the system .(L4)
ME102.CO.5: Justify the most appropriate technique which can be compatible with the existing environment. (L5)
ME102.CO.6: Develop the system which will give appropriate solution to the identified problem. (L6)

PRACTICALS		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Study and analysis of various components on the motherboard of a standard desktop computer.
2. Installation of various components like hard disk drive on the motherboard and check the system setup for verification.
3. Formatting the hard disk drive and installation of Windows and Linux operating system making the system dual boot
4. Study of various network components like switch, Router and configure the devices.
5. Crimping of Unshielded Twisted Pair cable. (Cat-6) 6. Study of TCP/IP Stack, and configure as well as develop a Local Area Network.
7. Configuration of Network Monitoring tool and checking the results
8. Installation of DHCP server and checking the results.
9. Installation of web server and checking the results.
10. Configuration of MS Access and Deploying Access 2007 Runtime-Based Solutions
11. Study and usage of Google Tools (creating Forms, Blog).
12. Using the Google form with add on, create a PDF file of the form.
13. Designing a static HTML page
14. Uploading the pages using FTP server on a web site
15. Deploy a simple web site using LAMP server creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Minimum 6 practicals from the following**	**12 HOURS**

1. Basic electronics component and switches
2. PCB and Soldering Tools And Technique
3. Relay and application
4. Manufacturing of extension board/Spike Guard
5. Series and parallel connection of Electrical Load
6. Actuators and application (Electrical and Mechanical).
7. PCB Wizard
8. Proteus
9. Virtual Instrumentation.
10. Cathode Ray Oscilloscope
11. Power Supply

PRACTICAL NO.03	Mechanical Engineering Laboratories (Minimum 6practicals from the following	12 HOURS

1. Linear and angular measurements.
2. Types of mechanism and making any one mechanism containing four links using card board.
3. Open a household component and explain it with free hand sketches.
4. Draw the outline of the problem identified for project on software package.
5. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
6. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
7. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
8. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
9. Measurement of Relative humidity of air in the lab.
10. Measurement of hardness of Steel and Aluminum.
11. Measurement of stiffness of helical spring (compression or tension). Open IT
12. Mixer or kitchen machine/ Printer.
13. Refrigerator/ Window Air Conditioner.
14. Boiler and accessories / thermal power plant (Mini).
15. Two stroke or four stroke engine.
16. Assembly and Disassembly of parts in any software package.
17. Introduction to threaded fasteners and joints using threaded fasteners.

PRACTICAL NO.04	Chemical Engineering (Minimum 3 practicals from the following	06 HOURS

1. Determination of specific gravity of liquid
2. Study of molecular diffusion
3. Liquid liquid extraction: Separation of one liquid component from the solution.
4. Solid-liquid separation from filtration
5. Membrane Separation process
6. Fuel from Plastic
7. Demonstration of mechanical operation models.
8. Production of Biodiesel
9. Open and Study Heat Exchangers.
10. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Mimimum 3 Practicals from the following)	06 HOURS

1. To find the area and included angle of given plot and fix boundary from given plan.
2. To determine the level difference between 5 points with level tube and determine height of tower with trigonometry.
3. To draw the plan of given housing to a given scale.
4. To draw line diagram of household water supply line and sewage line with list of materials used.
5. To draw line diagram of rain water harvesting unit with all details and its importance.
6. To make report on daily water requirement in public building and its waste water disposal, and reuse.
7. To identify and make report on the earthquake resisting structural members of building and its role.
8. To demonstrate the lifesaving dos and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

TEXT BOOK

1. Bruce Hallberg, Networking A Beginners Guide , 4th edition, Tata McGraw-Hill,2005, ISBN 0-07-060791-5
2. R.S. Khandpur, Printed Circuit Boards Design, Fabrication, Assembly and Testing, Tata McGraw-Hill Education, 2005, ISBN 0070588147, 9780070588141.
3. S R Dara, Engineering Chemistry, 5th edition, S.Chand , ISBN 81-219-0359-9

REFERENCE BOOK

1. Mackenzie L. Davis, Water and Wastewater Engineering, 13th edition, Tata McGraw- Hill, ISBN 978-1-25-906483-8
2. R. S. Khurmi, J. K. Gupta, Theory of Machines, 14th edition, S. Chand, ISBN 81-219-2524-X
3. Philip Wankat, Seperation Process Engineering , 3rd edition, Pearson, ISBN 978-93-325-2484-2
4. N.V. Ragvendra, L. Krishnamurthy, Engineering Metrology and Measurements, Oxford University Press, ISBN 978-0-19-808549-2.
5. Dr. Vinod Hosur, Earthquake- Resistant Design of Building Structures, Wiley, ISBN 978-81265-3859-1
6. M. S. Shetty, Concrete Technology, S. Chand, 2008, ISBN 9788121900034.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME103
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	25	-	25	50

PRE-REQUISITE : -

COURSE OBJECTIVES :

ME103.CEO.1: Disseminate the philosophy of design thinking.
ME103.CEO.2: Impart the information regarding User centric approach.
ME103.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME103.CEO.4: Enhancethinking in order to inspect diverse solutions.
ME103.CEO.5: Sensitize about the feasibility, desirability and viability criterias for selection of appropriate solution.
ME103.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME103.CO.1: Recall fundamental principles of design thinking (L1)
ME103.CO.2: Explain all the dimensions of user and his needs using design thinking approach (L2)
ME103.CO.3: Identify user centric problem by using information gathering techniques (L3)
ME103.CO.4: Compare multiple solutions through ideation process (L4)
ME103.CO.5: Justify most appropriate solution for defined user centric problem (L5)
ME103.CO.6: Develop the most optimum solution (L6)

SESSION		
SESSION 1		**2 HOURS**
Design thinking Methodology General Problem Statement, Random check list, mind mapping, Categorization of random check list.		
SESSION 2		**2 HOURS**
Brainstorming of problem areas, Research Methodology Information gathering Primary, Secondary Sources, data presentation, Preparation of survey forms		
SESSION 3		**2 HOURS**
SWOT analysis, drawing inferences, translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of cuboids, cylinders, simple form products (Isometric views) Ideation sketches, Ergonomic and aesthetic consideration in design		
SESSION 4		**2 HOURS**
Concept validation, evaluation and detailing, prototyping		

PROJECT		
PHASE NO.01		**4 HOURS**
General Problem Statement and problem background		
PHASE NO.02		**4 HOURS**
Research methodology		
PHASE NO.03		**4 HOURS**
Design Brief		
PHASE NO.04		**8 HOURS**
Ideation		
PHASE NO.05		**4 HOURS**
Concept Evaluation, Validation and Concept detailing		
PHASE NO.06		**8 HOURS**
Prototyping		
PHASE NO.07		**8 HOURS**
Report Writing		

TEXT BOOK

1. Engineering Design Process, Second Edition Yousef Haik and Tamer ShahinPublisher, Global Engineering. Cengage Learning. ISBN-13: 978-0-495-66814-5.
2. Product Design and Development, Kevin Otto and Kristin Wood, Product Design: Techniques in Reverse Engineering and New Product Development, Pearson Education Inc. ISBN-10: 0130212717.
3. Product Lifecycle Management, Grieves, Michael, McGraw-Hill, 2006. ISBN 0071452303.
4. Lateral Thinking: Creativity Step by Step Harper Perennial; Reissue edition (24 February 2015) (Perennial Library) Six Thinking Hats by Edward de Bono Paperback ISBN-10: 0060903252.
5. Design Methods, John Chris Jones., John Wiley & Sons, David Fulton Publishers, London, ISBN 0-471-28496-3.

Web references

1. www.designcouncil.org.uk
2. www.surveymonkey.com
3. http://en.red-dot.org

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mathematics II
	COURSE CODE	AS104
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
4	1	40	50	10	25	Nil	125

PRE-REQUISITE : Basic elementary Mathematics of XI & XII, Mathematics I

COURSE OBJECTIVES :

AS104.CEO.1: To identify different methods to evaluate integrals.
AS104.CEO.2: To classify and solve linear differential equations of higher order
AS104.CEO.3: To demonstrate an understanding towards evaluating multiple integrals.
AS104.CEO.4: To relate and examine the applications of multiple integrals.
AS104.CEO.5: Analyse different probability distribution functions.
AS104.CEO.6: To study different statistical methods for solving problems

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS104.CO.1: Distnguish different methods to evaluate integrals.(L4)
AS104.CO.2: Conclude solutions for higher order lineardifferential equations(L4)
AS104.CO.3: Evaluate the multiple integrals(L5)
AS104.CO.4: Apply the knowledge of multiple integrals wherever required(L3)
AS104.CO.5: Solve the probability distribution problems(L3)
AS104.CO.6: Assess statistical problems(L5)

THEORY COURSE CONTENT		
UNIT 1	**Integral Calculus**	**8 HOURS**
Reduction Formulae , Beta - Gamma functions and Differentiation under integral sign.		
UNIT 2	**Linear Differential Equations of higher order**	**8 HOURS**
General solution of Linear Differential equations with constant coefficients, Method of Variation of parameters, Equations reducible to Linear Differential equation with constant coefficients: Cauchy&Legendres linear differential equations		
UNIT 3	**Multiple Integrals**	**8 HOURS**
Tracing ofCurves: Cartesian curves, Polar curves, Parametric curves ,Double Integration, Evaluation of Double Integration, Change of order of integration, Integration by transforming Cartesian to Polar Coordinate system, Triple integration, Integration by transforming to spherical and cylindrical polar coordinates		
UNIT 4	**Applications of Multiple Integrals**	**8 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		
UNIT 5	**Probability**	**8 HOURS**
Probability, probability density function, probability distribution:Binomial, Poisson, Normal .		
UNIT 6	**Statistics**	**8 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Examples on Reduction Formulae, Beta and Gamma functions. Examples on Differentiation under integral sign		
TUTORIAL NO.02		**1 HOURS**
General solution of Linear Differential equations with constant coefficients , Method of Variation of parameters.		
TUTORIAL NO.03		**1 HOURS**
Equations reducible to Linear Differential equation with constant coefficients: Cauchy- Euler equations		

TUTORIAL NO.04		**1 HOURS**
Tracing of Cartesian curves .Tracing of Polar and Parametric curves .Double Integration, Evaluation of Double Integration, Change the order of integration.		
TUTORIAL NO.05		**1 HOURS**
Integration by transforming Cartesian to Polar Coordinate system, Triple integration,Integration by transforming to spherical and cylindrical polar coordinates.Applications of multiple integrals:To find Area, Volume		
TUTORIAL NO.06		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.07		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		
TUTORIAL NO.08		**1 HOURS**
Probability, probability density function, Probability distribution:Binomial		
TUTORIAL NO.09		**1 HOURS**
Probabilitydistribution :Poisson, Normal. Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.10		**1 HOURS**
Moments, skewness and kurtosis,correlation and regression.		

TEXT BOOK

1. Higher Engineering Mathematics by Dr. B.V. Ramana; Tata McGraw Hill, ISBN: 978-0-07-063419-2
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, 39th edition, ISBN: 81-7409- 195-5

REFERENCE BOOK

1. Calculus by G.B. Thomas &R.L.Finney (ISBN:81-7758-325-5, Pearson Education, 9th edition)
2. Advanced Engineering Mathematics by Erwin Kreyszig, Volume I & II (ISBN-10: 8126543132, ISBN-13: 978-8126543137, Wiley Eastern Ltd.)
3. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar (ISBN No.: 8173194203, Narosa Publishing house)
4. Advanced Engineering Mathematics by Peter V. ONeil (ISBN-13: 9788131503102, Cenage Learning, 7th Edition)

5. Advanced Engineering Mathematics by Dennis G. Zill& Warren S. Wright; Jones and Bartlett Publishers, 4th edition, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.

6. Higher Engineering Mathematics by B.S. Grewal (ISBN:81-7409-195-5,Khanna Publications,39 th edition)

7. Applied statistics and probability for engineers fourth edition by Douglas C. montgomery , George C runger(ISBN No:978-81-265-2315-3 wiley)

8. Miller& Freunds Probability and statistics for engineers by richard A johnson, irwin-miller,johnfreund(ISBN no:978-93325-5041-4,Pearson)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Language and Communication 2
	COURSE CODE	HP102
	COURSE CREDITS	2
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	30	35	10	25	Nil	100

PRE-REQUISITE : Basic proficiency in English at the higher secondary school level; Language and Communication- 1

COURSE OBJECTIVES :

HP102.CEO.1: To familarise the students with sounds in English and introduce phonemic transcription.

HP102.CEO.2: CEO.2: To enrich the vocabulary of the students with AWL and NAWL.

HP102.CEO.3: To acquaint the students with public speaking, presentation and interview skills in English.

HP102.CEO.4: To develop the students reading and listening skills with the use of written audio and video texts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP102.CO.1: Recognise and reproduce the sounds in English effectively. [L1]

HP102.CO.2: Choose and employ appropriate words from AWL and NAWL in communication. [L1, L3]

HP102.CO.3: Express their ideas effectively and demonstrate skills in interpersonal communication. [L2, L3]

HP102.CO.4: Analyse and infer from written, audio and video texts. [L 2, L4]

THEORY		
UNIT 1	**Phonetics and Vocabulary**	**3 HOURS**
Phonemes in English and phonemic transcription; Essential academic vocabulary (Academic Word List and New Academic Word List); Dictionary Skills; Phrasal verbs and collocations		
UNIT 2	**Oral Communication**	**4 HOURS**
Public Speaking; Presentation Skills; Interview Skills and telephonic communication; Meetings (types, agenda and minutes)		
UNIT 3	**Active Listening and Reading with Comprehension**	**5 HOURS**
Concept and types of listening; Steps in listening with comprehension; Essentials of good listening; Concept and types of reading; Guidelines for reading with comprehension; Analytical reading		

PRACTICALS		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**2 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Vocabulary Enrichment**	**2 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills		
PRACTICAL NO.03	**Phrasal Verbs and Collocations**	**2 HOURS**
Use of phrasal verbs and collocations; reading literary pieces, essays to identify phrasal verbs in context; story-telling		
PRACTICAL NO.04	**Public Speaking**	**2 HOURS**
Attributes of a good public speaker; prepared and extemporaneous speech; Listening to and Reading famous speeches		
PRACTICAL NO.05	**: Presentations**	**2 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.06	**Interview Skills and Telephonic Communication**	**2 HOURS**
Etiquettes of attending interviews; Preparation; Telephonic communication; Mock Interviews		

PRACTICAL NO.07	**Mock Meetings**	**2 HOURS**
Importance of effective interpersonal communication; working in teams; Mock Meetings		
PRACTICAL NO.08	**Active Listening**	**6 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		
PRACTICAL NO.09	**Reading with Comprehension**	**4 HOURS**
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
2. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
3. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
4. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
5. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
6. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
7. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

Second Year

Bachelor of Technology in Mechanical Engineering

2016-2020

(With Effect from Academic Year: 2017-2018)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2017-18**
S Y B TECH	**RELEASE DATE**	**:**	**01/06/2017**
DEPARTMENT OF MECHANICAL ENGG	**REVISION NO.**	**:**	**0.0**

SEMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC1	CH201	Environmental Science	2	2	3
2.	PC2	AS201	Applied Mathematics	3	2	4
3.	PC3	ET201	System Engineering	3	2	4
4.	DC1	ME202	Thermal Engineering	3	2	4
5.	DC2	ME203	Solid Mechanics	3	2	4
6.	SDP3	ET206	Prototyping	--	4	2
TOTAL				14	14	21

SEMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC4	IT201	Engineering Informatics	3	2	4
2.	PC5	ME201	Materials Engineering	3	2	4
3.	DC3	ME211	Fluid Mechanics	3	2	4
4.	DC4	ME212	Manufacturing Technology	3	2	4
5.	HSS3	HP201	Psychology	3	--	3
6.	SDP4	ME213	Minor Project	--	4	2
TOTAL				15	12	21

L: Lecture, P: Practical

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Environmental Science
	COURSE CODE	CH201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	15	NIL	50	125

PRE-REQUISITE : AS103: Chemistry

COURSE OBJECTIVES :

CH201.CEO.1: Give an overview of exploitation of various natural resources and its impact on the environment.
CH201.CEO.2: Understand the ecosystem and biodiversity.
CH201.CEO.3: Understand the importance of environment and its conservation.
CH201.CEO.4: Learn about the environmental pollution sources, effects and control measures.
CH201.CEO.5: Make aware of the national and international issue for the environment.
CH201.CEO.6: Make aware about the social and environmental responsibility.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH201.CO.1: Identify the various human activities adversely affecting the natural resources and the balance ecosystem.
CH201.CO.2: Observe the various aspects of ecosystems and suggest ways to protect them.
CH201.CO.3: Experiment the pollution of given locality and suggest steps to mitigate pollution.
CH201.CO.4: Record the sources of pollution and their controls.
CH201.CO.5: Compare laws and standards for pollution.
CH201.CO.6: Categorize the social and professional responsibility towards environment.

THEORY COURSE CONTENT		
UNIT 1	**Environment**	**5 HOURS**
Importance of environment, Biosphere, Structure and function of an ecosystem, ecological pyramids, effects of population growth on environment. Natural cycles: hydrologic, carbon, nitrogen, phosphorus and Sulphur cycle. Understanding carbon foot prints, Role of the environmental engineer. Need of environmental legislations and environmental Acts in India. Functions of central and state pollution control boards.		
UNIT 2	**Resources**	**4 HOURS**
Natural, conventional and non-conventional, Natural and manmade disasters on environment. Case studies on use and Impact of overutilization of natural resources: Food, forest, water, energy, land.		
UNIT 3	**Pollution**	**4 HOURS**
Structure and composition of atmosphere, Pollution, types of pollution, causes of pollution effects, control and prevention. Air, solid and water waste management Pollution prevention and control act.		
UNIT 4	**Pollution Impact**	**5 HOURS**
Case study on Nuclear Accidents; floods; land slid; climate change; air pollution in cities, water pollution; noise pollution. Case study on drought situation in Vidarbha-Marathwada.		
UNIT 5	**Social Issues**	**5 HOURS**
Case study on Plastic waste management, domestic waste issue, food problem in India & globally. Modernization of agriculture, traffic and pollution, e-waste disposal.		
UNIT 6	**Sustainable Development**	**5 HOURS**
Concept of sustainable development. Utilization and conservation of natural resources. Rainwater harvesting & Water management techniques. Role of an individual in environment protection. Energy audit, disaster management.		

PRACTICAL		
PRACTICAL NO.01	**Title: Fukushima Japan Nuclear Accident**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.02	**Title: Malin Land Slide**	**2 HOURS**
Details of the accident will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of accidents.		
PRACTICAL NO.03	**Title: Drought Situation in Vidarbha & Marathwada**	**2 HOURS**
Details of the drought situation will be discussed with the students. Students are supposed to write a case study report on the incident w. r. t. causes, effects & preventive measures to avoid such type of situations.		
PRACTICAL NO.04	**Title: River water pollution case study**	**2 HOURS**
Details of the River pollution of Ganga, Indrayani etc. will be discussed with the students. Students are supposed to write a case study report on the various causes of river pollution, preventive measures to avoid this & water treatment methodologies forriver water treatment.		
PRACTICAL NO.05	**Title: Project**	**16 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		

TEXT BOOKS

1. Rao C.S. "Environmental Pollution Control Engineering", Wiley Eastern Publications. ISBN: 9780470217634.
2. Kamaraj. P & Arthanareeswari .M, "Environmental Science – Challenges and Changes", 4th Edition, Sudhandhira Publications, 2010.
3. Sharma. B.K. and Kaur, "Environmental Chemistry", Goel Publishing House, Meerut, 1994 ISBN:8182830125.
4. Miller T. G. Jr., "Environmental Science", Wadsworth Publishing Co. ISBN-10: 1111988935 ISBN: 9781111988937
5. Metcalf Eddy "Wastewater engineering: Treatment and reuse", McGraw Hill, ISBN: 007041878.

REFERENCE BOOKS

1. Garg, S.K and Garg, R., "Ecological and Environmental Studies", Khanna Publishers, Delhi, 2006.ISBN: 9788174092182.
2. H. S. Peavy, D. R. Rowe, G. Tchobanoglous, "Environmental Engineering", McGraw Hill, ISBN: 8428204470.
3. Helen Kavitha. P "Principles of Environmental Science", Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
4. Henry J.G. and Heinke G.W., "Environmental Science and Engineering", 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
5. Masters G.M., "Introduction to Environmental Engineering and Science", 2nd Edition, Prentice Hall of India, New Delhi, 2004. ISBN: 0131481932 ISBN: 9780131481930.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY CHEM/CIVIL/MECH ENGG	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS201.CEO.1: To find the Laplace transform of continuous time signals (functions).
AS201.CEO.2: To determine the Fourier constants and construct the Fourier series.
AS201.CEO.3: To construct the integral representation of functions using Fourier transform.
AS201.CEO.4: To solve partial differential equations viz. heat and wave equations theoretically.
AS201.CEO.5: To apply numerical methods for constructing functions and solving Differential Equations.
AS201.CEO.6: To write and execute the program on problems of Laplace, Fourier and numerical methods using MATLAB.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS201.CO.1: Analyze the output response of given linear system using Laplace Transform.
AS201.CO.2: Analyze the frequency response of the system using appropriate Fourier transform.
AS201.CO.3: Justify the selection of appropriate transform for a given system.
AS201.CO.4: Solve and examine the solution of partial differential equations by theoretical methods.
AS201.CO.5: Determine the solution of ordinary differential equations using Euler's, Runge-Kutta 4th order and the interpolation using Newton's and Lagrange's interpolating methods.
AS201.CO.6: Implement Laplace Transform, Fourier transform and Numerical methods to find the solution of given problem using MATLAB.

THEORY

UNIT 1	**Laplace Transform I**	**6 HOURS**

Introduction of Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication by t, Division by t. Laplace Transform of derivatives, integration, Unit Step function, Impulse Function and Periodic Functions.

UNIT 2	**Laplace Transform II**	**6 HOURS**

Introduction of Inverse Laplace Transform, Properties: First shifting, Second shifting, Change of scale, Linearity, Multiplication by's', Division by's'. Inverse Laplace Transform of elementary functions, Derivatives, Integration. Use of partial fractions to find Inverse Laplace Transform. Solution and analysis of linear differential equation to linear system.

UNIT 3	**Fourier Series**	**6 HOURS**

Periodic functions, Fourier series, Dirichlet's conditions, determination of Fourier constants, Half ranges series, Even function series, odd function series, arbitrary period functions series.

UNIT 4	**Fourier Transform**	**6 HOURS**

Introduction of Fourier Transform, Complex exponential form of Fourier series, Fourier Integral Theorem (without proof), Fourier transform and its properties, Fourier Sine Transform, Fourier Cosine Transform, and Inverse Fourier transforms, Fourier Transform of derivatives of a function, Analysis of frequency response.

UNIT 5	**Applications of Partial differential Equations**	**6 HOURS**

One dimensional Heat flow and wave equations by method of separation of variables, Solution of Partial Differential equations by Numerical method: Crank Nicolson method.

UNIT 6	**Numerical Methods**	**6 HOURS**

Interpolation: Finite Differences, Newton's and Lagrange's Interpolation. Numerical solution of System of linear equations by Gauss elimination method and Ordinary differential equations by Euler's, Modified Euler's, Runge-Kutta 4th order methods.

PRACTICAL: Any 10 practicals are performed as per the requirement of a branch.		
PRACTICAL NO.01		**2 HOURS**
Introduction to MATLAB: Syntax, keywords, matrices, polynomials, loops.		
PRACTICAL NO.02		**2 HOURS**
Introduction to MATLAB: In-built functions, 2D/3D plots, creating simple programs.		
PRACTICAL NO.03		**2 HOURS**
Finding Laplace transforms of functions, solution of differential equations using Laplace transforms.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms.		
PRACTICAL NO.05		**2 HOURS**
Numerical Integration: Trapezoidal, Simpson's 1/3rd and Simpson's 3/8th rule.		
PRACTICAL NO.06		**2 HOURS**
Interpolation techniques: Lagrange's Interpolation.		
PRACTICAL NO.07		**2 HOURS**
Interpolation techniques: Newton's Interpolation.		
PRACTICAL NO.08		**2 HOURS**
Solution of differential equation by modified Euler's method.		
PRACTICAL NO.09		**2 HOURS**
Solution of differential equation by Runge-Kutta method.		
PRACTICAL NO.10		**2 HOURS**
Curve Fitting: Linear, Quadratic.		
PRACTICAL NO.11		**2 HOURS**
Solution of algebraic equations: Newton- Raphson method.		
PRACTICAL NO.12		**2 HOURS**
Solution of algebraic equations: Bisection method.		
PRACTICAL NO.13		**2 HOURS**
Curve Fitting: Cubic, Exponential.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Ram N. Patel and Ankush Mittal, "Programming in MATLAB- A Problem solving approach", Pearson Education, 2014, ISBN-978-93-325-2481-1.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. Amos Gilat, "MATLAB: An Introduction with Applications", 4th edition, Wiley Publication, 2003, ISBN-13: 9788126537204, 8126537205.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	System Engineering
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	NIL	25	125

PRE-REQUISITE :

1: ME102 Engineering Tools and Techniques
2: ME103 Design Thinking

COURSE OBJECTIVES :

ET201.CEO.1: To describe the rationale for using systems thinking for complex adaptive systems
ET201.CEO.2: To prioritize with stakeholders in a participatory way for research study
ET201.CEO.3: To design system engineering frame work
ET201.CEO.4: To apply system engineering tools
ET201.CEO.5: To evaluate the system

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET201.CO.1: Explain the rationale for using systems thinking for complex adaptive systems.
ET201.CO.2: Analyze interaction with stakeholders in a participatory way for research study.
ET201.CO.3: Design System Engineering framework.
ET201.CO.4: Apply system engineering tools.
ET201.CO.5: Evaluate the system.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Systems Thinking**	**4 HOURS**
Introduction to Systems Thinking and Understanding simple systems, Complex and Complex Adaptive Systems, Stakeholders and their engagement. **Further Reading : Case studies - Public health system, transportation system, solid waste management system.**		
UNIT 2	**System Dynamics Simulation**	**6 HOURS**
Standard test system conceptualization and mapping: an introduction to causal loop diagrams (Systems Thinking Diagrams; Influence Diagrams), principles of stock-and-flow diagrams, Application of stock and flow diagrams to engineering problems, Analysis using agent-based models, Application of systems thinking to policy decision making. **Further Reading : Case studies - Understand how to use Vensim PLE / Netlogo (Free academic version) to develop causal loop diagrams. Application of Stock and Flow Diagrams to Public Health.**		
UNIT 3	**Introduction to Systems Engineering**	**8 HOURS**
History and definitions, mission of system, types of system, system and its environment, System as a product, Systems Engineering as a profession, System Engineering Process and Management, Life cycle Integration. **Further Reading: Case studies - London Walkie-Scorchie Skyscraper, BRT system, garbage collection, Unmanned aerial vehicle, Washing machine etc.**		
UNIT 4	**System Engineering Design**	**8 HOURS**
System development process -– Systems engineering method, Systems testing through out development. Requirement Engineering -– Inputs, requirement types, purpose, Requirement analysis, requirement outputs. Case studies – Unmanned Aerial System. Functional Analysis -– Schematic, Functional block diagram. Design Synthesis — Process, Product realization, Product implementation, Product Integration, Product verification, product validation, product transition. **Further Reading: Development approaches – Waterfall, incremental spiral, evolutionary acquisition.**		
UNIT 5	**System Engineering Tools**	**8 HOURS**
Context diagrams, QFD (Quality function deployment), House of quality, Timeline analysis sheet and requirement allocation sheet, Functional flow diagrams, Design synthesis tools- Concept description sheet (CDS), Functional matrix diagram, Requirement break down structure, N2 diagrams, data flow diagrams, control flow diagrams, behavioral diagrams. **Further Reading: Popular System life cycle models (DoD–MIL STD 499B, IEEE 1220 SEP, EIA – 632 SEP, ISO/IEC15288, Professional Engineering model, NASA model, software life cycle models).**		
UNIT 6	**Partial Differential equations.**	**7 HOURS**
Verifying and validating the system, managing the configuration of the system, managing technical risk, project management, ILS (Integrated logistic support). **Further Reading: Case studies - Aircraft system.**		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Community based causal mapping – Developing causal loop diagrams for health care using Vensim.		
PRACTICAL NO.02		**2 HOURS**
Developing stock-and-flow diagrams for health care system using Vensim.		
PRACTICAL NO.03		**2 HOURS**

(Any 02)

1. Unmanned aerial vehicle
2. Conduct some research into the London building known as the "Walkie Scorchie". Identify what circumstances led to the building earning that unfortunate name and suggest which aspects of the systems engineering process may not have been followed correctly (at least as the issues have been reported in the media).The following links may assist in your investigations.
   http://www.dezeen.com/2013/09/06/we-made-a-lot-of-mistakes-with-this-building-says-walkie-scorchie- architect-vinoly/
   http://www.ibtimes.co.uk/walkie-scorchie-talkie-building-sunlight-london-reflects-504342.
3. Examine in detail the BRT of New Delhi,Identify what circumstances led to the failure of the system.
4. Garbage collection
5. Washing machine

PRACTICAL NO.04		**2 HOURS**
Determine the typical structure and contents of the system requirements specification (SyRS) for any one of the case study.		
PRACTICAL NO.05		**2 HOURS**
Choose an example related to your own discipline and then list and describe three detailed design tools to come up with a satisfactory design for anyone of the case study.		
PRACTICAL NO.06		**2 HOURS**
We want to modify our house (or from any one of the case studies) by for futuristic requirement to accommodate your children after marriage.Explain how accurate technical data on the house (as confirmed by PCA and FCA) supports this modification. Explain how the early design stages could have assisted with this modification if expandability/ future growth had been accounted for.		
PRACTICAL NO.07		**2 HOURS**
Mini project based on society, science and technology problem clubbed with Field visit and presentation (Define problem, data collection, requirement analysis,functional analysis.Design solution, progressive presentation of solution and final presentation). Note: The group of students should be from different program (Multidisciplinary group).		

PRACTICAL NO.08		2 HOURS
Watch the movie The Pentagon wars and write a two page report to assess what aspects System Engineering went wrong. (https://www.youtube.com/watch?v=iDYpRhoZqBY) .		
PRACTICAL NO.09		**2 HOURS**
Field visit / Industrial visit from system engineering point of view.		
PRACTICAL NO.10		**2 HOURS**
Working model case study of Quad copter/ aero modeling from system engineering point of view.		

TEXT BOOK

1. John D Sterman, "Business dynamics- Systems Thinking and modelling for a complex world", McGrawHill, ISBN: 007238915X.
2. Weinberg, G.M., An Introduction to General Systems Thinking, New York, NY: Dorset House Publishing, 2001, ISBN-13: 978-0932633491.
3. Alexander Kossiakoff, William N.Sweet, Systems Engineering: Principles and Practice, Wiley, 2009, ISBN-13: 978-8126524532.

TEXT BOOK

1. R. C. Dorf Dennis M Buede,"The Engineering Design of systems", Wiley; 2nd edition, 2002, ISBN- 13: 978-0070530393.
2. International Council of Systems Engineering, Systems Engineering Handbook, A guide for System Life Cycle Processes and Activities, version 3.2.1, January 2011.
3. Department of defense, systems engineering fundamentals, defense acquisition university press (Free e-book), https://www.scribd.com/document/321957824/SEFGuide-01-01.
4. Michael Ryschkewitsch, The Art and Science of Systems Engineering, (free e-book), https://www.nasa.gov/pdf/311198main-Art-and-Sci-of-SE-LONG-1-20-09.pdf
5. EIA 632 standard - www.psconsultech.com/yahoo-site-admin/assets/docs/EIA632.9212432.pdf
6. MIL standard - www.product-lifecycle-management.com/download/mil-std-499b-draft1993.pdf.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2016 - 2017
SECOND YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Thermal Engineering
	COURSE CODE	ME202
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	Nil	50	150

PRE-REQUISITE : Physics, Applied Mechanics

COURSE OBJECTIVES :

ME202.CEO.1: To Identify, use units and notations in Thermodynamics.

ME202.CEO.2: To apply the first and second laws of Thermodynamics to various gas processes and cycles..

ME202.CEO.3: To apply fundamentals of IC engines to enhance its performance-emission characteristics.

ME202.CEO.4: To correlate the properties of steam, dryness fraction measurement and performance estimation of steam generators.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME202.CO.1: Apply concepts and laws of thermodynamics to various thermal processes and real systems.

ME202.CO.2: Formulate performance of various Thermodynamic gas power cycles

ME202.CO.3: Examine the condition of steam and performance of steam generators.

ME202.CO.4: Estimate Stoichiometric air required for combustion of fuels and recent IC engine technologies..

THEORY COURSE CONTENT		
UNIT 1	**Laws of Thermodynamics**	**6 HOURS**
Introduction of thermodynamics, Review of basic definitions, Thermodynamic properties and their units, Zeroth law of thermodynamics, First law of thermodynamics, Steady flow energy equation and its application to different devices. Limitations of First law, Second Law of thermodynamics, Equivalence of Clausius and Kelvin Plank Statement, PMM I and II, Exergy, Review of Heat engine, heat pump and refrigerator.		
UNIT 2	**Entropy & Ideal gas**	**6 HOURS**
Entropy as a property, Clausius inequality, Principle of increase of Entropy. Ideal Gas: Ideal Gas Definition Gas Laws: Boyle's law, Charles's law, Avagadro's Law, Equation of State, Ideal Gas constant and Universal Gas constant, Ideal gas processes- on P-V and T-S Diagrams Constant Pressure, Constant Volume, Isothermal, Adiabatic, Polytropic, Throttling Processes, Calculations of heat transfer, work done, internal energy, change in entropy, enthalpy.		
UNIT 3	**Gas Power Cycles**	**6 HOURS**
Air Standard Cycle, Efficiency and Mean Effective Pressure, Otto Cycle, Diesel cycle, Dual cycle, Comparison of cycles, Carnot cycle, Rankine cycle, Comparison of Carnot cycle and Rankine cycle, Introduction of Regeneration, Reheating, and Co-generation.		
UNIT 4	**Properties of Pure Substances**	**6 HOURS**
Pure substance, Phases of pure substances, Formation of steam, Properties of steam, Use of Steam Tables, Study of P-V, T-S diagram for steam, Dryness fraction and its determination, Study of steam calorimeters (Barrel, Separating, Throttling and combined).		
UNIT 5	**I.C. Engine**	**6 HOURS**
Ideal gas mixtures, Combustion, Stoichiometry A/F Ratio, Product of combustion, Enthalpy of combustion, Adiabatic Flame temperature, Review of basic terms of SI & CI engine, stages of combustion in SI & CI engine, abnormal combustion, Recent trends in IC engine technologies like HCCI, EGR, Turbocharging etc.		
UNIT 6	**Steam Generators**	**6 HOURS**
Classification and Constructional details of boilers, Mountings and accessories of boiler, Introduction to IBR Act, Boiler draught (natural and artificial draught), Boiler performance calculations-Equivalent evaporation, Boiler efficiency, Energy balance.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Joule's experiment**	**2 HOURS**
Joule's experiment to validate first law of thermodynamics.		
PRACTICAL NO.02	**Air standard cycle using MATLAB**	**2 HOURS**
Performance estimation of Air standard cycle using standard simulation software's (MATLAB, PHYTHON).		
PRACTICAL NO.03	**Engine Test**	**2 HOURS**
Test on Multi cylinder Petrol engine for determination of Friction power.		
PRACTICAL NO.04	**Engine Test**	**2 HOURS**
Test on diesel engine to determine various efficiencies, SFC and Heat balance sheet.		
PRACTICAL NO.05	**Group task**	**2 HOURS**
Study of recent trends in IC engine technologies like EGR, SCR, HCCI, FSI etc.		
PRACTICAL NO.06	**Study Experiment**	**2 HOURS**
Study of Boiler Mountings and Accessories.		
PRACTICAL NO.07	**Boiler trial**	**2 HOURS**
Trial on boiler to determine boiler efficiency, equivalent evaporation and Energy Balance.		
PRACTICAL NO.08	**Industrial Visit**	**4 HOURS**
Industrial visit to any process industry which uses boiler and submission of detailed report.		

TEXT BOOK

1. P. K. Nag, Engineering Thermodynamics, Tata McGraw Hill Publications, 2008, ISBN 0-07-026062-1
2. Rayner Joel, Basic Engineering Thermodynamics, Pearson Education ltd., 1996, (ISBN 978-81-317-1888-9)
3. Yunus A. Cengel, Thermodynamics – An Engineering Approach, Tata McGraw Hill, 2008, ISBN 0073305375
4. V. Ganesan, Internal Combustion Engines, Tata McGraw-Hill, ISBN 978-1259006197

REFERENCE BOOK

1. Hawkins G. A, Engineering Thermodynamics, John Wiley and Sons, 1986, ISBN 0471812021
2. Material Science & Van Wylen, Sonntag R. E, Fundamentals of Classical Thermodynamics, John Wiley and Sons, 1978, ISBN 0471047945
3. T.D. Eastop and A. McConkey, Applied Thermodynamics, Addison Wesley Longman, 2009, ISBN 978-81-7758-238-3
4. Lynn D. Russell, Engineering Thermodynamics, Oxford University Press, 2007, ISBN 0195689054
5. Heywood, Internal Combustion Engine Fundamentals, Tata McGraw-Hill, ISBN 978-1259002076

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Solid Mechanics
	COURSE CODE	ME203
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	Nil	50	150

PRE-REQUISITE : Physics, Applied Mechanics

COURSE OBJECTIVES :

ME203.CEO.1: To remember the fundamentals of static equilibrium and material constitutive behavior.
ME203.CEO.2: To understand the various types of stresses developed in the mechanical elements.
ME203.CEO.3: To construct shear forces and bending moment diagrams.
ME203.CEO.4: To analyze concept of Slope and Deflections, Bending and Shear stresses for different channels.
ME203.CEO.5: To decide suitable dimensions for Column and shaft.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME203.CO.1: Memorize the concepts of static equilibrium, geometry of deformation, and material constitutive behavior.
ME203.CO.2: Understand the concept of resistance, deformation and thermal stresses and Principal Stresses.
ME203.CO.3: Construct shear forces and bending moment diagrams.
ME203.CO.4: To analyze concept of Slope and Deflections, Bending and Shear stresses in beams for different channels.
ME203.CO.5: Judge suitable dimensions for Column, solid and hollow circular shafts for mechanical systems.

THEORY COURSE CONTENT		
UNIT 1	**Simple Stresses and Strains**	**8 HOURS**
Concept of Resistance and deformation, stress tensor, Determinate and Indeterminate problems in Tension and Compression - Thermal Stresses - pure shear – Young's modulus of elasticity, Poisson's ratio, Modulus of rigidity and Bulk modulus - Relation between elastic constants - Stress-strain diagrams for brittle and ductile materials - working stress.		
UNIT 2	**Principal Stresses and Strains**	**6 HOURS**
Normal & shear stresses on any oblique plane. Concept of principal planes, derivation of expression for principal stresses & maximum shear stress, position of principal planes & planes of maximum shear. Graphical solution using Mohr's circle of stresses. Principal stresses in shaft subjected to torsion, bending moment & axial thrust (solid as well as hollow), Concept of equivalent torsional and bending moments. Theories of elastic failure: Maximum principal stress theory, maximum shear stress theory, maximum distortion energy theory, maximum principal strain theory, maximum strain energy theory – their applications & limitations.		
UNIT 3	**Shear Forces and Bending Moments**	**6 HOURS**
Shear forces & bending moment for statically determinate beams due to concentrated loads, uniformly distributed loads, uniformly varying loads & couples, Relationship between rate of loading, shear force and bending moment. Positions of point of contra shear & positions of points of contra flexure.		
UNIT 4	**Bending Stresses and Shear Stresses in Machine Elements**	**6 HOURS**
Bending stresses: Theory of simple bending, assumptions, derivation of flexural formula, Modulus of rupture, section modulus, second moment of area of different cross sections with respective centroidal & parallel axes, bending stress distribution diagrams, moment of resistance & section modulus Shear stresses: Concept, derivation of shear stress distribution formula, shear stress distribution diagrams for varying sections, maximum and average shears stresses, shear stress diagram for different cross section, Shear connectors.		
UNIT 5	**Slope & Deflection of beams and Column**	**8 HOURS**
Relation between BM & slope, slope & deflection of determinate beams, standard loading cases using Macaulay's method and Moment Area method, deflection due to shear. Buckling of columns: Concept of buckling of columns, Euler's formula for buckling load for column with hinged ends, concept of equivalent length for various end conditions, Limitations of Euler's formula, Rankine's formula (Only theoretical treatment)		
UNIT 6	**Torsion of Circular Shafts**	**6 HOURS**
Stresses, strain & deformations in determinate shafts of solid & hollow, homogeneous & composite circular cross section subjected to twisting moment, derivation of torsion equation, stresses due to combined torsion, bending & axial force on shafts. Strain energy due to bending and torsion Finite Element Modeling -One Dimensional Problem, Assembly of Global Stiffness Matrix and Load Vector, Properties of Stiffness Matrix, Finite Element Equations. Introduction to Strain gauges.		

PRACTICAL:		
Part A: Experimental Approach		
PRACTICAL NO.01	**Tensile Test**	**2 HOURS**
Tension test for ductile and brittle material on Universal Testing Machine.		
PRACTICAL NO.02	**Shear Test**	**2 HOURS**
Shear test of ductile material on Universal Testing Machine.		
PRACTICAL NO.03	**Verification of Flexural Formula**	**2 HOURS**
Experimental verification of flexural formula in bending for simply supported beam or cantilever beam.		
PRACTICAL NO.04	**Torsion Test**	**2 HOURS**
Verification of torsional formula on circular bar for different materials.		
PRACTICAL NO.05	**Strain Gauge**	**2 HOURS**
Determination of stresses in beams for different end conditions using strain gauges.		

Part B: Computational Approach		
PRACTICAL NO.01	**FEA analysis of 1D Elements**	**4 HOURS**
Computational stress analysis of (1D) axially loaded structural member using any FEA software. OR		
PRACTICAL NO.02	**FEA analysis of 2D Elements**	**2 HOURS**
Stress and deflection analysis of 2D structure using any FEA software.		
PRACTICAL NO.03	**Slope and Deflection by using MD Solid Software**	**2 HOURS**
Determination of slope and deflection using any software package.		

Part C: Analytical Approach		
PRACTICAL NO.01	**Principal Stresses**	**2 HOURS**
Principal stresses through graphical and analytical method. OR		
PRACTICAL NO.02	**Shear Force and Bending Moment Diagram**	**2 HOURS**
Shear force and bending moment diagrams for beams with different end conditions.		
PRACTICAL NO.03	**Slope and Deflection**	**2 HOURS**
Slope and deflection for beams with different end conditions.		

TEXT BOOK

1. G. H. Ryder, Strength of Materials, 3rd Edition, Macmillan Pub, India, ISBN-13: 978-0333109281
2. S.S. Rattan, Strength of Material, Tata McGraw Hill Publication Co. Ltd. ISBN-13: 978-0071072564
3. S. Ramamurtham, Strength of material, Dhanpat Rai Publication, ISBN-13: 978-8187433545
4. Timoshenko and Young, Strength of Materials, CBS Publication, ISBN-13: 978-0442085476

REFERENCE BOOK

1. Beer and Johnston, Strength of materials, CBS Publication, ISBN-13: 978-0070042841
2. E.P. Popov, Introduction to Mechanics of Solids, Prentice Hall Publication, ISBN-13: 978-0134877693
3. Singer and Pytel, Strength of materials, Harper and row Publication, ISBN-13: 978-0495667759

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Prototyping
	COURSE CODE	ET206
	COURSE CREDITS	02
RELEASED DATE : 01/06/2018	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	75	75

PRE-REQUISITE:

1. ME101 - Engineering Graphics
2. ME102 - Engineering Tools and Techniques
3. ME103 - Design Thinking
4. EX101 - Electrical and Electronics Engineering
5. CV101 - Applied Mechanics
6. IT101 - Computer Programming

COURSE OBJECTIVES:

ET206.CEO.1: Learn about materiality and techniques.

ET206.CEO.2: Justify the product development cycle through prototype project.

ET206.CEO.3: Inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.

ET206.CEO.4: Develop abilities to transmit technical information clearly and test the same by delivery of presentation based on the prototype Project.

COURSE OUTCOMES:

The students after completion of the course will be able to,

ET206.CO.1: Consolidate the techniques, skills and modern engineering tools.

ET206.CO.2: Apply acquired skills to the construction of a prototype project.

ET206.CO.3: Develop a prototype project by performing tasks in team.

ET206.CO.4: Demonstrate the work carried out in a team.

PRACTICAL:

Course Introduction:

This course is aiming at a Project Based Learning methodology. Through a series of projects, students will learn to design, build, and debug engineering prototype systems. They will cover multiple aspects of the prototyping process.

Students will complete four modules in rotational manner,

1. Mechanical Prototyping (MP)
2. Electronic Prototyping (EP)
3. Software Prototyping(SP)
4. Civil Prototyping(CP)

Each module will have on an average six laboratory sessions. The students will complete them in rotational manner. Every module will award for 75 marks.

Marks of all four course modules will be averaged and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

MODULE: 1/4	**Mechanical Prototyping (MP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to prototyping**	**02 HOURS**

1. Introduction to Prototyping, traditional prototyping vs. advance rapid Prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Suitable materials and their properties.
3. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.
4. Formation of a group of 5 students per project team.

PRACTICAL NO. 02	**Design of models**	**04 HOURS**

1. Introduction of CAD software and its interaction with prototype machine.
2. 3D Modeling using CAD software package.
3. Identify physical constraints of prototyping

PRACTICAL NO. 03	Preprocessing of prototype	06 HOURS

1. Generating STL files from the 3D models & working on STL files.
2. Pre-Processing the 3D Model in KISslicer / Cuba software.
3. Suitable filament selection and its properties.

PRACTICAL NO. 04	Orientation and support generation	04 HOURS

1. Operate Repeater / Cuba software, Selection of Orientation, Supports generation.
2. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Assembly of model	08 HOURS

1. Complete machine setup.
2. Hands on experience of rapid prototype machine for part/object, assembly manufacturing.
3. Material selection, cost benefit analysis for prototyping, financial aspect.

PRACTICAL NO. 06	Project presentation	04 HOURS

1. Final Presentation and report submission (assessment).

REFERENCE BOOK

1. Rapid Prototyping: Principles and Applications in Manufacturing, Chua C K, Leong K F, Chu S L, World Scientific, ISBN-13: 978-9812778987.
2. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Gibson D W Rosen, Brent Stucker, Springer, ISBN: 978-1-4419-1119-3.
3. Rapid Prototyping: Principles and Applications in Manufacturing,Noorani R, John Wiley & Sons, ISBN: 978-0-471-73001-9.
4. Rapid Tooling: Technologies and Industrial Applications, Hilton P, Jacobs P F, CRC press. ISBN:978-0824787882
5. Rapid Prototyping and Engineering applications: A tool box for prototype development, Liou W L, Liou F W, CRC Press, ISBN: 978-0849334092.
6. Rapid Prototyping: Theory & practice, Kamrani A K, Nasr E A, Springer, ISBN: 978-0-387-23291-1.
7. Kenneth Cooper, Rapid Prototyping Technology: Selection and Application, Marcel Dekker, Inc. New York, ISBN: 082470261.

MODULE: 2/4	Electronic Prototyping (EP)	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to design and construction of electronic prototyping**	**02 HOURS**

1. Gain familiarity with basic stages; Conceptualization, Detailed Design and Implementation.
2. Acquire concepts of basic processes in electronic prototyping.
3. Form a group of students. (03 max)
4. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span.
5. Develop a plan for construction of electronic proto from a concept.

PRACTICAL NO. 02	Basic electronic prototyping skills	02 HOURS

1. Soldering
   - Demonstrate structure of solder wire, soldering temperature, soldering station and gun.
   - Highlight Industrial safety norms, use of lead free solder, extractor fan etc.
   - Use of flux, desoldering gun, desoldering techniques, removing components/wires.
   - Fix Solder defects and inspect quality of solder joints.
2. Wiring
   - Cleaning, stripping and tinning the wires.
   - Connections and protections for wires.
   - Using cable ties , heat shrink tubes, sleeves and other wire dressing techniques.
3. Breadboard
   - Bending wires and making connections on breadboards.
   - Placing components on breadboards.
   - Testing circuits using breadboards.
4. Perfboards
   - Wire connections and component assembly on perfborads.
   - Debugging assembled circuit and increasing stability.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	04 HOURS

1. Gain familiarity with PCB Design software.
2. Draw schematics for PCB design.
3. Make PCB layout as per circuit diagram.
4. Learn PCB design standards.
5. Export PCB files like gerber (.gbr), .pdf etc.

PRACTICAL NO. 04	PCB fabrication	08 HOURS

1. Develop negative imprints of top and bottom sides and expose to PCB.
2. Perform etching process for PCB.
3. Perform cleaning and shearing for required size.
4. Check continuity of tracks.
5. Use drilling machine to make drills.

PRACTICAL NO. 05	Assembly and testing of electronic proto	08 HOURS

1. Make assembly of electronic prototype as per IPC 610 D.
2. Insert components, perform lead cutting with standard clearance.
3. Review mechanical fitment of PCB with component insertion.
4. Solder components and make wiring.
5. Test prototype for electrical functionality, to perform rework if required.
6. Assemble PCB with mechanical fitments and assemblies.
7. Analyze performance and compare with specifications.

PRACTICAL NO. 06	Final project presentation	04 HOURS

1. Demonstrate an electronic prototype in a team.
2. Write a report on implementation of prototype. (10-15 pages max)
3. Present prototype implementation in a team by Power Point presentation.
4. Enumerate proposed specifications of electronic prototype.
5. Highlight financial aspects including proposed cost and bill of material.

REFERENCE BOOK

1. Printed Circuit Boards: Design and Technology, Walter C. Bosshart, Tata McGraw-Hill Education, 1983, ISBN: 978-0074515495.
2. Electronic Assembly Fabrication, Charles A. Harper, 1st ed.,McGraw-Hill Education, 2002 ISBN: 978-0071378826.
3. Soldering in Electronics Assembly, Frank Riley, 1st ed., Springer, 2013, ISBN: 978-3-662-13163-3.
4. Electronic Techniques: Shop Practices and Construction, R. S. Villanucci, A. W. Avtgis, W.F. Megow, 6th ed., Practice-Hall, 1999. ISBN: 978-0130195661.
5. Printed Circuit Boards: Design, Fabrication, and Assembly, R. S. Khandpur, 1st ed. McGraw-Hill Education, 2005, ISBN: 978-0071464208.
6. Practical Electronics for Inventors, Paul Scherz , Simon Monk ,3rd Edition, McGraw-Hill Education, 2013, ISBN 978-0071771337 (Available on TAB edition, Kindle)
7. IPC-J-STD-001E-2010, Requirements for Soldered Electrical and Electronic Assemblies, IPC. , ISBN: 9781580986922.
8. IPC-A-610 D-2014, Acceptability of Electronic Assemblies, IPC. ISBN: 9781611931549.

MODULE: 3/4	**Software Prototyping (SP)**	**28 HOURS**

PRACTICAL:

PRACTICAL NO. 01	**Introduction to software engineering**	**04 HOURS**

Concepts, Software development life cycle (SDLC). Student need to use AEIOU Framework (Design Thinking) to decide the problem statement. Students will work in group of three on AEIOU framework

PRACTICAL NO. 02	**Design UML Diagrams for given problem statement**	**04 HOURS**

Students have to work in group on Project Development canvas and then design following,

1. Creation of data Flow diagram
2. Creation of block diagram
3. Design a Activity Diagram

PRACTICAL NO. 03	**Requirement analysis**	**04 HOURS**

1. Find the requirement specification of given problem statement and formulate the feasible solution.
2. Paper (low-fidelity) prototype: choose the interface intend to develop, giving the reasons (pros and cons) and describing it summarily - choose the similar interface, indicating its key characteristics.

PRACTICAL NO. 04	Design analysis	06 HOURS

1. Make an Inspiration board.
2. Start an inspiration board by listing 5-10 words that relate to your design idea or point of view. These words can be anything – from similar designs to feelings that the idea evokes.
3. Once you've listed your words, come up with at least five inspirations, and share them by providing links or images within your assignment submission. For each inspiration, give a brief (1-2 sentences) and insightful explanation of why you chose it (What did you take away from it? What did you learn from it. In other words, why did it inspire you?). Each of these inspirations should offer a different perspective to the design you are working on.

PRACTICAL NO. 05	Design analysis	06 HOURS

1. Create Storyboards
2. A storyboard is a comic-strip-like set of drawings about what interface does and how it is used to accomplish tasks in a real usage scenario. A good storyboard should clearly demonstrate who the user is, the usage situation, and the user's motivations for using the interface. It should show what the user can accomplish with interface, but it needn't (and often shouldn't) show a specific user interface design. For a storyboard including an app screen, the details of the screen are not relevant, but what those screens enable you to accomplish is. Each storyboard should comprise 5-8 panels and will provide all details of end product.

PRACTICAL NO. 06	Presentation	04 HOURS

1. Each group will be given 10 min to present their work.

REFERENCE BOOK

1. Software Engineering A practitioner's Approach, Roger S, Pressman, 7th Edition, ISBN: 978–0–07–337597–7
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MODULE: 4/4	**Civil Prototyping (CP))**	**28 HOURS**
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**04 HOURS**
Introduction of bamboo as a construction material, its physical, mechanical properties, selection, seasoning and treatment, testing, joinery, case studies of bamboo buildings.		
PRACTICAL NO. 02	**Analysis of determinant trusses.**	**04 HOURS**
Study of different types of trusses, analysis of determinant trusses by method of joint and method of section		
PRACTICAL NO. 03	**Design bamboo trusses**	**04 HOURS**
Design of different bamboo trusses (span more than 3m), Hands on for different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo truss**	**08 HOURS**
Making of bamboo truss		
PRACTICAL NO. 05	**Testing bamboo truss**	**04 HOURS**
Testing of different bamboo truss		

PRACTICAL NO. 06	Final project presentation	04 HOURS
Comparative study of analytical and test results of forces in truss members, final project presentation.		

REFERENCE BOOK

1. Vector mechanics for Engineers: statics and dynamics by Beer & Johnston 10th edition, McGraw Hill Education , ISBN: 978-0073398242
2. Bamboo Architecture & Design (Architecture & Materials), by Chris van Uffelen, , ISBN: 978-3037681824
3. Designing and Building with Bamboo ,Jules J.A. Janssen Technical University of Eindhoven Eindhoven, The Netherlands, ISBN 978-8186247464
4. Codes and standards
5. IS 1902:1993.Code of Practice for preservation of bamboo and cane for non-structural purposes.
6. IS 6874:1973 Methods of test for round bamboos
7. IS 7344:1974 Specification for bamboo tent bamboos.
8. IS 8242:1976 Methods of tests for split bamboos
9. IS 8295 (Part 1): 1976 Specification for bamboo chicks
10. ISO 22157 Standard guidelines for tensile, compressive, shear and bending Strength Parallel to grain and Perpendicular to grain.

REFERENCE

1. Paris Agreement (http://unfccc.int/paris agreement/items/9485.php)
2. Kyoto Protocol(http://unfccc.int/kyoto protocol/items/2830.php)
3. Green Building Objectives & Checklist, Auroville Bamboo Centre, Pudducherry, Tamilnadu.(http://aurovillebamboocentre.org/)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF COMPUTER AND ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	Nil	25	125

PRE-REQUISITE :

IT101 – Computer Programming, ME102 – Engineering Tools and Techniques

COURSE OBJECTIVES :

IT201.CEO.1: To introduce facts, concept and theory of an information system.
IT201.CEO.2: To understand evolution of an information system.
IT201.CEO.3: To explain an information life cycle.
IT201.CEO.4: To develop IoT based information system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

IT201.CO.1: Interpretation of Data, Information and Knowledge. [Apply]
IT201.CO.2: Make use of data acquisition techniques for an information system. [Apply]
IT201.CO.3: Categories different storage techniques. [Analyze]
IT201.CO.4: Develop dashboard for effective communication of information. [Apply]
IT201.CO.5: Determine components of Human computer interaction. [Evaluate]
IT201.CO.6: Design IoT based information system. [Analyze].

THEORY COURSE CONTENT		
UNIT 1	**Evolution Of Information**	**6 HOURS**
Data, Types of Data: Primary data, Secondary data, Meta data, Operational data and Derived data Information: Life Cycle, Semantics of information, Knowledge Data forms: Analog and Digital (Telephone and Stenography) ADC, DAC Evolution of Information- Man Machine Interaction Self-Study: Grade Sheet Generation system **Further Reading:Railway reservation, Inventory machine**		
UNIT 2	**Information Generation**	**6 HOURS**
Data Acquisition, Human interface, Hardware Interface: Input / Output devices Data Transformation: Rearranging, Classifying, Calculating, Summarizing; Self-Study: Weather forecasting System **Further Reading:Data Acquisition Applications**		
UNIT 3	**Information Storage And Transmission**	**4 HOURS**
Need of data storage, Types of storage: stand alone, centralized, distributed, and cloud. Encryption and decryption (define and need) Transmission Type, Synchronous, Asynchronous, Serial, Parallel, Satellite, radio **Case Study:**Dial up, Broadband **Self-Study:**Stand Alone and Disk storage **Further Reading:**Wireless–(Bluetooth, XBEE)		
UNIT 4	**Information Visualization**	**4 HOURS**
Representations: Graphs and Charts: Pi Chart, Scatter plot, Histogram, Heat map, Maps, Geo maps Case Study: Dynamic dashboard **Further Reading:**		
UNIT 5	**Human Computer Interface**	**4 HOURS**
Introduction of HCI, Types – mobile, stand-alone, computer etc, Interactive devices – touch screen, mic, keys, keyboard, scanner, camera etc., HCI design principles- standards, Usability principles –portability, scalability, GUI design and evaluation, Interactive Multimedia document search- image, audio, video, animation Case study: Ticket Generation Kiosk Self-Study: Web based systems interactivity **Further Reading:** Usable GUI Design		
UNIT 6	**Internet Of Things**	**4 HOURS**
IoT: Overview, Characteristics and Architecture Embedded Devices: Sensors, Actuators, Arduino and RaspberryPI IOT Ecosystem: Basic elements / building blocks of IOT application, Systematic method to design IOT application Applications: Asset management, Industrial automation, Smart cities Self-Study:IoT Essentials. **Further Reading:IOT and big Data**		

PRACTICAL		
PRACTICAL NO.01	**Data Acquisition , Storage and Retrieval Systems**	**8 HOURS**

In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow:

- Identification of an interdependent elementary data items which have facts and figure
- Data collection through sensors
- Processing using Arduino
- Data Storage using MySQL in an accessible form
- Data visualization using graphs

PRACTICAL NO.02	**Dashboard Design**	**8 HOURS**

Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system.

PRACTICAL NO.03	**IoT Application**	**8 HOURS**

Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi.

1. Identify the home appliances that require human interaction for its operations and state the need of automation.
2. Identify system component
3. Design circuit diagram
4. Assemble system components
5. Program the interface
6. System Testing
7. System Deployment

TEXT BOOK

1. Ralph M Stair, George W Reynolds, "Fundamentals of Information Systems", Course Technology Inc; 5th edition, 2008, ISBN 978-1423925811.
2. Benny Raphael, Ian F. C. Smith, "Engineering Informatics: Fundamentals of Computer-Aided Engineering", Wiley-Blackwell; 2nd Revised edition, 2013, ISBN-13: 978-1119953418.
3. Paul Mcfedries, "Excel Data Analysis: Your Visual Blueprint for Analyzing Data, Charts and Pivot Tables", Wiley; Fourth edition 2013, ISBN-13 978-8126544004

REFERENCE BOOK

1. Gerard Jounghyun Kim, "Human–Computer Interaction: Fundamentals and Practice", CRC Press, Auerbach Publications, 1 edition, 2015 ISBN 9781482233896
2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley, 2013 ISBN-13: 978-1118430620
   978-8126544004

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME201
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	Nil	25	125

PRE-REQUISITE : Physics, Chemistry

COURSE OBJECTIVES :

ME201.CEO.1: To select material for engineering application.
ME201.CEO.2: To classify the available materials.
ME201.CEO.3: To utilize available material for specified purpose.
ME201.CEO.4: To compare desired quality of materials from standard data.
ME201.CEO.5: To measure useful properties of materials.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME201.CO.1: Select material for engineering application.
ME201.CO.2: Classify the available materials.
ME201.CO.3: Utilize available material for specified purpose.
ME201.CO.4: Compare desired quality of materials from standard data.
ME201.CO.5: Measure useful properties of materials.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**8 HOURS**
Classifications and specifications of steels and cast iron. Heat treatment of steels, Defects due to heat treatment and remedial measures. Classification of surface hardening treatments. Classification, Composition, Properties & applications of: Copper and Its alloys, Nickel and Its alloys, Aluminum and Its alloys. Specific alloys: soldering & brazing alloy, Precipitation hardening alloys. Bearing materials and their applications.		
UNIT 2	**Engineering Polymers, Ceramics and Glass**	**6 HOURS**
Classification of polymers, Polymer types-thermoplastics-thermoset-Elastomers, Polymer synthesis and processing-injection moulding-extrusion-blow moulding-calendaring, Degradation of polymers-chemical, thermal, -biological-mechanical. Polymer recycling methods Introduction to Advanced Ceramics-Barium Titanate, Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications, Introduction to Cermets and its application. HIGH PERFORMANCE POLYMERS:Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation		
UNIT 3	**Composite Materials**	**6 HOURS**
Need of composites. Particle-reinforced composites, large-particle composites, dispersion-strengthened composites. Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic-matrix composites, carbon–carbon composites, fiber-reinforced composites, structural composites, laminar composites.		
UNIT 4	**Electronic and Photonic materials**	**6 HOURS**
Electronic Materials: Intrinsic and extrinsic semiconductors-p-n junction, Bandgap diagrams for conductor, semiconductor and insulator, IR detectors, Hall effect Superconducting Materials: Normal and High temperature superconductivity, Applications. Photonic Materials: LED, LCD, Photo conducting materials, Photo detectors, Photonic crystals and applications. Advancements in electronic materials: Smart materials		
UNIT 5	**Testing of Engineering Materials**	**8 HOURS**
Need and Comparison of destructive and non-destructive tests, Study of destructive testing: Engineering stress-strain curve, true stress-strain curve, Jominy End Quench Test for hardenability, Izod and Charpy Impact Test. Vickers, Rockwell hardness tests. Non –Destructive Testing Non-Destructive testing: Principles & procedure, advantages, disadvantages and Industrial applications of NDT like Sonic & Ultrasonic testing and Radiography tests. Brief overview of another NDT test- Eddy current test, Magnetic Particle Test		
UNIT 6	**Nanomaterials.**	**6 HOURS**
Basic concepts of Nano science and Nanotechnology, Carbon nanotubes, Principle of SEM, TEM and AFM, X ray diffraction Fundamentals principles of SEM, SE and BSE imaging modes, Fracture mode analysis and failure analysis using SEM. Potential uses of nonmaterial's' in electronics, robotics, sports equipment, mobile electronic devices, Medical applications of nanomaterials-Cancer, AIDS treatment.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Jominy End Quench Test**	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO.02	**Izod / Charpy Impact Test**	**2 HOURS**
Izod / Charpy Impact Test.		
PRACTICAL NO.03	**Hardness Test**	**4 HOURS**
Vickers,/ Rockwell, Brinell/Durometers & Poldi Hardness Test.		
PRACTICAL NO.04	**Magnetic Particle & Dye Penetrant Test**	**4 HOURS**
Magnetic Particle & Dye Penetrant Test.		
PRACTICAL NO.05	**Ultra-sonic Test**	**4 HOURS**
Ultra sonic test for detection of flaws in materials.		
PRACTICAL NO.06	**Determination of Hall coefficient**	**4 HOURS**
Determination of Hall coefficient for a semiconducting material.		
PRACTICAL NO.07	**Soldering**	**4 HOURS**
Hard and Soft soldering using soldering materials.		
PRACTICAL NO.08	**Industrial Visit**	
Visit to advanced materials characterization laboratory.		

TEXT BOOK

1. Material Science & Metallurgy for Engineers, Dr. V.D. Kodgire & S. V. Kodgire, Everest Publications.31st Edition, ISBN No: 8186314008
2. Mechanical Behavior & Testing of Materials, A. K. Bhargava, C.P. Sharma P H I Learning Private Ltd. 2011 edition, ISBN No 13-9788120342507

REFERENCE BOOK

1. Engineering Metallurgy, Higgins R. A., Viva books Pvt. Ltd., 2004 ISBN No 13-9788176490276
2. Material Science & Engineering, Raghavan V., Prentice Hall of India, New Delhi. 2003 ISBN No 13-9788120324558
3. Introduction to Physical Metallurgy, Avner, S. H., Tata McGraw-Hill, 2014, ISBN 13-9780074630068
4. Materials Science & Engineering, W. Callister, Wiley Publications,2013, ISBN No 13-9788126521432
5. Physical Metallurgy for Engineers, Clarke D.S. & Varney W.R. Affiliated East-West Press, New Delhi ISBN No 13-978-8176710350

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Fluid Mechanics
	COURSE CODE	ME211
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : Physics, Applied Mechanics

COURSE OBJECTIVES :

ME211.CEO.1: To recall properties and basic concepts of fluid mechanics.
ME211.CEO.2: To observe flow patterns and able to classify the flow.
ME211.CEO.3: To apply various fluid dynamic equations to flow field.
ME211.CEO.4: To analyze and minimize various losses in flow field.
ME211.CEO.5: To predict the behavior of flow field in real life.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME211.CO.1: Define the properties of fluids and different terms in fluid statics, kinematics and dynamics.
ME211.CO.2: Identify the pressure, velocity and discharge in any type of flow also able to visualize the flow.
ME211.CO.3: Calculate losses in flow field.
ME211.CO.4: Analyse when and which types of flow equations are applicable for the flow problems.
ME211.CO.5: Predict the type of flow and able to use fundamental equations in real life problems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamental Concepts and Fluid Statics**	**8 HOURS**
Fundamental Concepts: Continuum, fluid properties - density, pressure, viscosity, surface tension, compressibility. Classification of fluid. Fluid Statics: Definition of body forces and surface forces, static pressure, Pascal's law, Hydrostatic equation, Application to manometer, Forces on submerged surfaces, Buoyancy, stability and Archimedes' Principle.		
UNIT 2	**Fluid Kinematics**	**8 HOURS**
Description of flow field - Langragian and Eulerian approach, Acceleration, Classification of flow field, Fluid element's translation, rotation and deformation, Flow patterns streamlines, path lines and streak lines, Circulation, Vorticity, stream function, velocity potential function.		
UNIT 3	**Fluid Dynamics**	**7 HOURS**
Forces acting on fluid, Forces in Navier–Stokes and Reynolds equation, Euler's equation, Bernoulli's equation and its application, Fundamental equation of mass, momentum and energy. Hydraulic Coefficients. Flow through the orifice and notches.		
UNIT 4	**Flow Through Pipes and Head Losses**	**9 HOURS**
Reynolds Number and its significance in flow, Laminar flow through pipes and ducts, Turbulent flow through pipes, deriving velocity profile using NS equation and developing expression to compute other quantities-flow rate, pressure drop, shear stress, friction factor etc. Head losses- Major and Minor losses, HGL, TEL.		
UNIT 5	**External Flows and Dimensional Analysis**	**6 HOURS**
Fluid Instability, Boundary layer theory, Boundary layer thickness, flow separation, Flow over immersed bodies: Plate, Sphere, Cylinder and other objects, Concept of drag and lift. Aerofoil terminology.Introduction to dimensional analysis, Buckingham pi theorem, Dimensionless numbers		
UNIT 6	**Introduction to CFD**	**2 HOURS**
Introduction to CFD – Need, Applications, Numerical vs Analytical vs Experimental Solutions, Governing equation with convection, diffusion and source term.		

PRACTICAL:		
PRACTICAL NO.01	**Viscosity**	**2 HOURS**
Determination of viscosity of given oil and it's variation with respect to temperature		
PRACTICAL NO.02	**Bernoulli's**	**2 HOURS**
Verification of Bernoulli's equation.		
PRACTICAL NO.03	**Cd in Venturimeter/ Orificemeter**	**4 HOURS**
Calculate coefficient of discharge in Veturimeter/ orificemeter/rotameter.		
PRACTICAL NO.04	**Reynolds's experiment**	**2 HOURS**
Identification of type of flow using Reynolds's experiment		
PRACTICAL NO.05	**Major Losses**	**2 HOURS**
Determination of major losses in pipes		
PRACTICAL NO.06	**Minor Losses**	**2 HOURS**
Determination of minor losses in pipes		
PRACTICAL NO.07	**Metacentric Height**	**2 HOURS**
Calculate its Metacentric height of ship model		
PRACTICAL NO.08	**Heleshaw Apparatus**	**2 HOURS**
Visualization of flow by using Heleshaw apparatus		
PRACTICAL NO.09	**Velocity Profile in Pipe**	**4 HOURS**
Visualization of velocity profile (for laminar flow) in a pipe using CFD Technique		
PRACTICAL NO.10	**Mini Project**	**4 HOURS**
Project Based Learning (PBL) Practices.		
PRACTICAL NO.11	**Notch Experiment**	**2 HOURS**
Calibration of Notch		

TEXT BOOK

1. Dr. R.K. Bansal, Fluid Mechanics, Laxmi Publication, 2017, ISBN No. 9788131808153
2. Dr. P.N. Modi, Dr. S. M. Seth, Fluid Mechanics and Hydraulic Machines, Standard book house,2009, ISBN No. 78-8189401269
3. Frank M. White, Fluid Mechanics, McGraw Hill Publications, 2010, ISBN-13: 978-0077422417
4. Streeter and Wylie, Fluid Mechanics, McGraw Hill, ISBN-13: 978-0070622425
5. Munson, Fundamentals of Fluid Mechanics, Wiley, 2001, ISBN-13: 978-0471442509

REFERENCE BOOK

1. Kundu, Cohen, Dowling, Fluid Mechanics, Elsevier India, 2015, ISBN-13: 978-0124059351 9
2. Yunus Cengel, John Cimbala, Fluid Mechanics Fundamentals and Applications, McGraw Hill, ISBN-13:978-0-07-070034-5
3. Som, Biswas and Chakraborty, Introduction to fluid mechanics and fluid machines, McGraw Hill,2017, ISBN-13: 978-0071329194
4. FOX, McDONALD, PRITCHARD, Fluid Mechanics, Wiley publication,2015, ISBN No. 978-81-265-4128-7
5. John Anderson Jr. Computational Fluid Dynamics the basics with application, McGraw Hill, 2012, ISBN: 9781259025969

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Manufacturing Technology
	COURSE CODE	ME212
	COURSE CREDITS	4
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	50	20	50	-	150

PRE-REQUISITE : Physics, Engineering Tools & Techniques

COURSE OBJECTIVES :

ME212.CEO.1: List different manufacturing machines and their processes.
ME212.CEO.2: Illustrate different manufacturing techniques.
ME212.CEO.3: Select proper metal cutting tools and machining parameters for manufacturing process.
ME212.CEO.4: Identify the CNC specifications and its uses in industries.
ME212.CEO.5: Compare different non-conventional machining processes.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME212.CO.1: Select appropriate manufacturing processes and machines for manufacturing a product.
ME212.CO.2: Demonstrate working of various machines.
ME212.CO.3: Make use of proper tooling and different machining parameters for manufacturing.
ME212.CO.4: Develop jigs and fixtures for specified product.
ME212.CO.5: Utilize the CNC Technology and non-conventional machining processes in industry.

THEORY COURSE CONTENT		
UNIT 1	**Conventional Manufacturing Processes**	**8 HOURS**
Material removing processes: Turning, milling, drilling, boring and broaching. Material Adding processes: Casting, Welding, Soldering, and Brazing. Material shaping processes: Forging. Material finishing processes: Grinding, lapping and buffing.		
UNIT 2	**Conventional Machines**	**8 HOURS**
Material removing Machines: Lathe, milling and drilling. **Material Adding Machines:** Arc, TIG, MIG and Spot welding. **Material shaping Machines:** Forging. **Material finishing Machines:** Grinding, lapping and buffing.		
UNIT 3	**Cutting Tools**	**6 HOURS**
Single point tools: Tool terminology, carbide, brazed and index able inserts. **Drills, Milling tools:** Tool terminology, types, tool selection and applications. **CNC Tools:** Modern cutting tools for CNC machines. Cutting tool materials.		
UNIT 4	**Metal Cutting Technology**	**6 HOURS**
Concept of speed, feed, depth of cut, cutting action, cutting forces. Tool dynamometry- Requirements, types and applications, Measurement of cutting forces. Power requirement, Machinability, tool life, Selection of coolants.		
UNIT 5	**CNC Technology**	**6 HOURS**
Introduction, CNC axes and drives. Automatic Tool and pallet Changer, Concept of a CNC Part Program and CNC support systems. Introduction and applications of Jigs and fixtures.		
UNIT 6	**Non-conventional Machining Processes**	**6 HOURS**
Importance & scope of non-conventional machining processes: Electro-Discharge machining (EDM), Wire Electro-Discharge machining (WEDM), Abrasive Jet Machining (AJM), and Laser Beam Machining (LBM), Ultrasonic Machining (USM), Abrasive water Jet Machining (AWJM).		

PRACTICAL:		
PRACTICAL NO.01	**Machining operations**	**10 HOURS**
To manufacture a product involving – operations on Lathe, Milling and Drilling Machines like facing, step turning, taper turning drilling, slotting & keyway making.		
PRACTICAL NO.02	**Machining time calculations**	**2 HOURS**
To calculate Machining Time for the component manufactured in Practical No.1		
PRACTICAL NO.03	**Welding operations**	**10 HOURS**
To manufacture product by welding joint using TIG or MIG or Arc welding, with its process sheet like Edge preparation, drilling, tapping, taper filling, etc Test.		
PRACTICAL NO.04	**Clamping techniques**	**2 HOURS**
To study clamping of the components with different clamping techniques.		
PRACTICAL NO.05	**Jigs and fixtures**	**4 HOURS**
Mini Project: To design a mini jig and fixture from wood for a given component.		
PRACTICAL NO.06	**CNC and part programming**	**2 HOURS**
Introduction to CNC Machine and Part Programming		
PRACTICAL NO.07	**Industrial Visit**	
Industrial visit.		

TEXT BOOK

1. S.K. Hajra Choudhary, A.K. Hajra Choudhary "Elements of Workshop Technology", Media Promoters, 2010, ISBN No. 13: 978-8185099156
2. D.K. Singh, "Fundamentals of Manufacturing Engineering", CRC Press, 2008, ISBN No. 13: 978-1420070477
3. P. N. Rao, "Manufacturing Technology: Foundry, Forming and Welding", TMH, 2009

REFERENCE BOOK

1. B. Ravi, "Metal Casting Computer Aided design and analysis", Prentice-Hall of India Pvt. Ltd, 2005, ISBN-13: 978-8120327269
2. Alexandre Reikhar, "Casting: An analytical approach", Springer, 2014, ISBN No ISBN-13: 978-1447159735
3. Wailong Wang, "Rapid tooling guidelines for sand casting", Springer, 2012, ASIN: B00I2JENU4

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2017 - 2018
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Psychology
	COURSE CODE	HP201
	COURSE CREDITS	2
RELEASED DATE : 01/06/2017	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	-	20	40	15	NIL	NIL	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP201.CEO.1: To introduce the basic concept and scope of Organizational Behavior.
HP201.CEO.2: To teach the theory of personality and its implications in the organization.
HP201.CEO.3: To evince types and styles of Leadership and the impact of values on the same.
HP201.CEO.4: To guide learners through a decision making process.
HP201.CEO.5: To enhance participants' skills when practicing team work concepts through business games.
HP201.CEO.6: To introduce the concept of Motivation and constructive ways of coping.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP201.CO.1: Explain human behavior in the workplace from an individual, group, and Organizational perspective.
HP201.CO.2: Develop an ability to analyze one's own personality and that of others in Organizations.
HP201.CO.3: Compare different leadership styles with an understanding of how core values affect Leadership.
HP201.CO.4: Demonstrate decision making ability
HP201.CO.5: Identify the problems associated with organizing and managing teams.
HP201.CO.6: Comprehend the correlation amongst stress, motivation and personality.

THEORY

UNIT 1	Organizational Behaviour	6 HOURS

Meaning of Psychology and Organizational Behaviour, Psychology in Organization: History of Organizational Psychology; Scope and Research in Organizational Behaviour, Structure of Organization, Organizational culture, Strong vs Weak culture, Culture vs Formalization.

UNIT 2	Perception and Decision Making	6 HOURS

Meaning, process and determinants of Perception, Process of Decision Making, The link between Perception and Individual Decision Making, Influences on Decision Making: Individual Differences & Organizational constraints, Process and ethics of decision making.

UNIT 3	Personality, Values and Leadership	6 HOURS

What is Personality, The Big Five Personality Model, The importance of values; values and ethical behavior, Leadership, Understanding Personality, values and Leadership, Emotional Intelligence-Personal and Social Competence.

UNIT 4	Understanding Team Work and Conflict Resolution	6 HOURS

Difference between groups and teams, Types of teams, Turning Individuals into Team players, Team building and Team based work, Team dynamics, Types of conflict and conflict resolution.

UNIT 5	Motivation & Stress	4 HOURS

Motivation and its types, Content and Process Theories of Motivation, Concept and reactions to stress, Potential effects of stress, Coping with and managing stress.

TEXT BOOK

1. S. P. Robbins, "Organizational Behavior" Prentice-Hall India, 1995, ISBN-11:81-203-2875-2.
2. F. Luthans," Organizational Behavior". McGraw-Hill, 1995, ISBN-13: 0072873876.
3. U. Sekarn, "Organizational Behavior: Text and Cases", Tata McGraw Hill, 1996, ISBN: 0074603663.
4. Furnham, "The Psychology of Behavior at Work", Psychology Press, 1997, ISBN: 1841695041 .

REFERENCE BOOK

1. M. D. Dunnett, "Handbook of Industrial-Organizational Psychology", Jaico Press, 1990, ISBN: 978089106-041-3.
2. M. A. - Ansari," Managing people at work: Leadership styles and influence strategies", Sage, 1990, ISBN: 0803996500.
3. J. B. P. Sinha," Work Culture in Indian Context", Sage, 1990, ISBN: 0019-5286.
4. D.M. Pestonjee, "Stress and Coping: The Indian Experience, 2nd ed.", Sage Publications, 1999, ISBN: 0761993126.
5. L. N. Jewell & M. Siegall, "Contemporary Industrial/Organizational Psychology", West Publishing Company, 1990, ISBN: 0314715991.
6. D. Katz and-R. L. Kahn, "The Social Psychology of Organizations", Wiley, 1966, ISBN: 978-0-471-023553.
7. M.L. Blum, and J.C. Naylor," Industrial Psychology", CBS Publishers & Distributors, 1984, ISBN: 8123908601.
8. K. H. Blanchard and P. Hersey, "Management of Organizational Behavior: Utilizing Human Resources", Prentice-Hall India, 1993, ISBN: 0-13-5512868-9.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Minor Project
	COURSE CODE	ME213
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL/ TUTORIAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
-	4	-	-	-	-	75	75

PRE-REQUISITE : Design Thinking, Engineering Tools & Techniques, Prototyping

COURSE OBJECTIVES :

ME213.CEO.1: To identify and define a problem to be solved.
ME213.CEO.2: To develop a design for the solution of the problem using engineering tools available.
ME213.CEO.3: To prepare prototype/working model for solving the problem
ME213.CEO.4: To evaluate the model built for its functionality, reliability, sustainability, maintainability and affordability

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME213.CO1: Define the problem to be solved.
ME213.CO2: Apply knowledge of various engineering tools to develop the solution to the problem.
ME213.CO3: Critically analyze the options available to solve the problem and select the one identified most effective.
ME213.CO4: Justify the selection of the method to solve the problem is-a-vis other options considered.
ME213.CO5: :Build the working model of the solution to solve the problem.

PREAMBLE:

It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life.

GUIDELINES:

1. Every student shall undertake the Minor Project in semester IV.
2. Every student shall work on an approved project, a group of 03 students (maximum) shall be allotted for each minor project
3. The group members could be from different departments to support the interdisciplinary functioning
4. The students have to identify the social problem by discussion with various stakeholders, site visits and expert-opinions
5. Collect the sufficient data to establish the criticality of the problem to be solved.
6. Define the actual problem
7. Enumerate various approaches and solutions to solve the problem
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use
9. Develop prototype or model for its testing before implementation
10. The three-member committee of jury members will be appointed to monitor the progress and continuous evaluation of each project. One of the members will be the project guide. Assessment of the project for award of grade shall be done jointly by the guide and committee of jury members

TIMELINE

1. Project group formation: 1 Week.
2. Identification of the problem to be solved: 2 Weeks.
3. Data collection to prove the validity of the problem: 2 Weeks
4. Identification of the various approaches to solve the problem: 2 weeks.
5. Justification of the approach selected to solve the problem: 1 week
6. Building the solution to the problem using prototype or implementation: 6 Weeks
7. Report writing: 2Weeks

ASSESSMENT

Presentation 1: Motivation and need for the selected problem to be solved

Presentation 2: To prove the validity of the problem to be solved using data collected

Presentation 3: Identified approaches to solve the problem and justification of approach selected

Presentation 4: Progress towards the prototyping or implementation of the solution to the problem

Presentation 5: Final demonstration

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

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Curriculum

For

Third Year

Bachelor of Technology in Mechanical Engineering

2016-2020

(With Effect from Academic Year: 2018-2019)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2018-19
T Y B TECH	RELEASE DATE	:	01/12/2017
DEPARTMENT OF MECHANICAL ENGG	REVISION NO.	:	0.0

SEMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC5	ME301	Machine Design	3	2	4
2.	DC6	ME302	Machines & Mechanisms	3	2	4
3.	DC7	ME303	Heat Transfer	3	2	4
4.	OE1	ME31#	Open Elective - Refer Annexure.	3	2	4
5.	HSS5	HP302	Professional Skills	--	4	2
6.	SDP5	ME30#	Skill Development Lab - Refer Annexure	--	4	2
TOTAL				12	16	20

SEMESTER:VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	ME321	Turbomachines	3	2	4
2.	DC9	ME322	Quality Assurance	3	2	4
3.	DC10	ME323	Operations Research	3	2	4
4.	OE2	ME33#	Open Elective - Refer Annexure.	3	2	4
5.	HSS6	HP303	Basics of Entrepreneurship	--	2	1
6.	HSS4	HP301	Project Management	1	2	2
7.	SDP6	ME324	Mini Project	--	4	2
TOTAL				13	16	21

L: Lecture, P: Practical

Open Elective (OE): 4 Courses			
Computer Aided Engineering	**Sl. No.**	**Course Code**	**Name of Course**
	1.	ME311	Geometric Modeling & Design
	2.	ME331	Finite Element Analysis
	3.	ME421	Computational Fluid Dynamics
	4.	ME451	Advanced Engineering Analysis
Robotics & Automation	1.	ME312	Fundamentals of Robotics
	2.	ME332	Kinematics & Dynamics of Robots
	3.	ME422	Robotics Vision and Control
	4.	ME452	Intelligent and High Performance Robotics
Industrial Engineering & Management	1.	ME313	Work Process Assessment
	2.	ME333	Facility Planning & Design
	3.	ME423	Operations Management
	4.	ME452	Supply Chain Management

Skill Development and Project (SDP): 10 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	ME102	Engineering Tools and Techniques
2.	ME103	Design Thinking
3.	ET206	Prototyping
4.	ME213	Minor Project
5.	ME304	Skill Development Lab (Autodesk Inventor)
	ME305	Skill Development Lab (CATIA)
6.	ME403	Piping Design
	ME404	Six Sigma
	ME405	Energy Audit
7.	ME324	Mini Project
8.	ME402	Project - I
9.	ME406	Summer Internship
10.	ME432	Project - II

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Machine Design
	COURSE CODE	ME301
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Design Thinking, Solid Mechanics

COURSE OBJECTIVES :

ME301.CEO.1: To Select design procedure and Design parameters for machine Elements
ME301.CEO.2: To make use of different design standards.
ME301.CEO.3: To interpret different types of failure modes and criteria.
ME301.CEO.4: To illustrate design of different types of machine elements.
ME301.CEO.5: To develop teamwork, critical thinking and planning through design project.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME301.CO.1: Recall fundamental Design procedure and Design parameters for machine Elements.
ME301.CO.2: Illustrate Design Procedure of the Machine Elements considering failure criterias.
ME301.CO.3: Identify the various stresses induced in a machine elements for safer dimensions.
ME301.CO.4: Examine the stresses induced in machine elements for various failure modes.
ME301.CO.5: Determine the optimum and reliable solutions for the Mechanical Engineering problems based on required criteria's.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Machine Design**	**8 HOURS**
Introduction to Machine Design, Design Process Cycle, Design Considerations. Standards and Codes, Preferred Series, Ethics in design. Design for safety and reliability- Factor of safety, Service Factor. Design of Simple Machine Elements– Cotter joints, Knuckle joint.		
UNIT 2	**Shafts, Keys & Couplings**	**6 HOURS**
Design of Shafts on the basis of Strength, Torsional Rigidity And Lateral Rigidity. ASME Codes for shaft design. Types of keys and their design, Coupling.		
UNIT 3	**Design Against Fluctuating Load**	**6 HOURS**
Stress Concentration – Causes and remedies, fluctuating stresses, fatigue failure, S-N curve, Endurance, Notch Sensitivity, Endurance Strength Modifying Factors, Design For Finite And Infinite life, Cumulative Damage In Fatigue Failure, Soderberg , Gerber ,Goodman, Modified Goodman diagrams, Fatigue Design under combined stresses.		
UNIT 4	**Design of Spur and Helical Gears**	**10 HOURS**
Spur Gears: Terminology, Force Analysis, Gear Tooth failures, Beam Strength (Lewis Equation) ,Wear Strength, Design of Spur Gears. Helical Gears: Terminology, Force Analysis, Virtual number of teeth, Beam Strength, Wear Strength, Design of helical Gears.		
UNIT 5	**Design of Bevel and Worm Gears**	**8 HOURS**
Bevel Gear : Terminology, Force Analysis, Virtual number of teeth, Design of Bevel Gears. Worm Gear: Terminology, Force Analysis, Design of Worm and Worm Gears using thermal considerations.		
UNIT 6	**Rolling Contact Bearings**	**6 HOURS**
Classification, Static And Dynamic Load Carrying Capacities, Stribeck Equation, Load-Life Relationship, Selection of Bearing life, Selection of Rolling Contact Bearing From Manufacture's Catalogue, Bearing with probability of survival other than 90%. Mounting of Bearings , Preloading of bearings, Failures in Bearings- causes and remedies. Sliding Contact Bearings: Comparison Of Sliding Contact And Rolling Contact Bearings, Working Principle of Hydrodynamic and Hydrostatic Bearing.(Theoretical Treatment)		

PRACTICAL		
PRACTICAL NO.01	**Presentations Based On Case Studies**	**12 HOURS**

PPT Presentation / Poster Presentation based on real life application design problem.(Case Studies). Minimum 4 students are required to prepare a group and present the case studies. The presentation shall include Design Problem Area, Role of a specific machine element in the mechanical system, Identification of problem or failure modes, Approach/methodology to solve problem ,Necessary changes made in design parameters required to get the solution.

PRACTICAL NO.02	**Design Project Of a Two Speed Gearbox**	**16 HOURS**

Introduction to Conventional Drawing, Manufacturing Tolerances, Geometric Dimensioning and Tolerances.

Design of 2 Stage single speed Gearbox. It should consist of design of combination of two same or two different kind of gear pairs. Open ended problem statement related to current mechanical engineering applications is given to students or identified by students.

Each project shall consist Of Two Full Imperical Size Sheets-one involving assembly drawing with part list and overall dimensions and other involving the detailed drawing of individual components. Manufacturing tolerances ,Surface finish symbols and geometric tolerances should be specified so as to make it a working drawing.

A design report giving all necessary calculations of design of components and assembly should be separately submitted in the form of a file.Design data book should be used wherever necessary.

The drawings shall be completed by drawing and drafting softwares. Oral will be based on the Design Projects, Design report and the syllabus.

TEXT BOOK

1. Bhandari V. B., Design of Machine Elements, Tata McGraw Hill, 1994. ISBN 13: 9780070681798.
2. P.S. G. Design Data book (PSG College of Engg. & Tech.), DPV Printers, Coimbatore, 2002. 6 Norton, R. L., Machine Design: An Integrated Approach, 3/e, Pearson, 2004.
3. Shigley, J.E and Mischke, C. R. Mechanical Engineering Design, 6/e, Tata McGraw Hill, 2005. ISBN-13: 978-0071002929.

REFERENCE BOOK

1. Machine elements in Mechanical Design by R.L. Mott, Prentice Hall. ISBN: 0130618853, 9780130618856
2. Mechanical Design by P. Childs, Elsevier. ISBN: 9780080886862
3. Fundamentals of Machine Component Design by R. C. Juvinall & K. M. Marshek, Wiley. ISBN-13: 978-1118012895
4. Machine Design by R.L. Norton. ISBN: 0-13-148190-8
5. B.J. Hamrock, and S.R. Schmid, Fundamentals of Machine Elements, Tata McGraw Hill, New Delhi, 2005. ISBN-13: 978-1482247480

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Machines and Mechanisms
	COURSE CODE	ME302
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Engineering Graphics, Solid Mechanics

COURSE OBJECTIVES :

ME302.CEO.1: To learn Kinematics of Different Mechanisms and Machines.
ME302.CEO.2: To select Suitable Mechanism for Applications.
ME302.CEO.3: To categorize machine parts with their constructional and working features.
ME302.CEO.4: To learn all types of Gears and their Applications.
ME302.CEO.5: To develop competency in Drawing cam Profile

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME302.CO.1: Outline the design problem and solve it.
ME302.CO.2: Enlist principles of kinematic pairs, chains and their classification.
ME302.CO.3: Analyze the planar mechanisms for position, velocity and acceleration.
ME302.CO.4: Interpret Constructional features and working features of parts of machines.
ME302.CO.5: Evaluate gear tooth geometry and select appropriate gears for the required applications.
ME302.CO.6: Design cams and followers for specified motion profile

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Mechanisms**	**6 HOURS**
Links, pair, kinematic chain, mechanism. Degrees of freedom. Four link mechanisms. Slider-crank mechanism. Mobility and range of movement.		
UNIT 2	**Kinematic analysis of plane mechanism**	**6 HOURS**
Displacement analysis. Instantaneous center of velocity. Kennedy theorem. Velocity analysis by graphical method. Acceleration analysis by graphical method. Coriolis component. Klein's construction.		
UNIT 3	**Force and motion analysis**	**6 HOURS**
D' Alembert's principle, Dynamic Force analysis by graphical method, Dynamic motion analysis, Friction, Turning moment diagram, Flywheel analysis.		
UNIT 4	**Cams and followers**	**6 HOURS**
Classification of cams. Classification of followers. Terminology. Motions of followers. Construction of Cam profiles. Cam jump phenomenon. Spatial cam follower mechanism.		
UNIT 5	**Gears**	**8 HOURS**
Classification of gears, Terminology of gears, Fundamental law of gearing, Interference and undercutting, Helical gears, Virtual number of teeth, Center distance of helical gears, Efficiency of helical gears, Spiral gears, Worm and worm wheel.		
UNIT 6	**Gyroscope and Governors**	**8 HOURS**
Gyroscopic torque, Gyroscopic effect in 2W vehicles, 4W vehicles, Airplanes, Naval ships, Porter governor, Proell governor, Hartung governor, Hartnell governor, Inertia governor.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Prototype creation**	**4 HOURS**
To Create Prototype of any inversion of Slider Crank Mechanism		
PRACTICAL NO.02	**Velocity and Acceleration Analysis of Slider Crank Mechanism**	**6 HOURS**
Computer Program for Velocity and Acceleration Analysis of Slider Crank Mechanism		
PRACTICAL NO.03	**Cam Follower Mechanism**	**4 HOURS**
To Create Animation of Cam Follower Mechanism for a given Motion of Cam		
PRACTICAL NO.04	**Epicyclic gear trains**	**2 HOURS**
Torque analysis of Epicyclic gear trains		
PRACTICAL NO.05	**Study of Different Types of Gearboxes**	**2 HOURS**
Study of Different Types of Gearboxes and Their Applications		
PRACTICAL NO.06	**Gyroscopic couple of Uniform disc**	**2 HOURS**
Determination of Gyroscopic couple of Uniform disc		
PRACTICAL NO.07	**Governor**	**2 HOURS**
Experiment on Governor		
PRACTICAL NO.08	**Flywheel**	**2 HOURS**
To determine moment of inertia of a flywheel		

TEXT BOOK

1. S. S. Rattan, Theory of Machines, McGraw Hill Publications. ISBN:13: 978-9351343479
2. Thomas Bevan, The Theory of Machines, Pearson Publications. ISBN: 9788131729656
3. A. G. Ambekar, Mechanism and Machine Theory, PHI. ISBN: 9788120331341
4. N. K. Mehta, Machine Tool Design and Numerical Control, Tata McGraw Hill Publication. ISBN: 13: 978-125900457
5. John Uicker, Joseph Shigley, Theory of Machines and Mechanisms, Oxford University Press. ISBN: 9780190264482

REFERENCE BOOK

1. R L Norton, Kinematics and Dynamics of Machinery, McGraw-Hill. ISBN-13: 978-9351340201
2. Kenneth J Waldron, Gary L Kinzel, Kinematics, Dynamics and Design of Machinery, Wiley. ISBN: 978-1-118-93328-2
3. Meriam, J L and Kraige, L G, Engineering Mechanics: Dynamics, Wiley. ISBN: 9780471429173
4. D.K. Pal, S.K. Basu, Design of Machine Tools, Oxford & Ibh Publishing Co Pvt. Ltd. ISBN-13: 9788120417779
5. C. S. Sharma & Kamlesh Purohit, Theory of Machine and Mechanism, PHI, ISBN 9788120329010

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Heat Transfer
	COURSE CODE	ME303
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	30	40	30	30	20	150

PRE-REQUISITE : Thermal Engineering, Fluid Mechanics

COURSE OBJECTIVES :

ME303.CEO.1: To Recall modes of heat transfer and their applications.
ME303.CEO.2: To relate the heat transfer phenomenon of different thermal system.
ME303.CEO.3: To Calculate rate of heat transfer in real life applications.
ME303.CEO.4: To analyze the heat transfer in complex thermal systems.
ME303.CEO.5: To suggest suitable Heat Exchanger for any practical application.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME303.CO.1: Outline the design problem and solve it.
ME303.CO.2: Define the important modes of heat transfer and state their applications.
ME303.CO.3: Compare the heat transfer rate of different thermal system.
ME303.CO.4: Calculate heat transfer by conduction, convection and thermal radiation for practical situations.
ME303.CO.5: Analyze heat transfer in complex systems involving several heat transfer mechanisms.
ME303.CO.6: Recommend suitable Heat Exchanger for any practical application.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Heat Transfer**	**6 HOURS**
Modes/laws of heat transfer, Thermal Conductivity, Electrical Analogy in conduction, derivation of Generalized heat conduction equation in Cartesian coordinates. Its reduction to Fourier, Laplace and Poisson's equation. Thermal diffusivity, Generalized heat conduction equation in cylindrical and spherical co-ordinates.		
UNIT 2	**One Dimensional Steady State Heat Conduction**	**8 HOURS**
Heat conduction through a plane wall, cylindrical wall and sphere. Heat conduction through a composite slab, cylinder and sphere, effect of variable thermal conductivity, critical radius of insulation, Economic insulation, and thermal contact resistance. One dimensional steady state heat conduction with heat generation for plane wall, cylinder and sphere		
UNIT 3	**Extended Surfaces and Unsteady State Heat Conduction**	**8 HOURS**
Types and Applications of Fins. Heat transfer through Extended surfaces, derivation of equations for temperature distribution and heat transfer through fins of constant cross-section area. Effectiveness and efficiency of a fin. Errors in the measurement of temperature in a thermo-well. Unsteady state heat conduction: System with negligible internal resistance, Biot and Fourier numbers. Lumped heat capacity method. Time constant and response of thermocouple, Transient heat analysis using charts. Thermal Insulation – Types and selection, Economic and cost considerations, Payback period.		
UNIT 4	**Convection**	**6 HOURS**
Introduction to Convection: Local and average convective coefficient. Hydrodynamic and thermal boundary layer. Laminar and turbulent flow over a flat plate and in a pipe. Free and Forced Convection: Physical significance of the dimensionless numbers related to free and forced convection. Empirical correlations for convective heat transfer. Introduction to Condensation and Boiling: Modes of pool boiling, critical heat flux, burnout point, forced boiling. Film and drop wise condensation.		
UNIT 5	**Radiation**	**6 HOURS**
Concept of Black Body, Fundamental Laws of Radiation, Radiative properties of a surface, Radiation shape factor, use of shape factor charts, Heat exchange between non-black bodies, . Electrical Analogy for radiation heat exchange, heat exchange between two infinitely parallel planes, cylinders and spheres, Radiation shields.		
UNIT 6	**Heat Exchangers**	**8 HOURS**
Heat exchangers classification, overall heat transfer coefficient, heat exchanger analysis- use of log mean temperature difference (LMTD) for parallel and counter flow heat exchangers. LMTD correction factor, fouling factor. The effectiveness-NTU method for parallel and counter flow heat exchangers. Design considerations of heat exchanger, compact heat exchangers.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01		**4 HOURS**
Determination of thermal conductivity of insulating powder.		
PRACTICAL NO.02		**4 HOURS**
Determination of Thermal Conductivity of Composite wall.		
PRACTICAL NO.03		**2 HOURS**
Determination of temperature distribution, fin efficiency in Natural Convection.		
PRACTICAL NO.04		**2 HOURS**
Determination of heat Transfer Coefficient in Natural Convection from Cylinder.		
PRACTICAL NO.05		**2 HOURS**
Determination of heat Transfer Coefficient in Forced Convection from Cylinder.		
PRACTICAL NO.06		**4 HOURS**
Determination of Critical Heat Flux.		
PRACTICAL NO.07		**2 HOURS**
Determination of Stefan Boltzmann Constant.		
PRACTICAL NO.08		**4 HOURS**
Determination of emissivity of given surface.		
PRACTICAL NO.09		**4 HOURS**
Determination of effectiveness of Heat Exchanger.		

TEXT BOOK

1. Y.A. Cengel and A.J. Ghajar, Heat and Mass Transfer – Fundamentals and Applications, Tata McGraw Hill Education Private Limited. ISBN-13: 978-0073398181
2. S.P. Sukhatme, A Textbook on Heat Transfer, Universities Press. ISBN: 9788173715440
3. A.F. Mills, Basic Heat and Mass Transfer, Pearson. ISBN-13: 978-1292042480
4. B.K. Dutta, Heat Transfer-Principles and Applications, PHI. ISBN-13: 978-8120316256

REFERENCE BOOK

1. S.P. Venkatesan, Heat Transfer, Ane Books Pvt. Ltd.M. S. Jamil Asgar, "POWER ELECTRONICS", PHI Learning Private Limited-New Delhi; 1 Edition edition, 2004, ISBN: 978-8120323964
2. Holman, Fundamentals of Heat and Mass Transfer, McGraw – Hill publication. ISBN-13: 978-0078447860
3. P. K. Nag, Heat & Mass Transfer, McGraw Hill Education Private Limited. ISBN-13: 978-0070702530
4. M. Thirumaleshwar, Fundamentals of Heat and Mass Transfer, Pearson Education India. ISBN: 8177585193, 9788177585193
5. R. C. Sachdeva, Fundamentals of Engineering Heat and Mass Transfer, New Age Science. ISBN-13: 978-8122427851.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Management
	COURSE CODE	HP 301
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	15	25	10	NIL	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP301.CEO.1: To introduce the basic concept and scope of Project Management.
HP301.CEO.2: To teach the theory of project Initiation and its analysis with project vision.
HP301.CEO.3: To introduce the concept of risk analysis and different types of tools used in project planning.
HP301.CEO.4: To guide learners monitoring and controlling project progress.
HP301.CEO.5: To introduce the concept of System dynamics, project audit and reviews.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP301.CO.1: Explain the concept of project management.
HP301.CO.2: Develop an ability to analyze scope, objective and vision of project initiation.
HP301.CO.3: Able to analyze risk and different tools of project planning.
HP301.CO.4: Develop an ability to measure progress of project by monitoring and controlling
HP301.CO.5: Identify the problems associated with project and reviewing the same.

THEORY		
UNIT 1	**Introduction Project Management**	**5 HOURS**
Meaning of Project Management, Classifications of projects, The Triple Constraint, The PMBOK project management process framework, Standard project team roles and project organisation (Functional, matrix, projectised), System approach, Systems development, System analysis, Project feasibility, Product life cycle, Project appraisal, Project contracting, The phases of SDLC.		
UNIT 2	**Project Initiation**	**5 HOURS**
Determining the project business reason, creating a project charter (market and technical analysis), financial analysis evaluation of project proposals, risk analysis, sensitivity analysis and social cost benefits analysis, defining scope and objectives, define a project vision.		
UNIT 3	**Project Planning**	**6 HOURS**
Planning fundamentals, identifying the project team responsibilities, project master plan, work breakdown structure, and other tools of project planning, estimating the efforts and duration of tasks, Identifying and analyzing risks, PERT,CPM,GERT,SLAM,DPM and resource allocation.		
UNIT 4	**Project monitoring and controlling**	**4 HOURS**
Executingthe project on time, Measuring project progress, Identifying corrective actions, Internal & external project control, control process, variance limit, issues in project control.		
UNIT 5	**Project Learning**	**4 HOURS**
System dynamics, Project audit, Change management, Project reviews and reporting.		

PRACTICALS		
PRACTICAL NO.01	**SDLC**	**2 HOURS**
Preparing for managing and developing a perfect model of SDLC for a particular given problem.		
PRACTICAL NO.02	**PERT and CPM**	**2 HOURS**
Planning a project under PERT and CPM charts		
PRACTICAL NO.03	**GERT and SLAM**	**2 HOURS**
Planning a project under GERT and SLAM charts		
PRACTICAL NO.04	**DPM**	**2 HOURS**
Solving practical problems under DPM		

PRACTICAL NO.05	**Variance Limit**	**2 HOURS**
Project monitoring under variance and controlling according to the given situations.		
PRACTICAL NO.06	**System Dynamics**	**2 HOURS**
Understanding System dynamics by solving case studies		
PRACTICAL NO.07	**Change Management**	**2 HOURS**
Solving case studies for learning how change management works.		
PRACTICAL NO.08	**Project Reviewing**	**2 HOURS**
Solving many practical problems by reviewing projects as well as some case studies.		

TEXT BOOK

1. James P. Clements and Gido, "Effective Project Management" Cengage India 5th Edition , ISBN: 9781111824051
2. John Nicholas, "Project Management for Business and Technology: Principles and Practice", PHI- Eastern economy 3rd Edition, ISBN: 0-7506-7824-0
3. Juana Clark Craig, "Project Management Lite", 2nd Edition, ISBN-13: 9781478129226
4. Harold R. Kerzner, "Project Management", 11th Edition, ISBN: 978-1-118-48322-0

REFERENCE BOOK

1. Erik Larson and Clifford Gray, "Project Management: The Managerial Process", McGraw Hill ISBN-10: 0-07-340334-2
2. Enzo Frigneti, " The Practice of Project Management", KOGAN PAGE INDIA PRIVATE LIMITED,ISBN: 9788175545397
3. Geogary M. Horine, "Project Management", QUE 4th Edition, ISBN: 9780134653914
4. Cynthia Stackpole Snyder, "A User manual to The PMBOK Guide", ISBN: 9781118546604
5. Brown, James T., "The Handbook of Program Management: How to Facilitate Project Success with Optimal Program Management", Second Edition. The McGraw-Hill Companies, 2014, ISBN 978-0071837859
6. Frame, J. Davidson," Managing Projects in Organizations: How to Make the Best Use of Time, Techniques, and People", 3rd edition, Jossey-Bass, 2003, ISBN 0-787-96831-5
7. Kerzner, Harold," ProjectManagement: Project Management: A Systems Approach to Planning, Scheduling, and Controlling", 10th edition, Wiley, 2009, ISBN 0-470-27870-6
8. Meredith, R. Jack and Mantel, Jr., Samuel J., "Project Management: A Managerial Approach", 7th edition, Wiley, 2008, ISBN 0-470-22621-8
9. Stackpole, Cynthia Snyder, "A Project Manager's Book of Forms: A Companion to the PMBOK® Guide", Wiley, 2009, ISBN 978-0470389843
10. Weiss, Joseph and Wysocki, Robert," Five-phase Project Management: A Practical Planning And Implementation Guide", Basic Books, 1992, ISBN 0-201-56316-9

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Geometric Modeling and Design
	COURSE CODE	ME311
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Engineering Graphics, Applied Mathematics

COURSE OBJECTIVES :

ME311.CEO.1: To introduce the basic tools of computer-aided design (CAD) and computer graphics.
ME311.CEO.2: To expose contemporary computer design tools.
ME311.CEO.3: To prepare the student to be an effective user of a CAD system.
ME311.CEO.4: Explain vehicle suspensions and Safety Systems.
ME311.CEO.5: To impart the knowledge to develop design capabilities for 2D and 3D objects

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME311.CO.1: Recall fundamentals of Computer Graphics.
ME311.CO.2: Explain Computer Graphics and the role of computer-aided design (CAD) in product development
ME311.CO.3: Illustrate the concepts of geometric and modelling techniques.
ME311.CO.4: Apply the knowledge to develop visualization of image display.
ME311.CO.5: Evaluate the modeling, drafting, detailing of 2D and 3D models.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to GMD**	**6 HOURS**
Definitions and need of CAD, CAM and CAE, PLM A) Graphics System Types of systems, Input/output devices, Video display devices, Raster scan display, Random scan, Workstations and peripherals, graphics standards, Evaluation of CAD/CAM system. B) Geometric Modeling Types and parametric representation of lines & curves: DDA – Algorithm, Algorithms for line and circle		
UNIT 2	**Geometric Transformations**	**8 HOURS**
2-D Transformations, Composite Transformations, Introduction of 3-D transformations, Definitions of Projections, Viewing and clipping, Windowing, Segmentation, Trimming, Integration.		
UNIT 3	**Wire Frame Modeling**	**6 HOURS**
Introduction, Classification of wire frame entities, parametric representation of Analytic curves – lines, Circles, Ellipse, Conics, Parametric representation, Characteristics of Synthetic curves –Hermite cubic curves, Bezier curves, B-Splines curves.		
UNIT 4	**Surface Modeling**	**6 HOURS**
Introduction, features of Geometric Modeling, Surface entities, Surface representation Methods, parametric representation of surfaces, plane surface, ruled surface, surface of revolution, Tabulated surface. Hermite cubic surface, Bezier Surface, B spline surface.		
UNIT 5	**Solid Modeling**	**8 HOURS**
Introduction, Geometry and topology, Solid representation, Boundary representation (B-rep), Constructive solid geometry (CSG), Sweeping, Solid Manipulations.		
UNIT 6	**Advanced Modeling**	**6 HOURS**
Feature Based Modeling, Assembly Modeling, Introduction of Behavioral Modeling, Conceptual Design and Top-down Design. Techniques for visual realism - hidden line - Surface removal, Geometric Dimensioning & tolerances, Geometric and Dimensional Constraints.		

PRACTICAL: Perform practicals using any CAD software package		
PRACTICAL NO.01	**Modeling Using ANSYS Design Modeler**	**4 HOURS**
Use ANSYS Design Modeler to draw geometry of any machine component.		
PRACTICAL NO.02	**Part Modeling**	**4 HOURS**
Solid Modeling Using CATIA		
PRACTICAL NO.03		**2 HOURS**
Use following algorithm to rasterize line, circle a. DDA algorithm b. Bresenham' s Circle Algorithm		
PRACTICAL NO.04		**2 HOURS**
Use following transformations and solve for the given input figure/coordinates. (Composite transformation) a. Rotate through θ. c. Scaling b. Translation d. Reflection		
PRACTICAL NO.05	**Surface Modeling**	**4 HOURS**
Surface Modeling using CATIA		
PRACTICAL NO.06	**Assembly Modeling**	**4 HOURS**
Assembly of any one machine component like knuckle joint, coupling, gate valve, stop valve, Bench vice, etc.		
PRACTICAL NO.07	**Detailing**	**2 HOURS**
Detailing of any one assembly and parts made in assignment 6 (Draw detail views with symbols, tolerances, surface finish factors and BOM)		

TEXT BOOK

1. AutoCAD 2017(R1):3D Drawing & Modeling Autodesk Authorized Publisher ISBN- 978-1943184262
2. Paul Tigwell, Paul Carman CATIA reference guide onward press 2nd revised edition, ISBN-10:1566901553, ISBN-13- 978-1566901550
3. Computer Graphics, Hearn and Baker, Published by Dorling Kindersley Pvt. Ltd., 2nd Edition
4. C.R Alavala, CAD/CAM-Concepts and Applications, Prentice-Hall of India, 2008, ISBN-978-81-203-3340-6
5. Kuldeep Sareen- CAD/CAM-Theory & Concepts, S. Chand, ISBN: 9788121928748

REFERENCE BOOK

1. Ibraham Zeid, CAD/CAM-Theory and Practice-McGraw Hill, 2006. ISBN:0070728577, ISBN-13-978-0070728578
2. Martenson, E. Micheal, Geometric Modelling, John Wiley & Sons, 1995-ISBN-9780831132989
3. P.N.Rao, CAD/CAM Principles and Applications, Mc Graw Hill Education. ISBN-13: 978-0070681934
4. Principles of Interactive Computer Graphics, Newmanand Sproull, Mc Graw Hill Education ISBN-0070463387
5. D. Hearn and M.P. Baker, Computer Graphics with OpenGL Version, (3rd edition), Pearson Education, 2004.ISBN-9788177587654

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Fundamentals of Robotics
	COURSE CODE	ME312
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : Electrical & Electronics Engineering, Design Thinking

COURSE OBJECTIVES :

ME312.CEO.1: To identify & classify the robots.
ME312.CEO.2: To describe different types of sensors and actuators.
ME312.CEO.3: To analyze different transmission system used in robot.
ME312.CEO.4: To Create Mechatronic system with sensing actuation system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME312.CO.1: Identify key components of robots.
ME312.CO.2: Summarize classification, sensors and actuators of industrial robots.
ME312.CO.3: Develop different transmission system used in robotics.
ME312.CO.4: Create a robot with sensor/Actuator.

THEORY COURSE CONTENT		
UNIT 1	**Introduction of Robotics**	**6 HOURS**
Introduction, History, Specifications of Robots, Usage of Robots. Classifications of robots by– Application, by Coordinate system, By Actuation system, By Control method, By Programming Method, Work envelope - Flexible automation versus Robotic technology. Application: Manufacturing robots, Three axis KUKA Robot.		
UNIT 2	**Sensor and Actuators**	**8 HOURS**
Sensor classification, Internal Sensors, External Sensors, Sensor Selections., Actuators – Pneumatic, hydraulic, electric (servo motor, stepper motor), Selection of motors. Application: Used in heavy industry (more specifically). Forestry, automotive, sheet metal rolling and pressing, system that detects velocity, position, shock, vibration, or the acceleration of gravity to determine orientation		
UNIT 3	**Power Transmission System**	**6 HOURS**
Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link - Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws. Application: Electric screwdriver, dancing monster, oscillating sprinkler, windup alarm clock, washing machine and clothes dryer , automobiles , cooling towers.		
UNIT 4	**Manipulators**	**6 HOURS**
Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators. Application: Radioactive or bio hazardous materials, using robotic arms, or they were used in inaccessible places.		
UNIT 5	**Robot End Effectors**	**8 HOURS**
Classification of End effectors – Tools as end effectors. Drive system for grippers-Mechanical-adhesive-vacuum-magnetic-grippers. Hooks & scoops. Gripper force analysis and gripper design. Active and passive grippers. Application: Welding head, or a paint spray gun. end effector on the space shuttle's robotic arm. uses a pattern of wires which close like the aperture of a camera around a handle or other grasping point.		
UNIT 6	**Virtual Instrumentation**	**6 HOURS**
Historical perspectives, advantages, block diagram and architecture of a virtual instrument, data - flow techniques, graphical programming in data flow, comparison with conventional programming. Application: Require test, measurement, and control with rapid access to hardware and data insights, Measurements, test benches and Machine Vision than Industrial Automation.		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01		**4 HOURS**
Study of different types of robots and Component requirement analysis of robot.		
PRACTICAL NO.02		**4 HOURS**
Demonstration of different types of sensors using discrete component and Electronics Trainer Kit.		
PRACTICAL NO.03		**4 HOURS**
Design and selection of transmission system required for particular mechanism.		
PRACTICAL NO.04		**4 HOURS**
Demonstration of Pneumatic or hydraulic actuators using mechatronics trainer kit.		
PRACTICAL NO.05		**4 HOURS**
Design and Simulate an actuator to pick and place objects of different shapes.		
PRACTICAL NO.06		**2 HOURS**
Design and simulate Data Acquisition System using LabView.		
PRACTICAL NO.07		**6 HOURS**
Capstone Project – Building a Bot		

TEXT BOOK

1. Mikell P. Groover, Industrial Robots – Technology, Programming and applications, McGraw Hill, New York, 2014, ISBN :978-0070249899
2. Deb S. R. and Deb S., Robotics Technology and Flexible Automation, Tata McGraw Hill Education Pvt. Ltd, 2010. ISBN :978-0070077911
3. John J.Craig , Introduction to Robotics, Pearson, 2009 ,2nd edition , ISBN : 978-0201543612,

REFERENCE BOOK

1. S.K.Saha, Introduction to robotics, Tata-McGraw-Hill Publication, ISBN: 978-0070140011
2. Richard Klafter, "Robotic Engineering: An Integrated Approach", Prentice – Hall, ISBN: 978-8121926164.
3. Fu K S, Gonzalez R C, Lee C.S.G, Robotics: Control, Sensing, Vision and Intelligence, McGraw Hill, 1987, ISBN: 9780070226258

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Work Process Assessment
	COURSE CODE	ME313
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	Nil	50	150

PRE-REQUISITE : Engineering Graphics, Design Thinking

COURSE OBJECTIVES :

ME313.CEO.1: To study concepts of productivity.
ME313.CEO.2: To study the basics of finance.
ME313.CEO.3: To understand the concepts of work study, method study and time study.
ME313.CEO.4: To measure standard time to complete specific task with different techniques.
ME313.CEO.5: To study the parameters of ergonomics and propose the solution to increase human efficiency.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME313.CO.1: Define productivity concepts and principles.
ME313.CO.2: Recall the principles of economics.
ME313.CO.3: Describe work study, method study and time study.
ME313.CO.4: Calculate standard time to carry out a specified job with different techniques.
ME313.CO.5: Design the man-machine system to improve human efficiency.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Work Study**	**6 HOURS**
Introduction to Industrial Engineering, Historical background, Contribution of Taylor and Gilbreth, Productivity – Definition, Types, Productivity of material, land, building, machine and power, Factors affecting the productivity, Numerical and Cases on Productivity Definition and scope of Work Study, Work study and management, Work study and supervision, Work study and worker.		
UNIT 2	**Method Study**	**8 HOURS**
Method Study: Definition, objective and scope of method study, Activity recording and exam aids, Charts to record moments in shop operation – process charts, flow process charts, travel chart and multiple activity charts. (With simple problems). Micro and memo motion study: Charts to record moment at workplace – principles of motion economy, Classification of moments two handed process chart, SIMO chart, Micro motion study. Development, definition and installation of the improved method, brief concept about synthetic motion studies.		
UNIT 3	**Work Measurement**	**6 HOURS**
Definition, objective and benefit of work measurement. Work measurement techniques. Work sampling: need, confidence levels, sample size determinations, random observation, conducting study with the simple problems.		
UNIT 4	**Time Study**	**8 HOURS**
Time Study, Definition, time study equipment, selection of job, steps in time study. Breaking jobs into elements, recording information. Rating & standard Rating, standard performance, scale of rating, factors of affecting rate of working, allowances and standard time determination. Predetermined motion time study – Method time measurement (MTM)		
UNIT 5	**Ergonomics**	**6 HOURS**
Introduction, areas of study under ergonomics, system approach to ergonomics model, man-machine system. Components of man-machine system and their functions – work capabilities of industrial worker, study of development of stress in human body and their consequences. Computer based ergonomics. DESIGN OF MAN-MACHINE SYSTEM: Fatigue in industrial workers, Quantitative qualitative representation and alphanumeric displays, Controls and their design criteria, control types, relation between controls and displays, layouts of panels and machines. Design of workplaces, influence of climate on human efficiency. Influence of noise, vibration and light.		
UNIT 6	**Introduction to Engineering Economy**	**6 HOURS**
Engineering Decision-Makers, Engineering and Economics, Problem solving and Decision making, Intuition and Analysis, Tactics and Strategy. Engineering Economic Decision, Maze. Law of demand and supply, Law of returns, Interest and Interest factors: Interest rate, Simple interest, Compound interest, Cash - flow diagrams, Personal loans and EMI Payment.		

PRACTICAL		
PRACTICAL NO.01	**Productivity**	**2 HOURS**
Numerical on Productivity		
PRACTICAL NO.02	**Work Study**	**2 HOURS**
Review of a case study on productivity improvement using Work Study		
PRACTICAL NO.03	**Recording Tools & Techniques**	**4 HOURS**
Assignment on Recording Tools & Techniques – Charts- Diagrams		
PRACTICAL NO.04	**Method Study**	**4 HOURS**
Case 1– Bagging Exercise – Method Study (Record, Examine) Case 2– Bagging Exercise – Method Study (Develop, Evaluate. Define)		
PRACTICAL NO.05	**Process Chart**	**4 HOURS**
Case – Toy Assembly – Earth Mover (Two handed process chart)		
PRACTICAL NO.06	**Workplace Design**	**4 HOURS**
Workplace Design using Principles of motion economy		
PRACTICAL NO.07	**Time Standards**	**4 HOURS**
Setting Time Standards using Video Time Study and MTM.		
PRACTICAL NO.08	**Work Sampling**	**2 HOURS**
Work Sampling Exercise		
PRACTICAL NO.09	**Ergonomics**	**2 HOURS**
Measurement of heart beat rate, calorie consumption parameters using walking simulator or cycle Ergometer		

TEXT BOOK

1. Introduction to work study, International Labour Office, Geneva, - III Revised Edition, 1981, ISBN 13: 9789221000112.
2. Motion and Time study - Ralph M Barnes; John Wiley, 8th Edition, 1985, ISBN-13: 978-0471059059
3. Engineered work Measurement - Weldon, ELBS, Marvin E. Mundel- Motion and Time study, PHI, 4th edition, ISBN-13: 978-0831111700
4. Engineering Economy- Riggs J.L. McGraw Hill, 2002, ISBN 0-07912248-5.

REFERENCE BOOK

1. Human Factors in Engineering Design 7- S Sanders and E J McCormick, 6th Edition, McGraw Hill, ISBN 0-07-054901-X.
2. Industrial Engineering Hand Book, Maynards H.B., third edition, New York and London, McGraw- Hill, ISBN-13: 978-0070411029
3. Work Study and Ergonomics, S Dalela and Sourabh, Chand Publishers, 3rd edition, ISBN-13: 978-8180141331
4. Industrial Engineering and Management–O. P.Khanna, Dhanpat Rai & Sons 2000, ISBN-818992835X

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Skill Development - Autodesk INVENTOR
	COURSE CODE	ME304
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	50	50

PRE-REQUISITE : Engineering Graphics

COURSE OBJECTIVES :

ME304.CEO.1: To Use AutoCAD for daily working process.
ME304.CEO.2: To Understand the fundamentals of computer aided design.
ME304.CEO.3: To learn different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication.
ME304.CEO.4: To enable the students to Create multiple designs using several of tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME304.CO.1: Identify the components of the AutoCAD user interface and basic CAD terminology.
ME304.CO.2: Utilize AUTOCAD features to create and modify drawings.
ME304.CO.3: Use professional-level CAD software to draw, read engineering.
ME304.CO.4: Apply the skills attained from 2D and 3D modelling to design working drawings using Inventor.

PRACTICAL		
PRACTICAL NO.01	**AUTODESK INVENTOR INTRODUCTION**	**6 HOURS**
Autodesk Inventor Fundamentals Autodesk Inventor user Interface Model Manipulation, Designing Parametric Parts. Basic sketching techniques: Creating 2D sketches Geometric constraints Dimensioning sketches.		
PRACTICAL NO.02	**BASIC SHAPE DESIGN**	**8 HOURS**
Creating basic sketched features Intermediate sketching, editing parametric parts 3D grip editing, creating work features Creating basic swept shapes, Detailed shape design: Creating chamfers and fillets Creating holes and threads Patterning and mirroring features Creating thin-walled parts, Additional Features Face: Draft, Splitting a Face or Parts, Shells, Ribs, Bend Parts.		
PRACTICAL NO.03	**MODEL AND DISPLAY MANIPULATION**	**8 HOURS**
Reordering Features Inserting Features, Suppressing Features, Section Views, Design Views, Sweep Features, Loft Features, Duplication Tools		
PRACTICAL NO.04	**ASSEMBLY DESIGN**	**6 HOURS**
Assembly design overview, designing assemblies, Using project files in assembly designs, Joint Connections		
PRACTICAL NO.05	**PLACING, CREATING AND CONSTRAINING COMPONENTS**	**6 HOURS**
Placing components in an assembly Constraining components, placing standard components using the content center, Basic part design in an assembly		
PRACTICAL NO.06	**BASIC VIEW CREATION**	**6 HOURS**
Drawing creation environment Base and projected views Section views, Detail views Crop views Managing views.		
PRACTICAL NO.07	**DIMENSIONS, ANNOTATIONS AND TABLES**	**8 HOURS**
Automated dimensioning techniques Manual dimensioning techniques Annotating holes and threads, Creating centerlines, symbols and leaders, Revision tables and tags. Sheet Metal		
PRACTICAL NO.08	**ANNOTATING ASSEMBLY DRAWINGS**	**6 HOURS**
Assembly-centric bill of materials Creating and customizing parts Lists Creating balloons, Drawing standards and resources.		

TEXT BOOK

1. AutoCAD 2017(R1):3D Drawing & Modeling Autodesk Authorized Publisher ISBN- 978-1943184262

REFERENCE BOOK

1. Autodesk Inventor 8 Essentials Plus 3rd Ed Edition Alan Kalameja, Daniel T. Banach, Travis Jones ISBN: 9781401864965

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Skill Development - CATIA
	COURSE CODE	ME305
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	50	50

PRE-REQUISITE : Engineering Graphics

COURSE OBJECTIVES :

ME305.CEO.1: To get acquainted with PLM structure

ME305.CEO.2: To design product in digital environment and design procedure implementation using CAD/CAM applications for better, efficient and fast product development

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME305.CO.1: Make Database in PLM Environment.

ME305.CO.2: Apply various tools for modeling, assembly & surfacing.

ME305.CO.3: Design new products in 3D digital environment.

PRACTICAL		
PRACTICAL NO.01	**Introduction to CATIA V6 PLM**	**6 HOURS**
Import the existing CATIA V5 data and store in V6, Search and identify the data located in V6 database, Modify the data in any PLM process, Sharing information with users, Save the modifications into database		
PRACTICAL NO.02	**Part Design**	**10 HOURS**
Introduction to Sketcher Analyzing the degrees of freedom of the sketch Sketch based features Dress up features		
PRACTICAL NO.03	**Assembly Design**	**10 HOURS**
Introduction to assembly design Importing existing parts into assembly design Positioning the parts at their respective positions Defining the assembly constraints Saving assembly into the database		
PRACTICAL NO.04	**Drafting**	**10 HOURS**
Introduction to generative drafting Frame, title block and view generation Saving a drawing document and its links Additional view generation using detail and clipping Adding section views and cuts for detail information		
PRACTICAL NO.05	**Generative Shape Design - Surfacing**	**20 HOURS**
Wireframe creation to create skeleton for surfaces Creation of basic surfaces Surface Operation Assemble, relimit and connect the surfaces		

REFERENCE BOOK

1. Documentation of Dassault Systemes for CATIA

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Turbomachines
	COURSE CODE	ME321
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Thermal Engineering, Fluid Mechanics

COURSE OBJECTIVES :

ME321.CEO.1: To recall the basics of Fluid Mechanics and Thermodynamics.
ME321.CEO.2: To explain the velocity triangle of different turbo machines
ME321.CEO.3: To provide the students with opportunities to apply basic thermo-fluid dynamics flow equations to Turbo machines.
ME321.CEO.4: To distinguish the different turbo machines based on characteristic curves, specific speed and heads.
ME321.CEO.5: To measure the performance of turbines, pumps and compressors by using velocity triangles.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME321.CO.1: Define the power producing and power consuming devices.
ME321.CO.2: Classify the different turbomachines.
ME321.CO.3: Solve the turbomachines problem by using basic knowledge of fluid machines and thermodynamics
ME321.CO.4: Analyze the effect of various parameters on the overall performance of turbomachines.
ME321.CO.5: Evaluate the performance of turbines, pumps and compressors by using velocity triangles.

THEORY COURSE CONTENT		
UNIT 1	**Impulse momentum principle and its application**	**6 HOURS**
Classification, Euler's turbomachinery equation, Applications , Impulse momentum principle and its applications, Force exerted on fixed and moving flat plate, hinged plate, curved vanes, series of flat plates and radial vanes, velocity triangles and their analysis, work done equations, vane efficiency.		
UNIT 2	**Hydraulic Turbines**	**8 HOURS**
Classification of hydraulic Turbines, Pelton, Francis, Kaplan and propeller turbines, velocity triangles, Alternate form of Euler's turbine equation, Degree of Reaction, utilization factor, Relation between degree of reaction and Utilization factor, power and efficiency calculations, specific speed and its significance, draft tube, cavitation, governing of impulse and reaction turbines, performance characteristics (operating and main characteristics), Design parameters for all the three turbines		
UNIT 3	**Steam Turbines**	**8 HOURS**
Stream nozzles: Types and applications Steam turbines; basic cycle, impulse and reaction turbines, compounding of steam turbines, Parsons' turbine and its condition for maximum utilization factor, reaction staging, velocity triangles and analysis		
UNIT 4	**Pumps**	**8 HOURS**
Centrifugal Pumps: Introduction, classification of pumps, Pumping System and the Net Head Developed, Centrifugal pump components and their functions. Euler Head, various efficiencies, Need of priming, pump characteristics, Pumping systems and system head curves, Operating point model testing, Pumps in Series and Parallel, NPSH & Cavitation in Pumps: Calculation of NPSH (A) and its significance, Effect of blade discharge angle on performance.		
UNIT 5	**Centrifugal compressor and Axial compressor**	**6 HOURS**
Centrifugal Compressors: Components, Work done & pressure rise, enthalpy entropy diagram, Slip factor, Power input factor, various losses in centrifugal compressor, Performance characteristics, surging choking phenomenon Axial flow Compressors: Work done and Pressure rise, Degree of reaction, losses and efficiency, Stalling, Compressor characteristics		
UNIT 6	**Jet Propulsion**	**6 HOURS**
Propulsion Cycles: Jet Propulsion Cycles and their Analysis for turbojet, turboprop and turbofan engines-efficiency and specific thrust Factors Affecting Flight Performance & Methods of Thrust Augmentation		

PRACTICAL		
PRACTICAL NO.01	**Impulse momentum principle**	**4 HOURS**
Verification of impulse momentum principle		
PRACTICAL NO.02	**Pelton wheel**	**4 HOURS**
Trial on impulse water turbine (Pelton wheel) and plotting of main and operating characteristics		
PRACTICAL NO.03	**Francis Turbine**	**4 HOURS**
Trial on hydraulic reaction turbine (Francis Turbine) and plotting of main and operating characteristics		
PRACTICAL NO.04	**Centrifugal pump**	**4 HOURS**
Trial on centrifugal pump and plotting operating characteristics		
PRACTICAL NO.05	**Centrifugal air compressor**	**4 HOURS**
Trial on centrifugal air compressor and plotting its characteristics		
PRACTICAL NO.06	**Visit to hydro/steam power plant**	**4 HOURS**
Visit to hydro/steam power plant and report to be submitted.		
PRACTICAL NO.07	**Case Study**	**4 HOURS**
Case study on any one hydro/steam power plant.		

TEXT BOOK

1. Turbines, Compressors & Fans, S.M. Yahya, Tata-McGraw Hill. ISBN: 9781259000720 Turbomachines, B. U. Pai, Wiley India. ISBN: 9788126539550
2. Fluid mechanics and hydraulic machines, Dr. R.K. Bansal. ISBN-13: 978-8131808153
3. Hydraulic Machines, Dr. J. Lal, Metropolitan Book Co. Pvt. Ltd., Delhi. ISBN-13: 978-8120000261
4. Hydraulics, Fluid Mechanics and Machinery, Modi P N & Seth S N, Standard Book House, New Delhi. ISBN: 9788189401269
5. R. Yadav, Steam and Gas Turbines and Power Plant Engineering, VII edition, Central Publ. house. ISBN-13: 978-8185444352

REFERENCE BOOK

1. William W. Perg, Fundamentals of Turbomachinery, John Wiley & Sons.
2. Thermal Turbomachines, Dr. Onkar Singh, Wiley India. ISBN: 9788126546855
3. V. P. Vasandani, Theory of Hydraulic Machinery, Khanna Publishers, Delhi. ISBN-13: 978-8174092502
4. Karassik, Hand Book of Pumps, Tata McGraw Hills Ltd., New Delhi. ISBN: 9780071460446
5. S.L. Dixon, Fluid Mechanics, Thermodynamics of Turbomachinery, IV edition, Butterworth-Heinemann Publ., 1966. ISBN-13: 978-0124159549

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Quality Assurance
	COURSE CODE	ME322
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Engineering Tools & Techniques

COURSE OBJECTIVES :

ME322.CEO.1: To understand metrology, its advancement & measuring instruments.
ME322.CEO.2: To study fundamentals of inspection methods and systems.
ME322.CEO.3: To understand advancement in metrology like CMM.
ME322.CEO.4: To suggest appropriate Quality Management System for given application.
ME322.CEO.5: To select and apply Quality control methods for given applications.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME322.CO.1: Identify different measurement standards as per application.
ME322.CO.2: Explain the tolerance, limits of size, fits and gauge design.
ME322.CO.3: Describe measurements of threads, gears.
ME322.CO.4: Apply QC tools at appropriate application.
ME322.CO.5: Prepare the Quality Control Plan, Recommend corrective action.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Metrology**	**6 HOURS**
Metrology, Errors, Calibration, Types of Geometric Form Measurement, Accuracy and Precision.		
UNIT 2	**Metrological Applications**	**8 HOURS**
Design of gauges, System of Limits, Fits and Tolerances, Comparators, Thread and Gear Metrology, Surface Roughness, Measurement, Force and torque measurement, Strain measurement, Temperature measurement, Laser technology in measurements, Interferometer, Machine Vision System, Coordinate Measuring Machine.		
UNIT 3	**Quality Control in various Industrial sectors**	**6 HOURS**
Quality control methods and parameters in different industries like Automobile, Food, Pharma, CAD, Electronic and Electrical components manufacturing.		
UNIT 4	**Introduction to Quality Tools**	**6 HOURS**
Concept of quality, Deming's cycle, Juran's Trilogy approach, Seven Tools, Quality in Manufacturing, Quality Control Plan.		
UNIT 5	**Statistical Quality Control Tools**	**8 HOURS**
Frequency diagrams, Variance Analysis, Control Chart, Pie charts, histograms, Statistical process control, Process capability. Sampling Techniques, QC curve, Use of sampling tables		
UNIT 6	**Total Quality Management**	**6 HOURS**
Concepts of 5S, Kaizen, Poka Yoke, Kanban, JIT, Six sigma, Zero Defects. Quality Management Systems, ISO 9001, ISO 14000, OHSAS18001		

PRACTICAL		
PRACTICAL NO.01	**Error Measurements**	**2 HOURS**
Error measurement in linear/angular measurement.		
PRACTICAL NO.02	**Dimension and Geometrical Measurements**	**4 HOURS**
Use of pneumatic comparator for dimensions and geometrical measurements.		
PRACTICAL NO.03	**Measurement of Gear Parameters**	**4 HOURS**
Gear parameter measurement using Gear Tooth Vernier.		
PRACTICAL NO.04	**Measurement of Surface Roughness**	**4 HOURS**
Surface roughness measurement using surface roughness tester		
PRACTICAL NO.05	**Application of Profile Projector**	**4 HOURS**
Use of profile projector and tool maker's microscope for determination of complex geometrical applications.		
PRACTICAL NO.06	**Machine alignment Testing**	**4 HOURS**
Machine Tool Alignment Testing.		
PRACTICAL NO.07	**Case Study**	**4 HOURS**
TQM Case study.		
PRACTICAL NO.07	**Industrial Visit**	**4 HOURS**
Visit to CMM facility.		

TEXT BOOK

1. Mechanical Measurements, Beckwith Marangoni and Lienhard, Pearson Education, 6th Edition, 2006. ISBN-13: 978-0201847659.
2. Engineering Metrology, R. K. Jain, Khanna Publishers, Delhi, 2009. ISBN: 978-81-7409-153-X.
3. Juran J.M., Quality Handbook, McGraw Hill Publications. ISBN: 9780071070898.
4. Grant S.P., Statistical Quality Control, Tata McGraw Hill Publication. ISBN 13: 9780070435551.

REFERENCE BOOK

1. Narayana K.L., Engineering Metrology. ISBN: 8183711189, 9788183711180.
2. ASTME, Handbook of Industrial Metrology, Pretice Hall of India Ltd.
3. Connie Dotson, Fundamentals of Dimensional Metrology, Thamson Publn, 4th Edition. ISBN-13: 978-0766820715
4. Kulkarni V.A. and Bewoor A.K., Quality Control, John Wiley Publication. ISBN: 9788126519071

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Oprations Research
	COURSE CODE	ME323
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Applied Mathematics

COURSE OBJECTIVES :

ME323.CEO.1: To understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand.

ME323.CEO.2: To understand the relationship between a linear program and its dual, including strong duality and complementary slackness.

ME323.CEO.3: To Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change.

ME323.CEO.4: To solve specialized linear programming problems and network models.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME322.CO.1: Identify and develop operational research models from the verbal description of the real system.

ME322.CO.2: Apply the mathematical tools that are needed to solve optimization problems.

ME322.CO.3: Use mathematical software to solve the proposed models.

ME322.CO.4: Solve specialized linear programming problems like the transportation and assignment problems.

ME322.CO.5: Solve network models like the shortest path, minimum spanning tree, and maximum flow problems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Operation Research**	**6 HOURS**
Introduction, Graphical Method, Simplex Method, Big M Method, Two Phase Simplex Method, Degeneracy. Decision Theory: Steps in Decision Making, Types of Management Decisions, Decision under Certainty, under Risk, under Uncertainty, Decision Trees.		
UNIT 2	**Transportation and Assignment Problem**	**6 HOURS**
Specific features of transportation problem, NW Corner Rule, Matrix Minima Method, VAM, MODI Method Stepping Stone Method, Mathematical Formulation of an Assignment Problem, Hungarian Method, Unbalanced Assignment Problem, Travelling Salesman Problem.		
UNIT 3	**Theory of Games and Dynamic Programming**	**8 HOURS**
Types of Games: Maximin–Minimax Principle, 2*2 Games without Saddle Points, 2*N or M*2 Games, Dominance Property, Use of L.P. to games. Dynamic Programming: Characteristics, principle of optimality, solution procedure, deterministic problems		
UNIT 4	**Network Scheduling**	**8 HOURS**
Introduction, Fulkerson's Rule, Time Analysis, CPM, PERT Procedure, Cost Consideration in CPM and PERT		
UNIT 5	**Waiting Line Theory and Sequencing Model**	**8 HOURS**
Queuing System, Kendall's Notation, Birth and Death Model, N/FCFS Model, Multiservice Model, M/FCFS Model. Solution of sequencing Problem - Processing of n jobs through two machines, Processing of n jobs through three machines, Processing of two jobs through m Machines, Processing of n jobs through m Machines		
UNIT 6	**Investment Analysis and Inventory Control**	**6 HOURS**
Break-Even Analysis, Payback Period Method, DCF Method, IRR Method, Introduction to Probabilistic Models. Deterministic Models, Probabilistic Inventory Models, Replacement of Items that deteriorate and Fail suddenly.		

PRACTICAL: Perform following experiments using MATLAB or Open source software.		
PRACTICAL NO.01	**Big M Methods.**	**4 HOURS**
Program on Big M Method		
PRACTICAL NO.02	**Transportations**	**4 HOURS**
Program on Transportation Problem		
PRACTICAL NO.03	**Assignment Problem.**	**4 HOURS**
Program on Assignment problem		
PRACTICAL NO.04	**Optimization by using suitable solver.**	**4 HOURS**
Demonstration of optimization problem using suitable solver		
PRACTICAL NO.05	**Game theory**	**4 HOURS**
Program on Theory of Games		
PRACTICAL NO.06	**Case study**	**4 HOURS**
Case Study on Network Scheduling		
PRACTICAL NO.07	**Break even analysis**	**2 HOURS**
Program on Break Even Analysis or IRR Method		
PRACTICAL NO.08	**Birth and death model.**	**2 HOURS**
Demonstration of Birth and Death model or Multi service model		

TEXT BOOK

1. Hillier F.S., and Lieberman G.J., Operations Research, Eight Edition, Mc. Tata McGraw Hill, India. ISBN-13: 978-0070600928
2. N. D. Vora, Quantitative Techniques. ISBN-13: 978-0070146730
3. Gupta P. K. and Hira D. S.: Operations Research, S Chand & Company Ltd. ISBN13: 9788121902816
4. Sharma S. D., Kedar Nath : Operations Research, Ram Nath & Co., ISBN:-13 5551234001596

REFERENCE BOOK

1. Taha H. A.: Operations Research: An Introduction, Prentice Hall of India Pvt. Ltd. ISBN-13: 978-0132555937.
2. Belegundu, — Optimization Concepts and Applications in engineering, Cambridge Uni. Press, India ISBN-13: 978-0521878463.
3. Hamdy A Taha, Operations Research - An introduction, Pearson Education. ISBN: 9780132555937.
4. Ravindran, Phillips and Solberg, Operations Research Principles and Practice, Second Edition, Mc.WSE Willey, ISBN: 978-0-471-08608-6.
5. Wagner H. N.: Principles of Operations Research with applications to Managerial Decisions, Prentice Hall of India Pvt. Ltd. ISBN-13: 978-0137095926.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Finite Element Analysis
	COURSE CODE	ME331
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Geometric Modeling & Design

COURSE OBJECTIVES :

ME331.CEO.1: To equip the students with the Finite Element Analysis fundamentals.
ME331.CEO.2: To enable the students to formulate the design problems into FEA.
ME331.CEO.3: To enable the students to perform engineering simulations using Finite Element Analysis software (ANSYS/Optistruct).
ME331.CEO.4: To enable the students to understand the ethical issues related to the utilization of FEA in the industry.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME331.CO.1: Identify mathematical model for solution of common engineering problems.
ME331.CO.2: Formulate simple problems into finite elements..
ME331.CO.3: Solve for modeling and meshing of structural problems.
ME331.CO.4: Use professional-level finite element software to solve engineering problems in Solid mechanics.
ME331.CO.5: Derive element matrix equation by different methods by applying basic laws in mechanics and integration by parts.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of FEA**	**8 HOURS**
Basics of Solid Mechanics, Basic equations of elasticity, Equilibrium equation in elasticity, plane stress, plane strains, Solution methodologies to solve engineering problem, Failure Analysis of product, Review of Theories of Failures, Past, Present & Future of FEA, FEA Terminology, General Procedure of FEA, Introduction to Types of Analysis.		
UNIT 2	**Discretization and Basic Procedure**	**6 HOURS**
Introduction to meshing/ discretization, Introduction to different element types, 1D, 2D & 3D Meshing, Mesh Quality Check, Boundary Conditions. Introduction to different approaches used in FEA such as direct approach, Variational approach, weighted residual, energy approach, Galerkin and Raleigh Ritz approach.		
UNIT 3	**1 D Elements: Springs & Bars**	**8 HOURS**
Types of 1D elements, displacement function, global and local coordinate systems, polynomial form of interpolation functions- linear, quadratic and cubic, properties of shape function, primary and secondary variables. Formulation of elemental stiffness matrix and load vector for Spring, bar using any approach, Assembly of global stiffness matrix and load vector, properties of stiffness matrix, half bandwidth, treatment of boundary conditions- elimination approach, stress and reaction forces calculations.		
UNIT 4	**1 D Elements: Beams & Truss**	**6 HOURS**
Shape functions, Formulation of elemental stiffness matrix and load vector for truss and beam using any approach, Assembly of global stiffness matrix and load vector, treatment of boundary conditions-elimination approach, stress and reaction forces calculations.		
UNIT 5	**2D Elements**	**8 HOURS**
Two-Dimensional Stress Analysis: Plane Stress/Strain problems in 2D elasticity, constitutive relations Constant Strain Triangle(CST), Liner Strain Rectangle (LSR), displacement function, Pascal‘s triangle, compatibility and completeness requirement, geometric isotropy, convergence requirements, strain filed, stress filed, Formulation of element stiffness matrix and load vector for Plane Stress/Strain problems .Assembly of global stiffness matrix and load vector, Boundary conditions, solving for primary variables (displacement), stress calculations		
UNIT 6	**1D Steady State Heat Transfer**	**6 HOURS**
Review of modes of HT Conduction, convection, radiation, Governing Differential Equation, Boundary conditions, Steady State Heat transfer formulation of 1D elements for conduction and convection.		

PRACTICAL: Perform following practical's.		
PRACTICAL NO.01	**Modeling & Meshing Using 2D Elements**	**6 HOURS**
Modeling and meshing of plate with 2 D tria and quad Element using Hypermesh with quality check		
PRACTICAL NO.02	**Modeling & Meshing Using 3D Elements**	**6 HOURS**
Modeling and meshing of any 3 D machine component using Hypermesh with quality check		
PRACTICAL NO.03	**Analysis of Plate with Hole**	**4 HOURS**
Static stress concentration factor calculation for a plate with center hole subjected to axial loading in tension using FEA software.(ANSYS/ Optistruct)		
PRACTICAL NO.04	**Analysis of Machine Component for Stress, Strain**	**4 HOURS**
Stress and deflection analysis of any machine component consisting of 3-D elements using FEA Software (ANSYS/ Optistruct).		
PRACTICAL NO.05	**Analysis of Beam**	**4 HOURS**
Find Deflection, Stress and Strains in Beam with various cross sections with various loads and validate with numerical results.		
PRACTICAL NO.06	**Analysis of Bar**	**4 HOURS**
Find Deflection, Stress and Strains in Bar with various cross sections with various loads and validate with numerical results.(Also take composite bars)		

TEXT BOOK

1. J. N. Reddy, An Introduction to the Finite Element Method, Tata McGraw-Hill.ISMN-13-9780070513556
2. C.S. Krishnamurthy, Finite Element Analysis: Theory & Programming, TMH Publishing Co.
3. Reddy J. N., An Introduction to Finite Element Methods, McGraw Hill Company, 1984. ISBN-13-978-0072466850

REFERENCE BOOK

1. Trupathi R Chandrupatla and Ashook D. Belegundu, Introduction of Finite Element in Engineering, Prentice Hall of India, 1997.ISBN-13- 978-0132162746
2. K.J. Bathe, Finite Element Procedures, Klaus-Jurgen Bathe.ISMB-13- 978-0133173055
3. O.C. Zienkiewicz , The Finite Element Method.ISBN-13- 978-1856176330
4. Rao S. S., The Finite Element Methods of Engineering, Pergamon Press, 1989.ISBN-13- 978-1856176613
5. Segerland L. J., Applied Finite Element Analysis, Wiley Publication, 1984-ISMn-13- 978-0471806622
6. Gokhale N. S., Deshpande S. S., Bedekar S. V. and Thite A. N., —Practical Finite Element Analysis, Finite to Infinite, Pune

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Kinematics & Dynamics of Robots
	COURSE CODE	ME332
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : Fundamentals of Robots, Machines & Mechanisms

COURSE OBJECTIVES :

ME332.CEO.1: To List configurations of robot.
ME332.CEO.2: To Apply design considerations in Trajectory Planning.
ME332.CEO.3: To Analyze concept of kinematics and dynamics for position control.
ME332.CEO.4: To Create a Task based robot system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME332.CO.1: Enlist the configurations of robot.
ME332.CO.2: Prepare trajectory design plan for shooting robot.
ME332.CO.3: Combine kinematics and dynamics for position control.
ME332.CO.4: Create a Programmable Robot with Transformed Mechanisms..

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Robotics**	**8 HOURS**
Introduction to Robotics, Introduction & Basic concepts of robotics, Different configuration robots, Robot performance, Homogenous transformation, Euler's Angle.		
UNIT 2	**Robot Kinematics and Dynamics**	**8 HOURS**
Direct kinematics of a manipulator, Inverse kinematics, Geometric approach for inverse kinematics, Algebraic approach for inverse kinematics.		
UNIT 3	**Trajectory Planning and Manipulator Control**	**6 HOURS**
Introduction to trajectory planning, Cartesian space & Joint Space Technique, Manipulator control –Linear, 2nd order, force control, modeling and control of a single joint.		
UNIT 4	**End effectors, sensors and vision systems**	**6 HOURS**
End effectors –Types & working, Sensor-need, classification of Sensor, desirable features, Introduction to RCC, Need of vision system		
UNIT 5	**Balancing**	**8 HOURS**
Centre of Gravity, Static balancing - Dynamic balancing - Balancing of revolving masses - Balancing of reciprocating masses - Balancing machines.		
UNIT 6	**Robotic System design and applications**	**4 HOURS**
Robot design, Manipulator Mechanism Design, Actuation Scheme, Robot application -Material handling, loading/unloading, palletizing, inspection and Processing, Robotic actuators, types, working principle		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01		**4 HOURS**
Study and demonstration of different mechanisms.		
PRACTICAL NO.02		**4 HOURS**
Detailed study report - Design of Robotic Transmission System.		
PRACTICAL NO.03		**4 HOURS**
Design and Simulate an actuator to pick and place objects of different shapes using CATIA or similar Software.		
PRACTICAL NO.04		**4 HOURS**
Study of robotic arm and its configuration – Each group has to present one design.		
PRACTICAL NO.05		**4 HOURS**
Study and demonstration of trajectory system for Robots.		
PRACTICAL NO.06		**2 HOURS**
Static and dynamic balancing of robot.		
PRACTICAL NO.07		**2 HOURS**
Critical speed analysis of different robots.		
PRACTICAL NO.07		**4 HOURS**
Capstone Project – Building of Task Based Robot.		

TEXT BOOK

1. Reza Jazar, Theory of Applied Robotics,2010, Springer US, ISBN – 978-0-387-68964-
2. Ambekar A.G., "Mechanism and Machine Theory" Prentice Hall of India, New Delhi, 2007 ISBN :978-8120331341
3. Shigley J.E., Pennock G.R and Uicker J.J., "Theory of Machines and Mechanisms", Oxford University Press, 2003, 978-0190264482.

REFERENCE BOOK

1. Rao.J.S. and Dukkipatti R.V. "Mechanisms and Machines", Wiley-Eastern Ltd., New Delhi, 1992.ISBN 13 : 978-8177581270.
2. Richard D. Klafter, Thomas. A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009. ISBN-1-59047-816-9.
3. John Hannah and Stephens R.C., "Mechanics of Machines", Viva Low Prices Student Edition, 1999, 978-0713132311.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Facility Planning & Management
	COURSE CODE	ME333
	COURSE CREDITS	4
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Work Process Assessment

COURSE OBJECTIVES :

ME333.CEO.1: To study the basics of maintenance and safety measures in industry.
ME333.CEO.2: To study and discuss different parameters affecting business location.
ME333.CEO.3: To study and suggest material handling system for specific application.
ME333.CEO.4: To study different elements of costing for engineering products and services.
ME333.CEO.5: To study the existing plant layout and propose new improved layouts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME333.CO.1: Recall basics of Maintenance and safety measures in industry.
ME333.CO.2: Identify location of facilities for business organizations.
ME333.CO.3: Apply fundamental principles of material handling.
ME333.CO.4: Calculate the cost of given engineered product and service.
ME333.CO.5: Design new layouts incorporating products, process and personnel requirements for manufacturing and service organizations.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to facility planning**	**8 HOURS**
Plant Location: Factors influencing plant location, Theories of plant location and Locational Economics. Capitals- Objectives of plant layout, Principles of plant layout, Types of plant layout, their merits and demerits.		
UNIT 2	**Material Handling**	**8 HOURS**
Principles of Material Handling, Material Handling Function, Scope and Functions of Material Handling, Manual Mechanical Handling Ratio, MH Equipment Types, Positioning Equipment, Unit Load Equipment, Auto Identification & Control Equipment, Transport Equipment – Conveyors, Cranes, Industrial Trucks. Storage Equipment, AGVs & Robots		
UNIT 3	**Plant layout design**	**6 HOURS**
Plant Layout Design: Traditional Layout procedures: Immer's Basic Steps, Nadler's ideal systems approach, Muther's SLP, Apple's Plant Layout Procedure and Reed's procedure, Activity relationship chart, relationship Diagram, Space relationship diagram. Computerized Layout Planning: Classification of Layout Algorithms – distance based Vs. Adjacency based approaches, Pairwise Exchange Method, Graph based method. CRAFT, CORELAP, ALDEP – Input requirements and procedure Introduction to Simulated Annealing and Genetic Algorithm in Layout design.		
UNIT 4	**Space utilization and construction of layout**	**6 HOURS**
Space Determination & Area Allocation: Factors for consideration in space planning, receiving, storage, production, shipping, tool room and tool crib, other auxiliary service actions. Establishing total space requirement. The area allocation procedure, the plot plan. Constructing the Layout: Methods of constructing the layout, Evaluation of layout, Efficiency indices, Presenting layout to management.		
UNIT 5	**Maintenance and safety**	**6 HOURS**
Role of Maintenance Management, Organization & Systems of Maintenance Management, Types of Maintenance: Breakdown, Preventive, Predictive. Industrial Safety – Training for Safety, Communicating Safety Messages, Safe Practices in Industry, Safety Considerations in Manual & Mechanical Handling, Transportation, Role of Factory Inspector, Safety Officer		
UNIT 6	**Engineering Economy - Estimating and Costing**	**6 HOURS**
Components of costs such as Direct Material Costs, Direct Labor Costs, Fixed Overheads, Factory cost, Administrative Overheads, first cost, Marginal cost, Selling price, Estimation for simple components.		

PRACTICAL: Perform following practical's.		
PRACTICAL NO.01	**Case study of facility layout**	**18 HOURS**
Student should visit industry at least for the duration of 50 hours. Should submit the report which should include 1. Single facility location problems or Multiple facility location problems 2. Line Balancing 3. Computerized Layout Planning 4. Layout Evaluation Techniques Based on study, student should give suggestions on layout improvement or improvement on material handling system, which should be acknowledged by respective industry.		
PRACTICAL NO.02	**Making of Techno-commercial quotation for given product**	**10 HOURS**
To make a detailed costing with BOM and techno-commercial quotation for given products like Mechanical structure, Special purpose machines, Special measurement gauge etc.		

TEXT BOOK

1. Facilities Planning – James A.Tomkins, John A.White, Yavuz A. Bozer, J M. A. Tanchoco, John Wiley and Sons, 2010, ISBN 978-0-470-44404-7.
2. Plant Layout and Material handling - James M Apple, John, Wiely and Sons, 2nd Edition,1977 ISBN-13: 978-0471071716.
3. Facility layout and Location - Francies,R.L. and White,J.A., McGraw Hill 2nd edition, ISBN-13: 978-0132992312.
4. Engineering Economy - Paul Degarmo, Macmillan Pub, Co. 2001, ISBN-00-23286008.

REFERENCE BOOK

1. Practical layout - Muther Richard, McGraw Hill-1955. ISBN-13: 978-0070441569.
2. Facilities Design – Sunderesh Heragu, PWS Publishing Company, ISBN-0-534-95183.
3. Plant Layout Design - James M Moore, McMilan Co.1962 LCCCN61- 5204.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Basic Entrepreneurship
	COURSE CODE	HP 303
	COURSE CREDITS	1
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
-	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : WF Orientation Course

COURSE OBJECTIVES :

HP303.CEO.1: To understand the fit between you and your entrepreneurialambitions
HP303.CEO.2: To find a problem worthsolving
HP303.CEO.3: To identify yourcustomers
HP303.CEO.4: To develop a solution for your customers' problems and problemsolution
HP303.CEO.5: To build and demonstrate anMVP
HP303.CEO.6: To structure a business model around the problem, customer, and solution and present your Business ModelCanvas.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP303.CO.1: Why entrepreneurship requires
HP303.CO.2: Outline the Problems Worth Solving by using various techniques like DT, JTBD
HP303.CO.3: Identify the Customer Segments and Early Adopters
HP303.CO.4: Develop the solution demo for identify problem.
HP303.CO.5: Create Business Model Canvas and Minimum Viable Product

PRACTICALS:		
PRACTICAL NO.01	**GET STARTED - Discover Yourself**	**2 HOURS**
Find your flow, Effectuation, Case Study: Tristan Walker: The extroverted introvert, Identify your entrepreneurial style.		
PRACTICAL NO.02	**IDEA/PROBLEM - Identify Problems Worth Solving**	**4 HOURS**
What is a business opportunity and how to identify it. Find problems around you that are worth solving. Methods for finding and understanding problems - (Observation, Questioning, DT, Jobs to be done (JTBD) How to run problem interviews to understand the customer's worldview Introduction to Design Thinking - Process and Examples Generate ideas that are potential solutions to the problem identified - DISRUPT GOOTB: Run problem interviews with prospects Class Presentation: Present the problem you "love" Form teams		
PRACTICAL NO.03	**CUSTOMER**	**6 HOURS**
Identify Your Customer Segments and Early Adopters The difference between a consumer and a customer (decision maker); Market Types, Segmentation and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns. Identify the innovators and early adopters for your startup.Craft Your Value Proposition Come up with creative solutions for the identified problems Deep dive into Gains, Pains and "Jobs-To-Be-Done" (using Value Proposition Canvas, or VPC) Identify the UVP of your solution using the Value Proposition section of the VPC Outcome-Driven InnovationClass Presentation: Communicating the Value Proposition- 1 min Customer Pitch		
PRACTICAL NO.04	**BUSINESS MODEL**	**4 HOURS**
Get Started with Lean Canvas Basics of Lean Approach and Canvas; Types of Business Models (b2b; b2c)		
PRACTICAL NO.05	**VALIDATION**	**9 HOURS**
Develop the Solution Demo Build solution (mockups) demo, How to run solution interviews, GOOTB: Run Solution interviews. Does your solution solve the problem for your customers: The problem-solution test. Sizing the Opportunity Differences between a Startup venture and a small business; Industry Analysis Understanding what is Competition and it's role, Analyze competition Case study: Blue Ocean Strategy Building an MVP Identify an MVP and build it - I; Document and validate your assumptions Build-Measure-Learn feedback loop and the MVP/Javelin Board How to do MVP Interviews GOOTB: Run MVP interviews Is there a market for your product –The product-market fit test Class Presentation: Present your MVP		
PRACTICAL NO.06	**MONEY**	**5 HOURS**
Revenue Streams Basics of how companies make money. Understand income, costs, gross and net margins. Identify primary and secondary revenue streams. Pricing and Costs Value, price, and costs; Different pricing strategies. Understand product costs and operations costs; Basics of unit costing Financing Your New Venture How to finance business ideas, Various sources of funds available to an entrepreneur and pros and cons of each, What investors expect from you, Practice Pitching to Investors and Corporates.		

PRACTICAL NO.07	TEAM	2 HOURS
Team Building Shared Leadership Role of a good team in a venture's success; What to look for in a team; How do you ensure there is a good fit? Defining clear roles and responsibilities. How to pitch to candidates to join your startup Explore collaboration tools and techniques - Brainstorming, Mind mapping, Kanban Board, #Slack.		
PRACTICAL NO.08	**MARKETING & SALES**	**2 HOURS**
Positioning Understand the difference between product and brand and the link between them. Define the positioning statement for your product/service and how it should translate into what your customers should see about that brand in the marketplace. Channels & Strategy Building Digital Presence and leveraging Social media, Creating your company profile page, Measuring the effectiveness of selected channels, Budgeting and planning. Sales Planning Understanding why customers buy and how buying decisions are made; Listening. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customers needs, not on product features) Follow-up and closing a sale; Asking for the sale.		
PRACTICAL NO.09	**SUPPORT**	**2 HOURS**
Planning & Tracking Importance of project management to launch and track progress Understanding time management, workflow, and delegation of tasks Business Regulation Basics of business regulations of starting and operating a business; Importance of being compliant and keeping proper documentation How to find help to get started		
PRACTICAL NO.10	**Capstone Project: Present Your BMC (Optional - and MVP)**	**2 HOURS**
BMC: Business Model Canvas. / MVP: Minimum Viable Product.		

REFERENCES

1. Read Forbes article and do Group Discussionhttps://www.forbes.com/sites/chrismyers/2015/12/16/find-your-flow-and-success-will-follow/
2. https://necrophone.com/2014/01/20/effectuation-the-best-theory-of-entrepreneurship-you-actually-follow-whether-youve-heard-of-it-or-not/
3. Use your self awareness to find out what motivates and drives Entrepreneurial activity - Ted Talk "What is your Entrepreneurial style - EntrepreneurKnow
4. Prof. Clay Christensen "IdentifyingCustomerNeeds" https://www.youtube.com/watch?v=yVCZ-7xSsCw
5. ''Understand the customer problem by GOOTB":by GOOTB":https://www.youtube.com/watch?v=sEENIZgscDw
6. https://www.forbes.com/sites/danschawbel/2013/12/17/geoffrey-moore-why-crossing-the-chasm-is-still-relevant
7. Value Proposition: https://www.youtube.com/watch?v=jZN6CUieuOQ&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
8. Value Proposition & Customer Need:https://www.youtube.com/watch?v=6FnG8pJL8yM&index=3&list=PLw540Wq5kay866m6A6xI7KOwEAh7is4m
9. https://strategyn.com/turn-customer-input-into-innovation/ CASE STUDIES in ODI: https://jobs-to- be-done.com/tagged/case-study
10. TheLeanBMC https://www.youtube.com/watch?v=FjBe7UO1hc
11. Ash Maurya -Capture your BMC in 20
12. minuteshttps://www.youtube.com/watch?v=7o8uYdUaFR4&t=462s
13. Ash Maurya - How to Prioritize Risks on Your BusinessModel https://www.youtube.com/watch?v=01z7EPXS42k
14. https://pt.slideshare.net/bmorelean/dan-lemberg-lean-pitch
15. https://startups.fb.com/en-in/categories/development/
16. Designing Experiments: https://www.youtube.com/watch?v=WiMZWCg1Hu8&t=111s
17. Customer Development Process:https://www.youtube.com/watch?v=lLEebbiYIkI
18. Beating the Competition: https://www.youtube.com/watch?v=46uP6vOj5G0
19. Q&A with Garr :https://www.youtube.com/watch?v=SmJjjOrusyI
20. Basic Accounting Lingo for Entrepreneurs:https://www.youtube.com/watch?v=Y7Pm1jEEKE
21. Vinod Khosla : How Leaders can BUILDhttps://www.youtube.com/watch?v=bRCoBgCn1Q
22. Vinod Khosla: https://www.youtube.com/watch?v=VIrNLzTs9cw
23. How to Pitch the way VC's think, so you can convince co-founders : https://www.youtube.com/watch?v=fTgU7THoKCw
24. Tony Buzan:http://www.tonybuzan.com/about/mind-mapping/
25. Google : Think branding:https://www.youtube.com/watch?v=1l2CUjkg0ug
26. The Battle for your mind using Positioning:https://www.youtube.com/watch?v=jQrY8xRx-0 Design rules-https://www.igorinternational.com/, Web design course:https://www.coursera.org/specializations/web-designStrikingly Free : https://www.strikingly.com/online-resume/linkedin
27. https://certification.hubspot.com/inbound-sales-certification-course
28. https://www.udemy.com/courses/business/sales/
29. https://www.accountingtools.com/articles/2017/5/17/sales-budget-sales-budget-example

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2018 - 2019
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP 302
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	2	NIL	NIL	NIL	50	25	75

PRE-REQUISITE : Basic Communication Skills

COURSE OBJECTIVES :

HP302.CEO.1: To define the importance of professional skills in student's life
HP302.CEO.2: To explain them necessary, specific professional skills
HP302.CEO.3: To appraise students for placements through acquisition of professional skills
HP302.CEO.4: To support them detect their present level in respect of each professional skill and show direction for improvement

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP302.CO.1: Relate the importance of professional skills(L2)
HP302.CO.2: Build necessary, specific professional skills (L3)
HP302.CO.3: Analyze the environment of employ-ability (L4)
HP302.CO.4: Develop various techniques of effective team building in their professional life(L6)

PRACTICALS: (SECTION A)		
PRACTICAL NO.01	**Self Awareness**	**2 HOURS**
Concept of Johari Window, Advantages and disadvantages of every quadrant, Identifying the proportion of each quadrant in respect of self, Using the tools of 'Feedback' & 'Exposure' for self-development		
PRACTICAL NO.02	**Personal Interviews**	**6 HOURS**
Preparing for Interviews, Typical expected questions & suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions		
PRACTICAL NO.03	**Group Discussion**	**4 HOURS**
Parameters of assessment, Initiating the discussion, Effective listening, Own contribution, Paraphrasing, Arguing and counter-arguing, Giving direction to the discussion		
PRACTICAL NO.04	**Team building and Motivation**	**2 HOURS**
Hallmark of effective teams, Barriers to team work, Subjugation of Individual interests for achievement of team's goal, Leading & motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2 HOURS**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique, Collective and individual Brain Storming,		
PRACTICAL NO.06	**Decision Making**	**2 HOURS**
Levels of decisions, Process of decision-making, Types of criteria, Individual and collective decision-making, Barriers in decision making, Keys to sound decision-making		
SECTION B:	**Aptitude Training.**	

REFERENCE BOOK

1. Stephen Covey: The Seven Habits of Highly Effective People, Simon and Schuster Ltd, ISBN: 0-671-71117-2
2. Krishna Mohan, Meera Banerji, Developing Communication Skills, Birla Institute of Technology and Science, ISBN: 033392-919-5
3. Charles Kepner and Benjamin Tregoe, The Rational Manager: A systematic Approach to Problem Solving and Decision Making , Tata McGraw-Hill Publishing Company Ltd., ISBN:13:978-0070341753
4. Priyadarshini Patnaik, Group Discussion and Interview Skills , Foundation Books, 1st Ed.- 2011, ISBN No.: 9788175967847, 8175967846.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
THIRD YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Mini Project
	COURSE CODE	ME324
	COURSE CREDITS	2
RELEASED DATE : 01/06/2018	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL/	PRESENTATION/	TOTAL
LECTURE		MSE	ESE	IA	TERMWORK	DEMONSTRATION	
-	4	-	-	-	-	75	75

PRE-REQUISITE : Minor Project

COURSE OBJECTIVES :

ME324.CEO.1: To understand the Product Development Cycle through Mini project.

ME324.CEO.2: To undertake & execute a mini Project through a group of students

ME324.CEO.3: To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices, aesthetics and ergonomics.

ME324.CEO.4: To understand the role of professional and ethical practices, management principles,Technical documentation and communication skills in engineering.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME324.CO1: Execute an idea in a team as well as within constraints.

ME324.CO2: Acquire knowledge of the techniques, skills and modern engineering tools necessary for engineering practices.

ME324.CO3: Use standard engineering tools and processes for design, simulation, testing,analysis in implementation and deployment of theoretical idea into practice.

ME324.CO4: Use standard documentation and presentation tools for a professional report and presentation of the work.

PREAMBLE:
The main objective of this course is to understand the Product Development Cycle through mini Project, Where students will undertake & execute a project through a group of students. They will plan for various activities of the project and distribute the work amongst team members. The students will learn budgeting, planning for the project, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards, significance of aesthetics & ergonomics while designing a product. This course will develop students.abilities to transmit technical information clearly and delivery of presentation based on the Mini Project. They will understand the importance of document design standards by compiling technical report on the mini Project work carried out in a team.

PRACTICAL

Stage- 1	**Formation of group and Allocation of project adviser**	**Week 1**

- Project group formation and project advisor allocation by the department
- Project group shall consist of Minimum 02 and maximum 03 students per group (For detailed process please check Annexure-1 Mini project guidelines)
- Selection of finalized topic from approved project topics by the department.
- The project design idea shall be based on refereed papers, white papers, product, patent, application notes,industry problem, academic, institute or societal requirement, funded research, innovative thought,modification/ development in existing idea etc.
- Each student will maintain a logbook/project diary. This diary will be utilized to monitor project progress throughout

Stage- 2	Project Review -1 Internal review by project adviser	Week-2,3

- The project group will work on ,
  1. Conceptualization of an Idea
  2. Literature review
  3. Market survey
  4. Finalizing the Specificationsy
- Presentation of work progress to project adviser and proceed to project approval.

Stage- 3	Project Review -2 Project Approval	Week-4

- Presentation of concept to Department Review Committee (DRC) or Committee appointed by department.
- Review of concept and feasibility of project and necessary suggestions for implementation by the committee
- The project group will make corrections and continue their work.

Stage- 4	Project Review -3 Internal review by project adviser	Week-5,6,7,8,9

- The project group will work on ,
  1. System Architecture and Design
  2. Simulation /software development (As applicable)
  3. Manufacturing of project
  4. Assembly
  5. Testing
  6. Troubleshooting
- Presentation of work progress to project adviser and proceed to final project progress review.

Stage- 5	Project Review -4 Final Project progress review	Week-10,11

The project group will work on

1. Result analysis against specifications
2. Enclosure/Aesthetic design (As applicable)
3. Technical report generation (Draft copy)
4. User's manual (As applicable)
5. Bill of material etc.

The technical report may incorporate following points,

1. Title
2. Introduction and Concept
3. Literature & Market survey
4. Theory and relevance
5. Block diagram
6. Drawings (As applicable)
7. Specifications
8. Project plan
9. Bill of material
10. Enclosure/aesthetic design (As applicable)
11. Results
12. Results analysis
13. Conclusion
14. References

- Presentation of project work, draft copy of technical report , Final presentation etc. to DRC or Committee appointed by department.
- Review of project progress and necessary suggestions by DRC or Committee appointed by department for final presentation.
- The project group will make corrections. After clearing all comments from DRC; project can be presented to final l examination.
- Project must be approved by department to appear for final examination.

Practical- 6	Examination: Final Demonstration and presentation	Week-12

- Final examination will be divided in three parts
  1. Demonstration
  2. Presentation
  3. Project documentation
- For final examination project must be demonstrated in front of examiner panel. For Industry sponsored projects or other installations examiner panel can visit the project venue.
- All students must be physically present in front of examiner panel at the time of examination.
- Only demonstrated projects can be evaluated for presentation and documentation.
- Mini Project demonstration: Demo of project works and validation of project results to examiners panel.
- Mini Project presentation: Presentation of overall project work form project idea to implementation and deployment of project to examiners panel.
- Mini Project documentation: Presentation of technical documentary report to examiners panel

Assessment:

Internal Assessment:

1. Project Review -2 Project Approval -05 Marks
2. Project Review -3 Internal review by project adviser- -05 Marks
3. Project Review -4 Final Project progress review- 10 Marks

Examination: Final Demonstration and presentation

1. Mini Project demonstration: 20 Marks
2. Mini Project presentation: 20 Marks
3. Mini Project documentation: 15 Marks

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

Final Year

Bachelor of Technology in Mechanical Engineering

2016-2020

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W. E. F	:	2019-20
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	RELEASE DATE	:	01/12/2018
	REVISION NO.	:	0.0

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ME401	Heating Ventilation & Air Conditioning	3	2	4
2.	DE1	ME41#	Discipline Elective - Refer Annexure.	3	--	3
3.	OE3	ME42#	Open Elective - Refer Annexure.	3	2	4
4.	HSS7	HP402	Sociology	2	--	2
5.	HSS8/ SDP7	HP403/ ME40#	Business Strategies / Piping Design/ Six Sigma/ Energy Audit	--	2	1
6.	SDP8	ME402	Project - I	--	8	4
7.	SDP9	ME404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ME431	Noise Vibration & Harshness	3	2	4
2.	DE2	ME44#	Discipline Elective - Refer Annexure	3	--	3
3.	OE4	ME45#	Open Elective - Refer Annexure	3	2	4
4.	HSS9	HP401	Engineering Economics	2	--	2
5.	SDP10	ME432	Project - II	--	8	4
TOTAL				11	12	17

L: Lecture, P: Practical

Open Elective (OE): 4 Courses			
Computer Aided Engineering	**Sl. No.**	**Course Code**	**Name of Course**
	1.	ME311	Geometric Modeling & Design
	2.	ME331	Finite Element Analysis
	3.	ME421	Computational Fluid Dynamics
	4.	ME451	Advanced Engineering Analysis
Robotics & Automation	1.	ME312	Fundamentals of Robotics
	2.	ME332	Kinematics & Dynamics of Robots
	3.	ME422	Robotics Vision and Control
	4.	ME452	Intelligent and High Performance Robotics
Industrial Engineering & Management	1.	ME313	Work Process Assessment
	2.	ME333	Facility Planning & Design
	3.	ME423	Operations Management
	4.	ME453	Supply Chain Management

Department Elective (DE): 2 Courses		
	Course Code	**Name of Course**
1.	ME411	Mechatronics
	ME412	Pressure Vessel Design
	ME413	Power Plant Engineering
	ME414	Product Lifecycle Management
2.	ME441	Hydraulics & Pneumatics
	ME442	Mechanical System Design
	ME443	Non-Conventional Machining
	ME444	Enterprise Resource Planning

Skill Development and Project (SDP): 10 Courses		
Sl. No.	**Course Code**	**Name of Course**
1.	ME102	Engineering Tools and Techniques
2.	ME103	Design Thinking
3.	ET206	Prototyping
4.	ME213	Minor Project
5.	ME304	Skill Development Lab (Autodesk Inventor)
	ME305	Skill Development Lab (CATIA)
6.	ME403	Piping Design
	ME404	Six Sigma
	ME405	Energy Audit
7.	ME324	Mini Project
8.	ME402	Project - I
9.	ME406	Summer Internship
10.	ME432	Project - II

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Heating Ventilation & Air Conditioning
	COURSE CODE	ME401
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	50	-	150

PRE-REQUISITE : Heat Transfer

COURSE OBJECTIVES :

ME401.CEO.1: To impart working and operating principles of Air Refrigeration, Vapor compression and Vapor Absorption system.

ME401.CEO.2: To apply concepts of air-conditioning cycles in developing energy efficient cooling systems.

ME401.CEO.3: To expose students to various HVAC controls and applications of Refrigeration, Heating Ventilation and Air-conditioning.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME401.CO.1: Apply fundamental principles of refrigeration cycles used in air conditioning and refrigeration systems. (L3)

ME401.CO.2: Discuss various properties of refrigerants and its impact on environment.(L2)

ME401.CO.3: Read psychometric chart to solve commercial cooling and heating problems. (L4)

ME401.CO.4: Manage to construct and design HVAC systems (L3)

ME401.CO.5: Explain various air conditioning systems and its components.(L3)

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Refrigeration**	**8 HOURS**
First and Second Law applied to refrigerating machines, Reverse Carnot cycle, Carnot refrigerator, Carnot heat pump, unit of refrigeration, Co-efficient of Performance, Energy Efficiency Ratio (EER), and BEE star rating. Air refrigeration systems: Bell Coleman cycle, applications Application of refrigeration system.		
UNIT 2	**Refrigeration Cycles, components and refrigerants**	**10 HOURS**
Simple vapour compression cycle, Effect of liquid sub cooling & superheating, effect of evaporator and condenser pressures, methods of sub cooling, use of P-h charts, Actual VCR cycle, Use of p -h Charts, Comparison between air-cooled and water-cooled condenser based air conditioning systems. Components: Types of condensers, evaporators, expansion devices, compressors and cooling tower Refrigerants: Desirable properties of refrigerants, ASHRAE numbering system for refrigerants. Thermodynamic, Chemical and Physical properties, Secondary refrigerants, ODP and GWP, Montreal protocol and India's commitment, Recent substitutes for refrigerants.		
UNIT 3	**Psychrometry**	**6 HOURS**
Need for air conditioning, Principle of Psychrometry, Psychometric properties, chart and processes, air washers, requirements of comfort air conditioning, summer and winter air conditioning		
UNIT 4	**Design of Air Conditioning Systems**	**10 HOURS**
Different Heat sources, Adiabatic mixing of two air streams, Bypass factor, sensible heat factor, RSHF, GSHF, ERSHF, Room apparatus dew point and coil apparatus dew point, Ventilation and Infiltration, Inside and Outside Design condition, Cooling Load estimation. Introduction to Unitary Products viz. Room/Split and Packaged Air Conditioners, Introduction to recent developments viz. Variable Refrigerant Flow systems, VAV control systems, Inverter Units.		
UNIT 5	**Design of Duct, Ventilation and Exhaust system**	**6 HOURS**
Duct Design Friction chart for circular ducts, Equivalent diameter of a circular duct for rectangular Ducts, Static pressure regain, and equal pressure drop methods of duct design. Factors considered in air distribution system, Air distribution systems for cooling and heating. Types of ventilation system and its design, Types of exhaust system.		
UNIT 6	**New trends in the Build environment, Controls and Non-Conventional Refrigeration Systems**	**4 HOURS**
Vapour Absorption Refrigeration – NH3 – Water Vapour Absorption system, Heat pump, Green Buildings, Net zero and Net positive Buildings, Systems Indoor Air Quality (IAQ), BMS Smart building. Human Comfort, Thermal exchange of body with environment, Effective temperature, Comfort chart, Comfort zone, Controls– LP/HP cutoff, Thermostats, Humidistat, Interlocking control, Electronic Controllers. Thermoelectric Refrigeration, Thermo-acoustic Refrigeration, Vortex Tube Refrigeration		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01		**2 HOURS**
Test on Vapour Compression cycle test rig		
PRACTICAL NO.02		**2 HOURS**
Test on Vapour absorption cycle test rig		
PRACTICAL NO.03		**2 HOURS**
Test on Ice plant test rig		
PRACTICAL NO.04		**2 HOURS**
Test on air conditioning test rig		
PRACTICAL NO.05		**2 HOURS**
Test on Heat pump		
PRACTICAL NO.06		**2 HOURS**
Case study on Domestic Refrigerator		
PRACTICAL NO.07		**2 HOURS**
Estimation of cooling load of simple air conditioning system		
PRACTICAL NO.08		**2 HOURS**
Case study on cold storage		
PRACTICAL NO.09		**2 HOURS**
Thermal analysis of refrigeration cycle using suitable software		
PRACTICAL NO.10		**6 HOURS**
Visit to air conditioning plant/Cold storage is compulsory.		

TEXT BOOK

1. C. P. Arora, "Refrigeration and air-conditioning", Tata McGraw-Hill Education, 2nd Edition, 2000 ISBN -0- 07-463010-5
2. R. J. Dossat, Principles of refrigeration, Willey Eastern Publication, 4th Edition, 2007, ISBN: 9788177588811, 8177588818
3. P. Ananthanarayana, Basic Refrigeration and air-conditioning, McGraw-Hill Education,4th Edition, 2003, ISBN: 9781259062704, 1259062708

REFERENCE BOOK

1. Manohar Prasad, Refrigeration and air-conditioning, New Age International Publishers, 2nd Edition, 2000 ISBN: 9788122436945, 8122436943
2. W F Stoeker and J W Jones, Refrigeration and air-conditioning, McGraw-Hill Education, 2nd Edition ISBN: 9789332902954, 933290295X
3. ASHRAE Handbook of Fundamentals
4. ASHRAE Handbook of Systems
5. ASHRAE Handbook of Equipment
6. ISHRAE Air Conditioning Handbook
7. ISHRAE Refrigeration Handbook

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Mechatronics
	COURSE CODE	ME411
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : Electrical & Electronics Engineering

COURSE OBJECTIVES :

ME411.CEO.1: To describe mechatronics system and its key elements, Representation of systems in block diagram.
ME411.CEO.2: To describe concept of signal processing and interfacing.
ME411.CEO.3: To understand sensors and their characteristics for its applications.
ME411.CEO.4: Describe actuators with classification and application.
ME411.CEO.5: Implementation of Programming by any controller.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME411.CO.1: Identification of key elements of mechatronics system and its representation in terms of block Diagrams.
ME411.CO.2: Apply the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O.
ME411.CO.3: Select the sensors and interfacing with DAQ.
ME411.CO.4: Choose the actuator based on application.
ME411.CO.5: Program to control sensor and actuators.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Sensors**	**8 HOURS**
Introduction to Mechatronics, Measurement characteristics: - Static and Dynamic Sensors: Position Sensors: - Potentiometer, LVDT, Encoders; Proximity sensors: - Optical, Inductive, Capacitive; Motion Sensors: - Variable Reluctance; Temperature Sensor: RTD, Thermocouples; Force / Pressure Sensors: - Strain gauges; Flow sensors: - Electromagnetic		
UNIT 2	**Block Diagram Representation**	**6 HOURS**
Open and Closed loop control system, identification of key elements of mechatronics systems and represent into block diagram (Electro-Mechanical Systems), Concept of transfer function, Block diagram reduction principles, problems on reduction of block diagram Applications of mechatronics systems: - Household, Automotive, Shop floor (industrial).		
UNIT 3	**Data Acquisition & Microcontroller System**	**8 HOURS**
Interfacing of Sensors / Actuators to DAQ system, Bit width, Sampling theorem, Aliasing, Sample and hold circuit, Sampling frequency, ADC (Successive Approximation), DAC (R-2R), numerical on data conversion, Current and voltage Amplifier.		
UNIT 4	**Introduction to Robotic System**	**6 HOURS**
Introductions of robots, Classification of robots based on Physical configuration, Mechanism in robotic system, Structure and application of robots, Machine learning.		
UNIT 5	**Actuators**	**6 HOURS**
Classification of actuators: Electrical Drives, Pneumatic Drives, Hydraulic drives, Other special application drives. Grippers and end effectors. selection of motors based on application with force/power/torque requirement.		
UNIT 6	**Controllers and programming**	**6 HOURS**
Programming for reading Analog data, Digital data. Controlling Motor by PWM. Servo Motor control, Stepper motor control, BLDC motor control, Development boards.		

TEXT BOOK

1. K.P. Ramchandran, G.K. Vijyaraghavan, M.S. Balasundaram, Mechatronics: Integrated Mechanical Electronic Systems, Willey Publication, 2008, ISBN-13: 978-8126518371
2. Bolton, Mechatronics - A Multidisciplinary approach, 4th Edition, Prentice Hall, 2009, ISBN-10: 0132407639

REFERENCE BOOK

1. Alciatore & Histand, Introduction to Mechatronics and Measurement system, 4th Edition, Mc-Graw Hill publication, 2011, ISBN: 978-0071254076
2. Bishop (Editor), Mechatronics – An Introduction, CRC Press, 2006, ISBN 9780849363580
3. Mahalik, Mechatronics – Principles, concepts and applications, Tata Mc-Graw Hill publication, New Delhi, ISBN: 9780070483743
4. C. D. Johnson, Process Control Instrumentation Technology, Prentice Hall, New Delhi, ISBN-13: 978-0131194571

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Pressure Vessel Design
	COURSE CODE	ME412
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	-	100

PRE-REQUISITE : Machine Design

COURSE OBJECTIVES :

ME412.CEO.1: To aware of IS2825 standards for pressure vessel design and materials.

ME412.CEO.2: Perform elementary design calculations using ASME Code formulas to determine wall thicknesses.

ME412.CEO.3: Understand the various welding processes used in today's fabrication facilities.

ME412.CEO.4: Estimate stresses due to structural and temperature loads in pressure vessel components.

ME412.CEO.5: Master the design and calculation of horizontal storage vessels, get familiar with the basic structures of horizontal and spherical storage vessels.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME412.CO.1: Understand and explain all calculations used by the Code and relate them to fundamental principle.

ME412.CO.2: Explain and apply the fundamental principles of loads and stresses as applied to pressure vessels.

ME412.CO.3: Identify the different types of stresses and their effects on pressure vessel.

ME412.CO.4: Verify the testing and failures of design vessels under thermal and fatigue load.

ME412.CO.5: Design shells, end closures and nozzles of pressure vessels using ASME codes.

THEORY COURSE CONTENT		
UNIT 1	**Process Design Parameters**	**8 HOURS**
Basic concepts in process design, block diagrams for flow of Processes, material flow balance. Design pressures -–temperatures, design stresses, factory of safety, minimum shell thickness and corrosion allowance, weld joints efficiency, design loading, stress concentration and thermal stresses, failure criteria, optimization technique such as Lagrange's multiplier and golden section method, cost and profitability estimation. Introduction to design codes like IS-2825, ASME-SECT, EIGHT-DIV-II TEMA.API-650, BS-1500 & 1515.		
UNIT 2	**Stresses in Pressure Vessels**	**8 HOURS**
General theory of membrane stresses in vessel under internal pressure and its application to shells (cylindrical, conical and spherical) and end closures. Bending of circular plates and determination of stresses in simply supported and clamped circular plate. Thermal stresses, Stress concentration in plate having circular hole due to bi-axial loading, Excessive elastic deformation, Plastic instability, Brittle rupture and creep. Theory of reinforced opening and reinforcement limits.		
UNIT 3	**Design of Cylindrical and Spherical Vessels**	**8 HOURS**
Thin and thick-walled cylinder analysis, design of end closers, local stresses due to discontinuity or change of shape of vessel, vessel opening compensation, design of standard and non-standard flanges, design of vessels and pipes under external pressure, design of supports for process vessels.		
UNIT 4	**Supports for vertical & horizontal vessels**	**4 HOURS**
Design of base plate and support lugs. Types of anchor bolt, its material and allowable stresses. Design of saddle supports.		
UNIT 5	**Design of Vessels using Codes**	**8 HOURS**
Introduction to ASME codes for pressure vessel design, Pressure vessel and related components' design using ASME codes; Supports for short vertical vessels, Stress concentration at a variable thickness transition section in a cylindrical vessel; Design of nozzles.		
UNIT 6	**Other Design Considerations**	**8 HOURS**
Buckling phenomenon, Elastic Buckling of circular ring and cylinders under external pressure, collapse of thick-walled cylinders or tubes under external pressure, Effect of supports on Elastic Buckling of Cylinders, Design of circumferential stiffeners, Buckling under combined External pressure and Axial loading. Fatigue, shock, high pressure, high temperature, irradiation, corrosion, and other hostile environments; High strength, lightweight pressure vessels, Vessels resistant to external high pressures found in undersea exploration, offshore drilling, and mineral mining.		

TEXT BOOK

1. Pressure Vessels: Design and Practice by Somnath Chattopadhyay; CRC Press, ISBN-13: 978-0849313691
2. Harvey J F, Pressure vessel design, CBS Publication, ISBN-13: 978-8123910413
3. Henry H. Bedner, Pressure Vessels, Design Hand Book, CBS publishers and Distributors,1987, ISBN-13: 978-0894645037

REFERENCE BOOK

1. Brownell L. E and Young. E. D, Process equipment design, Wiley Eastern Ltd., India, ISBN-13: 978-0849313691
2. ASME Pressure Vessel and Boiler code, Section VIII Div. 1, 2, and 3, ASME, American standard code for pressure piping, B 31.1, ASME, ISBN-13: 978-0849313691
3. Henry H Bednar, Pressure vessel Design Hand book, CBS publishers and distributors
4. Stanley M Wales, Chemical Process Equipment, Selection and Design, Butterworths, Series in Chemical Engineering, 1988. Elsevier, ISBN-13: 978-0894645037
5. J. Phillip Ellenberger, Pressure Vessels: ASME Code Simplified, ASME.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Power Plant Engineering
	COURSE CODE	ME413
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : Turbomachines

COURSE OBJECTIVES :

ME413.CEO.1: To apply principles/ methods related to Thermodynamics and Turbomachinery
ME413.CEO.2: Understand the different power generation methods, its economics and global energy situation
ME413.CEO.3: To impart a knowledge about the design of green power system.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME413.CO.1: Recall fundamentals of Thermal Engineering
ME413.CO.2: Evaluate different types of power plant
ME413.CO.3: Experiment verification of basic concept.
ME413.CO.4: Analyze the load calculation for any system.
ME413.CO.5: Investigate the methods to reduce pollution from power plants.
ME413.CO.6: Design a simple power plant according to need.

THEORY COURSE CONTENT		
UNIT 1	**Thermal Power Plant**	**8 HOURS**
Working of the thermal power plant, FBC boilers, High-pressure boilers (Supercritical and Ultra Supercritical), Rankine cycle with reheat and regeneration, cogeneration power plant (Numerical), condenser and cooling tower, coal classification, coal and ash handling, Methods to reduce the pollution from the thermal power plant.		
UNIT 2	**Hydro-electric power plant**	**6 HOURS**
Classification, layout, components and auxiliaries of hydropower plant, Selection of turbines, micro-hydro plants, pumped storage, flow duration curve, mass curve		
UNIT 3	**Nuclear power plant**	**8 HOURS**
Evolution of nuclear energy from atoms by fission and fusion, chain reaction, Fission material, Components of a nuclear reactor, Classification of reactors, Pressurized water reactor, Boiling water reactor, Gas-cooled reactor, CANDU reactor, Fast breeder reactor, Nuclear waste and its disposal, Nuclear power plants in India		
UNIT 4	**Gas turbine power plant**	**8 HOURS**
Classification, open and closed cycle, gas turbine fuels, actual Brayton cycle, optimum pressure ratio for maximum thermal efficiency, work ratio, air rate, effect of operating variables on the thermal efficiency and work ratio and air rate, combined steam and gas turbine plant, gas turbine blade cooling The diesel-electric power plant, a different system of diesel power plant.		
UNIT 5	**Non-conventional power plant**	**6 HOURS**
Wind resource assessment, types and selection of wind turbines; operation and control of machines; Solar PV power plants: system components, selection criteria; Solar Thermal Power Plants: Types of solar thermal plants, component description, the auxiliary heating requirement		
UNIT 6	**Economic Analysis of Power Plants**	**6 HOURS**
Load curves, Load duration curves, Connected load, Maximum load, Peak load, Base load and peak load power plants, Load factor, Plant capacity factor, Plant use factor, Demand factor, Diversity factor, Cost of the power plant, Tariff for electric energy, Comparison of power plants. Power plant- Global scenario, Indian scenario, Maharashtra scenario, Environmental Aspects.		

REFERENCE BOOK

1. Power Plant Engineering, P.K. Nag, McGraw-Hill Education, ISBN 0070435995
2. Power Plant Technology, M.M. El-Wakil, McGraw-Hill Education, ISBN 978007072448
3. Thermal Engineering, R. K. Rajput, Laxmi Publication, ISBN 9788131808047
4. Gas Turbines by V Ganeshan, McGraw Hill Education, ISBN 0070435995

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Product Lifecycle Management
	COURSE CODE	ME414
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	Nil	30	40	30	Nil	Nil	100

PRE-REQUISITE : Design Thinking, Prototype

COURSE OBJECTIVES :

ME414.CEO.1: To familiarize the students with the need, benefits and components of PLM.
ME414.CEO.2: To acquaint students with Product Data Management & PLM strategies.
ME414.CEO.3: To give insights into new product development program and guidelines for designing and developing a product.
ME414.CEO.4: To familiarize the students with Virtual Product Development.
ME414.CEO.5: To familiarize the students with life cycle environmental strategies and project management schedule.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME414.CO.1: Recall the knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation.
ME414.CO.2: Illustrate various approaches and techniques for designing and developing products.
ME414.CO.3: Apply product engineering guidelines / thumb rules in design and development of virtual product.
ME414.CO.4: Select the appropriate life cycle environmental strategies and project management schedule.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Product Lifecycle Management (PLM)**	**8 HOURS**
Product Lifecycle Management (PLM), Need for PLM, Product Lifecycle Phases, Opportunities of Globalization, Pre-PLM Environment, PLM Paradigm, Importance & Benefits of PLM, Widespread Impact of PLM, Focus and Application, A PLM Project, Starting the PLM Initiative, PLM Applications Developing PLM Vision and PLM Strategy, Change management for PLM.		
UNIT 2	**Product Design**	**8 HOURS**
Product Design and Development Process, Engineering Design, Typologies of Design Process Models, PD Relation with the Development Process Planning Phase, Relation with the Post design Planning Phase, Methodological Evolution in Product Design, Concurrent Engineering, Characteristic Features of Concurrent Engineering, Concurrent Engineering and Life Cycle Approach, The Design for X System, Objective Properties and Design for X Tools.		
UNIT 3	**Product Data Management (PDM)**	**6 HOURS**
Product and Product Data, PDM systems and importance, Components of PDM, Reason for implementing a PDM system, financial justification of PDM, barriers to PDM implementation.		
UNIT 4	**Virtual Product Development Tools**	**6 HOURS**
For components, machines, and manufacturing plants, 3D CAD systems and realistic rendering techniques, Digital mock-up, Model building, Model analysis, Modeling and simulations in Product Design, Examples/Case studies.		
UNIT 5	**Integration of Environmental Aspects in Product Design**	**6 HOURS**
From Sustainable Development to Design for Environment, Need for Life Cycle Environmental Strategies, Useful Life Extension Strategies, End-of-Life Strategies, Introduction of Environmental Strategies into the Design Process.		
UNIT 6	**Life Cycle Assessment and Life Cycle Cost Analysis**	**6 HOURS**
Introduction to Schedule Management, Configuring Schedule, Creating and managing schedules, Performing and tracking your tasks, Reviewing schedules and tasks, Costing of the project, Resource allocation.		

TEXT BOOK

1. Grieves, Michael, Product Lifecycle Management, McGraw-Hill, 2006. ISBN 0071452303
2. Antti Sääksvuori, Anselmi Immonen, Product Life Cycle Management - Springer, 1st Edition Nov.5, 2003, ISBN 978-3-540-78172-1.
3. Stark, John. Product Lifecycle Management: Paradigm for 21st Century Product Realization, Springer Verlag, 2004. ISBN 1852338105
4. Kari Ulrich and Steven D. Eppinger, Product Design & Development, McGraw Hill International Edns, 1999, ISBN-13: 978-9352601851.

REFERENCE BOOK

1. John Stark, Product Lifecycle Management: Paradigm for 21st Century Product Realisation, Springer-Verlag, 2004. ISBN: 1852338105
2. Fabio Giudice, Guido La Rosa, Antonino Risitano, Product Design for the environment-A life cycle approach, Taylor & Francis 2006, ISBN: 0849327229
3. Saaksvuori Antti, Immonen Anselmie, Product Life Cycle Management, Springer, Dreamtech, ISBN: 3540257314
4. Michael Grieve, Product Lifecycle Management: Driving the next generation of lean thinking, Tata McGraw Hill, 2006, ISBN: 0070636265

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Computational Fluid Dynamics
	COURSE CODE	ME421
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Heat Transfer, Finite Element Analysis

COURSE OBJECTIVES :

ME421.CEO.1: Model fluid / heat transfer problems and apply fundamental conservation principles.
ME421.CEO.2: Discretize the governing equations by Finite Difference Method and Finite volume Method.
ME421.CEO.3: Develop software skills for conduction, convection and fluid dynamics problems.
ME421.CEO.4: Solve basic convection and diffusion equations and understands the role in fluid flow and heat transfer.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME421.CO.1: Explain and calculate the governing equations for fluid flow;
ME421.CO.2: Apply finite difference and finite volume methods to fluid flow problems
ME421.CO.3: Analyze and model fluid flow and heat transfer problems
ME421.CO.4: Generate high quality grids and interpret the correctness of numerical results with physics.
ME421.CO.5: Use a CFD tool effectively for practical problems and research.

THEORY COURSE CONTENT		
UNIT 1	**Basic concepts of CFD**	**6 HOURS**
Review of FM and HT, Concept of substantial derivative, divergence and curl of velocity, Definition and overview of CFD, need, Advantages of CFD, Numerical vs Analytical vs Experimental, Applications of CFD, CFD methodology, grid independence, Verification and validation		
UNIT 2	**Governing Equations: Mass, Momentum & Energy**	**8 HOURS**
Reynold's Transport Theorem, Navier Stokes equation, Derivation and physical interpretation of governing equations (conservation of mass, momentum and energy) in differential form, Mathematical behavior of partial differential equations – Elliptical, parabolic and Hyperbolic, Boundary conditions – Dirichlet, Neuuman, Robbins, Initial Conditions.		
UNIT 3	**Discretization methods & solution to conduction equation**	**6 HOURS**
Introduction to FEA, FDM and FVM, Solution of two dimensional steady and unsteady heat conduction equation using finite volume method (Implicit and Explicit), Stability Criteria.		
UNIT 4	**Solution to advection equation**	**8 HOURS**
Solution of two dimensional steady and unsteady heat advection equation using finite volume method (Implicit and Explicit) with Dirichlet BC, Stability Criteria, Introduction to first order upwind, CD, second order upwind and QUICK convection schemes.		
UNIT 5	**Solution to Convection-Diffusion Equation**	**6 HOURS**
Solution of two dimensional steady and unsteady heat convection-diffusion equation for slug flow using finite volume method (Implicit and Explicit), Stability Criteria, 1-D transient convection-diffusion system, Peclet Number		
UNIT 6	**Calculation of The Flow Field**	**6 HOURS**
Representation of the pressure gradient term, staggered grids, Pressure and Velocity Correction, SIMPLE Algorithm, SIMPLER Algorithm, PISO Algorithm		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Laminar flow through the pipe**	**4 HOURS**
Laminar flow through the pipe.		
PRACTICAL NO.02	**Temperature distribution in a pipe flow**	**4 HOURS**
Temperature distribution in a pipe flow.		
PRACTICAL NO.03	**Steady state temperature distribution in a rectangular plate**	**4 HOURS**
Steady state temperature distribution in a rectangular plate		
PRACTICAL NO.04	**Unsteady state temperature distribution in a rectangular plate**	**4 HOURS**
Unsteady state temperature distribution in a rectangular plate		
PRACTICAL NO.05	**Pin Fin**	**4 HOURS**
Temperature distribution over Pin Fin.		
PRACTICAL NO.06	**Natural convection**	**4 HOURS**
Natural Convection over Cylinder.		
PRACTICAL NO.07	**CFD Analysis of external flow**	**4 HOURS**
Circular Cylinder or Airfoil (NACA 0012).		

TEXT BOOK

1. John D Anderson: Computational Fluid Dynamics- The Basics with Applications, McGraw-Hill, ISBN:9780070016859.
2. Atul Sharma, Introduction to Computational Fluid Dynamics: Development, Application and Analysis, Wiley, ISBN:9781119369189.
3. Suhas V. Patankar, Numerical Heat Transfer and Fluid Flow, Hemisphere Publishing Corporation, ISBN:9780891165224.
4. A. W. Date, Introduction to Computational Fluid Dynamics, Cambridge Univ. Press, USA, ISBN:0521853265.
5. H. Versteeg, and W.Malalasekara, An Introduction to Computational Fluid Dynamics: The Finite Volume Method, Pearson, ISBN:9780131274983.

REFERENCE BOOK

1. H. Tennekes and J. L. Lumley, A First Course in Turbulence, MIT Press, ISBN:9780262200196.
2. David C. Wilcox, Turbulence Modeling for CFD, DCW Industries, ISBN:97811928729082.
3. H. Schlichting and K. Gersten, Boundary-Layer Theory, Springer, ISBN:9783662529195.
4. T. J. Chung, Computational Fluid Dynamics, Cambridge University Press, ISBN:9780521769693.
5. J. Tu, G.-H. Yeoh and C. Liu: Computational Fluid Dynamics: A practical approach, Elsevier, ISBN:9780080982534.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Robotic Vision
	COURSE CODE	ME422
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : Fundamentals of Robotics and Design , Kinematics and Dynamics of Robotics

COURSE OBJECTIVES :

ME422.CEO.1: Introduce the principles and applications of vision system in modern manufacturing.
ME422.CEO.2: Classify and prioritize various vision algorithms.
ME422.CEO.3: Organize different object recognition method.
ME422.CEO.4: Explore MATLAB/Python for image processing application.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME422.CO.1: Choose optimum parameters for robotics vision system.
ME422.CO.2: Apply image processing algorithms in robotics application.
ME422.CO.3: Illustrate various image capturing and processing techniques.
ME422.CO.4: Experiment with object recognition strategies.

THEORY COURSE CONTENT		
UNIT 1	**Vision system**	**8 HOURS**
Basic Components – Elements of visual perception, Lenses: Pinhole cameras, Camera geometry and color sensing, sensors in robotics		
UNIT 2	**Low Level Vision**	**10 HOURS**
Introduction, Image acquisition, illumination techniques, imaging geometry, some basic relationship between pixels, preprocessing		
UNIT 3	**High Level Vision**	**8 HOURS**
Introduction, segmentation, description, segmentation and description of 3D structures, recognition, interpretation **Further Reading:**		
UNIT 4	**Object recognition and feature extraction**	**8 HOURS**
Object recognition, System component, Complexity of the object recognition, Object representation, Feature detection, recognition strategies, verification		
UNIT 5	**Applications of robotics vision**	**8 HOURS**
Pick and place robot, pedestrian detection, face detection, Introduction to ADAS		

PRACTICAL		
PRACTICAL NO.01		**8 HOURS**
Hardware interfacing for image/video acquisition. Interfacing variety of hardware for image processing application		
PRACTICAL NO.02		**8 HOURS**
Image/Video processing techniques with OpenCV-Python/LABVIEW/MATLAB,Introduction to OpenCV-Python, Using modules for performing operations like image enhancement, filtering, thresholding, segmentation, edge detection etc.		
PRACTICAL NO.03		**8 HOURS**
Object detection with OpenCV-Python/LABVIEW/MATLAB, Development of algorithms for object detection in video/Camera streaming		

TEXT BOOK

1. Saeed B Niku, "Introduction to robotics : analysis, Systems, applications", 2nd Ed New Delhi, Prentice Hall of India, 2009. 978-81-203-2379-7 Paperback
2. Richard D. Klafter, "Robotics Engineering: An integrated approach" ,Prentice-Hall (4 April 1989), 978-0134687520
3. Fu K S; Gonzalez R C; Lee C S G, "Robotics: Controls, Sensing, Vision and Intelligence" 00710990107 , McGraw-Hill Education, 978-0071004213

REFERENCE BOOK

1. Rafael C. Gonzalez and Richard E. Woods. Digital Image Processing, Wesley, 2007. ISBN 13: 978813726952.
2. Prof. S. K. Saha. Introduction to robotics, Tata-McGraw-Hill, ISBN -13 – 9780070140011.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Operations Management
	COURSE CODE	ME423
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Work Process Assessment

COURSE OBJECTIVES :

ME423.CEO.1: To study types of production.
ME423.CEO.2: To discuss components of balance sheet.
ME423.CEO.3: To apply appropriate planning and scheduling techniques based on product.
ME423.CEO.4: To solve demand forecasting problems using appropriate tools and techniques.
ME423.CEO.5: To prepare master production schedule for given product based on available man and machine resource.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME423.CO.1: Identify appropriate production system based on the product attributes such as variety, volumes etc.
ME423.CO.2: Explain the need of various functions in production planning for better management of manufacturing or service system.
ME423.CO.3: Prepare demand forecast model for given product or service.
ME423.CO.4: Analyze the material requirements for manufacturing environments.
ME423.CO.5: Develop aggregate plans, master production schedule, capacity requirement plans and material requirement plans as a part of resource requirements planning system.

THEORY COURSE CONTENT		
UNIT 1	**Scope of Operations Management**	**6 HOURS**
Scope of Operations Management - Nature, Scope, Importance. Various Functions in Operations. Types of Production Systems – Project type, Job shop, Batch Production, Flow / Continuous Production, Mass Production - Characteristics and applicability of each type. Operations Strategies: Process choice – Select the appropriate production system, Competitiveness with Operations, Competing on cost, quality, flexibility, speed, reliability. Order Winners & Order Qualifiers. Introduction to ETO, MTO, ATO & MTS. Functions in Operations Management. Relations of operations with R&D, Design, Materials, Marketing, Finance, Personnel.		
UNIT 2	**OPC and Material Requirement Planning I (MRP I)**	**8 HOURS**
Operations Planning & Control – PPC – Functions, Operations Planning & Control Framework. Material Requirement Planning (MRP I): Inputs to MRP – MPS, BOM – Types of BOM, BOM Explosion, Inventory Transaction Files, MRP Processing (Logic) – Time Phased Operation Plan, Numerical on BOM Explosion Netting Requirements, Outputs of MRP. Significance of Process Planning. Preparation of Process, Plans & Process Sheets, Time, Cost & Material Estimation.		
UNIT 3	**Material Requirement Planning II (MRP II)**	**6 HOURS**
MRP II (Manufacturing Resource Planning) Operations Control – Gantt Charts. Planning & Scheduling Techniques: Scheduling v/s Loading, Scheduling Types – Forward Scheduling & Backward Scheduling Techniques – Dispatching Rules – SPT, LPT, Critical Ratio, EDD, etc. Evaluate lateness, tardiness. Documentation - Production Work Order. Techniques of scheduling, dispatching and expediting. Nature of production control in different types of production systems.		
UNIT 4	**Demand Forecasting**	**8 HOURS**
Components of Demand, Techniques of Demand Forecasting – Qualitative (Survey & Judgmental – Delphi, Expert Opinion) & Quantitative (Causal Methods – Input-Output Method, Leading Indicators Method & Time Series Analysis– Moving Average, Exponential Smoothing, Regression Method). Holts Model, Winters Model, Box-Jenkins Model. Measuring Errors in Forecasting – MAD, MSE, Tracking Signal Qualitative Techniques of Forecasting – Experts Opinion, Delphi Method, Market Survey		
UNIT 5	**Aggregate Planning & Quantitative Techniques in Scheduling**	**6 HOURS**
Pure Strategies – Chase, Level, Mixed Strategies, Master Production Schedule, Detailed Capacity Requirement Planning, Johnsons Algorithm - Sequencing n jobs on m machines, Assignment Models. Numerical & Cases in Aggregate Planning.		
UNIT 6	**Engineering Economy – Scope of Finance**	**6 HOURS**
Statements of Financial Information: Introduction, Source of financial information, Financial statements, Balance sheet, Profit and Loss account, relation between Balance sheet and Profit and Loss account. Simple Numerical Examples		

PRACTICAL		
PRACTICAL NO.01	**Production System**	**2 HOURS**
Assignment on Production Systems		
PRACTICAL NO.02	**Operations strategy**	**2 HOURS**
Case on Operations Strategy & Process Choice		
PRACTICAL NO.03	**Material requirement planning**	**4 HOURS**
Assignment on MRP 1 – BOM Explosion or Netting requirements		
PRACTICAL NO.04	**Demand Forecasting**	**4 HOURS**
Assignment on demand forecasting – Quantitative Model or Qualitative techniques		
PRACTICAL NO.05	**Capacity planning**	**2 HOURS**
Assignment on capacity planning		
PRACTICAL NO.06	**Aggregate planning**	**2 HOURS**
Assignment on aggregate planning		
PRACTICAL NO.07	**Job shop scheduling**	**2 HOURS**
Assignment on job shop scheduling		
PRACTICAL NO.08	**Johnson's rule**	**4 HOURS**
Assignment on Johnson's rule		
PRACTICAL NO.09	**Balance sheet**	**2 HOURS**
Case study of balance sheet		
PRACTICAL NO.10	**Profit and loss account**	**4 HOURS**
Case study of balance sheet with respect to profit and loss account		

TEXT BOOK

1. Chase, Aquilano, Jacobs, Operations Management for Competitive Advantage, Tata McGraw Hill, ASIN: B07VM96K54
2. Chary, Production & Operations Management –McGraw Hill Publications S K Mukhopahyay, Operations Planning & Control, Jaico Publications
3. S K Mukhopahyay, Operations Planning & Control, Jaico Publications
4. Engineering Economy - Paul Degarmo, Macmillan Pub, Co. 2001, ISBN-00-23286008.

REFERENCE BOOK

1. Krajewski, Operations Management, 9th Edition, Pearson Education, ISBN-13: 978-0136065760.
2. Production & Operations Management – Panneerselvam, McGraw Hill Publications, ASIN: B00K7YK5X6.
3. Financial Mangement, Prasanna Chandra, TMH, 2004, ISBN-13: 978-9353166526.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Sociology
	COURSE CODE	HP402
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP402.CEO.1: The course focuses on the society in India with an attempt to acquaint students with sociology as a social science and the distinctiveness as a social science.

HP402.CEO.2: It displays the relevance and significance of sociology in understanding the society and in attempting to solve its problems.

HP402.CEO.3: Many of the Sociological Changes are an answer to the age-old social norms and practices giving rise to a solution which is critical to social issues and problems.

HP402.CEO.4: The course sensitizes students to the emerging social issues and enables them to acquire sociological understanding of these issues with an ability to answer the problems.

HP402.CEO.5: Projects in Sociology are tools that facilitate the construction of knowledge in imparting the right attitude towards social issues .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP402.CO.1: Get acquainted to sociology as a social science.

HP402.CO.2: Explain the significance of sociology in solving problems.

HP402.CO.3: Derive solutions to critical social issues.

HP402.CO.4: Change their attitude towards social issues.

THEORY

UNIT 1	Introduction to Sociology	6 HOURS

The nature of Sociology, meaning of Sociology: Origin, Definition, Scope, Culture, meaning, components, beliefs, values, norms, technology, diversity, towards a global culture.

UNIT 2	Sociolization	5 HOURS

Socialization, Agents of Socialization, Heredity and Environment, Group, Social structure, Status and role, family, school, peer group, media, adult socialization, resocialization, Role of Social moments, Illustrations: Women, Tribal & Dalit Movements .

Further Reading:

UNIT 3	Nature and factors of Social Change	5 HOURS

Change: Meaning. Nature and factors of Social Change: Biological Factors. Demographic Factors, Technological Factors, Economic Factors Cultural Factors, Info-tech factors, Meaning of Gender sensitization, Discrimination, violence and Abuse.

Further Reading:

UNIT 4	Visions of Social Change in India	4 HOURS

Idea of development planning and mixed economy, Constitution, law and social change, Education and social change.

Further Reading:

UNIT 5	Works and Economic Life	4 HOURS

Social organization of work in different types of society- slave society, feudal society, industrial /capitalist society. Formal and informal organization of work. Labour and society.

Further Reading:

UNIT 6	Introduction to Applied sociology	4 HOURS

The use of Sociology: Introduction to applied Sociology-Sociology and social problems, Ecology and Environment: Pollution, Global warming and Greenhouse effect. Impact of Industrialization and Urbanization on Environment.

REFERENCE BOOKS

1. T.B. Bottomore, Sociology: A Guide to Problems and Literature, Blackie and Sons Publishers, 1978, ISBN:978-0043000267
2. Sociology: A guide to problems and literature. Bombay: George Allen and Unwin (India): Harlambos, M.1998. ISBN: 978-0043000267
3. Sociology: Themes and perspectives. New Delhi Oxford University Press.: Inkeles, Alex, 1987
4. What is Sociology, Madras: Macmillan, India: Johnson, Harry M. 1995.
5. Sociology: A Systematic Introduction. New Delhi, Allied Publishers. ISBN: 978-8170231370 .

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Bussiness Strategies
	COURSE CODE	HP403
	COURSE CREDITS	1
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	CA	PRACTICAL	DEMONSTRATION	
-	2	NIL	NIL	25	NIL	25	50

PRE-REQUISITE : HP303 : Basics of Entrepreneurship

COURSE OBJECTIVES :

HP403.CEO.1: To understand the importance of growth and to be able to chart a path towards growth.
HP403.CEO.2: To revisit your business model
HP403.CEO.3: To give a growth orientation your customer acquisition, operations, revenue and sales strategy
HP403.CEO.4: To list and comply with the requirements relating to regulatory compliance
HP403.CEO.5: To be able to effectively pitch your venture to potential stakeholders .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP403.CO.1: Rephrase business model and Identify additional customer segments
HP403.CO.2: Identify channels and strategy for budgeting and planning.
HP403.CO.3: Make use of Legal aspect, Mentors, Advisors, and Experts in startups
HP403.CO.4: Analyze the growing revenues, sales planning, strengthening sales, improving margins
HP403.CO.5: Estimate customer lifetime value, competitor and peer's financial models for venture growth
HP403.CO.6: Formulate the all procedure for new venture ; Product market fit and A Pitch Deck

PRACTICALS:		
PRACTICAL NO.01	**Orientation to Growth**	**3 HOURS**
Getting Ready for Growth Why growth stage is different compared to startup phase, Why Product-Market fit is not enough, Case study, To assess readiness for growth, To chart a growth path .		
PRACTICAL NO.02	**Customers**	**3 HOURS**
Expanding Customer Base Revisit your business model and develop few variants (more business model types). Identify additional customer segments that your solution can address. Evaluate business models for the new customer segments. Relook at the Problem Statement (can you expand the scope and scalability of your business by repositioning your problem statement?) Explore additional ways to monetize.		
PRACTICAL NO.03	**Traction**	**12 HOURS**
Scaling How to gain traction beyond early customers. Defining traction (in quantifiable terms) and identifying the most important metrics to measure traction. Calculate cost of new customer acquisition. Estimate your customer lifetime value (LTV). Identifying waste in your operations and focusing your team on what is important for traction. **Channels and Strategies** The Bulls eye framework, Identify Channels using Bulls Eye Framework, Measuring the effectiveness of selected channels, Budgeting and planning.		
PRACTICAL NO.04	**Money**	**20 HOURS**
Growing Revenues. Stabilizing key revenue streams. Developing additional revenue streams (licensing, franchising). Exploring new channels and partnerships. Sales Planning. Understanding why customers buy and how buying decisions are made; Listening skills. Sales planning, setting targets. Unique Sales Proposition (USP); Art of the sales pitch (focus on customer's needs, not on product features) Follow-up and closing a sale; Asking for the sale. Strengthening Sales. Building a professional sales team. Sales compensation and incentives. Sales planning, setting targets Improving Margins. Testing price elasticity. Optimizing costs and operational expenses. Advanced concepts of unit costing. Financial Modeling. Financial modeling of your venture's growth. Analyzing competitor and peer's financial models.		
PRACTICAL NO.05	**Support**	**5 HOURS**
Legal Overview of legal issues and their impact on entrepreneurs. Importance of getting professional help (legal and accounting). Importance of being compliant and keeping proper documentation. Patents and Intellectual property. Trademarks. Mentors, Advisors, and Experts. The importance of a Mentor and how to find one. Role of business advisors and experts for specific targets in your growth plan.		
PRACTICAL NO.06	**Capstone Project: Pitch Your Venture**	**2 HOURS**

REFERENCE BOOKS

1. Zero to One: Note on Start Ups, or How to Build the Future, Peter Thiel and Blake Masters, Virgin Books,ISBN: 9780753555194
2. Tools of Titans: The Tactics, Routines, and Habits of Billionaires, Icons, and World-Class Performers, Timothy Ferriss, Random House,ISBN: 9781785041273.
3. Disrupted: My Misadventure in the Start-Up Bubble, Dan Lyons, Penguin Publishers, ISBN: 9781786491022
4. Unshakeable: Your Financial Freedom Playbook, Tony Robbins, Simon & Schuster Publishers,ISBN: 9781471164934
5. Grit: The Power of Passion and Perseverance, Angela Duckworth, Vermilion Publishing,ISBN: 9781785040207
6. Big Magic: Creative Living 4BEyond Fear, Elizabeth Gillbert, Penguin Publishers,ISBN: 9781408886182
7. Pivot: The Only Move That Matters Is Your Next One, Jernny Blake, Random House,ISBN: 9780241975466
8. Financial Management; Text and Problems, 7th Ed., A Khan and P. K. Jain, TataMacGraw Hill, ISBN: 9789353162184
9. Financial Management; Theory and Practice, 4th Ed., Prasanna Chandra, TataMacGraw Hill, ISBN: 9789339222574
10. Essentials of Management : An International and Leadership Perspective, 10th Ed., Harold Koontz and Heinz Weihrich, MGH, ISBN: 9789339222864
11. Kites in a Hurricane: Startups from Cradle to Fame, Rishi Kapal, SAGE Publishing, ISBN: 9789352807895
12. Wadhwani Foundation “Advanced Course in Entrepreneurship”

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Piping Design
	COURSE CODE	ME403
	COURSE CREDITS	1
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	2	-	-		50	-	50

PRE-REQUISITE : Machine Design, Thermal Engineering

COURSE OBJECTIVES :

ME403.CEO.1: To introduce the design of piping system.

ME403.CEO.2: Apply knowledge of piping design software for Mechanical & Chemical Engineering applications

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME403.CO.1: Create piping layout in piping design software package.

ME403.CO.2: Design piping system for Mechanical & Chemical Engineering Applications

PRACTICAL: To be conducted on Piping Design Software Package		
PRACTICAL NO.01		**2 HOURS**
ASME B31 Piping Codes, Basic understanding of AutoCAD Plant 3D,		
PRACTICAL NO.02		**2 HOURS**
Setting up the Plant 3D workspace, Working with Plant 3D files		
PRACTICAL NO.03		**2 HOURS**
Creating a new model		
PRACTICAL NO.04		**6 HOURS**
Working with the structural Objects, Creating equipment		
PRACTICAL NO.05		**6 HOURS**
Basic pipe routing, Moving and copying data		
PRACTICAL NO.06		**4 HOURS**
Isometric drawings		
PRACTICAL NO.07		**2 HOURS**
Project Work		
PRACTICAL NO.08	**Mini Project**	**4 HOURS**
Students should take a problem of their choice and verify the CFD solution with experimental data / research paper.		

REFERENCES

1. Help of Piping Design Software Smart® 3D – developed by INTERGRAPH CORPORATION
2. PDMS – Plant design & Management software developed by AVEVA PLANT
3. PDS- Plant design software developed by INTERGRAPH CORPORATION
4. AutoPLANT developed by BENTLEY
5. CADWorx developed by INTERGRAPH CORPORATION
6. AutoCAD plant-3D by Autodesk

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Six Sigma
	COURSE CODE	ME404
	COURSE CREDITS	1
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	2	-	-	25	25	-	50

PRE-REQUISITE : Quality Assurance

COURSE OBJECTIVES :

ME404.CEO.1: To recall the fundamentals of Quality Control tools.
ME404.CEO.2: To apply various optimization tools to solve industrial problems.
ME404.CEO.3: To suggest suitable quality control tool for QMS.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME404.CO.1: Demonstrate the productivity improvement aspects in their field.
ME404.CO.2: Accumulate, organize the data and analyze for identifying the problem and getting the solution to the problem.
ME404.CO.3: Excel the knowledge using applied tools in Six Sigma and Lean.
ME404.CO.4: Streamline the work procedures.
ME404.CO.5: Orient on Minitab Software

PRACTICAL: To be conducted on Piping Design Software Package		
PRACTICAL NO.01		**4 HOURS**
Prepare Project charter for an improvement project - including DMAIC plan		
PRACTICAL NO.02		**4 HOURS**
Team Role and responsibilities- Role Play		
PRACTICAL NO.03		**6 HOURS**
Use of Minitab software for advanced Data analysis- Inferential statistical tests- Z, t, Chi square, ANOVA		
PRACTICAL NO.04		**4 HOURS**
Improvement project for- Manufacturing/Service/ IT industry		
PRACTICAL NO.05		**4 HOURS**
Implementation aspects & Presentation of Six Sigma in organization's		
PRACTICAL NO.06		**4 HOURS**
Solving Lean management case lets		
PRACTICAL NO.07		**2 HOURS**
Project Work		

REFERENCES

1. Six Sigma handbook,by Thomas Pyzdek, Paul Keller, McGraw-Hill Education; 4 edition, ISBN-13: 978-0071840538
2. Implementing Six Sigma and Lean: A practical guide to tools and techniques,Ron Basu, Butterworth-Heinemann; 1 edition, ISBN-13: 978-1856175203
3. Six Sigma for Business Excellence: Approach, Tools and Applications 1st Edition, Kindle Edition, ASIN: B00AQTN08E

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Energy Audit
	COURSE CODE	ME405
	COURSE CREDITS	1
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	2	-	-	25	25	-	50

PRE-REQUISITE : Power Plant Engineering

COURSE OBJECTIVES :

ME405.CEO.1: To understand the importance of energy conservation and energy audit.
ME405.CEO.2: To learn essential steps of energy audit.
ME405.CEO.3: To understand performance evaluation of various thermal and electrical energy systems.
ME405.CEO.4: Analyze technical and financial feasibility of energy conservation projects.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME404.CO.1: Compare energy scenario and energy security aspects of India and World.
ME404.CO.2: Apply energy audit methodology in industry.
ME404.CO.3: Apply financial techniques to check feasibility of energy conservation projects.
ME404.CO.4: Evaluate performance of thermal utilities and relevant energy conservation opportunities.
ME404.CO.5: Evaluate performance of electrical utilities and relevant energy conservation opportunities.

PRACTICAL		
PRACTICAL NO.01	**General Aspects of Energy Management**	**4 HOURS**
Types of energy, Present energy scenario - India and World, Relationship between Environment and Energy, Concept of Energy Conservation and Energy Efficiency (EE), Energy Conservation Act – 2001 and its features – ECBC, S&L, DSM, BLY, DC, Certification of Energy Managers and Energy Auditors.		
PRACTICAL NO.02	**Principles of Energy Audit**	**4 HOURS**
Energy Audit – definition and need, Types of energy audit, Energy Audit Methodology, Instruments used for Energy Audit Understanding energy costs, bench marking, energy performance, Fuel and energy substitution, Analysis and recommendations of energy audit, Energy Audit reporting.		
PRACTICAL NO.03	**Energy Efficiency in Thermal Utilities**	**8 HOURS**
Numerical treatment - Energy performance assessment of Boilers (Direct and indirect method), Furnaces (Direct and indirect method), Insulation, Waste Heat Recovery, Cooling towers, HVAC systems, energy conservation opportunities in thermal utilities.		
PRACTICAL NO.04	**Energy Efficiency in Electrical Utilities**	**8 HOURS**
Introduction to electrical power supply system, Electricity billing, Electrical load management, Step by step approach for MD Control, Power factor improvement and benefits, Selection and location of capacitors (Numerical treatment). Electrical motors - working, types, Characteristics, Loading, efficiency, selection, Energy efficient motors, Speed control (Conceptual Numerical treatment) Performance evaluation of compressors, Lamp types and their features, recommended illumination levels, Lighting system performance assessment and efficiency improvement (Numerical). Energy conservation opportunities in thermal utilities.		
PRACTICAL NO.05	**Financial Analysis**	**4 HOURS**
Costing of utilities – steam, compressed air, financial analysis methods – Simple Payback Period (SPP), Time Value of Money, Net Present Value (NPV), Return on Investment (ROI), Internal Rate of Return (IRR) (Simple numerical treatment)		

REFERENCES

1. Handbook of Energy Audit, Albert Thumann, P.E. CEM, William J. Younger CEM, The Fairmont Press Inc., 7th Edition, ISBN 0-88173-685-6
2. Handbook on Energy Audit and Environment management, Y. A. Abbi, S. Jain, TERI, Press, New Delhi, 2006, ISBN 81-7993-092-0
3. Energy Management Handbook, Wayne C. Turner, The Fairmont Press Inc., 5th Edition, Georgia, ISBN: 0-88173-542-6
4. Guide books of BEE For Examination on Certification of Energy Managers and Energy Auditors.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Major Project - I
	COURSE CODE	ME402
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	8	–	–	–	100	50	150

PRE-REQUISITE : Minor Project, Mini Project

COURSE OBJECTIVES :

ME402.CEO.1: To implement the idea/ real time industrial problem/ current application from engineering domain

ME402.CEO.2: To evaluate an alternative approaches and justify the use of selected tools and methods

ME402.CEO.3: To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.

ME402.CEO.4: To understand the roles and responsibility, accountability and learn team work ethics

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME402.CO1: Solve real life problems by applying the knowledge and problem solving ability.

ME402.CO2: Analyze alternative approaches, find feasible solution and apply most appropriate one.

ME402.CO3: Use standard engineering tools and processes for analysis, design, simulation, testing, Implementation and deployment of idea into practice.

ME402.CO4: Participate effectively in multidisciplinary and heterogeneous teams exhibiting team work, inter-personal Relationship, conflict management and leadership quality.

PREAMBLE:

objective of this Major Project-I course is to understand the Product Development through team work. The students will able to shoulder the roles and responsibility and activity distribution amongst them. The students will learn designing, budgeting, planning, engineering skills and processes, testing and effective trouble-shooting practices, safety norms and standards while developing the application/ product. The students will deliver a presentation on the advancement in Technology pertaining to the selected project topic and able to understand importance of document design and professional ethics.

GUIDELINES:

Project work stage –I is an integral part of Project work. In this, the student shall complete the partial work of project, consist of problem statement, literature survey, Project specification and planning. The students expected to complete the project at least up to the design phase. As a part of project phase-I, candidate shall appear for two reviews and delivered the presentation on the advancement of selected project topic. The student shall submit the duly certified project report in standard format for satisfactory completion of work by the concern Advisor and Dean of the School.

The examinee will be assessed by panel of examiner of which one is necessarily as a external examiner. The assessment will be broadly based on work undergone, content delivery, presentation skills, documentation, question answer and report.

Preparation of the Literature survey paper and communicating and publishing in relevant publishing agency agency is recommended. Bonus 10 marks will be awarded.

Follow the guideline and formats as mentioned in guideline document Annexure-I.)

TIMELINE

1. Formation of Project Group: 2 Weeks (1st ,2nd week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (3rd, 4th week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (7th, 8th week)
4. Preparation of Project Progress Report – I (week 9th and 10th)
5. Project Phase-I Evaluation by external examiner (End Semester by 12th, 13th week)

ASSESSMENT

1. Internal Assessment (TW)

a. Project Review -1 Project Approval -30 Marks

b. Project Review -2 Analysis and Design- -30 Marks

c. Project Review -3 Project progress Report-I and Presentation - 40 Marks

d. Paper publication/IPR -10 marks (Bonus)

2. Examination: Final Demonstration and presentation

a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Noise Vibration & Harshness
	COURSE CODE	ME431
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Machines & Mechanisms

COURSE OBJECTIVES :

ME431.CEO.1: To develop analytical competency in solving vibration problems.
ME431.CEO.2: To know and able to determine the natural frequency of the single-degree freedom system.
ME431.CEO.3: To know the fundamentals of acoustics and Indian standards of Noise.
ME431.CEO.4: To know the sound absorbing materials and its practical applications.
ME431.CEO.5: To know the measurement and control techniques of vibration and noise.
ME431.CEO.6: To understand the effect of noise on human comfort and environment.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME431.CO.1: Solve one, two-degree freedom system problems.
ME431.CO.2: Apply the knowledge of acoustics in practice.
ME431.CO.3: Implement the measurement and control techniques of Vibration and Noise.
ME431.CO.4: Analyse the sources, effects of noise & vibration.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Vibration**	**10 HOURS**
Single Degree of Freedom Systems – Free Vibration Introduction, Definition, Types of vibration, Introduction to Physical and Mathematical modeling of vibratory systems: Bicycle, Motor bike and Quarter Car. Formulation of differential equation of motion (Newton, D'Alembert and energy method) Undamped free vibrations: Natural frequency for longitudinal, transverse and torsional vibratory systems. Damped free vibrations: Different types of damping, Viscous damping – over damped, critically damped and under damped systems, initial conditions, and logarithmic decrement. Single Degree of Freedom Systems - Forced Vibrations Forced vibrations of longitudinal, Frequency Response to harmonic excitation, magnification factor, Force and Motion transmissibility, Quality Factor. Half power bandwidth method.		
UNIT 2	**Two Degree of freedom systems**	**8 HOURS**
Free vibration of spring coupled systems – longitudinal, natural frequency and mode shapes, Eigen value and Eigen vector by Matrix method, Undamped dynamic vibration absorber. Modal analysis of free and forced undamped and damped vibrations.		
UNIT 3	**Fundamental of Noise**	**8 HOURS**
Introduction to Sound, Sound propagation, wave equation, Quantification of sound- frequency and wavelength, Sound levels and decibels, sound power level sound pressure level, Sound intensity level, Octave & 1/3 octave bands, A weighting, Sound field, Sound reflection ,absorption and transmission - concept & governing equation with correlation of each other, Loudness, Introduction to harshness.		
UNIT 4	**Noise Measurement and Control**	**8 HOURS**
Noise measuring instruments- microphones, types of microphones Sound pressure measurement, Sound power measurement, Sound intensity measurement, Measurement of sound transmission loss, sound level meter, FFT spectrum analyzer, conditioning monitoring, Introduction to array techniques - Acoustic holography & beam forming. Major Sources of noise, noise due to construction equipments and domestic applications, Interior Noise of Automobiles - Interior noise sources, Structure borne noise, airborne noise. Industrial noise, industrial noise control- strategies, noise control at the source, noise control at the path, Acoustic barriers, noise control at the receiver. Active noise control techniques.		
UNIT 5	**Passive Noise Treatments**	**6 HOURS**
Ducts & Mufflers – Types of mufflers, performance parameters – acoustics and back pressure, reactive and absorptive silencers and overall design considerations. Acoustic Material Characterization – Sound transmission, absorption and damping, Behavior of acoustic material with respect to sound absorption and transmission, Standard methods for evaluating sound absorption coefficient and transmission loss, Types of sound absorbers, Prediction of transmission loss, Damping materials and their applications.		
UNIT 6	**Noise Regulations**	**6 HOURS**
Non-auditory and auditory effect noise on human beings, Noise standards and limits in India, Ambient emission noise standards in India, Hazardous noise exposure – legal aspects, Day night sound level, Noise specifications for automotive vehicles – pass-by & stationary and Noise specifications for generator sets, firecrackers and household articles.		

PRACTICAL: Perform the following experiments		
PRACTICAL NO.01		**2 HOURS**
To determine the natural frequency of damped vibration of single degree freedom system and to find it 's damping coefficient.		
PRACTICAL NO.02		**2 HOURS**
To obtain frequency response curves of single degree freedom system of vibration for different amount of damping.		
PRACTICAL NO.03		**2 HOURS**
Measurement of vibration parameters like frequency, amplitude, velocity and acceleration of any vibrating system by using vibration measuring instrument.		
PRACTICAL NO.04		**2 HOURS**
To determine natural Frequency of Transverse Vibration of Beam using vibration analyser.		
PRACTICAL NO.05		**2 HOURS**
Analysis of machine vibration signature using analysis software package.		
PRACTICAL NO.06		**2 HOURS**
Noise measurement and analysis using vibration analyser.		
PRACTICAL NO.07		**2 HOURS**
Determination of sound absorption coefficient of acoustic material by using impedance tube		
PRACTICAL NO.08		**2 HOURS**
Determination of transmission loss of reactive silencer by using impedance tube.		
PRACTICAL NO.09	**Projects 1**	**2 HOURS**
Simulation (using suitable software) of free response of SDOF damped system to demonstrate different damping conditions by solving differential equation numerically.		
PRACTICAL NO.10	**Project 2**	**2 HOURS**
Simulation (using suitable software) of total response of SDOF damped system to harmonic excitation by solving differential equation numerically.		

TEXT BOOK

1. Rao S. S., Mechanical Vibrations, Pearson Education Inc. New Delhi.ISBN 978-0-13-212819-3
2. Grover G. K., Mechanical Vibrations, New Chand and Bros., Roorkee ISBN-10: 9788185240565
3. Clarence W. de Silva, Vibration Monitoring, Testing, and Instrumentation, CRC Press, 2007 ISBN 9781420053197
4. David A. Bies and Colin H. Hansen Engineering Noise Control: Theory and Practice Spon Press, London, 2009 ISBN 0-203-16330-3
5. C. Sujatha Vibration and Acoustics : McGraw hill Publication 2010 ISBN 10: 0070148783
6. M. L. Munjal, Acoustics of Ducts and Mufflers, Willy publications, ISBN 9780471847380
7. A. G. Ambekar, Mechanical Vibration and Noise Engineering, PHI publications, ISBN. 9788120329003

REFERENCE BOOK

1. Bell, L. H. and Bell, D. H., Industrial Noise Control Fundamentals and Applications, Marcel Dekker Inc, ISBN 10: 0824790286
2. Meirovitch, Elements of Mechanical Vibrations, McGraw Hill ISBN-10: 0070413401
3. Ver, Noise and Vibration Control Engineering, Wiley India Pvt. Ltd, New Delhi ISBN: 9780471449423
4. Bies, D. and Hansen, C., Engineering Noise Control Theory and Practice, ISBN 9781498724050
5. Kelly S. G., Mechanical Vibrations, Schaum's outlines, Tata McGraw Hill Publishing Co. Ltd., New Delhi, ISBN 13: 9780070616790
6. Allan G. Piersol, Thomas L. Paez Harris' Shock and Vibration Handbook, McGraw-Hill, New Delhi, 2010, ISBN: 0071508198
7. William Thomas and Marie Dillon Dahleh-Theory of Vibration with Applications. Pearson Publishing,2007, ISBN-10: 013651068

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Hydraulics & Pneumatics
	COURSE CODE	ME441
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	Nil	30	40	30	Nil	Nil	100

PRE-REQUISITE : Fluid Mechanics

COURSE OBJECTIVES :

ME441.CEO.1: Study Application of fluid mechanics and governing laws in hydraulic and pneumatic systems.
ME441.CEO.2: Study of working principle of various components used in hydraulic and pneumatic systems.
ME441.CEO.3: Selection of different components used in hydraulic and pneumatic systems.
ME441.CEO.4: Design of hydraulic and pneumatic circuits.
ME441.CEO.5: Understand Industrial applications of hydraulic and pneumatic circuits.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME441.CO.1: Find working principle of various components used for hydraulic & pneumatic systems.
ME441.CO.2: Identify various components of hydraulic & pneumatic systems.
ME441.CO.3: Select appropriate components required for hydraulic and pneumatic systems.
ME441.CO.4: Enlist industrial applications of hydraulic and pneumatic system.
ME441.CO.5: Troubleshooting of hydraulic & pneumatic circuits through Automation studio software.

THEORY COURSE CONTENT		
UNIT 1	**Fluid Power Principles and Fundamentals**	**8 HOURS**
Introduction to Fluid power- Advantages and Applications- Fluid power systems, Types of fluids- Properties of fluids, Basics of Hydraulics -Pascal's Law- Principles of flow, Work, Power and Torque. The source of Hydraulic Power: Pumps - Classification of pumps, Pumping theory of positive displacement pumps, construction and working of Gear pumps, Vane pumps, Piston pumps, fixed and variable displacement pumps, pump Selection factors, troubleshooting of pumps.		
UNIT 2	**Control Components in Hydraulic Systems**	**8 HOURS**
Classification of control valves, Directional Control Valves- Symbolic representation, constructional features of poppet, sliding spool, rotary type valves solenoid and pilot operated DCV, shuttle valve, check valves, Pressure control valves - types, direct operated types and pilot operated types. Flow Control Valves -compensated and non-compensated FCV, needle valve, temperature compensated, pressure compensated, pressure and temperature compensated FCV, symbolic representation.		
UNIT 3	**Hydraulic Actuators and Motors**	**8 HOURS**
Classification of actuators: Cylinder and hydraulic motors, Linear Hydraulic Actuators-cylinders, single and double acting cylinder, Mechanics of Hydraulic Cylinder Loading, mounting arrangements, cushioning, special types of cylinders, problems on cylinders, construction and working of rotary actuators such as gear, vane, piston motors, Hydraulic Motor Theoretical Torque, Power and Flow Rate, problems, symbolic representation of hydraulic actuators cylinders and motors.		
UNIT 4	**Pneumatic Systems**	**8 HOURS**
Compressors- Filter, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust valves, Pneumatic actuators, Servo systems, General function of Industrial Automation, Safety in Industrial Automation, Practical Programmable Logic Controller Applications, Logical Program Development.		
UNIT 5	**Analysis of Hydraulic and Pneumatic Circuits**	**6 HOURS**
Analysis of various hydraulic circuits like safety circuits, quick return, locking circuits, circuits for hydraulic press, flow-controlled circuits etc. Analysis of various pneumatic circuits and pneumatic logic circuits.		
UNIT 6	**Design of hydraulic circuits and troubleshooting**	**8 HOURS**
Design of hydraulic circuits using hydraulic component manufacturer's product catalogue. Selection of various components. Hydraulic circuits drawing and specification of each components.		

TEXT BOOK

1. Anthony Esposito, Fluid Power with Applications, PHI / Pearson Education, 2005, ISBN-10: 0135136903
2. Douglas M. Considine, Process instruments and Control Handbook McGraw-Hill, New York. 1985, ISBN-13: 978-0070124288
3. Majumdar, S.R., Pneumatic Systems – Principles and Maintenance, Tata McGraw Hill, 2007, ISBN-13: 0135176905

REFERENCE BOOK

1. Shanmuga sundaram.K, Hydraulic and Pneumatic controls, S. Chand & Co, 2006, ISBN-13: 978-8121926355
2. Majumdar, S.R., Oil Hydraulics Systems- Principles and Maintenance, Tata McGraw Hill, 2001, ISBN-10: 0074637487
3. Micheal J, Pinches and Ashby, J.G., Power Hydraulics, Prentice Hall, 1989, ISBN-13: 978-0136874430
4. 99 Example of pneumatic application, Author G Prede & D. Schloz Publisher FESTO –AG Germany.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Mechanical System Design
	COURSE CODE	ME442
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	Nil	30	40	30	Nil	Nil	100

PRE-REQUISITE : Machine Design

COURSE OBJECTIVES :

ME442.CEO.1: To develop competency for system visualization and design.

ME442.CEO.2: To introduce student to optimum design and use optimization methods to design mechanical components.

ME442.CEO.3: To identify the mechanical systems and design it for specific applications.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME441.CO.1: Enlist the difference between component level design and system level design.

ME441.CO.2: Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.

ME441.CO.3: Identify optimum design principles and apply it to mechanical components.

ME441.CO.4: Optimize design for efficient performance.

ME441.CO.5: Apply the concept of system design.

THEORY COURSE CONTENT		
UNIT 1	**Machine Tool Gearbox**	**6 HOURS**
Machine tool gearboxes, design and its applications, basic considerations in design of drives, determination of variable speed range, graphical representation of speed and structure diagram, ray diagram, difference between numbers of teeth of successive gears in a change gear box.		
UNIT 2	**Optimum Design**	**6 HOURS**
Objectives of optimum design, adequate and optimum design, Johnson 's Method of optimum design, Primary design equations, subsidiary design equations and limit equations, optimum design of tension bar, transmission shaft and helical spring, Design for manufacture, assembly and safety.		
UNIT 3	**Statistical considerations in design**	**8 HOURS**
Frequency distribution-Histogram and frequency polygon, normal distribution - units of of central tendency and dispersion- standard deviation - population combinations - design for natural tolerances -design for assembly - statistical analysis of tolerances, mechanical reliability and factor of safety		
UNIT 4	**Belt conveyor system for material handling**	**8 HOURS**
System concept, basic principles, objectives of material handling system, unit load and containerization. Types of Belt conveyors, capacity of conveyor, rubber covered and fabric ply belts, belt tensions, conveyor pulleys, belt idlers, tension take-up systems, power requirement of horizontal belt conveyors.		
UNIT 5	**Cylinders and Pressure vessels**	**6 HOURS**
Thin and thick cylinders; failure criteria of vessels; Lame's equation; Clavarino's and Birnie's equation; Autofrettage and compound cylinders; Types of pressure vessels, Classification and Design of pressure vessel as per IS 2825, 1969. Shell and end closures. Effect of opening & nozzles in shell & covers. Types of pressure vessel support.		
UNIT 6	**I. C. Engine components**	**6 HOURS**
Introduction to selection of material for I. C. engine components, Design of cylinder and cylinder head, construction of cylinder liners, design of piston and piston-pins, piston rings, design of connecting rod. Design of crankshaft and crank-pin..		

TEXT BOOK

1. Bhandari V.B. Design of Machine Elements, Tata McGraw Hill Pub. Co. Ltd., ISBN: 9339221125
2. Juvinal R.C, Fundamentals of Machine Components Design, Wiley, India., ISBN: 11118012895
3. Machine Design by Robert L.Norton, Tata Mc- Graw Hill Publication, ISBN: 013335671X
4. Patil S. P., Mechanical System Design, Jaico Publishing House, Mumbai, ISBN: 9788179923153
5. Ray T. K., Mechanical Handling of Materials, Asian Book Pvt. Ltd., Delhi, ISBN: 9788186299470

REFERENCE BOOK

1. Shigley J. E. and Mischke C.R., Mechanical Engineering Design, McGraw Hill Pub. Co, ISBN: 933922163X
2. M. F. Spotts, Mechanical Design Analysis, Prentice Hall Inc, ISBN: 8177584219
3. Black P.H. and O. Eugene Adams, Machine Design, McGraw Hill Book Co. Inc, ISBN: 9789339205218
4. Engineering Design by Dieter G.E. Tata Mc- Graw Hill Publication, ISBN: 0073398144
5. Design of Pressure vessel by Harve, CBS publishers and distributors, ISBN: 04422324489
6. IS-2825-1969 code for unfired pressure vessels, by J. Phillip Ellenberger, Mc Graw-Hill Education, ISBN: 0071436731
7. Rudenko N., Material Handling Equipment, PEACE Publishers, Moscow, ISBN: 0714702854
8. Joshi M. V., Mahajani V. V., Process Equipment Design, MacMillan India, Ltd.,Delhi, ISBN: 9789351380191
9. Ullman D.G., The Mechanical Design Process, McGraw Hill International Editions, ISBN: 9780999357804
10. Willium C. Orthwine, Machine Components Design I and II, Jaico Publishing House, Mumbai, ISBN: 0314242570
11. Johnson R.C.,Optimum Design of Mechanical Elements, John Wiley & Sons.Inc., London, ISBN: 0471038946

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Non-Conventional Machining
	COURSE CODE	ME443
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	Nil	30	40	30	Nil	Nil	100

PRE-REQUISITE : Manufacturing Technology

COURSE OBJECTIVES :

ME443.CEO.1: To classify non-conventional machining processes.

ME443.CEO.2: To explain the principle, mechanism of metal removal of various non-conventional machining processes.

ME443.CEO.3: To outline various process parameters and their effect on the component, machined on various non-conventional machines.

ME443.CEO.4: To identify various applications of non-conventional machining processes

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME443.CO.1: Illustrate the working of various non-conventional machining processes

ME443.CO.2: Apply the working principles and processing characteristics of non-conventional machining like EDM, ECM to the production of precision components

ME443.CO.3: Analyze mechanical, thermal and Electrochemical type non-conventional machining processes

ME443.CO.4: Examine the effect of material removal rate (MRR), Tool Wear and Surface roughness on work piece

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**8 HOURS**
Introduction to Non-Conventional machining, Need for Non-Conventional machining process, Comparison between Conventional and non-Conventional machining, general classification Non-Conventional machining processes, classification based on nature of energy employed in machining, selection of non-Conventional machining processes, Specific advantages, limitations and applications of non-Conventional machining processes.		
UNIT 2	**Ultrasonic Machining (USM)**	**8 HOURS**
Introduction, Equipment and material process, Effect of process parameters: Effect of amplitude and frequency, Effect of abrasive grain diameter, effect of slurry, tool & work material. Tool Design. Process characteristics: Material removal rate (Numerical) tool wear, accuracy, surface finish, applications, advantages & limitations of USM. Case studies - Industrial.		
UNIT 3	**Abrasive Jet Machining (AJM), Water Jet Machining (WJM)**	**6 HOURS**
Abrasive Jet Machining (AJM): Introduction, Equipment and process of material removal, process variables: carrier gas, type of abrasive, work material, stand-off distance (SOD). Process characteristics-Material removal rate, Nozzle wear, accuracy & surface finish (Numerical). Applications, advantages & limitations of AJM. Water Jet Machining (WJM): Equipment & process, Operation, applications, advantages and limitations of WJM. Case studies - Industrial.		
UNIT 4	**Electrochemical Machining (ECM), Chemical Machining (CHM)**	**8 HOURS**
Electrochemical Machining (ECM): Introduction, Principle of electro chemical machining: ECM equipment, elements of ECM operation, Chemistry of ECM. ECM Process characteristics: Material removal rate, accuracy, surface finish (Numerical). Process parameters: Current density, Tool feed rate, Gap between tool & work piece, velocity of electrolyte flow, type of electrolyte, its concentration temperature, and choice of electrolytes. ECM Tooling: ECM tooling technique & example, Tool & insulation materials. Applications ECM: Electrochemical grinding and electrochemical honing process. Advantages, disadvantages and application of ECG, ECH. Chemical Machining (CHM): Elements of the process: Resists (maskants), Etchants. Types of chemical machining process, chemical blanking process and chemical milling process. Process characteristics of CHM: material removal rate, accuracy, surface finish, advantages, limitations and applications of chemical machining process. Case studies - Industrial.		
UNIT 5	**Electrical Discharge Machining (EDM), Plasma Arc Machining (PAM)**	**8 HOURS**
Electrical Discharge Machining (EDM): Introduction, mechanism of metal removal, EDM equipment: spark erosion generator (relaxation type), dielectric medium-its functions & desirable properties, electrode feed control system. Flushing types; pressure flushing, suction flushing, side flushing, pulsed flushing. EDM process parameters: Spark frequency, current & spark gap, surface finish, Heat Affected Zone (Numerical). Advantages, limitations & applications of EDM, Electrical discharge grinding, Traveling wire EDM. Plasma Arc Machining (PAM): Introduction, non-thermal generation of plasma, equipment mechanism of metal removal, Plasma torch, process parameters, process characteristics. Safety precautions, applications, advantages and limitations. Case studies - Industrial.		

UNIT 6	Laser Beam Machining (LBM), Electron Beam Machining (EBM)	6 HOURS

Laser Beam Machining (LBM): Introduction, generation of LASER, Equipment and mechanism of metal removal, LBM parameters and characteristics, Applications, Advantages & limitations. Electron Beam Machining (EBM): Introduction, Principle, equipment and mechanism of metal removal (Numerical), applications, advantages and limitations. Case studies - Industrial.

TEXT BOOK

1. Ghosh and Mallik, Manufacturing Science, EWP Private Ltd, ISBN-13: 978-8176710633
2. V.K.Jain, Advance Machining Processes, Allied Publisher Bombay, ISBN-13: 978-8177642940
3. Advanced manufacturing processes, Hassan Abdel, Gabad El Hoffy, McGraw Hill, ISBN-13: 978-0071453349
4. Mishra, P. K., Non-Conventional Machining, The Institution of Engineers (India), Text Book Series, New Delhi, 1997, ISBN: 978-81-7319-522-8
5. Garry F. Benedict, Unconventional Machining Process, Marcel Dekker Publication, New York, 1987, ISBN 13: 9780824773526

REFERENCE BOOK

1. Bennedict, G. F., Non-Traditional Machining Techniques, Marcel Decker, New York, 1990, ISBN-10: 9780824773526
2. Pandey P.C., Shan H.S., Modern machining processes, Tata McGraw-Hill Education, ISBN 10: 0070965536 / ISBN 13: 9780070965539
3. Weller E.J., Non-traditional machining processes, Society of Manufacturing Engineers, Publications, ISBN: 978-81-7319-522-8
4. The Science and Engineering of Micro-fabrication, Stephen P. Campbell, and Oxford University press, ISBN-10: 9780824773526 Pandey and Sha, Modern Manufacturing Process, Prentice Hall, New Jersey.
5. Fundamentals of Modern Manufacturing by M.P. Groover, John Wiley & Sons, 4th Edition ISBN-10: 9780824773526
6. Advanced Machining Processes by V. K. Jain, Narosa Publishing House, New Delhi, ISBN: 978-81-7319-522-8
7. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH, ISBN 10: 0070965536
8. New Technology / Bhattacharya A/ The Institution of Engineers, India 1984.ISBN 13: 9780070965539
9. Advanced Machining Processes by V. K. Jain, Narosa Publishing House, New Delhi, ISBN-13: 978-0071453349

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Enterprise Resource Planning
	COURSE CODE	ME444
	COURSE CREDITS	3
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	30	40	30	-	-	100

PRE-REQUISITE : Product Lifecycle Management

COURSE OBJECTIVES :

ME444.CEO.1: To Describe the concept of ERP and the ERP model; define key terms; explain the transition from MRP to ERP; identify the levels of ERP maturity.

ME444.CEO.2: To Describe the elements of a value chain and explain how core processes relate.

ME444.CEO.3: To Identify the international issues that impact a worldwide implementation of ERP; identify the key technological considerations and infrastructure concerns in ERP implementation.

ME444.CEO.4: To Describe the strategic use of technology for ERP.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME444.CO.1: Comprehend the technical aspects of ERP systems

ME444.CO.2: Learn concepts of reengineering and how they relate to ERP system implementations

ME444.CO.3: Understand the steps and activities in the ERP life cycle

ME444.CO.4: Be able to identify and describe typical functionality in an ERP system

ME444.CO.5: Understand current trends and issues related to Enterprise Systems.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to ERP**	**5 HOURS**
Introduction, Evolution of ERP, Reasons for growth of ERP, Advantages / disadvantages of ERP, Evaluation of ERP, Various Modules in ERP		
UNIT 2	**ERP and Technology**	**6 HOURS**
ERP and Related Technologies-. Business Process Reengineering (BPR) -Data Warehousing-Data Mining-On-line Analytical Processing (OLAP) -Product Life Cycle Management (PLM) - Supply Chain Management (SCM) - Customer Relationship Management (CRM) -Advanced Technology and ERP Security		
UNIT 3	**Modules in ERP**	**8 HOURS**
Finance and Controlling, Sales and Distribution, Materials Management, Production Planning and Control, Quality Management, Planet Maintenance, Human Resource Business Processes Order To Cash, Procure To Pay, Plan To Produce, Make To Stock, Make To Order and Assemble To Order, Difference in Discrete and Process industries		
UNIT 4	**ERP Implementation**	**6 HOURS**
Planning Evaluation and selection of ERP systems - Implementation life cycle-ERP Implementation-Methodology and Frame work Training Data Migration People and Organization in implementation Consultants, Vendors and Employees.		
UNIT 5	**Supply chain management**	**7 HOURS**
Role of ERP in Supply Chain management, Supply Chain Drivers and Metrics, Supply Chain Performance, Managing Economics of Scale in a Supply Chain, Managing Uncertainty in a Supply Chain, Determining the Optimal level of Product Availability.		
UNIT 6	**Future Directions in ERP**	**6 HOURS**
Current trends in ERP, Changes in the ERP Implementations, Faster implementation methodologies, Web enabling, Maintenance of ERP Organizational and Industrial impact Success and Failure factors of ERP Implementation case studies.		

TEXT BOOK

1. Thomas F. Wallace, Michael H. Kremzar, 'ERP Making It Happen', 2001, ISBN: 978-0-471-39201-9
2. V.K. Garg & N.K. Venkitakrishnan, ERP Ware: ERP Implementation framework, ISBN: 8120322541

REFERENCE BOOK

1. V.K. Garg & N.K. Venkitakrishnan, ERP Concepts and Planning, Cengage, ISBN: 9788131525920
2. Alexis Leon, Enterprise Resource Planning, ISBN 8120322541
3. Rahul Altekar, Enterprise Resource Planning, ASIN: B00K7YGX2S
4. APIC's material on ERP

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Advanced Analysis
	COURSE CODE	ME451
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Finite Element Analysis, Computational Fluid Dynamics

COURSE OBJECTIVES :

ME451.CEO.1: Conceptualize the programming skills.
ME451.CEO.2: Use a CFD tool effectively for practical problems and research.
ME451.CEO.3: Provides experience with a commercial FEM code and practical modeling exercises.
ME451.CEO.4: Prepare the students for research leading to higher studies and career in CAE industry using software tools.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME451.CO.1: Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
ME451.CO.2: Provide the mathematical foundations of the finite element formulation for engineering applications (solids, heat, fluids).
ME451.CO.3: Understand of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the CFD.
ME451.CO.4: Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer
ME451.CO.5: Interpret the results of finite element analyses.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Nonlinear Analysis**	**8 HOURS**
Basic of non-linear finite element analysis, Continuum mechanics, Nonlinear Heat Equation - 1 Dimension, Basic Nonlinear Continuum Mechanics of Solids, Total and Updated Lagrangian Approaches.		
UNIT 2	**Isoparametric Elements**	**8 HOURS**
Concept of isoparametric elements, Terms Isoparametric, super parametric and subparametric. Isoparmetric formulation of bar element. Coordinate mapping - Natural coordinates, Area coordinates (for triangular elements), higher order elements (Lagrangean and serendipity elements). Convergence requirements- patch test, Uniqueness of mapping - Jacobian matrix. Numerical integration – 2- and 3-point Gauss Quadrature, full and reduced integration. Sub-modeling, substructuring.		
UNIT 3	**Dynamic Analysis**	**6 HOURS**
Types of dynamic analysis, general dynamic equation of motion, lumped and consistent mass, Mass matrices formulation of bar, truss and beam element.		
UNIT 4	**Introduction to Grid Generation**	**6 HOURS**
Undamped-free vibration: Eigenvalue problem, evaluation of eigenvalues and eigenvectors (characteristic polynomial technique). Structured and Unstructured Grids, General transformations of the equations, body fitted coordinate systems, Algebraic and Elliptic Methods, multi block structured grids, adaptive grids		
UNIT 5	**Introduction to Turbulence**	**8 HOURS**
Introduction, Statistical representation of turbulent flows: General Properties of turbulent quantities, Closure problem: Necessity of turbulence modeling, Reynolds average Navier stokes (RANS) equation		
UNIT 6	**Turbulence Modeling**	**6 HOURS**
Different types of turbulence model: Eddy viscosity models, Mixing lengths model, Turbulent kinetic energy and dissipation, The k-ϵ model, Advantages and disadvantages of k-ϵ model, Two-equation models: k-ϵ model and k-ω model, Reynolds stress equation model (RSM).		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01		**4 HOURS**
Computer programs for (i) modal analysis and, (ii) stress analysis for 1-D beam (simply supported or cantilever beams) (Use Any programing language like C, C++, Matlab etc.)		
PRACTICAL NO.02	**Modal Analysis**	**4 HOURS**
Modal analysis of any machine component using FEA software		
PRACTICAL NO.03	**Transient Analysis**	**4 HOURS**
Transient structural analysis of any machine component using FEA software		
PRACTICAL NO.04	**Couplefied Analysis**	**6 HOURS**
Coupled Thermal-Structural Analysis using FEA software		
PRACTICAL NO.05	**Steady State Heat Conduction Using Fvm**	**4 HOURS**
Computer Program on One-dimensional steady state conduction using finite volume method (Use Any programing language like C, C++, Matlab etc.)		
PRACTICAL NO.06	**Forced Convection Under Turbulent Flow Conditions**	**6 HOURS**
Convection steady state heat transfer analysis of flow through pipe under turbulent flow conditions		

TEXT BOOK

1. John D Anderson: Computational Fluid Dynamics- The Basics with Applications, McGraw-Hill, ISBN:9780070016859.
2. Atul Sharma, Introduction to Computational Fluid Dynamics: Development, Application and Analysis, Wiley, ISBN:9781119369189.
3. Suhas V. Patankar, Numerical Heat Transfer and Fluid Flow, Hemisphere Publishing Corporation, ISBN:9780891165224.
4. A. W. Date, Introduction to Computational Fluid Dynamics, Cambridge Univ. Press, USA, ISBN:0521853265.
5. H. Versteeg, and W.Malalasekara, An Introduction to Computational Fluid Dynamics: The Finite Volume Method, Pearson, ISBN:9780131274983.

REFERENCE BOOK

1. H. Tennekes and J. L. Lumley, A First Course in Turbulence, MIT Press, ISBN:9780262200196.
2. David C. Wilcox, Turbulence Modeling for CFD, DCW Industries, ISBN:97811928729082.
3. H. Schlichting and K. Gersten, Boundary-Layer Theory, Springer, ISBN:9783662529195.
4. T. J. Chung, Computational Fluid Dynamics, Cambridge University Press, ISBN:9780521769693.
5. J. N. Reddy, An Introduction to the Finite Element Method, Tata McGraw-Hill.ISMN-13-9780070513556
6. Gokhale N. S., Deshpande S. S., Bedekar S. V. and Thite A. N., —Practical Finite Element Analysis, Finite to Infinite, Pune, ISBN: 9788190619509.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Intelligent and high performance Robotics
	COURSE CODE	ME452
	COURSE CREDITS	4
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	–	50	150

PRE-REQUISITE : Robotics Vision

COURSE OBJECTIVES :

ME452.CEO.1: Describe methods of solving problems using Artificial Intelligence.
ME452.CEO.2: Percolate the concepts of optimal control for obtaining high performance.
ME452.CEO.3: Illustrate the concepts of Expert Systems and machine learning.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME452.CO.1: Classify different types of learning, planning and reasoning under AI methods.
ME452.CO.2: Identify appropriate AI methods to solve a given problem.
ME452.CO.3: Formalize a given problem in the language/framework of different AI methods.
ME452.CO.4: Explore and analyze diverse fields in robotic applications.

THEORY COURSE CONTENT		
UNIT 1	**ARTIFICIAL INTELLIGENCE FOR ROBOTICS**	**08 HOURS**
History, state of the art, Need for AI in Robotics. Thinking and acting humanly, intelligent agents, structure of agents. PROBLEM SOLVING: Solving problems by searching –Informed search and exploration–Constraint satisfaction problems–Adversarial search, knowledge and reasoning–knowledge representation – first order logic.		
UNIT 2	**Planning**	**08 HOURS**
Planning with forward and backward State space search – Partial order planning – Planning graphs–Planning with propositional logic – Planning and acting in real world.		
UNIT 3	**Reasoning**	**08 HOURS**
Uncertainty – Probabilistic reasoning–Filtering and prediction–Hidden Markov models–Kalman filters–Dynamic Bayesian Networks, Speech recognition, make decisions. Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.		
UNIT 4	**Learning**	**08 HOURS**
Forms of learning – Knowledge in learning – Statistical learning methods –reinforcement learning, communication, perceiving and acting, Probabilistic language processing, perception.		
UNIT 5	**AI in Robotics**	**08 HOURS**
Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics Ariel robots- Collision avoidance-Robots for agriculture, mining, exploration, underwater, civilian and military applications, nuclear applications, Space applications		

PRACTICAL: Perform following experiments using		
PRACTICAL NO.01	**Capstone Project Development**	**18 HOURS**
Power management algorithms for energy harvesting sensing systems		

TEXT BOOK

1. Stuart Russell, Peter Norvig, "Artificial Intelligence: A modern approch", Pearson Education, India2003. , ISBN : 978-0136042594.
2. Negnevitsky, M, "Artificial Intelligence: A guide to Intelligent Systems",. Harlow: Addison-Wesley, 2002., ISBN : 978-1408225745.

REFERENCE BOOK

1. David Jefferis, "Artificial Intelligence: Robotics and Machine Evolution", Crabtree Publishing Company, 1992. , ISBN : 978-0778700463

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Supply Chain Management
	COURSE CODE	ME453
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	25	25	150

PRE-REQUISITE : Operations Management

COURSE OBJECTIVES :

ME453.CEO.1: To study the concepts in supply chain management.
ME453.CEO.2: To understand different models in network design.
ME453.CEO.3: To analyze different financial ratios.
ME453.CEO.4: To review inventory management in Supply Chain Management.
ME453.CEO.5: To assess existing the supply chain for manufacturing company.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME453.CO.1: Identify the key elements and processes in supply chain.
ME453.CO.2: Discuss the designing, planning and operational decisions in Supply Chain Management.
ME453.CO.3: Predict the future developments in logistics and supply chain.
ME453.CO.4: Apply the critical components techniques in management in supply chain.
ME453.CO.5: Design supply chain network for manufacturing company.

THEORY COURSE CONTENT		
UNIT 1	**Supply Chain Management Concepts**	**8 HOURS**
Supply Chain: Concept, Objective. Decision Phases in Supply Chain. Process View of Supply Chain – Cycle View, Push/pull view, Supply Chain Performance – Achieving Strategic Fit. Types of Supply Chain – Responsive, Efficient, And Achieving Strategic Fit. Supply Chain Drivers – Facilities, Inventory, Transportation, Information. Importance of Supply Chain, Examples of Supply Chain		
UNIT 2	**Network Design in Supply Chain Management**	**8 HOURS**
Factors Influencing Distribution Network Design – Response time, Product variety, Product availability, Customer experience, Order visibility, Return ability. Logistics Modeling: Location – Allocation Models Multiple Facility Location Models: Baumol Wolf Method, Add & Construction Heuristic, Allocation Models: Transportation Model: Variants, Special Cases, Solution - Vogel's Approximation Method, Optimality Methods – UV Method, Stepping Stone Method, Transshipment problems. Traveling Salesman Problem, Vehicle Routing Problem Factors Influencing Network Design Decisions – Strategic, Technological, Macroeconomic, Political, Infrastructure,		
UNIT 3	**Planning demand in Supply Chain**	**6 HOURS**
Managing Supply: Managing Capacity – time flexibility of workforce, seasonal workforce, subcontracting, use of dual facilities, design product flexibility into production processes. Managing Inventory – use common components across multiple products, build inventory of high demand of predictable demand products Managing Demand: Variable pricing, Forward buying. Collaborative Planning Forecasting & Replenishment, Demand Forecasting & Aggregate Planning in Supply Chain.		
UNIT 4	**Planning and managing Inventories in Supply Chain**	**6 HOURS**
Managing Economies of Scale: Cycle Inventory- Role in SC - Lot sizing for single product, multiple products or customers, Aggregating multiple products in single order Managing Uncertainty: Safety Inventory – Role in SC – Determine appropriate level of safety inventory Transportation & Inventory Cost Trade-off: Choice of Transportation Mode, Inventory Aggregation. Transportation cost and customer-responsiveness trade-off Pricing & Revenue Management in Supply Chain: Role, Revenue Management for Multiple Customer Segments, Seasonal Demand, Bulk & Spot Customers Economies of scale to exploit quantity discounts. Procurement Process. Sourcing Planning & Analysis Numerical on Inventory management in SCM.		
UNIT 5	**Co-ordination & Technology in the Supply Chains**	**6 HOURS**
Co-ordination in Supply Chain: Lack of SC Coordination & Bullwhip Effect. Effect on Performance. Obstacles to SC Coordination. Manager Levers to Achieve Coordination. Information Technology and Supply Chain: Role of IT in SC Supply Chain IT Framework. E-business & Supply Chain Building Strategic Partnerships and Trust within a Supply Chain. Future of IT in Supply Chain. Cases on E-business and supply chains		
UNIT 6	**Case study of Supply Chain Management**	**6 HOURS**
Introduction, Nature of ratio analysis, Liquidity ratios, Leverage ratios, Activity ratios, Profitability ratios, Evaluation of a firm's earning power. Comparative statements analysis. Simple numerical examples		

PRACTICAL: Perform the following experiments.		
PRACTICAL NO.01	**Case study of Supply Chain Management**	**18 HOURS**
Student should choose company of their choice and should make detailed study of SCM model of the same company. Case study should mention about 1. Allocation models 2. Single or multiple facility 3. Aggregate planning 4. Inventory Management 5. Software use Detailed report should be submitted for the same.		
PRACTICAL NO.02	**Case study of Financial ratio analysis**	**10 HOURS**
Student should choose the company and based on the balance sheet, should make case study based on different financial ratios. Report should be presented in group presentation.		

REFERENCE BOOK

1. Sunil Chopra & Peter Meindl, Supply Chain Management - Strategy, Planning & Operation – Pearson Education, ASIN: B071WJYFBF.
2. Engineering Economy - Paul Degarmo, Macmillan Pub, Co. 2001, ISBN-00-23286008.

TEXT BOOK

1. Bowersox, Logistical Management - The Integrated Supply Chain Process, ISBN-10: 9780070435544
2. Christopher, Logistics & Supply Chain Management, Pearson Education, ISBN-13: 978-0273731122
3. Logistics & Supply Chain Management – Raghuram, ISBN-10: 0333933427
4. Business Logistics / Supply Chain Management – Ronald Ballou, Peason Education, ISBN-13: 978-0130661845

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2019 - 2020
FOURTH YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP401
	COURSE CREDITS	2
RELEASED DATE : 01/06/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	50	20	NIL	NIL	70

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP401.CEO.1: To enable the students to understand the basic concepts of Economics

HP401.CEO.2: To impart knowledge, with respect to practical applications of Economics .

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP401.CO.1: The students would have understood the basic concepts of Economics.

HP401.CO.2: The students would have acquired knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions

HP401.CO.3: The course is designed to improve critical thinking, problem solving skills by using economic models and theories and predict economic relationships

HP401.CO.4: Students entering any profession in the workforce today must be able to utilize these basic economic principles. The course expected to develop critical understanding of current topics in economics and able to formulate their own opinions on economic issues

THEORY

UNIT 1	Introduction to Economics	6 HOURS

Economic Issues and Concepts; How Economist Work ; Theory of Demand & Supply; Meaning, Determinants, Law of Demand and Supply, Equilibrium between Demand & Supply; Elasticity of demand, price elasticity, income elasticity, cross elasticity.

UNIT 2	Micro Economics	6 HOURS

Revenue Concepts; Cost Concepts, Short run & Long run cost Concepts and curves, opportunity cost. Break even analysis; meaning, explanation, numerical. Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Competition , Oligopoly).

Further Reading:

UNIT 3	Macro Economy	5 HOURS

National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP,NDP, Personal income, disposal income. Inflation; meaning, types, causes, measures to control.

Further Reading:

UNIT 4	Indian Economy	5 HOURS

Characteristics of an Indian Economy; Human Development Index(HDI); Concepts of Foreign Trade, Goods and Services Tax(GST); Micro Small and Medium Enterprise(MSME) ; Foreign Direct Investment(FDI);Unemployment: meaning, types, causes, remedies.

Further Reading:

UNIT 5	Introduction to Banking & Money Market	6 HOURS

Banking; meaning, types, functions, Commercial Banks- Instruments in Operation of an Account, Central Bank- RBI; its functions, Concepts- CRR, Bank Rate, Repo Rate, Reverse Repo rate, SLR; Introduction to Money and Capital Market , Introduction to Fiscal policy- meaning and tools.

Further Reading:

REFERENCE BOOKS

1. R.Paneerselvam :Engineering Economics, , PHI publication ISBN : 978-81-203-5172-1
2. Robbins S.P. and Decenzo David A :Fundamentals of Management: Essential Concepts and Applications, Pearson Education, ISBN-13: 9780133499919
3. N Gregory Mankiw : Economics: Principles of Economics, Cengage Learning ISBN-10: 1305585127
4. L.M. Prasad: Principles and Practices of Management ISBN-10: 9351610500; ISBN-13: 978-9351610502
5. Tripathy and Reddy :Principles of Management ISBN, 1259050572, 9781259050572
6. Dr. K. K. Dewett & M. H. Navalur, S. Chand :Modern Economic Theory ISBN, : 9788121924634 .

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2016 – 2020)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Major Project - II
	COURSE CODE	ME432
	COURSE CREDITS	4
RELEASED DATE : 01/01/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	8	–	–	–	100	50	150

PRE-REQUISITE : Major Project– I

COURSE OBJECTIVES :

ME432.CEO.1: To follow the standard guideline to meet the objective for development of Project.
ME432.CEO.2: To test rigorously before deployment of Systems
ME432.CEO.3: To Verify and Validate the work Undertaken
ME432.CEO.4: To Consolidate the work and preparation of final report

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME432.CO1: Show the evidence of independent evaluation.
ME432.CO2: Critically analyzed the result and their implementation methodology.
ME432.CO3: Validate the results with standard tools and techniques.
ME432.CO4: Understand the importance of documentation and report writing.

PREAMBLE:

objective of this Major Project-II to implement the full and final project and the report. After The remaining project work which consist of selection of approach / methodology / tools and techniques, Designing, installation, results and performance evaluation. Also includes the comparative analysis and validation of result. Should prepare the Project report as per format for satisfactory completion of work certified by concern project advisor and dean. .

It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded.:

Follow the guideline and formats as mentioned in guideline document.(Annexure-II):

GUIDELINES:

In Project Work Stage-II, the student shall complete the remaining project work which consists of Selection of Methodology, Tools and Technology, Installations, Design, Implementations, testing, Results, performance analysis if applicable (discussions using data tables per parameter considered for the improvement with existing/known algorithms/systems) and comparative analysis and validation of results and conclusions. The student shall prepare and submit the report of Project work in standard format for satisfactory completion of the work that is the duly certified by the concerned advisor and Dean of the school.

It is desirable to prepare and publish the conference or journal paper or IPR and publish with peer reviewed publishing agency. 10 marks will be awarded.

Follow the guideline and formats as mentioned in guideline document.(Annexure-II)

TIMELINE

1. Presentation of Project Review- 3 Project Progress Monitoring DRC review – (Week 5th)
2. Presentation of Project Review – 4 Project Progress Monitoring and Report Preparation –(Week-8th)
3. Internal Examination/ Project Expo: Project-2 Demonstration and presentation- (Week 10th)
4. External Examination: Project-2 Demonstration and Presentation- (End semester-Week 12th or 13th)

ASSESSMENT

1. Internal Assessment

a. Project Review -3 Progress Monitoring - 30 Marks

b. Project Review -4 Progress Monitoring and Report Preparation -30 Marks

c. Project Expo/ Examination- Evaluation Presentation and Demonstration- 30 Marks

d. Paper publication/presentation/IPR -10 Marks

2. Examination: Final Demonstration and presentation a. Project presentation: 15 Marks

b. Project design / execution / demonstration : 20 Marks

c. Project Report preparation and documentation: 15 Marks

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

Final Year

Bachelor of Technology in

Mechanical Engineering

(Amendments for Semester Long Internship)

2016-2020

(With Effect from Academic Year: 2019-2020)

1. ELIGIBILITY:

I. No live backlogs
II. CGPA of 8.50 and above
III. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student)

Only students satisfying the above criteria can be permitted for semester-long internship in any MNCs / R&D laboratories such as DRDO, NCL, NEERI, CDAC and Institutions like IITs/ NITs / International institutes of repute.

2. DEADLINES:

For the current batch, the applications must be submitted by 30, November 2019 by all students desired to go for the semester long internship.

3. APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including details of the organization along with the details of the project in brief, copy of their CV and copies of mark sheet to the respective school Corporate Relations (CR) coordinator. The application must be as per the format given below.

Application for Internship Program

Sr. No.	Particulars	
1	Name of the applicant (in bold letters)	
2	Gender	
3	School	
4	Date of Birth & Age (as on date)	
5	Roll Number & PRN	
6	Address for correspondence with mobile / telephone number and email-id	
7	Name & address of the Institute / Industry	
8	Core Domain of Institute / Industry	
9	Contact details Supervisor / HR Mobile / Telephone number and email-id	
10	Period of internship	24-26 weeks
11	Details of the Project proposed	

Signatures

Student	**School Internship Coordinator**
Approved by:	
No. of credits proposed	6 / 10
Dean – School of _____ Engineering	MIT AOE Seal
Date:	

4. RULES AND CONDITIONS:

I. Sponsored project should be along the same track of the minor (Open Elective) chosen by the student. (desirable)

II. Semester long internship is applicable only in the 8th semester. The distribution of credits for the VIII semester is as follows

DC	Department Core	4 Credits
DE	Department Elective	3 Credits
OE	Open Elective	4 Credits
HSS	Humanities & Social science	2 Credits
SDP	Skill development and Project	4 Credits

III. For a student who are opting for a semester long internship, 10 credits (OE, HSS and SDP) will be awarded if OE is part of the internship otherwise 6 credits will be awarded.

IV. The equivalence courses for the DC, DE and OE are floated by the Schools.

V. The credits of DC, DE and OE should be earned through MOOC courses.

VI. If a student is not able to successfully earn the credits of the DC / DE / OE within the stipulated time, they will not be eligible for graduation in the same academic year.

5. ASSESSMENT METHOD:

Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel.

I. The Panel for the evaluation should be 3 members (if 3 credits) or 4 members (if 5 credits). The composition of the team would be as follows.

- **a.** Dean, Respective School
- **b.** Project Guide
- **c.** CR Coordinator / Project Coordinator
- **d.** Project Guide (Industry)
- **e.** The domain expert (In case of 5 credits, as per the minor specialization)

II. Presentation I at the end of 45th day and presentation II at the end of 90th day from the start of the project combined to a total weightage of 5 credits **(3 credits if OE is exempted).** It can be possible to do through Skype, if acceptable to the panel. **In Grade card it will be mentioned as SLIP – Project Design.**

III. Presentation at the end of the Internship Work and Final Internship Report after the completion of the Internship Work combined for a total weightage of 5 credits **(3 credits if OE is exempted)** and should be as per the template). **In Grade card it will be mentioned as SLIP – Project Implementation.**

5.2 ASSESSMENT METHOD FOR OTHER COURSES RUN THROUGH INSTITUTE LMS:

Credits for the courses run through Go-Webinar will be assessed using the following methods.

I. There will be SIX assignments (one per unit) to be submitted through the moodle. This will have a weightage of 30% of the total score. This contributes to the IA for the course.

II. There will be SIX quizzes (one per unit) to be conducted through moodle. This will have a weightage of 30% of the total score. This contributes to the ISE for the course.

III. One FINAL presentation to be done at the end and evaluated by a team of THREE members including the Course Champion, Instructor and any other nominated member by the respective School Dean. This will have a weightage of 40% of the total score. This contributed for the ESE of the course.

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	:	**2019-20** (PART B)
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**RELEASE DATE**	:	**01/12/2018**
	REVISION NO.	:	**0.0**

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ME401	Heating Ventilation & Air Conditioning	3	2	4
2.	DE1	ME41#	Discipline Elective	3	--	3
3.	OE3	ME42#	Open Elective	3	2	4
4.	HSS7	HP402	Sociology	2	--	2
5.	HSS8/ SDP7	HP403/ ME40#	Business Strategies / Piping Design/ Six Sigma/ Energy Audit	--	2	1
6.	SDP8	ME402	Project – I	--	8	4
7.	SDP9	ME404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII (SLIP not inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ME431	Noise Vibration & Harshness@	3	2	4
2.	DE2	ME44#	Discipline Elective	3	--	3
3.	OE4	ME45#	Open Elective@	3	2	4
4.	SEMESTER LONG INTERNSHIP – Project Design			--	6	3
5.	SEMESTER LONG INTERNSHIP – Project Implementation			--	6	3
TOTAL				7	20	17

L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2020)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W. E. F**	**:**	**2019-20** (PART C)
FINAL YEAR BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING	**RELEASE DATE**	**:**	**01/12/2018**
	REVISION NO.	**:**	**0.0**

SEMESTER: VII

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC11	ME401	Heating Ventilation & Air Conditioning	3	2	4
2.	DE1	ME41#	Discipline Elective	3	--	3
3.	OE3	ME42#	Open Elective	3	2	4
4.	HSS7	HP402	Sociology	2	--	2
5.	HSS8/ SDP7	HP403/ ME40#	Business Strategies / Piping Design/ Six Sigma/ Energy Audit	--	2	1
6.	SDP8	ME402	Project – I	--	8	4
7.	SDP9	ME404	Summer Internship	--	--	4
TOTAL				11	14	22

SEMESTER: VIII (SLIP not inline with the Open elective)

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC12	ME431	Noise Vibration & Harshness@	3	2	4
2.	DE2	SWAYAM/ NPTEL	Discipline Elective	3	--	3
3.	SEMESTER LONG INTERNSHIP – Project Design			--	10	5
4.	SEMESTER LONG INTERNSHIP – Project Implementation			--	10	5
TOTAL				6	22	17

L: Lecture, P: Practical

@ - Courses run through institute LMS.

DEPARTMENT ELECTIVE ON MOOCS PLATFORM			
SR. NO.	**COURSE DETAILS**	**MOOC DETAILS**	**NO. OF WEEKS**
1.	Fundamentals of Industrial Oil Hydraulics and Pneumatics By Prof. R.N. Maiti, IIT Kharagpur	SWAYAM	8
2.	Design for Quality, Manufacturing and Assembly by Prof. Palaniappaan Ramu, IIT Madras	SWAYAM	12
3.	Non Traditional Abrasive Machining Processes-Ultrasonic, Abrasive Jet and Abrasive Water Jet Machining by Prof. Asimava Roy Choudhury, IIT Kahragpur	SWAYAM	8
4.	Enterprise Resource Planning (ERP) BY Sara Behdad, The State University of New York	COURSERA	4

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

Savitribai Phule Pune University

Curriculum for

Master of Technology in

Computer Engineering

(Choice Based Credit System)

2016-2020

BoS Chairman
Dean, School of
Computer Engineering
& Technology

Member Secretary
Academic Council
Dean Academics

Chairman
Academic Council
Director MITAOE

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

First Year

Master of Technology

2016-2020

(With Effect from Academic Year: 2016-2017)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULM STRUCTURE (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.	W.E.F	:	2016-17
FY MTECH	RELEASE DATE	:	1/08/2016
	REVISION NO.	:	0.0

TRIMISTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	T	CREDIT
1.	PC1	AS501	Computing and Mathematics	2	2	4
2.	PC2	CS501	Management System	2	2	4
3.	PC3	CS502	Modern Technologies	2	2	4
TOTAL				6	6	12

TRIMISTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC4	EX501	Research Methodology	2	--	2
2.	DC1	CS511	Machine Learning-I	3	2	4
3.	DC2	CS512	Internet of Things: Design	3	2	4
TOTAL				8	4	10

TRIMISTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC5	EX502	Technical Writing	2	--	2
2.	DC3	CS521	Machine Learning-II	3	2	4
3.	DC4	CS522	Internet of Things: Applications	3	2	4
4	SDP1	CS523	Project Work - I	--	4	2
TOTAL				8	8	12

Note: L: Lecture, P: Practical

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Computing and Mathematics
			COURSE CODE	**:**	AS501
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**TUTORIAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
2	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. AS501.CEO.1: To learn different numerical methods to solve differential equations and obtain the solution.
2. AS501.CEO.2: To understand different sampling techniques, analyze the data and process it to obtain a quality product.
3. AS501.CEO.3: To learn mathematical methodologies, techniques and mathematical tools to obtain an optimal solution of the problems.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. AS501.CO.1: Identify the accurate solution method (minimizing the error) to solve the differential equation with given conditions and obtains the particular solution of the problem.
2. AS501.CO.2: Collect, categorize, analyze, processing mathematically the data, thereby to obtain a quality proven product.
3. AS501.co.3: Understand the physical situation, identify the accurate mathematical model and

solve the problem mathematically or with the use of Statistical tools available and finally interpret it in the original context
THEORY:
Computational Methods to Ordinary Differential Equations: Euler's Method, Heun's Method, Mid-point Method, Runge-Kutta Method and Multi step Methods- Explicit Adams-Bash forth technique and Implicit Adams-Moulton techniques, Adaptive RK Method, Embedded RK Method, Higher Order Ordinary differential equation- Shooting Method. **Operations Research**: Simplex method: Feasible solution to system of equations, reduction of feasible to basic feasible solution, solution of LPP: computational procedure, Penalty (Big M) method. Transportation problem: North-West corner method, Least-cost method, Vogel's approximation method. **Statistics and Quality Control:** Central Tendency of data, Variance, Standard Deviation, Coefficient of Variance, Moments, Correlation, Coefficient of Correlation, Regression lines. Control Charts for Process Location: $\bar{X}$ Chart, Control Charts for Process Variation: S Chart, R charts.

PRACTICAL:		
Practical No. 1	**Title:** First Degree Differential equation	**2 Hours**
Introduction to first order first degree Differential equation and its actual solution		
Practical No. 2	**Title:** Differential equation methods	**2 Hours**
Euler's Method, Heun's Method, Mid- point Method, Runge-Kutta Method.		
Practical No. 3	**Title:** Differential equation Methods	**2 Hours**
Adams-Bash forth technique and Implicit Adams-Moulton techniques.		
Practical No. 4	**Title:** Differential equation Methods	**2 Hours**
Adaptive RK Method Embedded RK Method, Shooting Method.		
Practical No. 5	**Title:** Simplex method Feasible solution	**2 Hours**
Solution of system of equations using simplex method (Feasible solution).		
Practical No. 6	**Title:** simplex method (Feasible to basic feasible solution).	**2 Hours**
Solution of system of equations using simplex method (Feasible to basic feasible solution).		
Practical No. 7	**Title:** Transportation problem	**2 Hours**
Transportation problem: North-West corner method, Least-cost method.		
Practical No. 8	**Title:** Vogel's approximation method	**2 Hours**
Transportation problem: Vogel's approximation method.		

Practical No. 9	**Title:** Central Tendency of data, Variance, Standard Deviation	**2 Hours**
Central Tendency of data, Variance, Standard Deviation.		
Practical No. 10	**Title:** Moments, Correlation, Coefficient of Correlation	**2 Hours**
Moments, Correlation, Coefficient of Correlation.		
Practical No. 11	**Title:** Regression Lines.	**2 Hours**
Regression Lines.		
Practical No. 12	**Title:** Charts	**2 Hours**
$\overline{X}$ Chart, S Chart, R chart		

TEXT BOOKS:

1. Numerical Methods for Engineers by Steven C. Chapra& Raymond P. Canale, sixth edition, ISBN 978–0–07–340106–5, MHID 0–07–340106–4.
2. Operations Research by KantiSwarup, P.K.Gupta, Man Mohan, ISBN: 81-8054-226-2.
3. Statistical Methods Vol. 2 by Das, ISBN:9780070263512.

REFERENCES:

1. Numerical Methods by V.N. Vedamurthy&N.Ch.S.N.Iyenger, First edition, ISBN: 9788125906308.
2. Operations Research by S.D.Sharma.
3. Statistical Methods Vol. 1 by Das, ISBN:9780070263505.
4. Introduction to Probability and Statistics by Milton, ISBN: 9780070636941.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Management System
			COURSE CODE	**:**	CS501
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**TUTORIAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
2	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. CS501.CEO.1: To enable M.Tech Students in efficiently and effectively discharging any business related roles, which they may be assigned, after successful completion of their Post- Graduation from MITAOE.
2. CS501.CEO.2: To inculcate a spirit of entrepreneurship by promoting inquisitiveness for technological innovations, their conversion into business ideas and evolving strategy for induction of new products in new markets for growth of their entrepreneurial projects.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS501.CO.1: Describe and explain the Significance of Businesses in Society, their Management and linking these up with other relevant systems.
2. CS501.CO.2: Critically analyze the organizational structure, systems, competencies and identify the areas of improvement
3. CS501.CO.3: Draw a model of power structure and critically analyse with a view to improving it for achieving greater heights in objectives

4. CS501.CO.4: Identify and describe potential problem areas and advise proactive measures to install efficient measures.
5. CS501.CO.5: Identify Key Result Areas (KRAs), new area of growths, draw plans to achieve, implement them and provide effective leadership in the process, creating conducive environment in the organization

THEORY:

Concept of Systems; Concept of Business; Concept of Management; Concept of Learning and its mapping with Bloom's Taxonomy.

Nature and Process Management with an Input-Output Model, seen in scenarios of different aspects of social life.

Role of a Business Firm as a national economic entity with understanding of Macro, Micro and International economics. An understanding of products and services, circular model of flow of money, products and services in a society.

Essentials of Business Management, functioning and growth of a Business Unit with understanding of Break-Even Analysis, Abell's Three Dimensional model of business growth, various business functions in an organization and changing focus from production oriented business to customer orientation and value co-creation.

Various Schools of Thought on Management based on changing concepts of economics and evolution of Business Strategy. Need to understand innovative ways to evolve a new suitable management system for an organization with special focus on new Strategies at the bottom of the pyramid, quality as strategy, disruptive innovation and diffusion of technology.

Decision making, as an essence of management. Concept of Games Theory and its use in decision making.

Essentials of Project Management with use of Critical Path Method (CPM) and Programme Evaluation and Review Techniques (PERT).

Utilization of concepts of commanding, directing, managing and leading towards effective management of an organization. Skillful use of Emotional Intelligence in conflict management. Techniques for Self Management and Stress Management for improving personal efficiency and effectivity.

Growing significance of Human Relations, with use of Virtual and Informal Organizations and use of Social Media for management of emerging organizations with preponderance of knowledge workers and growing use of robotics and Artificial Intelligence. Process of evolving a Training needs in an organization and methodology for their fulfillment.

Concepts of Invention Innovation, Entrepreneurship and Technology Management for induction of new products in market. Business startups and growth in current Indian Environment. Presentation on Entrepreneurial plans

PRACTICAL:

Practical No. 1	**Title:** Corporate management case presentation	**4 Hours**

A corporate management case to be selected by students on their own choice, writing a Synopsis (2.5 Marks) and its Presentation before the class in 5 Minutes including answers to questions by class (2.5 Marks

Practical No. 2	**Title:** Entrepreneurial Business Plan presentation	**4 Hours**
Preparation and submission of an innovative and entrepreneurial Business Plan of student's own choice, submitting a Power Point Presentation to be evaluated by Faculty (2.5 Marks), and its presenting/ defending it before the class, to be evaluated by two peers on a Format to be given by Faculty (2.5 Marks)		

TEXT BOOKS:

1. Management – A Global and Entrepreneurial Perspective; Harold Koontz, Heinz Weihrich and Mark V Cannice, Tata McGraw Hill Publications, 12thEdition, 2008.
2. Management and Entrepreneurship in Indian Environment – A Perspective through Joining the Dots; Vachaspati Mishra; Himalaya Publishing House, First Edition, 2016.

REFERENCES:

1. Dr A Sivathanu Pillai; Technology Leadership – A Revolution in the Making; Tata McGraw Hill Publishing Company Ltd, New Delhi, 2005
2. James A Alexander and Mark W Hordes; S-Business: Reinventing the Services Organisations, Select Books Inc Biztantra, 2006
3. Vohra ND, Quantitative Techniques in Management; Tata McGraw Hill Publishing Company Limited, Third Edition 2007
4. Nakkiran S and Karthikeyan M; Training Techniques for Management Development; Deep and Deep Publications Pvt Ltd; 2007

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Modern Technologies
			COURSE CODE	**:**	CS502
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**TUTORIAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
2	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. CS502.CEO.1: To get familiar with big data, wireless sensor networks and Internet of Things technology.
2. CS502.CEO.2: To acquire the knowledge of geometrical transformation and grasp the animation techniques.
3. CS502.CEO.3: Study basic principles of nano car and different modern technologies
4. CS502.CEO.4: Apply their knowledge to understand different statistical tools and analysis software.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS502.CO.1: Understand the knowledge of advanced software's.
2. CS502.CO.2: Apply their knowledge in different fields.
3. CS502.CO.3: Apply advance technologies in automobile industry.

THEORY:

Big Data: Big Data, Hadoop Distributed File System, Network: Types of Networks, Internet Architecture, Wired and Wireless MAC, RFID, Internet of Things, IoT Applications, R Programming.

2D and 3D Geometrical Transformations: Scaling, Translation, Rotation, Reflection, Viewing Transformations: Parallel and Perspective Projection, Curves and Surfaces: Cubic Splines, Bezier Curves, B-Splines, Animation Technology – OpenGL, Maya, Blender.

Advance technologies: Nano Car Air velocity, Air conditioning system, Different modern energy storage devices, Modern evacuated tube technologies, Advanced Sensor technology, recent photovoltaic technology, Controlling of thermal power plants and its instrumentation, Agricultural robot, Closed ecological systems, Artificial photosynthesis, Energy harvesting.

Modern statistical tools like MATLAB, SPSS, etc., Mathematical Modeling, Data interpretation technologies like ANOVA, Introduction of Analysis software's like ANSYS, Star CD, etc., ERP system, SCADA, PLC System, Electronic Control Unit (ECU), Sources of Energy storage, fuel efficient engine through closed loop control system. Advances in Electronic Cooling Equipments. Bio-medical devices, their Applications, FDA approval procedures, A Certification.

Advances in automotive electronics: Night vision systems, Driver alertness monitoring, Event data recorders (automotive black boxes), Accident recorders, Adaptive cruise control systems, Autonomous emergency breaking systems, Electronic throttle control, On-Board diagnostics systems, Blind spot detection, Navigation systems, Communication systems, Engine control

PRACTICAL:		
Practical No. 1	**Title:** Animation Technologies	**2 Hours**
Case study on Animation Technologies		
Practical No. 2	**Title:** Wireless Sensor Application	**2 Hours**
Case study on Wireless Sensor Application.		
Practical No. 3	**Title:** Internet of Things	**4 Hours**
Case study on IoT (Smart City, Healthcare, Agriculture).		
Practical No. 4	**Title:** Hadoop	**4 Hours**
Case study on Big Data – Hadoop Configuration.		
Practical No. 5	**Title:** Data interpretation	**2 Hours**
Case study on Data interpretation technologies.		
Practical No. 6	**Title:** Agricultural robot	**2 Hours**
Case study on Agricultural robot.		
Practical No. 7	**Title:** Electronic cooling equipments.	**2 Hours**

Case study on Electronic cooling equipments.		
Practical No. 8	**Title:** Adaptive cruise control system	**2 Hours**
Case study on Adaptive cruise control system		

TEXT BOOKS:

1. S. Harrington, S. Harrington, “Computer Graphics”, 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 –100472 – 6.
2. Anthony F. Collings , Christa Critchley,”Artificial Photosynthesis: From Basic Biology to Industrial Application.” 2014, ISBN: 978-3-527-31090-6.
3. NasimulAlam Syed, Sanjib Islam, Saroj Kumar Patel, “Advanced Guide to MATLAB: Practical Examples in Science and Engineering” I K International Publishing House Pvt. Ltd., 2015, ISBN: 978-9384588359.
4. William B. Ribbens, Ph.D., Norman P. Mansour, Gerald Luecke, Charles W. Battle, Edward C. Jones and Leslie E. Mansir, “Understanding Automotive Electronics”, ISBN: 978-0-7506-7599-4.
5. Bosch Automotive Electrics and Automotive Electronics: Systems and edited by Robert Bosch GmbH, Springer science and digital media,ISBN-13: 978-3658017835, 2013.

REFERENCES:

1. J. Foley, V. Dam, S. Feiner, J. Hughes, “Computer Graphics Principles and Practice”, 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.
2. Robert Faludi, “Building Wireless Sensor Network” 2nd Edition, OReilly Publication, 2010.
3. Donald Norris, “ The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black”, McGraw-Hill Education, ISBN-13: 978-0071835206, 2015.
4. MadhuJagadeesh, SoumendraMohanty, HarshaSrivatsa, “Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics”, 1st Edition, Apress,ISBN-13: 978-1430248729, 2013.
5. NihalKulratna, “Energy storage devices for electronics system”, ISBN: 978-0-12-407947-2, 2015.
6. Ralph Remsburg, Advanced thermal design for electronics equipment, International Thomson Publishing Thomson Science, (ISBN: 978-1-4613-4633-3).
7. AsierPerallos, Unai Hernandez-Jayo, Enrique Onieva, Ignacio Julio GarcaZuazola, John Wiley and sons, “Intelligent Transport Systems: Technologies and Applications”, ISBN: 978-1-118-89478-1, 2015.
8. GalipUlsoy, Huei Peng, MelihÇakmakci, “Automotive Control Systems”, Cambridge 2012.
9. JayavardhanaGubbi, RajkumarBuyya “Internet of Things (IoT): A Vision, architectural elements and future directions”, Elsevier Journal on Future Generation Computer Systems, 29, pages 1645-1660, 2013.
10. Madden, Sam. “From databases to big data”, Article, IEEE, Internet Computing, IEEE 16.3 (2012): 4-6, http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6188576.
11. Daryl Oster, Masayuki Kumada, Yaoping Zhang, “Evacuated tube transport technologies (ET3) tm: a maximum value global transportation network for passengers and cargo.” 2013, Journal of Modern Transportation, ISSN: 2196-0577.
12. Ali Bahrami, Shahram Mohammadnejad, Saeede Soleimaninezhad “Photovoltaic cells technology:

principles and recent developments", Springer US, Online ISSN: 1572-817X, 2012.
13. Martin Kaiser, "Electronic control unit (ECU)", Springer US, Online ISBN 978-3-658-03964-6, pages 254-259, 2015.
14. Pritpal Singh, TanjotSethi , Bunil Kumar Balabantaray, BibhutiBhushanBiswal, "Advanced vehicle security system", IEEE, International Conference on "Innovations in Information, Embedded and Communication Systems (ICIIECS)", pages 1-6, 2015.
15. Hermann Kopetz , Stephan Poledna, "Autonomous Emergency Braking: A System-of-Systems perspective", IEEE, Conference on "Dependable Systems and Networks Workshop (DSN-W)", 43rd Annual IEEE/IFIP, pages 1-7, 2013.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Research Methodology
			COURSE CODE	**:**	EX501
			COURSE CREDITS	**:**	02
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
2	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. AS501 – Computing and Mathematics

COURSE OBJECTIVES:

1. EX501.CEO.1: To develop understanding of the basic framework of research process.
2. EX501.CEO.2: To develop an understanding of various research designs and techniques.
3. EX501.CEO.3: To identify various sources of information for literature review and data collection.
4. EX501.CEO.4: To develop an understanding of the ethical dimensions of conducting applied research.
5. EX501.CEO.5: Appreciate the components of scholarly writing and evaluate its quality.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. EX501.CO.1: Understand the objective & paradigm for the research
2. EX501.CO.2: Establish & validate the results & analysis
3. EX501.CO.3: Understand the ethical issues concerning the participation & data collection
4. EX501.CO.4: Individually write research proposal

THEORY:

Research – Introduction: What is research, Research definition, Objective & paradigm for the research, Identifying & defining the research problem, Literature &it's analysis, Qualitative & quantitative research, development of theoretical and conceptual frame work. Ethical Issues concerning research participants, Ethical issues in data collection, Data collection methods

Hypothesis, Data processing: Definition and functions of hypothesis, Processing operations, Problems in processing, Coding descriptive and quantitative data, Sampling techniques.

Statistics in research: Multivariate analysis, Concept of regression, Establishing validity and reliability of the result, Principal component analysis, variance & covariance- ANOVA, ANOCOVA.

Writing research proposal : Interpretation and its meaning, Readability of Manuscript, techniques, Contents, Report writing, structure, types of report, Procedure of writing research proposal, Writing as thinking, Habit of writing, Skills and thought process in technical writing, Role of computer in technical writing

TEXT BOOKS:

1. John W. Creswell," Research Design-Qualitative & Quantitative Approaches", SAGE publications, New Delhi ISBN: 0-8039-5254-6
2. Ranjit Kumar," Research Methodology- A Step by Step Guide for Beginners", 2nd ed., Pearson publication, New Delhi ISBN: 978-81-317-0496-7
3. Bernard M. Moret," The Theory of Computation", Pearson Publication ISBN: 978-81-317-0870-5

REFERENCES:

1. C. R. Kothari," Research Methodology, Methods & Techniques", 2nd Edition, New Age International Publication ISBN: 978-81-224-1522-3
2. Hamdy A. Taha, "Operation Research- An Introduction", 8th Edition, Pearson Publication ISBN: 978-81-317-1104-0
3. Wilson, Shawn, "What is indigenous research methodology?", Canadian Journal of Native Education; 2001; 25, 2; ProQuest Central, pp. 175

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Machine Learning - I
			COURSE CODE	**:**	CS 511
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	2	40	50	10	NIL	25	125

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. CS511.CEO.1: To provide knowledge about the key algorithms and theory that form the foundation of machine learning and computational intelligence.
2. CS511.CEO.2: To introduce modern techniques in machine learning, and a practical knowledge of algorithms and methods.
3. CS511.CEO.3: To recognize the characteristics of machine learning to apply on various real-world applications.
4. CS511.CEO.4: To be familiar with the use machine learning ideas, paradigms and techniques with its performance evaluation.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS511.CO.1: Understand and differentiate modern machine learning techniques and applications
2. CS511.CO.2:Identify potential application and apply existing models and algorithms
3. CS511.CO.3: Analyze appropriate method based on the particular characteristics of the domains and applications under consideration.
4. CS511.CO.4: Accurately evaluate the performance of algorithms, as well as formulate and test

hypotheses.

THEORY:

Introduction: Linear algebra, probability and random process, Pythonprogramming, Machine Learning and Examples of Applications, Learning Associations, Classification, Regression, Unsupervised Learning, SVM**Supervise Learning :** Learning a Class from Examples, Noise Learning Multiple Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm, Bayesian Decision Theory, Classification, Losses and Risks, Utility Theory, Association Rules, **Case Studies:** A simple binary classification problem,Financial Forecasting,

Parametric Method : Maximum Likelihood Estimation, Evaluating an EstimatorThe Bayes' Estimator, Parametric Classification, Regression, **Multivariate Methods**: Multivariate Data, Parameter Estimation, Estimation of Missing Values, Multivariate Normal Distribution, Multivariate Classification, Dimensionality Reduction, Subset Selection, Principal Components Analysis, Feature Embedding, FactorAnalysis, Association Analysis **Clustering:**Introduction K-Means Clustering,**Application:**Image segmentation using clusteringi.eClustering for Medical Image Processing.

Non-parametric method : Nonparametric Density Estimation, HistogramEstimator, KernelEstimator, K-Nearest Neighbor Estimator, Generalization to Multivariate Data, NonparametricClassification, Condensed Nearest Neighbor, Nonparametric Regression**Decision Trees**: Classification and Regression Trees, Pruning, Rule Extraction **Multilayer Perceptron's**:Introduction,Perceptron,Training a Perceptron,Learning Boolean Functions,Multilayer Perceptron's,Backpropagation Algorithm, training procedure**Applications:** WeatherForecasting, RainForecasting,Times Series Prediction.

PRACTICAL:

Practical No. 1	**Title:**	**2 Hours**
Design & Implement simple binary classification problem		
Practical No. 2	**Title:**	**2 Hours**
Design & Implement Image Segmentation using clustering.		
Practical No. 3	**Title:**	**2 Hours**
Design & Implement Weather Forecasting		
Practical No. 4	**Title:**	**2 Hours**
Design &Implementation of Rain Forecasting		
Practical No. 5	**Title:**	**2 Hours**
Study of Clustering for Medical Image Processing.		
Practical No. 6	**Title:**	**2 Hours**
Study of Time series Prediction		

TEXT BOOKS:

1. Ethem Alpaydin, “Introduction to Machine Learning”, Third Edition, The MIT Press,2014, ISBN 978-0-262-02818-9
2. Tom Mitchell, “Machine Learning” , McGraw Hill, 1997, ISBN 007-0-42807-7
3. Parag Kulkarni, “Reinforcement and Systemic Machine Learning for Decision Making”, Wiley, IEEE Press, 2012, ISBN: 978-0-470-91999-6

REFERENCES:

1. Peter Harrington, “Machine Learning in Action”, Dreamtech Press, 2012, ISBN 978-1-617-29018-3
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, “The Elements of Statistical Learning: Data Mining, Inference, and Prediction”, Second Edition, Springer, 2009, ISBN: 978-0-387-84857-0
3. Giacomo Tollo, StoyanTanev, Giacomo Liott, Davide De March, “Using online textual data, principal component analysis and artificial neural networks to study business and innovation practices in technology-driven firms”, Elsevier Journal on Computers in Industry, Vol. 74, Pages 16-28, 2015
4. Luca Pasa, Alberto Testolin, Alessandro Sperduti, “Neural Networks for Sequential Data: a Pre-training Approach based on Hidden Markov Models”, Elsevier Journal on Neurocomputing169, Pages 323–333, 2015.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Internet of Things: Design
			COURSE CODE	**:**	CS512
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	2	40	50	10	NIL	25	125

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. CS512.CEO.1: To understand the basics of Internet of Things (IoT).
2. CS512.CEO.2: To get basic knowledge of key technologies in Internet of Things and their applications in various areas.
3. CS512.CEO.3: To make students aware of various software and hardware resources available for IoT.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS512.CEO.1: Understand the basics of Internet of Things.
2. CS512.CEO.2: Apply key technologies in Internet of Things and their applications in various areas.
3. CS512.CEO.3: Analyze and identify various software and hardware resources available for IoT and applications

THEORY:

What is the Internet of Things? : History of IoT, About IoT, Overview and Motivations, Examples of Applications, Internet of Things Definitions and Frameworks : IoT Definitions, IoT Architecture, General Observations, ITU -T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities, Identification of IoT Objects and Services, Structural Aspects of the IoT, Environment Characteristics, Traffic Characteristics, Scalability, Interoperability, Security and Privacy, Open Architecture, Key IoT Technologies, Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology, RFID Technology, Satellite Technology.

Design Principles for Connected Devices: Technology, Web Thinking for Connected Devices, Affordances, Prototyping, Sketching, Familiarity, Costs versus Ease of Prototyping, Prototypes and Production, Changing Embedded Platform, Physical Prototypes and Mass Personalization, Climbing into the Cloud, Open Source versus Closed Source, Mixing Open and Closed Source, RFID: Introduction, Principle of RFID, Components of an RFID system, Issues.

Fundamental IoT Mechanisms And Key Technologies, Prototyping Embedded Devices, Electronics, Sensors, Actuators, Scaling Up the Electronics, Embedded Computing Basics, Microcontrollers, System-on-Chips, Choosing Your Platform, Arduino: Developing on the Arduino, Openness, Raspberry Pi: Cases and Extension Boards, Developing on the Raspberry Pi, Openness, BeagleBone Black : Cases and Extension Boards, Developing on the BeagleBone, Openness.

PRACTICAL:		
Practical No. 1	**Title:** Internet and web basics	**2 Hours**
Internet and web basics.		
Practical No. 2	**Title:** Arduino and Raspberry Pi study	**2 Hours**
Study of development boards of Arduino and Raspberry Pi		
Practical No. 3	**Title:** Open source software and IDE installation	**2 Hours**
Installation of open source software and IDE for communication with the boards on Linux platform		
Practical No. 4	**Title:** Monitoring sensors.	**2 Hours**
Study of various sensors available for monitoring.		
Practical No. 5	**Title:** Getting the data and stream values from sensors	**2 Hours**
Getting the data and stream values from sensors to the development board.		
Practical No. 6	**Title:** Demonstrate the use of streaming data	**2 Hours**
Application codes to demonstrate the use of streaming data captured from the board		
Practical No. 7	**Title:** Installation and embedding the codes into boards	**2 Hours**
Installation and embedding the codes into boards along with sensors and keeping it in continuous execute		

TEXT BOOKS:

1. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, ISBN 978-1-118-43062-0 (paperback); ISBN 978-1-118-43063-7 (ebook); 978-1-118-43065-1 (ebook), 2014 John Wiley and Sons, Ltd.
2. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Willy Publications
3. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

REFERENCES:

1. HakimaChaouchi, “ The Internet of Things Connecting Objects to the Web” ISBN : 978-1-84821-140-7, Willy Publications
2. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2 nd Edition, Willy Publications
3. Daniel Kellmereit, Daniel Obodovski, “The Silent Intelligence: The Internet of Things”,. Publisher: Lightning Source Inc; 1 edition (15 April 2014). ISBN-10: 0989973700, ISBN-13: 978-0989973700.
4. Qian Xu, Pinyi Ren, Houbing Song, andQinghe Du, “Security Enhancement for IoTCommunication Exposed to Eavesdroppers With Uncertain Locations” ,IEEE , Vol: 4, 2016.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Technical Writing
			COURSE CODE	**:**	EX 502
			COURSE CREDITS	**:**	02
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**TUTORIAL**	**THEORY**			**TERM WORK**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
2	NIL	40	NIL	10	50	NIL	100

PRE-REQUISITE:

1. HP101 - Language & Communication – 1
2. HP102 - Language & Communication – 2

COURSE OBJECTIVES:

1. EX502.CEO.1: Provide overview of technical English for research paper writing with a special focus on research methods typical for classroom based studies of pedagogical innovations. Reviewing and some common mistakes reviewers make.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. EX502.CO.1: Identify the correct verb tenses; write more effectively in English for argument essays.
2. EX502.CO.2: Identify plagiarism and explain how to prevent it
3. EX502.CO.3: Read and analyze several articles to form your own opinion on a topic - make connections between several articles
4. EX502.CO.4:Write a 7-8 page research paper - use source material correctly with MLA format

THEORY:

Introduction to Technical Communication, Reading Skill, Basics of English Grammar, Technical Writing, Reports and Proposals, Referencing and Styling.

Anatomy of a Research Article , Sternberg's 12 steps of Writing, Research Paper Writing, Technology-enabled Communication, Interpretation and Use of Charts, Graphs and Tables, Software Tools for Technical Writing

PRACTICAL:		
Practical No. 1	**Title:** A Group Discussion or 'Role Play	**2 Hours**
A Group Discussion or 'Role Play' on a topic / case to be assigned to students well in time, with groups comprising six students drawn from various disciplines. Members of the group will be evaluated by two peers, all to be assigned impromptu in the class. Faculty attending will modulate the evaluations.		
Practical No. 2	**Title:** Praparation of Innovative research article	**2 Hours**
Preparation, submission of an innovative research article in the field of their interest / specialization.		

TEXT BOOKS:

1. Advanced Learners's Dictionary. 8th edition, 2013., Oxford University Press; 9th Edition (2014), ISBN : 978-0194799485
2. Paul V. Anderson, Technical Communication: A Reader-centered Approach, 8th edition, 1st Indian reprint, new Delhi: Cengage Learning, 2014, ISBN: 9788131514030

REFERENCES:

1. Martin Hewings, Advanced Grammar in Use, Cambridge University Press, 2013, ISBN: 9780521532921.
2. Michael Swan, Practical English Usage. 3rd Edition, Oxford University Press-New Delhi, 2006, ISBN: 9780195679892
3. John Seely, The Oxford Guide to Effective Writing and Speaking, Oxford University Press, 2005, ISBN: 9780199652709.
4. [http://onlinestatbook.com/Online_Statistics_Education.pdf

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DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Machine Learning - II
			COURSE CODE	**:**	CS521
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	2	40	50	10	NIL	25	125

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. CS521.CEO.1: To introduce the basic theory underlying machine learning.
2. CS521.CEO.2: To understand the basic building blocks and general principles that allow one to design machine learning algorithms
3. CS521.CEO.3: To formulate machine learning problems corresponding to different applications.
4. CS521.CEO.4: To read current research papers and understands the issues raised by current research.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS521.CO.1: Differentiate the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
2. CS521.CO.2: Understand of the strengths and weaknesses of many popular machine learning approaches.
3. CS521.CO.3: Apply the mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

4. CS521.CO.4: Design and implement various machine learning algorithms in a range of real-world applications.

THEORY:

Introduction to multilayer perceptron's and local model, kernel machine, **Hidden Markov Models**: Discrete Markov Processes, Hidden Markov Models, Three Basic Problems of HMMs, Evaluation Problem, Finding the State Sequence, Learning Model Parameter, Continuous Observations, The HMM with Input, Model Selection in HMM, **Application:** Traffic Prediction in Wireless Channels using Java, Face recognition, text recognition

Reinforcement Learning: Single State Case: K-Armed Bandit, Elements of Reinforcement Learning, Model-Based Learning, Value Iteration, Policy Iteration, Temporal Difference Learning, Exploration Strategies, Deterministic Rewards and Actions, Nondeterministic Rewards and Actions, Eligibility Traces, Generalization, **Case Studies:** Dynamic Resource Allocation, Channel Assignment

Design and Analysis of Experiments: Factors and strategy of Experimentation, Response Surface Design, Randomization, Replication, and Blocking, Guidelines for Machine Learning Experiments, Cross-Validation and Resampling Methods, Measuring Classifier Performance, Interval Estimation, Hypothesis Testing, Assessing a Classification Algorithm's Performance, Comparing Classification Algorithms: two classification and multiple classification **Applications:** Handwriting/Digit Recognition, Spam Filtering, Product Recommendation

PRACTICAL: Implement following Assignments /Application in any language using any Tool i.e. MATLAB, Python OR JAVA (Any 3 assignment: 1 implementation & 2 Case study)

Practical No. 1	**Title:** Recommendation Systems	**2 Hours**
Study of recommendation Systems		
Practical No. 2	**Title:** Time series prediction	**2 Hours**
Study of time series prediction		
Practical No. 3	**Title:** Pattern recognition	**2 Hours**
Study of pattern recognition like Face, finger, hand, character etc.		
Practical No. 4	**Title:** Pattern recognition implementation	**2 Hours**
Design & Implement of any one pattern recognition		
Practical No. 5	**Title:** Traffic Prediction in Wireless Channels	**2 Hours**
Design &Implementation of Traffic Prediction in Wireless Channels using Java		
Practical No. 6	**Title:** recommendation using reinforcement learning	**2 Hours**
Design & Implementation of product recommendation using reinforcement learning		

TEXT BOOKS:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement Learning: An Introduction (Adaptive Computation and Machine Learning", First Edition, ISBN 978-0262193986
2. Tom Mitchell, "Machine Learning" , McGraw Hill, 1997, ISBN 007-0-42807-7
3. Parag Kulkarni, "Reinforcement and Systemic Machine Learning for Decision Making", Wiley, IEEE Press, 2012, ISBN: 978-0-470-91999-6

REFERENCES:

1. EthemAlpaydin, "Introduction to Machine Learning", Third Edition, The MIT Press,2014, ISBN 978-0-262-02818-9
2. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective, MIT Press 2012.
3. Christopher M. Bishop. Pattern Recognition and Machine Learning, Springer 2007.
4. S. Haykin. Neural networks and learning machines. Pearson 2008.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-18)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Internet of Things: Applications
			COURSE CODE	**:**	CS522
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
.3	2	40	50	10	NIL	25	125

PRE-REQUISITE:

1. IT101 – Computer Programming
2. CS303 - Data Communication & Networking
3. CS212 - Database Management Systems
4. CS202 - Digital Electronics and Microprocessors
5. CD512 - Internet of Things: Design

COURSE OBJECTIVES:

1. CS522.CEO.1: To apply the concept of Internet of Things (IoT) in the real world scenario.
2. CS522.CEO.2: To identify and describe different types of open source hardware.
3. CS522.CEO.3: To dissect and examine issues of privacy and security in IoT.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS522.CO.1: Outline the application usage of IoT in real time scenario.
2. CS522.CO.2: Design and illustrate the system using Arduino/Raspberry Pi or equivalent hardware.
3. CS522.CO.3: Demonstrate the knowledge of security and ethical issues in IoT.

THEORY:

Internet of Things Privacy, Security And Governance: Vulnerabilities of IoT, Security requirements, Threat analysis, Use cases and misuse cases, IoT security tomography and layered attacker model, Identity establishment, Access control, Message integrity, Non-repudiation and availability, Security model for IoT.

Raspberry Pi Platform: Raspberry Pi GPIO, Establishing a Raspberry Pi Development Station and ingredients, Setting Up the Raspberry Pi Software, The LAMP Project, MySQL Database, Temperature Sensor Networks, Serial Peripheral Interface, Database connectivity with Python programming, GPIO Pin Expansions, Interrupts, Conventional Webcam, Motion features and setup, Webcam viewing, Raspberry Pi Camera, Python with camera, Remote camera interfaces

Arduino Platform: Arduino Uno hardware and its features, types, programming the Arduino, data types, variable, constants, operators, control statements, loops, functions, strings, time, arrays, function libraries, Arduino due and zero, pwm, random numbers, interrupts, communication, inter IC's, serial interfaces, sensors of arduino: temperature, light and humidity, Ethernet shield, sketching the IDE, electronic components, basic applications: blinking LEDs, reading voltage, traffic control, buzzer control.

PRACTICAL:

Each student will be assigned with a problem statement separately. On that basis student has to develop mini project using IoT design and application.

TEXT BOOKS:

1. Donald Norris, "Internet of Things: Do-it-yourself", 1st Edition, 2015, McGraw Hill Education, ISBN:978-0-07-183520-6
2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", 1st Edition, 2014, John Wiley and Sons Ltd, ISBN:978-1-118-43062-0
3. Peter Membrey and David Hows, "Learn Raspberry Pi with Linux", 1st Edition, 2012, Apress Publications, ISBN:978-1-4302-4822-4
4. Simon Monk, "Programming Raspberry Pi: Getting Started with Python", 2nd Edition, 013, McGraw Hill Publications, ISBN: 978-0-07-180784-5

REFERENCES:

1. Hakima Chaouchi, " The Internet of Things Connecting Objects to the Web", 2010, Willy Publications, ISBN : 978-1-84821-140-7
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key Applications and Protocols", 2nd Edition, 2012, Willy Publications, ISBN: 978-1-119-99435-0
3. Daniel Kellmereit, Daniel Obodovski, "The Silent Intelligence: The Internet of Things", 1st Edition, 2014, Lightning Source Inc., ISBN:978-0989973700
4. Daeil Kwon, Melinda Hodkiewcz, "IoT-Based Prognostics and Systems Health Management for Industrial Applications", IEEE, Volume 4, July 2016.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	PROJECT WORK - I
			COURSE CODE	**:**	CS523
			COURSE CREDITS	**:**	02
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**TERM WORK**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
NIL	04	NIL	NIL	NIL	NIL	50	50

PRE-REQUISITE:

1. EX501 : Research Methodology
2. CS502 : Technical Writing

COURSE OBJECTIVES:

1. CS523.CEO.1: To Manage the selection and initiation of individual projects.
2. CS523.CEO.2: To conduct project planning activities that accurately forecast project costs, timelines, and quality.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. CS523.CO.1: Identify important concepts / real time problems from the knowledge of current trends /survey.
2. CS523.CO.2: Develop effective communication and presentation skills.
3. CS523.CO.3: Describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths.

CONTENTS:

Project work is divided into four stages namely Project Stage I, Project Stage II, Project Stage III and Project Stage IV.

Project Stage I is entirely related with selection of topic/problem by the students related to thrust areas identified by respective departments. Synopsis submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives

Final Project Stage I Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

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Savitribai Phule Pune University

Curriculum for

Second Year

Master of Technology

2016-2020

(With Effect from Academic Year: 2017-2018)

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULM STRUCTURE (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.	W.E.F	:	2017-18
SY MTECH	RELEASE DATE	:	1/08/2017
	REVISION NO.	:	0.0

TRIMISTER: IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	T	CREDIT
1.	DE1	CS63#	Elective course - I	3	--	3
2.	DE2	CS64#	Elective course - II	3	--	3
3.	SDP2	CS601	Project Work - II	--	8	4
TOTAL				6	8	10

TRIMISTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	SDP3	CS611	Project Work - III	--	20	10
TOTAL				--	20	10

TRIMISTER: VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	SDP4	CS621	Project Work - IV	--	20	10
TOTAL				--	20	10

Note: L: Lecture, P: Practical

Course Code	Elective Course – I Name
CS631	Information Retrieval
CS632	Infrastructure and Network Management
CS633	Computer Vision
CS634	Network Security Techniques
CS635	Open Elective

Course Code	Elective Course – II Name
CS641	Big Data Analytics
CS642	Virtualization and Cloud Computing
CS643	Business Intelligence
CS644	Ad-hoc Wireless Network: Principle, Protocol and Applications
CS645	Open Elective

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Information Retrieval
			COURSE CODE	**:**	CS631
			COURSE CREDITS	**:**	03
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. CS313 - Foundation of Data Mining and Warehousing

COURSE OBJECTIVES:

1. CS631.CEO.1: To learn the information retrieval models.
2. CS631.CEO.2: To be familiar with Web Search Engine.
3. CS631.CEO.3:To be exposed to Link Analysis
4. CS631.CEO.4:To understand Hadoop and Map Reduce
5. CS631.CEO.5:To learn document text mining techniques

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS631.CO.1: To understand the theoretical basis behind the standard models of IR (Boolean, Vector-space, Probabilistic and Logical models),
2. CS631.CO.2: To understand the difficulty of representing and retrieving documents, images, speech, etc.
3. CS631.CO.3: To implement, run and test a standard IR system
4. CS631.CO.4: To Develop the standard methods for Web indexing and retrieval,
5. CS631.CO.5: To evaluate techniques from natural language processing, artificial intelligence, human-computer interaction and visualization integrate with IR, and be familiar with various algorithms and systems.

THEORY:

INTRODUCTION: Introduction -History of IR- Components of IR – Issues –Open source Search engine Frameworks – The impact of the web on IR – The role of artificial intelligence (AI) in IR – IR Versus Web Search – Components of a Search engine- Characterizing the web.

INFORMATION RETRIEVAL: Boolean and vector-space retrieval models- Term weighting – TF-IDF weighting- cosine similarity – Preprocessing – Inverted indices – efficient processing with sparse vectors – Language Model based IR – Probabilistic IR –Latent Semantic Indexing – Relevance feedback and query expansion.

WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING : Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement – search engine optimization/spam – Web Search Architectures – crawling – meta-crawlers- Focused Crawling – web indexes –- Near-duplicate detection – Index Compression – XML retrieval.

WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH: Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity – Hadoop & Map Reduce – Evaluation – Personalized search – Collaborative filtering and content-based recommendation of documents and products – handling "invisible" Web – Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.

DOCUMENT TEXT MINING: Information filtering; organization and relevance feedback – Text Mining - Text classification and clustering – Categorization algorithms: naive Bayes; decision trees; and nearest neighbor – Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).

TEXT BOOKS:

1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008.
2. Ricardo Baeza -Yates and BerthierRibeiro – Neto,
3. Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011.
4. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.
5. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 2010..

REFERENCES:

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. OphirFrieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series ", 2nd Edition, Springer, 2004.
3. Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", and First Edition, Gate Mustru Publishing, 2008.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Infrastructure and Network Management
			COURSE CODE	**:**	CS632
			COURSE CREDITS	**:**	03
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. CS303 - Data Communication & Networking
3. CS302 - Operating System

COURSE OBJECTIVES:

1. CS632.CEO.1: To estimate IT infrastructure characteristics and components (Understanding).
2. CS632.CEO.2: To categorize IT infrastructure vendors and their products (Analyze).
3. CS632.CEO.3: To interpret storage, backup, server, security and alerts (Apply).
4. CS632.CEO.4: To illustrate current trends in infrastructure management (Apply).

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS632.CO.1: Identify parameters of infrastructure management; describe common infrastructure management activities and solutions.
2. CS632.CO.2: Evaluate storage architecture and understand current trends, tools and applications used in infrastructure.
3. CS632.CO.3: Describe storage networking technologies and data archival solutions.
4. CS632.CO.4: Articulate business requirements and infrastructure management

THEORY:

INTRODUCTION: Definition of IM, Components of IM(Policies, Processes, Equipment, Data, Human Resources, and External Contacts), Service Platforms(System Management, Network Management and Storage Management , Server Management, Database Management, Application Management, End User Management, Data Center Management, Configuration Management, Automation, Operations Quality and IT Helpdesk, Business Demand of IT infrastructure),Latest trends in IM (Cloud, Big Data, data analytics and Virtualization), IT Infrastructure service providers (IBM, HP, HCL, CISCO, Amazon etc.)

INFRASTRUCTURE MANAGEMENT SERVICES: Factors to consider in designing IT Infrastructure, Determining customer's Requirements, Data, Applications, Tools and their Integration, Patterns for IT systems management, Introduction to the design process for information systems, Service Models.

SERVICE MANAGEMENT: Definition of Service, Importance of Service, Information Technology Infrastructure Library (ITIL) : Service Delivery Processes, Service-level management, financial management andcosting, IT services continuity management, Capacity management, Availability management, Service Support Processes, Configuration Management, Service desk : Incident management. Problem management, Change management, Release management, Case Study : BMC Remedy, IBM Maximoetc.

Server Administration(User administration, Configuration and Maintenance of Server, Coordination with sub vendors in case of hardware failure, Availability of Server, Managing of Server Downtime,Causes and Consequences of downtime), Security Administration (Importance of Security, System Security administration (Password level security, access level security), Network Security administration (Unauthorized network users, Monitoring Network, Vulnerabilities, Firewall, Gateways, analyze and establish security requirements of network), IT security administration (Cyber law, Train employees for security awareness and procedures, Conduct security audits and make policy recommendations)), Case Study : Tivoli Identity Manager (TIM), Tivoli Access Managements (TAM) etc.

Storage Administration

Challenges, Data Storage Infrastructure, Components of a Storage System Environment(Disk drive components, Disk Drive performance, Logical Components), Data Protection (concept of RAID, RAID levels (RAID 0, 1, 3, 5, 0+1/1+0,and 6), Intelligent Storage System (ISS) and its components, Implementation of ISS as high-end and midrange storage arrays) ,Overview of FC-SAN, NAS, and IP-SAN, Network-Attached Storage (NAS) (Benefits of NAS, Components, Implementations, I/O operations, Performance and Availability), Content Addressed Storage (CAS) (Features and Benefits of a CAS, CAS Architecture, Storage and Retrieval)

Network Administration

Fiber Optic Network (Introduction, Dark Fiber, Plastic Optical Fiber, FDDI etc.), Switches and Routers for storage (Brocade, CISCO Fabric Router and Switches, Emulex, HP), Basics of SDN.

Backup Administration

Importance, Types of Backup,Backup/Recovery purposes and considerations, Architecture and different backup/recovery topologies, remote replication technologies and their operation, emerging technologies

like de-duplication, offsite backup,

Case Study: IBM and Reporting Administration: Importance, Configuration Management Database (CMDB), Server Availability Monitoring.

Case Study :Bocada for Backup reporting, Crystal Reports, Oracle reports for Database, IBM Cognos.

TEXT BOOKS:

1. G. Somasundaram, AlokShrivastava, EMC Educational Services, Information Storage and Management, Wiley Publishing, Inc., India, ISBN: 978-0-470-29421-5.
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003, ISBN: 0072224762, 9780072224764
3. Jan Van Bon, "Foundations of IT Service Management: based on ITIL", Van Haren Publishing, 2nd edition 2005, ISBN: 978 90 77212 58 5.

REFERENCES:

1. HakimaChaouchi, " The Internet of Things Connecting Objects to the Web", 2010, Willy Publications, ISBN : 978-1-84821-140-7 Marc Farley, "Building Storage Networks",Tata McGraw Hill ,Osborne, 2001, ISBN 0-07-212050-9.
2. Harris Kem, Stuart Gaiup, Guy Nemiro, "IT Organization: Building a World Class Infrastructure", Prentice Hall, 2000, *ISBN*:0-13-022298-4, 13: 978-0-13-022298-5.
3. Richard Barker and Paul Massiglia, Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs., Wiley India, ISBN 0-471-03445-2
4. Meet Gupta, .Storage Area Network Fundamentals., Pearson Education Limited, 2002, *ISBN*-10, 8178087774

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Computer Vision
			COURSE CODE	**:**	CS633
			COURSE CREDITS	**:**	03
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS323 - Signal Processing & Application
2. AS201 - Applied Mathematics

COURSE OBJECTIVES:

1. CS633.CEO.1: To describe the foundation of image formation, measurement, and analysis.
2. CS633.CEO.2: To implement common methods for robust image matching and alignment.
3. CS633.CEO.3: To gain exposure to object and scene recognition and categorization from images.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS633.CO.1: To demonstrate a thorough knowledge of fundamental concepts pertaining to computer vision.
2. CS633.CO.2: To segment objects in an image based on texture and color features.
3. CS633.CO.3: To design and implement a computer vision project utilizing the concepts taught in this course and evaluate their approach, analyze results and present research in class

THEORY:

Introduction: Digital Image Processing & Computer Vision-Introduction, Digital Image Fundamentals, Relationships between pixels, Distance measures; Image operations

Image Enhancement: Image Enhancement in spatial domain Gray level , Histogram processing , Enhancement operations , Frequency Domain 2-D Fourier transform, Convolution and Correlation theorems; Filtering in frequency domain - low pass smoothing, high pass sharpening.

Image restoration and reconstruction: Image degradation and restoration processes, Restoration in the presence of noise, linear position, Geometric

Image processing: Image segmentation, Image compression –Fundamentals, basic compression methods-Huffman coding, golomb coding, bit plane coding, wavelet coding, Image wavelets and description-Wavelets-Background of wavelets, multiresolution expansion, wavelet transforms in one dimensions, Image descriptions Image.

Object Recognition: Patterns and pattern classes; Decision theoretic methods , Structural methods, Need of intelligent processing and expert systems

TEXT BOOKS:

1. R. Gonzalez, R. Woods, and S. Eddins, Digital Image Processing Using Matlab (second edition), Gatesmark Publishing, 2009.
2. Richard Szeliski, “Computer Vision: Algorithm and Applications”,Springer,2011,ISBN 978-1-84882-935-0

REFERENCES:

1. R. Gonzalez and R. Woods, Digital Image Processing (third edition), Prentice-Hall, 2008
2. Forsyth, David A. & Ponce, Jean,” Computer Vision ,modern Approach” , Prentice Hall Professional Technical Reference,2000
3. Brian L. DeCost,Harshvardhan Jain,Anthony D. Rollett,Elizabeth A. Holm,"Computer Vision and Machine Learning for Autonomous Characterization of AM Powder Feedstocks",Springer ,2016
4. Xianghua XieMark Jones,Gary Tam,"Recognition, Tracking, and Optimization”, Springer 2017

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Network Security Techniques
			COURSE CODE	**:**	CS634
			COURSE CREDITS	**:**	03
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS303 - Data Communication & Networking

COURSE OBJECTIVES:

1. CS634.CEO.1: Identify various network security threats
2. CS634.CEO.2: Explain the concepts of malicious codes
3. CS634.CEO.3: Build security model to prevent, detect and recover from the attacks
4. CS634.CEO.4: Illustrate various securities issues and techniques applied in network security.
5. CS634.CEO.5: Analyze algorithms used to provide confidentiality, integrity and authenticity

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS634.CO.1: Identify various security practices applied in real time applications
2. CS634.CO.2: Analyze information security issue in computer and networking environment.
3. CS634.CO.3: Explain network security principles.
4. CS634.CO.4: Develop security algorithms for given computing system.
5. CS634.CO.5: Design security solution for given computing system.

THEORY:

A Model for Network Security, Classical Encryption Techniques.

Block Ciphers and the Data Encryption Standard: Strength of DES, Cryptanalysis, Block CipherDesign Principles, Finite Fields of the Form GF(p), Advanced Encryption Standard, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms, Public-Key Cryptography and RSA, Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Pseudorandom Number Generation Based on an Asymmetric Cipher.

Cryptographic Hash Functions: Simple Hash Functions, Requirements and Security, Cipher Block Chaining, MACs Based on Hash Functions, Authenticated Encryption, And Digital Signature Standard.

Key Management and Distribution: Symmetric Key Distribution Techniques, Distribution of Public Keys, User Authentication Protocols, Remote User Authentication, Federated Identity Management

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, Fifth Edition, 2011.
2. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007.
3. Principles of Information Security: Michael E. Whitman, Herbert J. Mattord, CENGAGE Learning, 4th Edition.

REFERENCES:

1. Cryptography and Network Security : ForouzanMukhopadhyay, McGraw Hill,
2. Godbole," Information Systems Security", Willey Publication
3. Mark Stamp, "Information Security: Principles and Practice", Wiley Inter Science, 2011
4. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 2007

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Big Data Analytics
			COURSE CODE	**:**	CS641
			COURSE CREDITS	**:**	03
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. CS313 - Foundation of Data Mining and Warehousing

COURSE OBJECTIVES:

1. CS641.CEO.1: To learn the concept of Big data and applications of big data analytics
2. CS641.CEO.2: To use advanced Storage technologies like Hadoop

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS641.CO.1: To apply Hadoop ecosystem components.
2. CS641.CO.2: To Develop Map Reduce Work Application.
3. CS641.CO.3: To Create the HDFS tables and loading them in Hive and learn joining of tables in Hive.
4. CS641.CO.4: To build and maintain reliable, scalable, distributed systems with Apache Hadoop.
5. CS641.CO.5: To design and build MongoDB based Big data Applications.

THEORY:

Parallel database architecture, Design of parallel systems, Study of DDBMS architectures, Analysis of Concurrency control in distributed databases, Implementation of Distributed query processing.

Apache Hadoop & Hadoop Ecosystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce -, Data Serialization. Building blocks of hadoop, components of hadoop (HDFS, Map-reduce) , HBASE, HIVE, PIG, Zookeeper .

Stages of analytical evolution, State of the Practice in Analytics, The Data Scientist, Big Data Analytics in Industry Verticals, Data Analytics Lifecycle, Operationalizing Basic Data Analytic Methods Using R, Advanced Analytics - Analytics for Unstructured Data - Map Reduce and Hadoop, In-database Analytics, Data Modeling.

Benefits of NOSQL, NOSQL using MongoDB- mongoDB shell, data types, manipulation (insert, update, delete documents), querying, aggregation, indexing, crowd-sourcing.

TEXT BOOKS:

1. Coronel, Morris and Rob, “Database Principals: Fundamentals of Design, Implementation and Management”,9th edition, Cengage Learning, (ISBN: 978-81-315-1736-9)
2. Bill Franks, “Taming The Big Data Tidal Wave”, 1st Edition, Wiley, 2012.
3. VigneshPrajapati, “Big Data Analyticswith R and Haoop”, Packet Publishing 2013.
4. Kyle Banker, Piter Bakkum, Shaun Verch, “MongoDB in Action” Dream tech Press
5. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012.

REFERENCES:

1. Raghu Ramkrishnan, Johannes Gehrke, "Database Management Systems", Second Edition, McGraw Hill International Edition
2. Thomas Connolly,Carolyn Beg —Database Systems :Practical approach to design implementation and management — third edition, Pearson education
3. Jared Dean, “Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners”, Wiley India Private Limited, 2014.
4. Raghu Ramkrishnan, Johannes Gehrke, "Database Management Systems", Second Edition, McGraw Hill International Edition.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Network Security Techniques
			COURSE CODE	**:**	CS634
			COURSE CREDITS	**:**	03
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS303 - Data Communication & Networking

COURSE OBJECTIVES:

1. CS634.CEO.1: Identify various network security threats
2. CS634.CEO.2: Explain the concepts of malicious codes
3. CS634.CEO.3: Build security model to prevent, detect and recover from the attacks
4. CS634.CEO.4: Illustrate various securities issues and techniques applied in network security.
5. CS634.CEO.5: Analyze algorithms used to provide confidentiality, integrity and authenticity

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS634.CO.1: Identify various security practices applied in real time applications
2. CS634.CO.2: Analyze information security issue in computer and networking environment.
3. CS634.CO.3: Explain network security principles.
4. CS634.CO.4: Develop security algorithms for given computing system.
5. CS634.CO.5: Design security solution for given computing system.

THEORY:

A Model for Network Security, Classical Encryption Techniques.

Block Ciphers and the Data Encryption Standard: Strength of DES, Cryptanalysis, Block CipherDesign Principles, Finite Fields of the Form GF(p), Advanced Encryption Standard, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms, Public-Key Cryptography and RSA, Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Pseudorandom Number Generation Based on an Asymmetric Cipher.

Cryptographic Hash Functions: Simple Hash Functions, Requirements and Security, Cipher Block Chaining, MACs Based on Hash Functions, Authenticated Encryption, And Digital Signature Standard.

Key Management and Distribution: Symmetric Key Distribution Techniques, Distribution of Public Keys, User Authentication Protocols, Remote User Authentication, Federated Identity Management

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, Fifth Edition, 2011.
2. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007.
3. Principles of Information Security: Michael E. Whitman, Herbert J. Mattord, CENGAGE Learning, 4th Edition.

REFERENCES:

1. Cryptography and Network Security : ForouzanMukhopadhyay, McGraw Hill,
2. Godbole," Information Systems Security", Willey Publication
3. Mark Stamp, "Information Security: Principles and Practice", Wiley Inter Science, 2011
4. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 2007

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Business Intelligence
			COURSE CODE	**:**	CS643
			COURSE CREDITS	**:**	03
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. AS501 – Computing and Mathematics

COURSE OBJECTIVES:

1. CS643.CEO.1: To introduce the idea of decision making in complex industrial and service environments
2. CS643.CEO.2: To understand the science behind better predictions and decisions.
3. CS643.CEO.3: To generate an ability to design, analyze and perform experiments on real life problems using various Decision making methodologies

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS643.CO.1: To understand articulate modern BI practices, including knowledge integration, sourcing and managing BI solutions.
2. CS643.CO.2: To discuss the social and ethical issues related to the use of Business Intelligence technologies in organizations.
3. CS643.CO.2: To understand articulate the crucial role that Business Intelligence plays in careers as well as in business and society in the 21st century.
4. CS643.CO.4: To understand articulate modern concepts, theories, and research in the field of

Business Intelligence.

5. CS643.CO.5: To apply BI enabling technologies in organizational settings.

THEORY:

Introduction: BI Definitions & Concepts, BI Infrastructure Components, The Architecture of BI and its types, Development of a business intelligence system, Role of Data Warehousing in BI, Business Applications of BI.

Definition of system: Representation of the decision-making process, Types of decisions, Approaches to the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system.

Structure of mathematical models: Data exploration, Bivariate analysis, Graphical analysis, Regression, Significance of the coefficients Analysis of variance, Multi-colinearity of the independent variables, Confidence and prediction limits.

Definition of time series: Evaluating time series models Distortion measures Dispersion measures, Decomposition of a time series, Exponential smoothing models, , Removal of trend and seasonality,

Relational marketing: Motivations and objectives, An environment for relational marketing analysis, Lifetime value, The effect of latency in predictive models, Market basket analysis, Web mining, Response functions, Business case studies, Retention in telecommunications, Acquisition in the automotive industry, Cross-selling in the retail industry

TEXT BOOKS:

1. Carlo Vercellis, “Business Intelligence”, John Wiley & sons 2009 edition , ISBN 978-0-470-51138-1

REFERENCES:

1. Elizabeth Vitt, Michael Luckevich, “Business Intelligence: Making Better Decision”, Microsoft Press, 2002 edition, ISBN 0-7356-1627-2
2. Larissa T. Moss, Shaku Atre, “Business Intelligence Roadmap: The Complete Project Life cycle for Decision Support systems”, Addison – Wesley Information Technology Series 2008, ISBN 0-201-78420-3

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Ad-hoc Wireless Network: Principle, Protocol and Applications
			COURSE CODE	**:**	CS644
			COURSE CREDITS	**:**	03
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS303 - Data Communication & Networking

COURSE OBJECTIVES:

1. CS644.CEO.1: To illustrate principles of different types of Ad hoc network
2. CS644.CEO.2: To design MAC and Routing protocol of Ad hoc network
3. CS644.CEO.3: To explain the importance of QOS and Energy efficiency in Ad hoc network.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS644.CO.1: To Explain the concept of ad hoc network in real time applications
2. CS644.CO.2: To design various protocols with Ad hoc network constraints
3. CS644.CO.3: To develop ad hoc wireless network for enhancement in protocols

THEORY:

Introduction: Fundamentals of WLANS, IEEE 802.11 Standard, HIPERLAN Standard, AD HOC Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks, AD Hoc Wireless Internet.

MAC Protocols: Design Issues and goals of MAC protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Based MAC Protocols with Scheduling Mechanisms, MAC Protocols using Directional Antennas, Other MAC Protocols. Application

Routing Protocols: Design Issues and goals of Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Application

Transport Layer and Security Protocols: Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer protocol, TCP Over Ad Hoc Wireless Networks, Importance of Security in Ad Hoc Wireless Networks, Network Security, Application of Secure communication in MANET and VANET.

Wireless Sensor Networks: Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, IoT with WSN. Energy Management in WSN, Application of energy efficient routing protocol in Agriculture Environment Sensing.

Quality of Service: Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QoS Frameworks for Ad Hoc Wireless Networks. Application & Case Study.

TEXT BOOKS:

1. C D M Cordeiro, D. P. Agarwal, “Adhoc and Sensor Networks: Theory and applications”, World Scientific, 2006, ISBN: 981-4-338-885
2. Jagannathan Sarangapani, “Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control”, CRC Press, 2007, ISBN: 978-0-8247-2675-1
3. Asoke K Talukder and Roopa R. Yavagal, ”Mobile Computing – Technology, Applications and Service Creation”, 2nd Edition, TMH Publication,2006, ISBN:978-0-07-014457-6

REFERENCES:

1. C.K. Toh, “Ad- Hoc Mobile Wireless Networks: Protocols & Systems”, 1st Edition, Pearson Education, ISBN: 9780132442046.
2. C. S. Raghavendra, Krishna M. Sivalingam, ”Wireless Sensor Networks”, Springer, 2004, ISBN:978-3-540-77689-5.
3. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, “Mobileadhoc networking”, Wiley-IEEE press, 2004, ISBN: 978-0-471-65688-3.
4. Senthilnathan Palaniappan, Kalaiarasan Chellan, “Energy-efficient stable routing using QoS monitoring agents in MANET”, In: Journal of Wireless and Communication and Networking, Springer, 2015.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	PROJECT WORK - II
			COURSE CODE	**:**	CS604
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**TUTORIAL**	**THEORY**			**TERM WORK**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
NIL	8	NIL	NIL	NIL	50	50	100

PREREQUISITES:

1. CS523 : Project Work I

COURSE OBJECTIVES:

1. CS604.CEO.1: To develop self-management, documentation & technical skills.
2. CS604.CEO.2: To Demonstrate a strong working knowledge of ethics and professional responsibility.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. CS604.CO.1: Develop self-management, documentation & technical skills.
2. CS604.CO.2: Design, analyze & troubleshoot schematics, connection diagrams, block diagrams, timing diagrams for a given electronics circuit or system.

CONTENTS:

Project Stage II is related with Goals and Objectives, System Architecture, Algorithm /Methodology. Project report submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- UML, DFD, Design Details
- Proposed Algorithm
- Expected Outcome and Result
- Preparation of manuscript (paper) on Literature survey

Final Project Stage II Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	PROJECT WORK - III
			COURSE CODE	**:**	CS611
			COURSE CREDITS	**:**	10
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**TERM WORK**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
NIL	20	NIL	NIL	NIL	150	50	200

PREREQUISITES:

1. CS523: Project Work - I
2. CS601: Project Work- II

COURSE OBJECTIVES:

1. CS611.CEO.1: Demonstrate effective project execution and techniques that result in successful projects.

COURSE OUTCOME:

1. CS611.CO.1: To execute work within prescribed guidelines, project specifications, and within a proposed budget.

CONTENTS:

Project Stage III is related with Design, Algorithm /Methodology Implementation Results. Project report submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- UML, DFD, Design Details
- Proposed Algorithm
- Methodology
- Implementation
- Results
- Preparation of manuscript (paper) on Literature survey as mentioned in Project Work II
- Preparation of manuscript (paper) on design
- Publication details of paper on Literature survey and Design (Peer reviewed International conference like IEEE, ACM, Elsevier, Springer etc)

Final Project Stage III Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry

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DEPARTMENT OF COMPUTER ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	PROJECT WORK - IV
			COURSE CODE	**:**	CS621
			COURSE CREDITS	**:**	10
RELEASE DATE	**:**	1/08/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**TERM WORK**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
NIL	20	NIL	NIL	NIL	200	100	300

PREREQUISITES:

1. CS523: Project Work I
2. CS601: Project Work II
3. CS611: Project Work III

COURSE OBJECTIVES:

1. CS621.CEO.1: Demonstrate effective project execution and techniques that result in successful projects.

COURSE OUTCOME:

1. CS621.CO.1: To execute work within prescribed guidelines, project specifications, and within a proposed budget.

CONTENTS:

Project work IV is related with algorithm/methodology, implementation, Results, Result analysis using various charts/graphs, Project report submission and end trimester presentation will be conducted by department based in following points.

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- System architecture
- UML, DFD, Design Details
- Proposed Algorithm
- Methodology
- Implementation
- Results
- Result Analysis
- Preparation of manuscript (paper) on literature survey as mentioned in project work –II.
- Preparation on manuscript (paper) on design as mentioned in Project work –III.
- Publication details of paper on Literature survey and Design (Peer reviewed International conference like IEEE, ACM, Elsevier, Springer etc. as mentioned in project Work – III)
- Publication details of paper on Result analysis (Peer reviewed / free International Journal)

Final Project Stage IV Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

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CURRICULUM FRAMEWORK (ELECTRONICS ENGINEERING)

MIT | Academy of Engineering (An Autonomous Institute)	COURSE STRUCTURE (2016 - 2018)		
DEPARTMENT OF ELECTRONICS ENGINERRING	W.E.F	:	2016-17
FY MTECH	RELEASE DATE	:	1/06/2016
	REVISION NO.	:	0.0

TRIMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	T	CREDIT
1.	PC1	AS501	Computing and Mathematics	2	2	4
2.	PC2	CS501	Management System	2	2	4
3.	PC3	CS502	Modern Technologies	2	2	4
TOTAL				06	06	12

TRIMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC4	EX501	Research Methodology	2	-	2
2.	DC1	EX511	Advance Embedded Architecture & Processor	3	2	4
3.	DC2	EX512	Analog CMOS Design	3	2	4
TOTAL				08	04	10

TRIMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC5	EX502	Technical Writing	2	-	2
2.	DC3	EX521	Real Time Operating System & Design	3	2	4
3.	DC4	EX522	Digital CMOS Design	3	2	4
4.	DC5	EX523	Project Work - I	-	4	2
TOTAL				08	08	12

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MIT | Academy of Engineering (An Autonomous Institute)	COURSE STRUCTURE (2016 - 2018)		
DEPARTMENT OF ELECTRONICS ENGINERRING	W.E.F	:	2017-18
SY MTECH	RELEASE DATE	:	1/06/2017
	REVISION NO.	:	0.0

TRIMESTER: IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC6	EX63#	Elective course I – Refer Annexure	3	---	3
2.	DC7	EX64#	Elective course II– Refer Annexure	3	---	3
3.	DC8	EX601	Project Work - II	---	08	4
TOTAL				06	08	10

TRIMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC9	EX611	Project Work - III	---	20	10
TOTAL				---	20	10

TRIMESTER: VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
5.	DC10	EX621	Project Work - IV	---	20	10
TOTAL				---	20	10

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	CREDITS				
	1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit				
SL. NO.	YEAR	TRIMESTER			TOTAL
		1	2	3	
1.	First Year	12	10	12	34
2.	Second Year	10	10	10	30
TOTAL					64

	CONTACT HOURS				
SL. NO.	YEAR	TRIMESTER			TOTAL
		1	2	3	
1.	First Year	12	12	16	40
2.	Second Year	14	20	20	54
TOTAL					94

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Annexure

Elective Course I : 1 Course		
Sl. No.	**Course Code**	**Course**
1	EX631	Embedded Network Design
2	EX632	Distributed System
3	EX633	Optimal Control

Elective Course II : 1 Course		
Sl. No.	**Course Code**	**Course**
1	EX641	Image Processing
2	EX642	ASIC Design
3	EX643	Reconfigurable computing

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DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2016-17
FY M.TECH.			COURSE NAME	:	Computing and Mathematics
			COURSE CODE	:	AS501
			COURSE CREDIT	:	4
RELEASE DATE	:	1/06/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	TUTORIAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	2	40	50	10	Nil	Nil	100

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. AS501.CEO.1: To learn different numerical methods to solve differential equations and obtain the solution.
2. AS501.CEO.2: To understand different sampling techniques, analyze the data and process it to obtain a quality product.
3. AS501.CEO.3: To learn mathematical methodologies, techniques and mathematical tools to obtain an optimal solution of the problems.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. AS501.CO.1: Identify the accurate solution method (minimizing the error) to solve the differential equation with given conditions and obtains the particular solution of the problem.

2. AS501.CO.2: Collect, categorize, analyze, processing mathematically the data, thereby to obtain a quality proven product.
3. AS501.CO.3: Understand the physical situation, identify the accurate mathematical model and solve the problem mathematically or with the use of Statistical tools available and finally interpret it in the original context.

THEORY:		
Unit I	**Computational Methods to Ordinary Differential Equations**	**8 Hours**
Euler's Method, Heun's Method, Mid- point Method, Runge-Kutta Method and Multi step Methods- Explicit Adams-Bash forth technique and Implicit Adams-Moulton techniques, Adaptive RK Method, Embedded RK Method, Higher Order Ordinary differential equation- Shooting Method.		
Unit II	**Operations Research**	**8 Hours**
Simplex method: Feasible solution to system of equations, reduction of feasible to basic feasible solution, solution of LPP: computational procedure, Penalty (Big M) method. Transportation problem: North-West corner method, Least-cost method, Vogel's approximation method.		
Unit III	**Statistics and Quality Control**	**8 Hours**
Central Tendency of data, Variance, Standard Deviation, Coefficient of Variance, Moments, Correlation, Coefficient of Correlation, Regression lines. Control Charts for Process Location: $\bar{X}$ Chart, Control Charts for Process Variation: S Chart, R charts.		

PRACTICAL:		
Tutorial No. 1	Title	**2 Hours**
Introduction to first order first degree Differential equation and its actual solution.		
Tutorial No. 2	Title	**2 Hours**
Euler's Method, Heun's Method, Mid- point Method, Runge-Kutta Method.		
Tutorial No. 3	Title	**2 Hours**
Adams-Bash forth technique and Implicit Adams-Moulton techniques.		
Tutorial No. 4	Title	**2 Hours**
Adaptive RK Method, Embedded RK Method, Shooting Method.		
Tutorial No. 5	Title	**2 Hours**

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Solution of system of equations using simplex method (Feasible soln).		
Tutorial No. 6	**Title**	**2 Hours**
Solution of system of equations using simplex method (Feasible to basic feasible soln).		
Tutorial No. 7	**Title**	**2 Hours**
Transportation problem: North-West corner method, Least-cost method.		
Tutorial No. 8	**Title**	**2 Hours**
Transportation problem: Vogel's approximation method.		
Tutorial No. 9	**Title**	**2 Hours**
Central Tendency of data, Variance, Standard Deviation		
Tutorial No. 10	**Title**	**2 Hours**
Moments, Correlation, Coefficient of Correlation.		
Tutorial No. 11	**Title**	**2 Hours**
Regression Lines.		
Tutorial No. 12	**Title**	**2 Hours**
$\bar{X}$ Chart, S Chart, R chart.		

TEXT BOOK:

1. Numerical Methods for Engineers by Steven C. Chapra & Raymond P. Canale, sixth edition, ISBN 978–0–07–340106–5, MHID 0–07–340106–4.
2. Operations Research by Kanti Swarup, P.K. Gupta, Man Mohan, ISBN: 81-8054-226-2.
3. Statistical Methods Vol. 2 by Das, ISBN:9780070263512.

REFERENCEs:

1. Numerical Methods by V.N. Vedamurthy &N.Ch.S.N. Iyenger, First edition, ISBN: 9788125906308.
2. Operations Research by S.D. Sharma.
3. Statistical Methods Vol. 1 by Das, ISBN:9780070263505.
4. Introduction to Probability and Statistics by Milton, ISBN: 9780070636941.

Research Paper :

1. The numerical analysis of ordinary differential equations: Runge-Kutta and general linear methods, JC Buckner,dl.acm.org, 1987.

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2. Operations Research: Applications and Algorithms, WL Winston and JB Goldberg, 2008
3. AHA Statistical Update, AS Go, D Mozaffarian, VL Roger, EJ Benjamin... - Circulation, 2013 - Am Heart Assoc.

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 -2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Management System
			COURSE CODE	:	CS501
			COURSE CREDIT	:	4
RELEASE DATE	:	1/06/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	TUTORIAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	2	40	50	10	Nil	Nil	100

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. CS501.CEO.1: To enable post graduate students for efficiently discharging the business roles they may be entrusted with and for effectively handling situations they may encounter in their businesses or professional career by imparting them with essential knowledge and skills.
2. CS501.CEO.2: To inculcate a spirit of entrepreneurship by promoting inquisitiveness for technological innovations, their conversion into business ideas and evolving strategy for induction of new products in new markets for growth of their entrepreneurial projects.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. CS501.CO.1: Describe and explain the internal and external environment which may affect their business.

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2. CS501.CO.2:Critically analyze the organizational structure, systems, competencies and weaknesses of their organization and identify areas for improvement.
3. CS501.CO.3: Draw a model of and analyze the power structure and potential change agents which may take an organization to greater heights
4. CS501.CO.4: Identify and describe inherent and potential problem areas and proactively create and install measures to avert likely disastrous situations.
5. CS501.CO.5 : Provide effective leadership to their group, for achievement of their assigned tasks and remain integrated to the organization they belong to.
6. CS501.CO.6: Identify areas of growth and development of knowledge workers in their organization.
7. CS501.CO.7: Create a conducive managerial environment in their organizations with spirit of cooperation, collaboration and better understanding.

THEORY:

UNIT		**24 Hours**

Concept of Systems; Nature, Process and Principles of a Management.
Role of a Business Firm as a national economic entity with understanding of Macro, Micro and International economics. An understanding of products and services, circular model of flow of money, products and services in a society.
Functioning and growth of a business unit with understanding of Break-Even Analysis, Abell's Three Dimensional model of business growth, various business functions in an organization and changing focus from product oriented business to customer orientation and value co-creation.
Schools of Thought on Management based on changing concepts of economics and evolution of Business Strategy. Need to understand innovative ways to evolve a new suitable management system for an organization with special focus on new Strategies at the bottom of the pyramid, quality as strategy, disruptive innovation and diffusion of technology.
Human Relations practices in organizations with preponderance of knowledge workers, development and training for leadership, motivation and conflict management.
Concept of Invention and Innovation, Entrepreneurship and technology management for induction of new products in market.
Business startups and growth in current Indian Environment. Presentation on Entrepreneurial plans.

PRACTICAL/ TUTORIAL:

Tutorial No. 1	Title	**4 Hours**

A corporate management case to be selected by students out of several cases given to them well in time, for their study research analysis and presentation, to be evaluated

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faculty.		
Tutorial No. 2	**Title**	**4 Hours**
Preparation and submission of an innovative and entrepreneurial Business Plan of student's choice, presenting and defending it before the class, to be evaluated by two peers. Faculty will modulate the evaluations.		
Tutorial No. 3	**Title**	**4 Hours**
Written presentation of Business plan (Soft copy)		

TEXT BOOK:

1. Harold Koontz, Heinz Weihrichand Mark V Cannice,"Management –A Global and Entrepreneurial Perspective" , Tata McGraw Hill Publications, 12th Edition, 2008.ISBN : 9780070660199
2. Vachaspati Mishra , "Management and Entrepreneurship in Indian Environment – A Perspective through Joining the Dot" , Himalaya Publishing House, First Edition, 2016. ISBN : 978-93-5262-132-3

REFERENCEs:

1. Dr A Sivathanu Pillai ,"Technology Leadership – A Revolution in the Making" , Tata McGraW Hill Publishing Company Ltd, New Delhi, Third edition , 2005 , ISBN : 9780070583283
2. James A Alexander and Mark W Hordes , "S-Business: Reinventing the Services Organisations," , Select Books Inc Biztantra, 2006 , ISBN : 978-1590790540
3. Vohra ND, "Quantitative Techniques in Management", Tata McGraw Hill Publishing Company Limited, Third Edition 2007 , ISBN : 978-0070146730.
4. Nakkiran S and Karthikeyan M , "Training Techniques for Management Development" , Deep and Deep Publications Pvt Ltd; 2007 , ISBN : 9788176299725
5. Arvind Pangariya; INDIA," The Emerging Giant" , Oxford University Press, Indian Edition, 2nd Edition , 2008 , ISBN : 978-0199751563.
6. Prahalad, CK and Krishnan MS, "The New Age of Innovation - Driving Co-Created Value Through Global Networks" , Tata McGraw-Hill , 2008, ISBN : 978-0070248618
7. Joe Tidd, John Bessant and Keith Pavitt, "Managing Innovation – Integrating Technological, Market and Organisational Change" ,Wiley India, Third Edition, 2011 , ISBN : 978-8126557134.
8. Sushama Khanna , "Understanding Organisational Behaviour" , Oxford University

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Press, Third Edition, 2012 , ISBN : 978-0199454716.
9. Kazmi, Dr Azhar and Dr Adela, "Strategic Management" , Fourth Edition (Tata McGraw-Hill Education (India) Private Limited, 2015

Research Paper :

1. Kshetri, Nir, "The Indian Environment for Entrepreneurship and Small Business Development" in StudiaNegotia, 56 (LVI), 4, 2011, 35-52
2. Management systems: purpose and benefits http://www.thecqi.org/Knowledge-Hub/Knowledge-portal/Corporate-strategy/Management-systems/

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 -2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2016-17
FY M.TECH.			COURSE NAME	:	Modern Technologies
			COURSE CODE	:	CS502
			COURSE CREDIT	:	4
RELEASE DATE	:	1/06/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	TUTORIAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	2	40	50	10	Nil	Nil	100

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:

1. CS502.CEO.1: To get familiar with big data, wireless sensor networks and Internet of Things technology.
2. CS502.CEO.2: To acquire the knowledge of geometrical transformation and grasp the animation techniques.
3. CS502.CEO.3: Study basic principles of nano car and different modern technologies.
4. CS502.CEO.4: Apply their knowledge to understand different statistical tools and analysis software.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. CS502.CO.1: Understand the knowledge of advanced software's.
2. CS502.CO.2: Apply their knowledge in different fields.
3. CS502.CO.3: Apply advance technologies in automobile industry.

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THEORY:		
Unit I		**24 Hours**

Big Data:Big Data, Hadoop Distributed File System, Network: Types of Networks, Internet Architecture,Wired and Wireless MAC, RFID, Internet of Things, IoTApplications,R Programming.

2D and 3D Geometrical Transformations: Scaling, Translation, Rotation, Reflection, Viewing Transformations: Parallel and Perspective Projection, Curves and Surfaces: Cubic Splines, Bezier Curves, B-Splines, Animation Technology – OpenGL, Maya, Blender.

Advance technologies: Nano Car Air velocity, Air conditioning system, Different modern energy storage devices, Modern evacuated tube technologies, Advanced Sensor technology, recent photovoltaic technology, Controlling of thermal power plants and its instrumentation, Agricultural robot, Closed ecological systems, Artificial photosynthesis, Energy harvesting.

Modern statistical tools like MATLAB, SPSS, etc., Mathematical Modeling, Data interpretation technologies like ANOVA, Introduction of Analysis software's like ANSYS, Star CD, etc., ERP system, SCADA, PLC System, Electronic Control Unit (ECU), Sources of Energy storage, fuel efficient engine through closed loop control system. Advances in Electronic Cooling Equipment's. Bio-medical devices, their Applications, FDA approval procedures, A Certification.

Advances in automotive electronics: Night vision systems, Driver alertness monitoring, Event data recorders (automotive black boxes), Accident recorders, Adaptive cruise control systems, Autonomous emergency breaking systems, Electronic throttle control, On-Board diagnostics systems, Blind spot detection, Navigation systems, Communication systems, Engine control.

PRACTICAL/ TUTORIAL:		
Tutorial No. 1	**Title**	**2 Hours**
Case study on Animation Technologies		
Tutorial No. 2	**Title**	**2 Hours**
Case study on Wireless Sensor Application.		
Tutorial No. 3	**Title**	**2 Hours**

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Arduino, Raspberry Pi and BeagleBone Black", McGraw-Hill Education, ISBN-13: 978-0071835206, 2015.
4. Madhu Jagadeesh, Soumendra Mohanty, Harsha Srivatsa, "Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics",First Edition, Apress,ISBN-13: 978-1430248729, 2013.
5. Nihal Kulratna, "Energy storage devices for electronics system", Academic Press , Second Edition , ISBN: 978-0-12-407947-2, 2015.
6. Ralph Remsburg,"Advanced thermal design for electronics equipment", International Thomson Publishing Thomson Science, ISBN: 978-1-4613-4633-3.
7. Asier Perallos, Unai Hernandez-Jayo, Enrique Onieva, Ignacio Julio Garca Zuazola, John Wiley and sons, "Intelligent Transport Systems: Technologies and Applications", ISBN: 978-1-118-89478-1, 2015.
8. Galip Ulsoy, Huei Peng, Melih Çakmakci, "Automotive Control Systems", Cambridge 2012. ISBN : 978110701011.

Research Paper :

1 Jayavardhana Gubbi, Rajkumar Buyya "Internet of Things (IoT): A Vision, architectural elements and future directions", Elsevier Journal on Future Generation Computer Systems, 29, pages 1645-1660, 2013.
2 Madden, Sam. "From databases to big data", Article, IEEE, Internet Computing, IEEE 16.3 (2012): 4-6, http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6188576.
3 Daryl Oster, Masayuki Kumada, Yaoping Zhang, "Evacuated tube transport technologies (ET3) tm: a maximum value global transportation network for passengers and cargo." 2013, Journal of Modern Transportation, ISSN: 2196-0577.
4 Ali Bahrami, Shahram Mohammad nejad, Saeede Soleimaninezhad "Photovoltaic cells technology: principles and recent developments", Springer US, Online ISSN: 1572-817X, 2012.
5 Martin Kaiser, "Electronic control unit (ECU)", Springer US, Online ISBN 978-3-658-03964-6, pages 254-259, 2015.
6 Pritpal Singh, Tanjot Sethi , Bunil Kumar Balaban taray, Bibhuti Bhushan Biswal, "Advanced vehicle security system", IEEE, International Conference on "Innovations in Information, Embedded and Communication Systems (ICIIECS)", pages 1-6, 2015.
7 Hermann Kopetz , Stephan Poledna, "Autonomous Emergency Braking: A System-of-Systems perspective", IEEE, Conference on "Dependable Systems and Networks Workshop (DSN-W)", 43rd Annual IEEE/IFIP, pages 1-7, 2013.

Case study on IoT (Smart City, Healthcare, Agriculture).		
Tutorial No. 4	Title	**2 Hours**
Case study on Big Data – Hadoop Configuration.		
Tutorial No. 5	Title	**2 Hours**
Case study on Data interpretation technologies.		
Tutorial No. 6	Title	**2 Hours**
Case study on Agricultural robot.		
Tutorial No. 7	Title	**2 Hours**
Case study on Electronic cooling equipment.		
Tutorial No. 8	Title	**2 Hours**
Case study on Adaptive cruise control system.		

TEXT BOOK:

1. S. Harrington, S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 –100472 – 6.
2. Anthony F. Collings , Christa Critchley,"Artificial Photosynthesis: From Basic Biology to Industrial Application." 2014, ISBN: 978-3-527-31090-6.
3. NasimulAlam Syed, Sanjib Islam, Saroj Kumar Patel, "Advanced Guide to MATLAB: Practical Examples in Science and Engineering" I K International Publishing House Pvt. Ltd., 2015, ISBN: 978-9384588359.
4. William B. Ribbens, Ph.D., Norman P. Mansour, Gerald Luecke, Charles W. Battle, Edward C. Jones and Leslie E. Mansir, "Understanding Automotive Electronics", ISBN: 978-0-7506-7599-4.
5. Bosch Automotive Electrics and Automotive Electronics: Systems and edited by Robert Bosch GmbH, Springer science and digital media, ISBN-13: 978-3658017835, 2013.

REFERENCEs:

1. J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.
2. Robert Faludi, "Building Wireless Sensor Network" Second Edition, OReilly Publication, 2010.ISBN : 978-1784395582.
3. Donald Norris, " The Internet of Things: Do-It-Yourself at Home Projects for

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 -2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Research Methodology
			COURSE CODE	:	EX501
			COURSE CREDIT	:	2
RELEASE DATE	:	1/06/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	TUTORIAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	Nil	40	50	10	Nil	Nil	100

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:
1. EX501.CEO.1: To develop understanding of the basic framework of research process.
2. EX501.CEO.2: To develop an understanding of various research designs and techniques.
3. EX501.CEO.3: To identify various sources of information for literature review and data Collection.
4. EX501.CEO.4: To develop an understanding of the ethical dimensions of conducting applied research.
5. EX501.CEO.5: Appreciate the components of scholarly writing and evaluate its quality.

COURSE OUTCOMES:
The students after completion of the course will be able to

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1. EX501.CO.1: Illustrate the objective & paradigm for the research.
2. EX501.CO.2: Establish & validate the results & analysis.
3. EX501.CO.3: Explore the ethical issues concerning the participation & data collection.

THEORY:

Unit I	**Research - Introduction**	**6 Hours**

What is research, Research definition, Objective & paradigm for the research, Terminologies, Identifying & defining the research problem, Type of research , Literature &it's analysis, Development of theoretical and conceptual frame work , Ethical Issues concerning research participants, Ethical issues in data collection, Data collection methods.

Unit II	**Hypothesis , Data processing**	**6 Hours**

What is Hypothesis - Definition and functions of hypothesis, Processing operations, Different types of Hypothesis, Problems in data processing, Coding descriptive data and quantitative data, Sampling techniques.

Unit III	**Statistics in research**	**6 Hours**

Multivariate analysis, Concept of regression, Establishing validity and reliability of the result, Principal component analysis, variance & covariance- ANOVA, ANOCOVA.

Unit IV	**Writing research proposal**	**6 Hours**

Interpretation and its meaning, Readability of Manuscript, techniques, Contents, Report writing, structure, types of report, Procedure of writing research proposal, Writing as thinking, Habit of writing, Skills and thought process in technical writing, Role of computer in technical writing.

TEXT BOOK:

1. John W. Creswell," Research Design-Qualitative & Quantitative Approaches", SAGE publications, New Delhi , Second Edition , ISBN: 0-8039-5254-6
2. Ranjit Kumar," Research Methodology- A Step by Step Guide for Beginners", Pearson publication, New Delhi , Second edition, ISBN: 978-81-317-0496-7

REFERENCEs:

1. C. R. Kothari," Research Methodology, Methods & Techniques", New Age International Publication, Second Edition, ISBN: 978-81-224-1522-3
2. Hamdy A. Taha, "Operation Research- An Introduction", Pearson Publication ,

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 -2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Advanced Embedded Architecture & Processor
			COURSE CODE	:	EX511
			COURSE CREDIT	:	4
RELEASE DATE	:	1/06/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	2	40	50	10	-	25	125

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. EX 511.CO.1: To review basic organizational and architectural techniques.
2. EX511.CO.1: To learn the performance metrics of microprocessors, memory, networks and disks.
3. EX511.CO.3: To exploit ILP using dynamic scheduling, multiple issue and speculation.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. EX 511.CO.1: Explain pipelining, instruction set architectures, memory addressing.

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Ninth Edition , ISBN : 978-9332518223

Research Paper :

1. Wilson, Shawn, "What is indigenous research methodology?", Canadian Journal of Native Education; 2001; 25, 2; ProQuest Central, pp. 175

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2. EX 511.CO.2: Propose various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges.
3. EX 511.CO.3: Describe multithreading by using ILP and supporting thread-level parallelism (TLP).
4. EX 511.CO.4: Describe TI DSP processor family, Intel® Atom™ Processor N2000 .

THEORY:		
Unit I	Architectural Techniques	**16 Hours**
Classification of set of architecture, basic parallel processing techniques, classification of parallel architecture, Instruction level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Hierarchical memory organization, Virtual memory design, RAID, Practical approach of Interconnecting networks, Intel IA-64ILP, Multicore architecture.		
Unit II	Processors family	**20 Hours**
Vector processing, Graphics Processing units, Review of modern processor, LPC 17XX microcontroller, Programmable DSP (P-DSP) processor, TI DSP Family, TMS320C6000 series processors, on chip peripherals, Intel Xscale ® Atom™ Processor N2000, Interrupts, Overlays & Virtual memory.		

PRACTICAL: Perform at least 7 practical (including case study) using any controller of LPC17xx series:		
Practical No. 1	Title	**6 Hours**
Interfacing with RGB LED.		
Practical No. 2	Title	**2 Hours**
Interfacing of ADC and display on LCD.		
Practical No. 3	Title	**2 Hours**
Generation of PWM signal and verify output using LED and Buzzer.		
Practical No. 4	Title	**2 Hours**
Interfacing of Graphical LCD.		
Practical No. 5	Title	**2 Hours**
Interface SD Card.		
Practical No. 6	Title	**2 Hours**

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Interface EEPROM using I2C protocol.		
Practical No. 7	**Title**	**2 Hours**
Implement CAN Protocol.		
Practical No. 8	**Title**	**2 Hours**
Implement ETHERNET protocol.		
Practical No. 9	**Capstone mini projects**	**4 Hours**
Case Study: Control the speed of Motor using PWM signal		

TEXT BOOK:

1. Hennessey and Patterson, "Computer Architecture: A quantitative Approach", Fifth Edition,Morgan Kaufman Series , ISBN-13: 978-0123838728.
2. Kai Hwang, Faye A. Brigs., "Computer Architecture and Parallel Processing", , McGraw-Hill, Inc. New York, 1990, First Edition , ISBN: 0070315566.
3. David Culler, J.P. Singh with Anoop Gupta, "Parallel Computer Architecture: A Hardware/Software Approach",Morgan Kaufman ,1998, ISBN 1-55860-343-3.

REFERENCES:

1. Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architectures: A Design Space Approach", Seventh Impression, Pearson Education, ISBN 978-81-317-0208-6.
2. John P. Shen, Mikko Lipasti, "Modern Processor Design: Fundamentals of Superscalar Processors", Waveland PrInc,2013, ISBN 13: 978-1478607830.
3. Geoffrey C. Fox, Roy D. Williams, Paul C. Messina, "Parallel Computing Works!", First Edition, Morgan Kaufman, 1994,ISBN-13: 978-1558602533.

Research Papers:

1. Ben A. Abderazek, Arquimedes Canedo, Tsutomu Yoshinaga, Masahiro Sowa, "The QC-2 parallel Queue processor architecture" Journal of parallel and distributed computing, Elsevier, 2007, doi:10.1016/j.jpdc.2007.08.004, available online at ScienceDirect, J. Parallel Distrib. Comput. 68, Pages 235–245, 2008.
2. Peter Cowling, Marcus Johansson, "Using real time information for effective dynamic scheduling" Elsevier European Journal of Operational Research, 139, Pages 230–244, 2002.
3. Vinay G. Vaidya, Priti Ranadive, Sudhakar Sah, "Dynamic scheduler for multi-core systems" IEEE Xplorer through Software Technology and Engineering

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Technical Writing
			COURSE CODE	:	EX502
			COURSE CREDIT	:	2
RELEASE DATE	:	1/06/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
2	Nil	40	50	10	Nil	Nil	100

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. EX502.CEO.1: Provide overview of technical English for research paper writing,
2. EX502.CEO.2: Research methods for classroom based studies of pedagogical innovations.
3. EX502.CEO.3: Study guidelines for review of technical publications.

COURSE OUTCOMES:

Students successfully completing the course will be able to,

1. EX502.CO.1: Apply correct verb tenses; write more effectively in English for argument essays.
2. EX502.CO.2: Evaluate plagiarism and explain how to prevent it
3. EX502.CO.3: Analyze several articles to form your own opinion on a topic - make connections between several articles.
4. EX502.CO.4: Summarize a 7-8 page research paper - use source material correctly with MLA format

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(ICSTE), 2010 2nd International Conference on 3-5 Oct. 2010, DOI: 10.1109/ICSTE.2010.5608969, Electronic ISBN: 978-1-4244-8666-3.

4. N. P. Jouppi, "The Nonuniform Distribution of Instruction-Level and Machine Parallelism and its Effect on Performance", IEEE Transactions on Computers, Volume 38, Issue 12, Pages 1645-1658, 1989.

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Real Time Operating System & Design
			COURSE CODE	:	EX521
			COURSE CREDIT	:	4
RELEASE DATE	:	1/06/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	2	40	50	10	NIL	25	125

PRE-REQUISITE:

1. EX511 : Advanced Embedded Architecture & Processor

COURSE OBJECTIVES:

1. EX521.CEO.1: To develop necessary Software skill required for real time OS development.
2. EX521.CEO.1: To provide practical knowledge and understanding of real time kernel.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. EX521.CO.1: Discuss the foundation of OS and RTOS
2. EX521.CO.2: Create and run multiple tasks.
3. EX521.CO.3: Communicate between different tasks.
4. EX521.CO.4: Synchronize different task to perform in a particular order.
5. EX521.CO.5: Manage different input/output and memory resources and better utilization.

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THEORY	24 Hours

Introduction to Technical Communication, Reading Skill, Basics of English Grammar, Technical Writing, Reports and Proposals, Referencing and Styling.

Anatomy of a Research Article , Sternberg's 12 steps of Writing, Research Paper Writing, Technology- enabled Communication, Interpretation and Use of Charts, Graphs and Tables, Software Tools for Technical Writing

TUTORIAL:

1. A Group Discussion or 'Role Play' on a topic / case to be assigned to students well in time, with groups comprising six students drawn from various disciplines. Members of the group will be evaluated by two peers, all to be assigned impromptu in the class. Faculty attending will modulate the evaluations.
2. Preparation, submission of an innovative research article in the field of their interest / specialization.

TEXT BOOKS:

1. Advanced Learners's Dictionary. 8th edition, 2013., Oxford University Press; 9th Edition (2014), ISBN : 978-0194799485
2. Paul V. Anderson, Technical Communication: A Reader-centered Approach, 8th edition, 1st Indian reprint, new Delhi: Cengage Learning, 2014, ISBN: 9788131514030

REFERENCES:

1. Martin Hewings; Advanced Grammar in Use, Cambridge University Press, 2013, Second Edition , ISBN: 9780521532921.
2. Michael Swan, Practical English Usage. 3rd Edition, Oxford University Press-New Delhi, 2006, First Edition , ISBN: 9780195679892
3. John Seely, The Oxford Guide to Effective Writing and Speaking, Oxford University Press, 2005,Third Edition , ISBN: 9780199652709.
4. [http://onlinestatbook.com/Online_Statistics_Education.pdf

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THEORY:		
Unit I	**Fundamentals of OS and RTOS**	**12 Hours**
This course introduces the principles of OS and then real-time operating systems. The course begins with the fundamental elements OS. Followed by real-time multitasking, embedded application software design and development.		
Unit II	**Fundamentals of OS and RTOS**	**12 Hours**
Linux Internals: Process Management, File Management, Memory Management, I/O Management. Introduction to Linux Device Drivers: Character, USB, Block & Network.		
Unit III	**RTOS Structure**	**12 Hours**
Processor and operating system concepts relevant to multitasking systems are examined with focus on preemptive task scheduling, inter task communication and synchronization. Topics include timer services, dynamic memory allocation schemes, network communication programming interfaces and device driver supervisors. Student will get experience with major real-time operating systems (RTOSs), micro-C/OS.		

PRACTICALS: Experiments have to perform on ARM cortex M3 based microcontroller with RTOS (RTOS) by considering the Application of Three story Building lift management.		
Practical No. 1	Title	**2 Hours**
Development of Task management.		
Practical No. 2	Title	**2 Hours**
Implementation of time delay and interval.		
Practical No. 3	Title	**2 Hours**
Exploring multitasking features. .		
Practical No. 4	Title	**2 Hours**
Implementation of Semaphore Service.		
Practical No. 5	Title	**2 Hours**
Exploration of Mutex Service.		
Practical No. 6	Title	**2 Hours**
Exploring Message Queue Services.		

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Practical No. 7	Title	2 Hours
Demonstrate ISR		
Practical No. 8	**Title**	**2 Hours**
Real Time Application Development.		
Practical No. 9	**Title**	**4 Hours**
Integration of Real Time Application services implemented.		

TEXT BOOK:

1. Jean Labrosse," MicroC/OS-II The Real Time Kernel", CMP Books, 2nd Edition , ISBN-13: 978-1578201037
2. Getting Started For ARM Processor-Based Microcontrollers Building Applications with RL-ARM, by Keil Tools by ARM. (Keil's Online support Document)
3. http://www.keil.com/pack/doc/CMSIS/RTOS/html/index.html.

REFERENCEs:

1. Dr. K V K Prasad, "Embedded Real time Systems: Concept, design and programming", Dream tech press. New Edition (2003) ISBN-13: 978-8177224610.
2. Jonathan Valvano , "Embedded Systems: Real-Time Operating Systems for the Arm Cortex-M3" , Create Space Independent Publishing Platform; Fourth edition (2012), ISBN-13: 978-1466468863.

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MIT | Academy of Engineering (An Autonomous Institute)	COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.	W.E.F.	:	2016-17
	COURSE NAME	:	Digital CMOS Design
FY MTECH	COURSE CODE	:	EX522
	COURSE CREDIT	:	4
RELEASE DATE : 1/06/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	2	40	50	10	NIL	25	125

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:
1. EX522.1: To understand the fundamental in Digital domain.
2. EX522.2: To show skill in Digital CMOS domain.
3. EX522.3: To aware design tool in IC technology.

COURSE OUTCOMES:
The student after completion of the course will be able to
1. EX522.1: Design Digital circuits using CMOS.
2. EX522.2: Demonstrate Circuit design using backend software tool.
3. EX522.3: Model Digital Circuits using VHDL.

THEORY		
Module	Introduction	20 Hours

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ASIC Design Flow , MOSFET Structure & behavior , Issue in Digital Integrated Circuit Design , Quality metrics of a Digital Design, Static CMOS inverter, Switching threshold and noise margin concepts and their evaluation ,Stick diagram, Design Rule Check (DRC), CMOS parasitic, Technology scaling, Lambda parameter. Self-Study :- Static, dynamic and short circuit power dissipations.		
Module II	**Sequential & Combinational Logic**	**20 Hours**
Sequential Ckts. Design of FSM, Moore & Mealy machines, Metastability, Solutions to Metastability, Synchronization methods, VHDL codes for complex sequential machines, Hazards, Types of hazards, Method to eliminate hazards, case studies, Domino logic ,NORA logic. Self-Study :- Advanced technology in VLSI design.		

PRACTICAL:		
Practical No. 1	**Title**	**4 Hours**
To design, prepare layout and simulate CMOS Inverter for the given specifications of load capacitance, propagation delay, power dissipation, foundry etc .		
Practical No. 2	**Title**	**4 Hours**
To design CMOS logic for F = A + B (C + D) + EFG and prepare layout .		
Practical No. 3	**Title**	**4 Hours**
To draw FSM diagram, write VHDL code, synthesis, simulate, place & route for any real time application like Tea/Coffee vending machine or Traffic light controller etc.		
Practical No. 4	**Title**	**4 Hours**
To design and simulate combinational logic to demonstrate hazards. Also, simulate the same logic redesigned for removal of hazards.		
Practical No. 5	**Capstone mini project**	**8 Hours**
Case study : Implementation of real time application using VHDL.		

TEXT BOOK:

1. J P Rabaey, A P Chandrakasan, B Nikolic, "Digital Integrated circuits: A design perspective", Prentice Hall electronics and VLSI series, Second Edition , ISBN:978-0130909961
2. Sung-Mo Kang, Yusuf Leblebici, "Cmos Digital Integrated Circuits", Second edition, Tata McGraw-Hill Education. , ISBN: 9780070530775.

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2016-17
FY MTECH			COURSE NAME	:	Project Work I
			COURSE CODE	:	EX523
			COURSE CREDIT	:	2
RELEASE DATE	:	1/06/2016	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
Nil	4	---	---	---	NIL	50	50

PRE-REQUISITE:

1. EX501 : Research Methodology
2. CS502 : Technical Writing

COURSE OBJECTIVES:

1. EX521.CEO.1: To Manage the selection and initiation of individual projects.
2. EX521.CEO.2: To Conduct project planning activities that accurately forecast project costs, timelines, and quality.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. EX523.CO.1: Identify important concepts / real time problems from the knowledge of current trends /survey.
2. EX523.CO.2: Develop effective communication and presentation skills.
3. EX523.CO.3: Describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths.

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REFERENCES:

1. P. E. Allen and D. R. Holberg, "CMOS Analog Circuit Design", Second Edition, Oxford University Press , Second Edition , ISBN: 9780195116441.
2. Neil H. E. Weste, David Money Harris "CMOS VLSI Design: A Circuits and Systems Perspective" , Third Edition , ISBN: 9788131762653.

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2017-18
SY MTECH			COURSE NAME	:	Embedded Network Design
			COURSE CODE	:	EX631
			COURSE CREDIT	:	3
RELEASE DATE	:	1/06/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	--	40	50	10	Nil	Nil	100

PRE-REQUISITE:

1. EX501 : Research Methodology
2. CS502 : Technical Writing

COURSE OBJECTIVES:

1. EX631.CEO.1: To expose knowledge of Serial and parallel communication protocols
2. EX631.CEO.2: To learn Wireless sensor network communication protocols.
3. EX631.CEO.3: To develop application using USB and CAN bus for PIC microcontrollers
4. EX631.CEO.4: To develop application using Embedded Ethernet for Rabbit processors

COURSE OUTCOMES:

After completion of the course, students will be able to:

1. EX631.CO.1: Use serial & parallel communication protocol.
2. EX631.CO.2: Use communication systems through wired, wireless technology in embedded system.

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Description		48 Hours

Project work is divided in to four stages namely Project Stage I, Project Stage II, Project Stage III and Project Stage IV.

Project Stage is entirely related with selection of topic/problem by the students related to thrust areas identified by respective departments. Synopsis submission and Mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- Proposed Algorithm

Final Project Stage I Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

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3	EX631.CO.3: Implement applications using USB and CAN protocols.

THEORY:		
Unit I	**EMBEDDED COMMUNICATION PROTOCOL**	**6 Hours**
Embedded Networking: Introduction–Serial / Parallel Communication, Introduction to serial communication protocols, connectors, Bus Architecture & Interfacing of external instruments to – RS232 standard – RS485 – Synchronous Serial Protocols - Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C). PC Parallel port programming -ISA/PCI Bus protocols – Firewire		
Unit II	**WIRELESS EMBEDDED NETWORKING**	**6 Hours**
Wireless sensor networks – Introduction – Sensor node architecture – Commercially available sensor nodes -Network Topology –Localization – Time Synchronization - Energy efficient MAC protocols – SMAC –Energy efficient and robust routing – Data Centric routing Applications of sensor networks- WSN Applications - Home Control - Building Automation - Industrial Automation.		
Unit III	**USB AND CAN BUS**	**6 Hours**
USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC 18 Microcontroller USB Interface – C Programs –CAN Bus – Introduction - Frames –Bit stuffing –Types of errors – Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN		
Unit IV	**CONTROLLER AREA NETWORK**	**6 Hours**
Controller Area Network – Underlying Technology, CAN Overview – Selecting a CAN Controller – CAN development tools. Implementing CAN open Communication layout and requirements – Comparison of implementation methods – Micro CAN open – CAN open source code – Conformance test – Entire design life cycle		
Unit V	**ETHERNET BASICS**	**6 Hours**
Elements of a network – Inside Ethernet – Building a Network: Hardware options – Cables, Connections and network speed – Design choices: Selecting components –		

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Ethernet Controllers – Using the internet in local and internet communications – Inside the Internet protocol		
Unit VI	**EMBEDDED ETHERNET**	**6 Hours**
Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure		

TEXT BOOK:

1. Frank Vahid, Givargis "Embedded Systems Design: A Unified Hardware / Software Introduction", Wiley Publications , Second Edition , ISBN : 978-8126508372
2. Jan Axelson, "Parallel Port Complete", Penram publications , Third Edition , ISBN : 978-8187972020
3. Dogan Ibrahim, "Advanced PIC microcontroller projects in C", Elsevier 2008 , Second edition , ISBN : 978-0080999241
4. Jan Axelson, 'Embedded Ethernet and Internet Complete', Penram publications , ISBN : 978-8187972112.

REFERENCES:

1. Glaf P.Feiffer, Andrew Ayre and Christian Keyold, "Embedded networking with CAN and CAN open", Embedded System Academy 2005 , ISBN : 978-0929392783.
2. Robert Faludi,"Building Wireless Sensor Networks",O'Reilly,2011 , Second Edition , ISBN : 978-9350232897.
3. Ernest O. Doeblin and Dhanesh N Manik, " Measrement Systems – Application and Design", 5th Edn, TMH, 2007 , ISBN : 978-0071006972.

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2017-18
SY MTECH			COURSE NAME	:	Distributed Systems
			COURSE CODE	:	EX632
			COURSE CREDIT	:	3
RELEASE DATE	:	1/06/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	–	40	50	10	Nil	Nil	100

PRE-REQUISITE:

Nil

COURSE OBJECTIVES:

1. EX632.CEO.1: Familiarize the student with the computer architecture
2. EX632.CEO.2: To introduce the student process synchronization and inter process communication.
3. EX632.CEO.3: To acquire the required skill to distribute file systems.

COURSE OUTCOMES:

After completion of the course, students will be able to:

1. EX632.CO.1: Demonstrate experience in building large-scale distributed Applications.
2. EX632.CO.2: Relate methods in distributed systems to support scalability and fault tolerance.
3. EX632.CO.3: Design distributed applications.

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2017-18
SY MTECH			COURSE NAME	:	Optimal Control
			COURSE CODE	:	EX633
			COURSE CREDIT	:	3
RELEASE DATE	:	1/06/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	–	40	50	10	Nil	Nil	100

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:
1. EX633.CEO.1: To develop necessary foundation of Optimal control system 2. EX633.CEO.2: To provide practical knowledge and understanding of different control algorithms .

COURSE OUTCOMES:
After completion of the course, students will be able to: 1. EX633.CO.1: Discuss the optimization concept 2. EX633.CO.2: Develop code for different optimal control algorithms 3. EX633.CO.3: Appreciate the applications of MPC.

THEORY:		
Unit I	Fundamentals of Optimal control	09 Hours

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THEORY:		
Unit I	**Distributed Systems**	**9 Hours**
Computer architecture: CICS, RISC, Multi-core Computer networking: ISO/OSI Model Evolution of operating systems Introduction to distributed computing systems. DCS design goals, Transparencies, Fundamental issues Distributed Coordination		
Unit II	**Distributed Coordination**	**7 Hours**
Temporal ordering of events, Lamport's logical clocks, Vector clocks; Ordering of messages, Physical clocks, Global state detection Process synchronization		
Unit III	**Process synchronization**	**6 Hours**
Distributed mutual exclusion algorithms, Performance matrix Inter-process communication		
Unit IV	**Inter-process communication**	**7 Hours**
Message passing communication, Remote procedure call, Transaction communication, Group communication; Broadcast atomic protocols Distributed file systems		
Unit V	**Distributed file systems**	**7 Hours**
Deadlocks in distributed systems and Load scheduling and balancing techniques		

TEXT BOOK:

1. G. Coulouris, J. Dollimore ,"Distributed Systems Concepts and Design" , Fourth Edition, Addison Wesley, ISBN 0321263545.
2. M. Singhal, N.G. Shivarathri, "Advanced Operating Systems", McGraw Hill, ISBN-9780070472686.
3. Randy Chow, T. Johnson "Distributed Operating Systems and Algorithms" , Addison Wesley, ISBN-978-0201498387
4. A.S. Tanenbaum, "Distributed Operating Systems", Prentice Hall , ISBN:0-13-219908-4

REFERENCES:

1. Tanenbaum, A. S. "Distributed Operating Systems", Third Edition , Prentice Hall 1995, ISBN : 978-131-439-340.
2. Tanenbaum, A. S." Modern Operating Systems", Second Edition , Prentice Hall 2001, ISBN 0-13-031358-0
3. Bacon, J., "Concurrent Systems", Second Edition, Addison Wesley 1998, ISBN 0-201-177-676.
4. Silberschatz, A., Galvin, P. and Gagne, G.,"Applied Operating Systems Concepts", First Edition, , Wiley 2000, ISBN 978-471- 3650841

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2017-18
SY MTECH			COURSE NAME	:	Image Processing
			COURSE CODE	:	EX641
			COURSE CREDIT	:	3
RELEASE DATE	:	1/06/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	Nil	40	50	10	Nil	Nil	100

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:

1. EX641.CEO.1: To learn basics of digital image processing, image transform and filtering.
2. EX641.CEO.2: To understand the concepts and techniques of image segmentation.
3. EX641.CEO.3: To study color image processing.
4. EX641.CEO.4: To use wavelets and Multi-resolution processing on images.
5. EX641.CEO.5: To study various image compression methods.
6. EX641.CEO.6: To learn the use of VLSI architectures for image processing.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. EX641.CO.1: Illustrate basic image processing techniques.
2. EX641.CO.2: Pertain color image processing, image compression and wavelet transform in various applications of image processing.
3. EX641.CO.3: Apply image processing techniques for real life interdisciplinary applications.

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Control systems, convex sets, convex functions, linear algebra, matrix computations, MATLAB Optimization, Convex optimization, LQR.		
Unit II	**Constraint optimization**	**09 Hours**
Constrained optimization, KKT conditions, linear programming using Simplex method, quadratic programming using interior point methods and active set methods. Sequential quadratic programming. .		
Unit III	**Optimal control algorithms**	**09 Hours**
Calculus of Variations, Pontryagin's maximum principle, concept of Lagrange multipliers. Least square, unconstrained optimization, Quasi Newton method, steepest descent method, conjugates gradient method,Exterior point method , Active set method, Interior point method		
Unit IV	**Introduction to MPC**	**09 Hours**
Introduction to Model predictive control, formulations of MPC, MPC and QP methods, explicit MPC, observer design, off-set free MPC. Case studies and applications of optimal control and MPC. MATLAB		

TEXT BOOK:

1. Kirk, Donald. Optimal Control Theory: An Introduction. New York, NY: Dover, 2004. Second Edition , ISBN: 9780486434841.

REFERENCES:

1. Bertsekas, Dimitri. Nonlinear Programming. Nashua, NH: Athena Scientific, 1999. ISBN: 9781886529007.
2. Bryson, Arthur. Dynamic Optimization. Upper Saddle River, NJ: Pearson Education, 1998. ISBN: 9780201361872.
3. Scales, L. E. Introduction to Non-Linear Optimization. New York, NY: Springer, 1985. ISBN: 9780387912523.

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THEORY:		
Unit I	**Fundamentals of Image Processing**	**8 Hours**
Steps in Digital Image Processing, Components of Image Processing System, Visual perception of eye, Representation of digital images, Basic relationship between pixel, mathematical tools used in digital image processing, Intensity Transformation and spatial filtering, Filtering in Frequency domain.		
Unit II	**Image segmentation**	**6 Hours**
Fundamentals, Point, Line and edge Detection, Thresholding. Self study: Region-based segmentation		
Unit III	**Color Image Processing**	**6 Hours**
Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full Color Image processing, Smoothing and Sharpening. Case Study: Identification and mapping of an object based on color and patterns. Self Study: Image segmentation based on color.		
Unit IV	**Wavelet and Multi-resolution Processing**	**6 Hours**
Basics, Multiresolution Expansion, Wave transform in one domain and two domain.		
Unit V	**Image Compression**	**6 Hours**
Fundamentals, some basic Compression methods-Huffman coding, Arithmetic Coding, LZW coding. Digital Image watermarking. Self Study: Predictive coding and Wavelet coding.		
Unit VI	**VLSI architectures for Image Processing**	**4 Hours**
Image Processing Algorithm for FPGA Xilinx Spartan-3E (XC3S500E), VLSI architecture for Image Segmentation, Edge Detection Algorithm and Image compression. Case study: Co-simulation model of different traffic signs carried out using Image processing and Xilinx System Generator tool.		

TEXT BOOK:

1. Gonzalez and Woods, "Digital Image Processing", Pearson Education, Third Edition, LPE, ISBN: 978-81-317-1934-3.
2. Anil K. Jain, "Fundamentals of Digital Image Processing", Pearson Education India, First Edition, ISBN: 978-93-325-5191-6.

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REFERENCEs:

1. Milan Sonka And Vaclav Hlavac, "Image Processing, Analysis, and Machine Vision", Fourth Edition, Cengage India 978-9386858146

RESEARCH PAPER:

1. Prachi Dewan, Rekha Vig, Neeraj Shukla and B. K. Das, "Novel VLSI Architectures for Image Segmentation and Edge Detection Algorithm", International Journal of Computer Applications, Vol. 149, No. 10, September, 2016.
2. Mohammad I. AlAl, Khaldoon M. Mhaidat, and Inad A. Aljarrah, "Implementing Image Processing Algorithms in FPGA Hardware" IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies, 2013.

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2017-18
SY MTECH			COURSE NAME	:	ASIC Design
			COURSE CODE	:	EX642
			COURSE CREDIT	:	3
RELEASE DATE	:	1/06/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
3	Nil	40	50	10	Nil	Nil	100

PRE-REQUISITE:
Nil

COURSE OBJECTIVES:

1. EX642.CEO.1: To understand the fundamental in Digital domain.
2. EX642.CEO.2: To show skill in Application specific Design.
3. EX642.CEO.3: To get aware of design tools in IC technology.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. EX642.CO.1: Explore the fundamentals of CMOS Technology & skills of designing analog and digital ASICs.
2. EX642.CO.2: Demonstrate capabilities and limitations of CMOS logic and adjust designs to best use CMOS ASIC technologies.
3. EX642.CO.3: Model Application Specific Digital Circuits using VHDL/Verilog.

THEORY:

UNIT I	ASIC design Flow and testing strategies	18 Hours

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Types of ASICs, VLSI Design flow, Programmable ASICs - Antifuse, SRAM, EPROM, EEPROM based ASICs. Programmable ASIC logic cells and I/O cells. Programmable interconnects. Latest Version - FPGAs and CPLDs and Soft-core processors. Trade off issues at System Level: Optimization with regard to speed, area and power, asynchronous and low power system design. ASIC physical design issues. Testing techniques used in ASIC :- ATPG(Automatic test pattern generation) Fundamentals – Combinational Circuit Test Generation, Redundancy Identification ATPG for Roths D-Algorithm, Scan test, Built in self test and JTAG. Logic and Fault Simulation, algorithms for True Value Simulation and Fault Simulation. ASIC Verification and its issues.

UNIT II	Partitioning, Floor Planning and Routing	18 Hours

Physical Design, System Partitioning, Estimating ASIC size, partitioning methods. Kernighan Lin Algorithm Floor planning tools, I/O and power planning, clock planning, Pin Assignment Problem formulation, Classification of pin assignment algorithms, General and channel Pin assignments, placement algorithms, iterative placement improvement, Time driven placement methods. Global Routing – Problem formulation, Classification of global routing algorithms, Maze routing algorithms, Detailed Routing– Problem formulation, Classification of routing algorithms, Single layer routing algorithms

TEXT BOOK:

1. Michael Smith, "Application Specific Integrated Circuits", , Pearson Education Asia, 1st Edition , ISBN- 978-0321602756
2. R.S. Soin, F. Maloberti and J. Franca, "Analogue-digital ASICs: circuit techniques, design tools and applications", IEE Publications, 1st Ed. Edition , ISBN : 978-0863412592

REFERENCEs:

1. Charls Roth, "Digital System Design using VHDL", ,Tata McGraw Hill, Second .Edition , ISBN: 978-0534384623

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2017-18
SY MTECH			COURSE NAME	:	Project Work III
			COURSE CODE	:	EX611
			COURSE CREDIT	:	10
RELEASE DATE	:	1/06/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
NII	20	---	---	150	NIL	50	200

Course Contents

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- Block Diagram
- Proposed Algorithm
- Expected Outcome and Result
- Publication details of Review paper on Literature survey

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DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2017-18
SY MTECH			COURSE NAME	:	Project Work II
			COURSE CODE	:	EX601
			COURSE CREDIT	:	4
RELEASE DATE	:	1/06/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
NII	8	---	---	50	NIL	50	100

Course Contents

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- Block Diagram
- Proposed Algorithm
- Expected Outcome and Result

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MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF ELECTRONICS ENGG.			W.E.F.	:	2017-18
SY MTECH			COURSE NAME	:	Project Work IV
			COURSE CODE	:	EX621
			COURSE CREDIT	:	10
RELEASE DATE	:	1/06/2017	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ITA	ETA	IA			
NII	20	---	---	200	NIL	100	300

Course Contents

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- Block Diagram
- Proposed Algorithm
- Methodology
- Implementation
- Results
- Result Analysis
- Publication details of Review paper on Literature survey
- Publication details of paper on Result analysis

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Curriculum

For

Master of Technology

In

Heat Power

(Choice Based Credit System)

2016 Pattern

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(Dean, SMCE)

Member Secretary
Academic Council
(Dean, Academics)

Chairman
Academic Council
(Director, MiTAoE)

M Tech

Mechanical Engineering

2016 Course

(w.e.f.: Academic Year 2016-17)

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Credit Table

Year	Semester	Credits
F Y M Tech	I	12
F Y M Tech	II	10
F Y M Tech	III	12
S Y M Tech	IV	10
S Y M Tech	V	10
S Y M Tech	VI	10
Total Credits		**64**

MIT Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.	W. E. F	:	2016-17
FY MTECH	RELEASE DATE	:	01/06/2017
	REVISION NO.	:	0.0

TRIMESTER: I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	T	CREDIT
1.	PC1	AS501	Computing and Mathematics	2	2	4
2.	PC2	CS501	Management System	2	2	4
3.	PC3	CS502	Modern Technology	2	2	4
TOTAL				6	6	12

TRIMESTER: II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC4	EX501	Research Methodology	2	-	2
2.	DC1	ME511	Advanced Thermodynamics and Combustion Technology	3	2	4
3.	DC2	ME512	Advanced Heat Transfer	3	2	4
TOTAL				8	4	10

TRIMESTER: III

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	PC5	EX502	Technical Writing	2	-	2
2.	DC3	ME521	Advanced Fluid Mechanics	3	2	4
3.	DC4	ME522	Design of Heat Transfer equipment's	3	2	4
4.	DC5	ME523	Project Work - I	-	4	2
TOTAL				8	8	12

MIT | Academy of Engineering (An Autonomous Institute)	CURRICULUM STRUCTURE (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.	W. E. F	:	2017-18
SY MTECH	RELEASE DATE	:	01/06/2017
	REVISION NO.	:	0.0

TRIMESTER: IV

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DE1	ME63*	Elective course – I	3	-	3
2.	DE2	ME64*	Elective course – II	3	-	3
3.	DC6	ME601	Project Work - II	-	8	4
TOTAL				6	8	10

TRIMESTER: V

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC7	ME611	Project Work - III	-	20	10
TOTAL				-	20	10

TRIMESTER: VI

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DC8	ME621	Project Work - IV	-	20	10
TOTAL				-	20	10

DICIPLINE ELECTIVE DETAILS

1) Any one course to be selected for Trimester IV from elective course I and elective course II.
2) The corresponding course to be chosen from same domain.

Elective course – I

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DE1.1	ME631	Advances in IC engines	3	-	3
2.	DE1.2	ME632	Energy Conservation and Management	3	-	3
3.	DE1.3	ME633	Computational Fluid Dynamics	3	-	3
4.	DE1.4	ME634	Compressible Fluid flow and Gas Dynamics	3	-	3

Elective course – II

SL. No.	COURSE TYPE	COURSE CODE	COURSE	TEACHING SCHEME		
				L	P	CREDIT
1.	DE2.1	ME641	Advanced Air Conditioning and Refrigeration Technology	3	-	3
2.	DE2.2	ME642	Industrial Hydraulics and Pneumatics	3	-	3
3.	DE2.3	ME643	Cryogenics and Vacuum Technology	3	-	3
4.	DE2.4	ME644	Steam Engineering	3	-	3

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Computing and Mathematics
			COURSE CODE	**:**	AS501
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**TUTORIAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
2	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

1. AS501.CEO.1: To learn different numerical methods to solve differential equations and obtain the solution.
2. AS501.CEO.2: To understand different sampling techniques, analyze the data and process it to obtain a quality product.
3. AS501.CEO.3: To learn mathematical methodologies, techniques and mathematical tools to obtain an optimal solution of the problems.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. AS501.CO.1: Identify the accurate solution method (minimizing the error) to solve the differential equation with given conditions and obtains the particular solution of the problem.
2. AS501.CO.2: Collect, categorize, analyze, processing mathematically the data, thereby to obtain a quality proven product.

3. AS501.co.3: Understand the physical situation, identify the accurate mathematical model and solve the problem mathematically or with the use of Statistical tools available and finally interpret it in the original context

THEORY:

Computational Methods to Ordinary Differential Equations: Euler's Method, Heun's Method, Mid-point Method, Runge-Kutta Method and Multi step Methods- Explicit Adams-Bash forth technique and Implicit Adams-Moulton techniques, Adaptive RK Method, Embedded RK Method, Higher Order Ordinary differential equation- Shooting Method.

Operations Research: Simplex method: Feasible solution to system of equations, reduction of feasible to basic feasible solution, solution of LPP: computational procedure, Penalty (Big M) method. Transportation problem: North-West corner method, Least-cost method, Vogel's approximation method.

Statistics and Quality Control: Central Tendency of data, Variance, Standard Deviation, Coefficient of Variance, Moments, Correlation, Coefficient of Correlation, Regression lines. Control Charts for Process Location: $\bar{X}$ Chart, Control Charts for Process Variation: S Chart, R charts.

PRACTICAL:

Practical No. 1	**Title:** First Degree Differential equation	**2 Hours**
Introduction to first order first degree Differential equation and its actual solution		
Practical No. 2	**Title:** Differential equation methods	**2 Hours**
Euler's Method, Heun's Method, Mid- point Method, Runge-Kutta Method.		
Practical No. 3	**Title:** Differential equation Methods	**2 Hours**
Adams-Bash forth technique and Implicit Adams-Moulton techniques.		
Practical No. 4	**Title:** Differential equation Methods	**2 Hours**
Adaptive RK Method Embedded RK Method, Shooting Method.		
Practical No. 5	**Title:** Simplex method Feasible solution	**2 Hours**
Solution of system of equations using simplex method (Feasible solution).		
Practical No. 6	**Title:** simplex method (Feasible to basic feasible solution).	**2 Hours**
Solution of system of equations using simplex method (Feasible to basic feasible solution).		
Practical No. 7	**Title:** Transportation problem	**2 Hours**
Transportation problem: North-West corner method, Least-cost method.		
Practical No. 8	**Title:** Vogel's approximation method	**2 Hours**
Transportation problem: Vogel's approximation method.		

Practical No. 9	**Title:** Central Tendency of data, Variance, Standard Deviation	**2 Hours**
Central Tendency of data, Variance, Standard Deviation.		
Practical No. 10	**Title:** Moments, Correlation, Coefficient of Correlation	**2 Hours**
Moments, Correlation, Coefficient of Correlation.		
Practical No. 11	**Title:** Regression Lines.	**2 Hours**
Regression Lines.		
Practical No. 12	**Title:** Charts	**2 Hours**
$\overline{X}$ Chart, S Chart, R chart		

TEXT BOOKS:

1. Numerical Methods for Engineers by Steven C. Chapra& Raymond P. Canale, sixth edition, ISBN 978–0–07–340106–5, MHID 0–07–340106–4.
2. Operations Research by KantiSwarup, P.K.Gupta, Man Mohan, ISBN: 81-8054-226-2.
3. Statistical Methods Vol. 2 by Das, ISBN:9780070263512.

REFERENCES:

1. Numerical Methods by V.N. Vedamurthy&N.Ch.S.N.Iyenger, First edition, ISBN: 9788125906308.
2. Operations Research by S.D.Sharma.
3. Statistical Methods Vol. 1 by Das, ISBN:9780070263505.
4. AHA Statistical Update, AS Go, D Mozaffarian, VL Roger, EJ Benjamin… - Circulation, 2013 - Am Heart Assoc.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Management System
			COURSE CODE	**:**	CS501
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**TUTORIAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
2	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:
NIL

COURSE OBJECTIVES:

1. CS501.CEO.1: To enable M.Tech Students in efficiently and effectively discharging any business related roles, which they may be assigned, after successful completion of their Post- Graduation from MITAOE.
2. CS501.CEO.2: To inculcate a spirit of entrepreneurship by promoting inquisitiveness for technological innovations, their conversion into business ideas and evolving strategy for induction of new products in new markets for growth of their entrepreneurial projects.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS501.CO.1: Describe and explain the Significance of Businesses in Society, their Management and linking these up with other relevant systems.
2. CS501.CO.2: Critically analyze the organizational structure, systems, competencies and identify the areas of improvement
3. CS501.CO.3: Draw a model of power structure and critically analyse with a view to improving it for achieving greater heights in objectives
4. CS501.CO.4: Identify and describe potential problem areas and advise proactive measures to install efficient measures.
5. CS501.CO.5: Identify Key Result Areas (KRAs), new area of growths, draw plans to achieve, implement them and provide effective leadership in the process, creating conducive environment in the organization

THEORY:

Concept of Systems; Concept of Business; Concept of Management; Concept of Learning and its mapping with Bloom's Taxonomy.

Nature and Process Management with an Input-Output Model, seen in scenarios of different aspects of social life.

Role of a Business Firm as a national economic entity with understanding of Macro, Micro and International economics. An understanding of products and services, circular model of flow of money, products and services in a society.

Essentials of Business Management, functioning and growth of a Business Unit with understanding of Break-Even Analysis, Abell's Three Dimensional model of business growth, various business functions in an organization and changing focus from production oriented business to customer orientation and value co-creation.

Various Schools of Thought on Management based on changing concepts of economics and evolution of Business Strategy. Need to understand innovative ways to evolve a new suitable management system for an organization with special focus on new Strategies at the bottom of the pyramid, quality as strategy, disruptive innovation and diffusion of technology.

Decision making, as an essence of management. Concept of Games Theory and its use in decision making.

Essentials of Project Management with use of Critical Path Method (CPM) and Programme Evaluation

and Review Techniques (PERT).

Utilization of concepts of commanding, directing, managing and leading towards effective management of an organization. Skillful use of Emotional Intelligence in conflict management. Techniques for Self Management and Stress Management for improving personal efficiency and effectivity.

Growing significance of Human Relations, with use of Virtual and Informal Organizations and use of Social Media for management of emerging organizations with preponderance of knowledge workers and growing use of robotics and Artificial Intelligence. Process of evolving a Training needs in an organization and methodology for their fulfillment.

Concepts of Invention Innovation, Entrepreneurship and Technology Management for induction of new products in market. Business startups and growth in current Indian Environment. Presentation on Entrepreneurial plans

PRACTICAL:

Practical No. 1	Corporate management case presentation	**4 Hours**
A corporate management case to be selected by students on their own choice, writing a Synopsis (2.5 Marks) and its Presentation before the class in 5 Minutes including answers to questions by class (2.5 Marks		
Practical No. 2	Entrepreneurial Business Plan presentation	**4 Hours**
Preparation and submission of an innovative and entrepreneurial Business Plan of student's own choice, submitting a Power Point Presentation to be evaluated by Faculty (2.5 Marks), and its presenting/ defending it before the class, to be evaluated by two peers on a Format to be given by Faculty (2.5 Marks)		

TEXT BOOKS:

1. Management – A Global and Entrepreneurial Perspective; Harold Koontz, Heinz Weihrich and Mark V Cannice, Tata McGraw Hill Publications, 12thEdition, 2008.
2. Management and Entrepreneurship in Indian Environment – A Perspective through Joining the Dots; Vachaspati Mishra; Himalaya Publishing House, First Edition, 2016.

REFERENCES:

1. Dr A Sivathanu Pillai; Technology Leadership – A Revolution in the Making; Tata McGraw Hill Publishing Company Ltd, New Delhi, 2005
2. James A Alexander and Mark W Hordes; S-Business: Reinventing the Services Organisations, Select Books Inc Biztantra, 2006
3. Vohra ND, Quantitative Techniques in Management; Tata McGraw Hill Publishing Company Limited, Third Edition 2007
4. Nakkiran S and Karthikeyan M; Training Techniques for Management Development; Deep and Deep Publications Pvt Ltd; 2007
5. Kshetri, Nir, “The Indian Environment for Entrepreneurship and Small Business Development” in *StudiaNegotia*, 56 (LVI), 4, 2011, 35-52

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Modern Technologies
			COURSE CODE	**:**	CS502
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	1/08/2016	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**TUTORIAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
2	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

1. CS502.CEO.1: To get familiar with big data, wireless sensor networks and Internet of Things technology.
2. CS502.CEO.2: To acquire the knowledge of geometrical transformation and grasp the animation techniques.
3. CS502.CEO.3: Study basic principles of nano car and different modern technologies
4. CS502.CEO.4: Apply their knowledge to understand different statistical tools and analysis software.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS502.CO.1: Understand the knowledge of advanced software's.
2. CS502.CO.2: Apply their knowledge in different fields.
3. CS502.CO.3: Apply advance technologies in automobile industry.

THEORY:

Big Data: Big Data, Hadoop Distributed File System, Network: Types of Networks, Internet Architecture, Wired and Wireless MAC, RFID, Internet of Things, IoT Applications, R Programming.

2D and 3D Geometrical Transformations: Scaling, Translation, Rotation, Reflection, Viewing Transformations: Parallel and Perspective Projection, Curves and Surfaces: Cubic Splines, Bezier Curves, B-Splines, Animation Technology – OpenGL, Maya, Blender.

Advance technologies: Nano Car Air velocity, Air conditioning system, Different modern energy storage devices, Modern evacuated tube technologies, Advanced Sensor technology, recent photovoltaic technology, Controlling of thermal power plants and its instrumentation, Agricultural robot, Closed ecological systems, Artificial photosynthesis, Energy harvesting.

Modern statistical tools like MATLAB, SPSS, etc., Mathematical Modeling, Data interpretation technologies like ANOVA, Introduction of Analysis software's like ANSYS, Star CD, etc., ERP system, SCADA, PLC System, Electronic Control Unit (ECU), Sources of Energy storage, fuel efficient engine through closed loop control system. Advances in Electronic Cooling Equipments. Bio-medical devices, their Applications, FDA approval procedures, A Certification.

Advances in automotive electronics: Night vision systems, Driver alertness monitoring, Event data recorders (automotive black boxes), Accident recorders, Adaptive cruise control systems, Autonomous emergency breaking systems, Electronic throttle control, On-Board diagnostics systems, Blind spot detection, Navigation systems, Communication systems, Engine control

PRACTICAL:

Practical No. 1	**Title:** Animation Technologies	**2 Hours**
Case study on Animation Technologies		
Practical No. 2	**Title:** Wireless Sensor Application	**2 Hours**
Case study on Wireless Sensor Application.		
Practical No. 3	**Title:** Internet of Things	**4 Hours**
Case study on IoT (Smart City, Healthcare, Agriculture).		
Practical No. 4	**Title:** Hadoop	**4 Hours**
Case study on Big Data – Hadoop Configuration.		
Practical No. 5	**Title:** Data interpretation	**2 Hours**
Case study on Data interpretation technologies.		
Practical No. 6	**Title:** Agricultural robot	**2 Hours**
Case study on Agricultural robot.		
Practical No. 7	**Title:** Electronic cooling equipments.	**2 Hours**

Case study on Electronic cooling equipments.		
Practical No. 8	**Title:** Adaptive cruise control system	**2 Hours**
Case study on Adaptive cruise control system		

TEXT BOOKS:

1. S. Harrington, S. Harrington, “Computer Graphics”, 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07 –100472 – 6.
2. Anthony F. Collings , Christa Critchley,”Artificial Photosynthesis: From Basic Biology to Industrial Application.” 2014, ISBN: 978-3-527-31090-6.
3. NasimulAlam Syed, Sanjib Islam, Saroj Kumar Patel, “Advanced Guide to MATLAB: Practical Examples in Science and Engineering” I K International Publishing House Pvt. Ltd., 2015, ISBN: 978-9384588359.
4. William B. Ribbens, Ph.D., Norman P. Mansour, Gerald Luecke, Charles W. Battle, Edward C. Jones and Leslie E. Mansir, “Understanding Automotive Electronics”, ISBN: 978-0-7506-7599-4.
5. Bosch Automotive Electrics and Automotive Electronics: Systems and edited by Robert Bosch GmbH, Springer science and digital media,ISBN-13: 978-3658017835, 2013.

REFERENCES:

1. J. Foley, V. Dam, S. Feiner, J. Hughes, “Computer Graphics Principles and Practice”, 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.
2. Donald Norris, “ The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black”, McGraw-Hill Education, ISBN-13: 978-0071835206, 2015.
3. MadhuJagadeesh, SoumendraMohanty, HarshaSrivatsa, “Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics”, 1st Edition, Apress,ISBN-13: 978-1430248729, 2013.
4. Pritpal Singh, TanjotSethi , Bunil Kumar Balabantaray, BibhutiBhushanBiswal, “Advanced vehicle security system”, IEEE, International Conference on “Innovations in Information, Embedded and Communication Systems (ICIIECS)”, pages 1-6, 2015.
5. Hermann Kopetz , Stephan Poledna, “Autonomous Emergency Braking: A System-of-Systems perspective”, IEEE, Conference on “Dependable Systems and Networks Workshop (DSN-W)”, 43rd Annual IEEE/IFIP, pages 1-7, 2013.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 -2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Research Methodology
			COURSE CODE	**:**	EX501
			COURSE CREDIT	**:**	2
RELEASE DATE	**:**	**1/06/2017**	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
2	Nil	40	50	10	Nil	Nil	100

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

1. EX501.CEO.1: To develop understanding of the basic framework of research process.
2. EX501.CEO.2: To develop an understanding of various research designs and techniques.
3. EX501.CEO.3: To identify various sources of information for literature review and data Collection.
4. EX501.CEO.4: To develop an understanding of the ethical dimensions of conducting applied research.
5. EX501.CEO.5: Appreciate the components of scholarly writing and evaluate its quality.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. EX501.CO.1: Illustrate the objective & paradigm for the research.
2. EX501.CO.2: Establish & validate the results & analysis.
3. EX501.CO.3: Explore the ethical issues concerning the participation & data collection.

THEORY:		
Unit I	**Research - Introduction**	**8 Hours**
What is research, Research definition, Objective & paradigm for the research, Terminologies, Identifying & defining the research problem, Type of research , Literature &it's analysis.		
Unit II	**Research Framework**	**6 Hours**
Development of theoretical and conceptual frame work , Ethical Issues concerning research participants, Ethical issues in data collection, Data collection methods.		
Unit III	**Hypothesis**	**6 Hours**
What is Hypothesis - Definition and functions of hypothesis, Processing operations, Different types of Hypothesis ,		
Unit IV	**Data processing**	**6 Hours**
Problems in data processing, Coding descriptive data and quantitative data, Sampling techniques.		
Unit V	**Statistics in research**	**6 Hours**
Multivariate analysis, Concept of regression, Establishing validity and reliability of the result, Principal component analysis, variance & covariance- ANOVA, ANOCOVA.		
Unit VI	**Writing research proposal**	**4 Hours**
Interpretation and its meaning, Readability of Manuscript, techniques, Contents, Report writing, structure, types of report, Procedure of writing research proposal, Writing as thinking, Habit of writing, Skills and thought process in technical writing, Role of computer in technical writing .		

TEXT BOOK:

1. John W. Creswell," Research Design-Qualitative & Quantitative Approaches", SAGE publications, New Delhi ISBN: 0-8039-5254-6
2. Ranjit Kumar," Research Methodology- A Step by Step Guide for Beginners", 2nd ed., Pearson publication, New Delhi ISBN: 978-81-317-0496-7

REFERENCEs:

1. C. R. Kothari," Research Methodology, Methods & Techniques", 2nd Edition, New Age International Publication ISBN: 978-81-224-1522-3
2. Hamdy A. Taha, "Operation Research- An Introduction", 8th Edition, Pearson Publication.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
F.Y. MTECH			**COURSE NAME**	**:**	Advance Thermodynamics and Combustion Technology
			COURSE CODE	**:**	ME 511
			COURSE CREDITS	**:**	4
RELEASE DATE	**:**	01/06/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:
NIL

COURSE OBJECTIVES:

1. ME511.CEO.1 To understand the thermodynamic process and the methods for analyzing thermodynamic properties.
2. ME511.CEO.2 To determine the direction of the process by the analysis of exergy, entropy, free energy, etc.
3. ME511.CEO.3 To master the property equations and thermodynamic properties of real gases, master the methods for analyzing multi-component systems.
4. ME511.CEO.4 To acquire basic knowledge of chemical thermodynamics, and grasp the thermodynamic processes and properties of special systems.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME511.CO.1: The ability to perform thermodynamic analysis of realistic problems using computer software
2. ME511.CO.2: The ability to apply the first and second laws to combustion processes.
3. ME511.CO.3: Knowledge with property equations and thermodynamic properties of real gases.
4. ME511.CO.4: The thermodynamic properties and basic concepts of phase equilibrium of multi component systems.
5. ME511.CO.5: Ability to understand the chemical thermodynamic basis and the thermodynamic process and properties of special systems.

THEORY:

Unit I	**Equation of State and Laws Of Thermodynamics**	**8 Hours**

State postulate for Simple System and equation of state, Ideal gas equation, Deviation from ideal gas, Equation of state for real gases, generalized Compressibility chart, Law of corresponding states 2nd law Analysis for Engg. Systems, Entropy flow & entropy generation, Increase of entropy principle, entropy change of pure sub, T-ds relations, entropy generation, thermoelectricity.

Unit II	**Availability Analysis and Thermodynamic Property Relations**	**8 Hours**

Reversible work - availability - irreversibility and second – law efficiency for a closed system and steady – state control volume. Availability analysis of simple cycles. Thermodynamic potentials. Maxwell relations. Generalized relations for changes in entropy - internal energy and enthalpy - generalized relations for Cp and Cv Clausius Clayperon equation, Joule – Thomson coefficient. Bridgeman tables for thermodynamic relations.

Unit III	**Real Gas Behavior and Multi – Component Systems**	**6 Hours**

Different equations of state – fugacity – compressibility - principle of corresponding States - Use of generalized charts for enthalpy and entropy departure - fugacity coefficient, Lee – Kesler generalized three parameter tables. Fundamental property relations for systems of variable composition. Partial molar properties. Real gas mixtures - Ideal solution of real gases and liquid - activity - equilibrium in multi-phase systems - Gibbs phase rule for non – reactive components.

Unit IV	**Chemical Thermodynamics and Equilibrium**	**6 Hours**

Thermochemistry - First law analysis of reacting systems - Adiabatic flame temperature-entropy change of reacting systems - Second law analysis of reacting systems - Criterion for reaction equilibrium. Equilibrium constant for gaseous mixtures - evaluation of equilibrium composition.

Unit V	Statistical Thermodynamics	6 Hours
Microstates and Macrostates - thermodynamic probability - degeneracy of energy levels - Maxwell – Boltzman, Fermi – Diarc and Bose – Einstein statistics - microscopic interpretation of heat and work, evaluation of entropy, partion function, calculation of the Macroscopic properties from partition functions.		
Unit VI	**Irreversible Thermodynamics**	**4 Hours**
Conjugate fluxes and forces - entropy production Onsager's reciprocity relations - thermo – electric phenomena, formulations.		

PRACTICAL: Perform ANY THREE Lab experiments/Assignment.		
Practical No. 1	Steady flow cyclic system.	**4 Hours**
Computer aided energy analysis of steady flow cyclic system.		
Practical No. 2	Mixture of gases, gas and vapour.	**4 Hours**
Study of mixture of gases, gas and vapour, estimation of properties and preparation of charts.		
Practical No. 3	Statistical thermodynamic techniques.	**4 Hours**
Analysis of ideal gas system using statistical thermodynamic techniques.		
Practical No. 4	Behavior of pure substance	**2 Hours**
Study of behavior of pure substance with change in pressure and temperature.		
Practical No. 5	Adiabatic flame temperature	**2 Hours**
Preparation of computer program to study the effect of percentage of theoretical on adiabatic flame temperature and equilibrium composition for a hydrocarbon fuel. (Program to be run for variable input data.)		

TEXT BOOK:

1. Adrian Bejan, "Advanced Engineering Thermodynamics", John Wiley and Cons, 3rd Edition,2006, (ISBN: 978-0-471-67763-5)
2. J.P. Holman, "Thermodynamics", McGraw – Hill Inc., 1988. Fourth Edition, (ISBN: 9780070296084) 3.
3. Yunus A. Cengel , Michael A. Boles, " Thermodynamics- An Engineering approach", McGraw-Hill Education , 8th International edition, (ISBN13 9789814595292)

REFERENCES:

1. Kenneth Wark Jt.m, “Advanced Thermodynamics for Engineers”, McGrew – Hill Inc., 1995, (ISBN : 9780071135504)
2. Smith J.M. and Van Ness H.C.,“Introduction to Chemical Engineering Thermodynamics”, McGraw – Hill Inc., Fourth. Edition, 1987. (ISBN : 0070587019)
3. Sonntag R.E., and Van Wylen G, “Introduction to Thermodynamics, Classical and Statistical Thermodynamics”, John Wiley and Sons, Third Edition, 1991, (ISBN :978-0471614272)
4. Sears F.W. and Salinger G.I., ”Thermodynamics, Kinetic Theory and Statistical Thermodynamics”, Narosa Publishing House, New Delhi, Third Edition 1993, (ISBN : 978-81-85015-71-2)

MIT Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
F.Y. MTECH			**COURSE NAME**	**:**	Advanced Heat Transfer
			COURSE CODE	**:**	ME 512
			COURSE CREDITS	**:**	4
RELEASE DATE	**:**	01/06/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	NIL	40	50	10	2	NIL	100

PRE-REQUISITE:
NIL

COURSE OBJECTIVES:

1. ME 512.CEO.1 To identify different mode of heat and mass transfer occurring in thermal system.
2. ME 512.CEO.2 To understand the methods of analyzing a heat exchanger.
3. ME 512.CEO.3 To analyze steady and transient conduction problem.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME512.CO.1: Recall basic Knowledge while working in Industries.
2. ME512.CO.2: Understand the phenomenon of Natural Convection and Forced Convections of heat transfer.
3. ME512.CO.3: Apply analytical/logical skill while Modeling various Heat transfer phenomenon.
4. ME512.CO.4: Demonstrate the real life Heat transfer problems.

THEORY:		
Unit I	**Introduction to Modes and Laws of Heat Transfer**	**6 Hours**
Simultaneous Heat Transfer Mechanism, Steady and Transient Heat Transfer, Multidimensional Heat Transfer, Thermal Conductivity, Thermal diffusivity, Various Boundary and Initial Conditions, General Heat Conduction Equation, Thermal Resistance, Generalized Thermal Resistance Networks, Thermal Contact Resistance.		
Unit II	**Transient Heat Conduction**	**6 Hours**
Lumped capacitance and its validity, General lumped capacitance analysis, spatial effects. Problems related with conventional geometries. Use of Haisler and Grober charts, Biot and Fourier numbers.		
Unit III	**Principle of Fluid flow and Convective heat transfer**	**6 Hours**
Concept of velocity and thermal boundary layers: Laminar and Turbulent flow. Navier-stokes equations and convection equation. Boundary layer approximations and special conditions. Boundary layer similarity. The normalized convection transfer equations. Dimensionless parameters & physical significance. Reynolds analogy, Chilton-Colburn analogy.		
Unit IV	**Natural Convection Physical Mechanism**	**6 Hours**
Equation of motion and Grashoff's Number, Natural Convection over surfaces, Natural convection from finned surfaces and PCBs, Natural Convection inside enclosures (Rectangular, Cylinder and Sphere), Combined Natural Convection and Radiation, Combined Natural and Forced Convection		
Unit V	**Forced Convection External Forced Convection**	**6 Hours**
Parallel flow over Flat plates, Flow across cylinders and spheres, Flow across tube banks Internal Forced Convection Entrance region, Constant surface heat flux, Constant surface temperature, Laminar and Turbulent flow in tubes.		
Unit VI	**Boiling and Condensation**	**6 Hours**
Boiling: Boiling modes, the boiling curve, modes of pool boiling, correlations. Forced convection boiling. Two phase flow. Condensation: Physical mechanisms, laminar film condensation on a vertical plate. Turbulent film condensation, film condensation on radial systems, film condensation in horizontal tubes, on banks of tubes, Drop-wise condensation correlations. Thermal Radiation: Thermal radiation, Blackbody radiation, Radiation intensity, Radiation properties, Atmospheric and Solar radiation, Shape factor, Radiation heat transfer in two surface enclosures, Radiation shields, Radiation exchange between Emitting and Absorbing gases.		

PRACTICALS:		
Practical No. 1		**4 Hours**
Transient Heat Conduction using Heisler and Grober charts.		
Practical No. 2		**4 Hours**
Numerical method in heat conduction & convection.		
Practical No. 3		**4 Hours**
Combined Natural and Forced Convection heat transfer.		
Practical No. 4		**4 Hours**
Boiling and Condensation.		
Practical No. 5		**4 Hours**
Radiation Heat Transfer in Two Surface Enclosures.		

TEXT BOOK:

1. John H Lienhard, “A Heat Transfer Textbook: Fourth Edition”, Dover Publications, (ISBN-13 : 978-0-486-47931-6)
2. S.P. Sukhatme, “Heat Transfer” Fourth Edition, Universities press, (ISBN: 81 7371 544 0)
3. Y V C Rao, “Heat Transfer” First Edition, Universities press, (ISBN: 81 7371 384 7)
4. Suhas V. Patankar, “Numerical Heat Transfer and Fluid Flow”, (ISBN: 0-89116-522-3)

REFERENCES:

1. Bergman, Theodore L.; Lavine, Adrienne S.; Incropera, Frank P.; DeWitt, David P., “Fundamentals of Heat and Mass Transfer, Fundamentals of Heat and Mass Transfer“, New York,1985,Wiley Publication, 2011,(ISBN 0470501979)
2. Frank Kreith:, “Principles of Heat Transfer”, Harper and Row Publishers, New York, Fourth edition,1986, (ISBN 0060437855)
3. Donald Q. Kern, “Process Heat Transfer”, Tata McGraw Hill Publishing Company Ltd., New Delhi. 1950, (ISBN 9780074632178)
4. Oszisik, “Heat Transfer”, McGraw Hill,1985, (ISBN 9780070664609)

5. Yunus A. Cengel, “Heat Transfer A Practical Approach”, McGraw Hill International Edition, 2007, (ISBN 0073129305)
6. J P Holman, “Heat Transfer”,McGraw-Hill Companies;1996, 8th edition, (ISBN 0078447852)

MIT Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 -2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Technical Writing
			COURSE CODE	**:**	EX 502
			COURSE CREDIT	**:**	2
RELEASE DATE	**:**	**1/06/2017**	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**TW**	**IA**			
2	Nil	40	50	10	Nil	Nil	100

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

1. EX502.CEO.1: Provide overview of technical English for research paper writing,
2. EX502.CEO.2: Research methods for classroom based studies of pedagogical innovations.
3. EX502.CEO.3: Study guidelines for review of technical publications.

COURSE OUTCOMES:

Students successfully completing the course will be able to,

1. EX502.CO.1: Apply correct verb tenses; write more effectively in English for argument essays.
2. EX502.CO.2: Evaluate plagiarism and explain how to prevent it
3. EX502.CO.3: Analyze several articles to form your own opinion on a topic - make connections between several articles.
4. EX502.CO.4: Summarize a 7-8 page research paper - use source material correctly with MLA format

THEORY:

Introduction to Technical Communication, Reading Skill, Basics of English Grammar, Technical Writing, Reports and Proposals, Referencing and Styling.

Anatomy of a Research Article , Sternberg's 12 steps of Writing, Research Paper Writing, Technology- enabled Communication, Interpretation and Use of Charts, Graphs and Tables, Software Tools for Technical Writing

PRACTICAL/TUTORIAL:

1. A Group Discussion or 'Role Play' on a topic / case to be assigned to students well in time, with groups comprising six students drawn from various disciplines. Members of the group will be evaluated by two peers, all to be assigned impromptu in the class. Faculty attending will modulate the evaluations.
2. Preparation, submission of an innovative research article in the field of their interest / specialization.

TEXT BOOK:

1. Advanced Learners's Dictionary. 8th edition, 2013., Oxford University Press; 9th Edition (2014), ISBN : 978-0194799485
2. Paul V. Anderson, Technical Communication: A Reader-centered Approach, 8th edition, 1st Indian reprint, new Delhi: Cengage Learning, 2014, ISBN: 9788131514030

REFERENCES:

1. Martin Hewings, Advanced Grammar in Use, Cambridge University Press, 2013, ISBN: 9780521532921.
2. Michael Swan, Practical English Usage. 3rd Edition, Oxford University Press-New Delhi, 2006, ISBN: 9780195679892
3. John Seely, The Oxford Guide to Effective Writing and Speaking, Oxford University Press, 2005, ISBN: 9780199652709.
4. [http://onlinestatbook.com/Online_Statistics_Education.pdf

MIT Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
S.Y. MTECH			**COURSE NAME**	**:**	Advanced Fluid Mechanics
			COURSE CODE	**:**	ME 521
			COURSE CREDITS	**:**	4
RELEASE DATE	**:**	01/06/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	2	40	50	10	2	NIL	100

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

1. ME 521.CEO.1 To remember the fundamentals of fluid mechanics.
2. ME 521.CEO.2 To understand the concept of governing equations in different forms.
3. ME 521.CEO.3 To apply knowledge of parallel flow for several airfoils.
4. ME 521.CEO.4 To analyze viscous flow and compressible flow.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME502.CO.1: Recall basic of fluid mechanics.
2. ME502.CO.2: Understand the concept of governing equations in different forms.
3. ME502.CO.3: Apply knowledge of parallel flow for several airfoils.
4. ME502.CO.4: Analyze viscous flow and compressible flow.

THEORY:		
Unit I	**Governing Equations: Review of Fluid Mechanics**	**6 Hours**
Definition and properties of Fluids, Fluid as continuum, Continuum model, and Flow kinematics: - Langragian and Eulerian description, Basic flow-analysis techniques, Flow Patterns: Streamlines, Streak lines, and Pathlines. Reynolds transport theorem, Conservation of mass, Linear momentum equation, Energy equation, Frictionless flow, Bernoulli equation. Acceleration field of a fluid, differential equation of mass conservation, Boundary Conditions for the basic equations, Velocity Potential, Stream Function, Vorticity.		
Unit II	**Navier-Stokes Equations**	**6 Hours**
Generalized form of NSE, Special forms: Euler equations, Bernoulli equation **Exact solutions:** fully developed flow in channel, pipe, flow between concentric rotating cylinders, Couette flow, Stokes First problem (unsteady flow), Creeping flow past a sphere, cylinder.		
Unit III	**Potential Flows**	**6 Hours**
Elementary Plane-Flow Solutions: Circulation, Superposition of Plane-Flow Solutions: Irrotational vortex, Vortex flow, Doublet, Flow past a circular cylinder, Magnus effect; Kutta-Joukowski lift theorem; Concept of lift and drag. .Complex potential functions. Conformal transformation to analyze the flow over flat plate, cylinder, oval body and airfoils. Thin airfoil theory – generalized airfoil theory for cambered and flapped airfoils.		
Unit IV	**Boundary Layers**	**6 Hours**
Boundary layer assumptions, equations, Flow over a flat plate, Similarity (Blasius) solution, Falkner-Skan equation, Momentum integral method, Flow separation.		
Unit V	**Viscous flow**	**6 Hours**
Laminar and turbulent Flow - laminar flow between parallel plates, circular pipes. Turbulent flow, losses during flow through pipes. Pipes in series and parallel – transmission of power through pipes, characteristics of turbulence, laminar-turbulent transition, Correlation functions, Mean and fluctuations, Governing equations, Turbulent boundary layer, Boundary conditions, shear stress models, Prandtl's mixing length, Velocity profile over a flat plate and in pipes, Equations for free shear layers: mixing layer, plane and axisymmetric jet, and wake, two equation model (k-ε), Large Eddy Simulation, Various Turbulent Models.		
Unit VI	**Compressible Flow**	**6 Hours**
One-dimensional flow: Fanno and Rayleigh curve, Normal shock relations, Introduction to oblique shocks, Prandtl-Meyer expansion waves, and simple supersonic wind tunnel – Design of supersonic		

wind tunnel Nozzle. Two dimensional Subsonic flow: - Flow with small perturbations, Flow past a wave shaped wall – Gothert's rule-Laitone's modification of Prandtl Glauret rule – affine transformations – Hodograph method –Tangent Gas approximations – Rayleigh Johnson method.

PRACTICALS:		
Practical No. 1		
Flow over a cylinder/sphere at different Re. Pressure variation over the body and drag Estimation.		
Practical No. 2		**2 Hours**
Flow past an aerofoil: Pressure measurements, calculation of lift.		
Practical No. 3		**4 Hours**
Flow through a converging-diverging nozzle: subsonic and supersonic flows.		
Practical No. 4		**4 Hours**
Friction factor determination: incompressible flow through pipes/ducts of variable cross section.		
Practical No. 5		**4 Hours**
Laminar/Turbulent boundary layer over a flat plate.		

TEXT BOOK:

1. Dr. R K Bansal, Fluid Mechanics and Hydraulic Machines, Laxmi Pulications,2010, (ISBN: 978-81-318-0815-3)
2. E. Ratha Krishnan, "Gas Dynamics", PHI Learning Pvt. Ltd New Delhi, 2004, (ISBN : 9788120348394)

REFERENCES:

1. S.M.Yahya, "Fundamentals of Compressible flow", New Age Publishers, Third edition, 1992, (ISBN: 8122414680)
2. Streeter, "Fluid Dynamics", McGraw Hill, New York, 2010, (ISBN: 9780070701403)
3. William Graebel, "Advanced Fluid Mechanics", Academic Press,2007, (ISBN: 9780123708854)
4. A J Raudkivi , Owls books, Toledo, "Advanced Fluid Mechanics", USA, 1972, (ISBN : 0470709405)

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
F.Y. MTECH			**COURSE NAME**	**:**	Design of Heat Transfer Equipment's
			COURSE CODE	**:**	ME 522
			COURSE CREDITS	**:**	4
RELEASE DATE	**:**	01/06/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	2	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. ME 512 Advanced Heat Transfer

COURSE OBJECTIVES:

1. ME 522.CEO.1 To understand the functioning of different heat transfer equipment's.
2. ME 522.CEO.2 To Understand thermal behavior of heat transfer equipment's.
3. ME 522.CEO.3 To Design the heat transfer equipment's from thermal point of view.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME522.CO.1:List the different types heat exchangers, cooling towers and furnaces
2. ME522.CO.2: Select the different types of heat exchangers, cooling towers and furnaces according to application.
3. ME522.CO.3: Apply the different methods to calculate effectiveness and pressure drop in heat exchanger.
4. ME522.CO.4: Analyze different heat transfer Equipment's from thermal point of view.
5. ME522.CO.5 Select and design appropriate heat transfer equipment for a given application.

THEORY:

Unit I	**Classification of Heat Exchangers**	**8 Hours**

Introduction, Classification, Overview of Heat Exchanger Design Methodology, Process and Design Specifications, Thermal and Hydraulic Design, Mechanical Design, Optimum Design , Heat Exchanger Variables and Thermal Circuit, Assumptions, Basic Definitions, ε - NTU Method , The P-NTU Method , TEMA , Multi-pass Exchangers, LMTD, Heat Exchanger Arrays and Multi-passing, Sizing and Rating Problems, Kern Method, Bell Delaware Method, Numerical on Shell and tube HEX.

Unit II	**Solution Methods for Determining Exchanger Effectiveness**	**8 Hours**

Exact Analytical Methods, Approximate Methods, Numerical Methods, Matrix Formalism, Chain Rule Methodology , Flow-Reversal Symmetry, Design Problems, Longitudinal Wall Heat Conduction Effects, Multipass Exchangers, Non-uniform Overall Heat Transfer Coefficients, Temperature - Length - Combined Effect.

Unit III	**Heat Exchanger Pressure Drop Analysis**	**6 Hours**

Importance of Pressure Drop, Devices, Extended Surface Heat Exchanger Pressure Drop, Tubular Heat Exchanger Pressure Drop, Tube Banks, Shell-and-Tube Exchangers, Plate Heat Exchanger Pressure Drop, Pipe Losses, Non-dimensional Presentation of Pressure Drop Data.

Unit IV	**Heat Transfer Characteristics**	**6 Hours**

Dimensionless Surface Characteristics, Experimental Techniques for Determining Surface Characteristics, Steady-State Kays and London Technique, Wilson Plot Technique, Transient Test Techniques, Friction Factor Determination, Hydrodynamic ally Developing Flows, Thermally Developing Flows, Extended Reynolds Analogy, Heat Exchanger Surface Geometrical Characteristics, Selection of Heat Exchangers and Their Components, Temperature Difference Distributions.

Unit V	**Cooling tower fundamentals**	**8 Hours**

Types, Nomenclature, material for construction, Structural components in details, Mechanical components (Fan, Speed reducer, Valves, Safety), Electrical components, Thermal performance testing – conduction and evaluation.

Unit VI	**Furnace and Thermal Devices**	**6 Hours**

Furnace, Types, Parts used in furnace, Nozzles used, Heat transfer related design of systems, Insulations, Applications in process industries. Heat pipe, Thermal interface material, use of nano

particle in heat transfer equipments, Steam Trap, Electronics cooling systems, Thermal interface materials, Heat transfer augmentation techniques.

PRACTICAL: Perform the following experiments.		
Practical No. 1		**4 Hours**
Visit to study heat exchanger manufacturing.		
Practical No. 2		**4 Hours**
Study of Instrumentation used related to Heat exchanger.		
Practical No. 3		**4 Hours**
Study of plate heat exchanger		
Practical No. 4		**4 Hours**
Experimentation on any one Heat exchanger		
Practical No. 5		**4 Hours**
Experimentation on Heat pipe		

TEXT BOOK:

1. Process Heat Transfer – Donald Q. Kern, Tata McGraw-Hill
2. Process Heat Transfer – Hewitt ,Shires & Bott, CRC Press

REFERENCES:

1. Cooling Tower, Fundamentals- John C. Hensley, SPX Cooling Technologies
2. Heat exchangers Selection, Rating and Thermal Design – Sadik Kakac,Hongtan Liu, Anchasa Pramunjanaroenkij, CRC Press
3. Heat Pipes Theory, Design & Applications – D.A. Reay, P.D.Dunn, Pergamon
4. Cooling Techniques for Electronic Equipment– Dave S. Steinberg, Wiley-InterScience Publication
5. Fundamentals of Heat Exchanger Design -Ramesh K. Shah, Dusan P. Sekulic,Wiley-India

MIT | Academy of Engineering (An Autonomous Institute)			**COURSE SYLLABI (2016-2018)**		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2016-17
FY MTECH			**COURSE NAME**	**:**	Project Work I
			COURSE CODE	**:**	ME523
			COURSE CREDIT	**:**	2
RELEASE DATE	**:**	**1/06/2016**	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
Nil	4	---	---	---	NIL	50	50

PRE-REQUISITE:

1. EX501 : Research Methodology
2. CS502 : Technical Writing

COURSE OBJECTIVES:

1. ME523.CEO.1: To Manage the selection and initiation of individual projects.
2. ME523.CEO.2: To conduct project planning activities that accurately forecast project costs, timelines, and quality.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME523.CO.1: Identify important concepts / real time problems from the knowledge of current trends /survey.
2. ME523.CO.2: Develop effective communication and presentation skills.
3. ME523.CO.3: Describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths.

CONTENTS

Project work is divided into four stages namely Project Stage I, Project Stage II, Project Stage III and Project Stage IV.

Project Stage I is entirely related with selection of topic/problem by the students related to thrust areas identified by respective departments. Synopsis submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives

Final Project Stage I Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

MIT Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
S.Y. MTECH			**COURSE NAME**	**:**	Advances in IC engines
			COURSE CODE	**:**	ME 631
			COURSE CREDITS	**:**	3
RELEASE DATE	**:**	01/06/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	NIL	30	50	20	NIL	NIL	100

PRE-REQUISITE:

1. ME511 Advanced Thermodynamics and Combustion Technology.

COURSE OBJECTIVES:

1. ME 201.CEO.1 To recall the fundamentals of I.C engines, construction and working principle of an engine, and testing of an engine for analyzing its performance.
2. ME 201.CEO.2 To study the combustion and its controlling factors in order to design efficient engine
3. ME 201.CEO.3 To study emissions from I.C. engines and its controlling methods, various emission norms.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME201.CO.1: Recall basics of alternative fuel technology.
2. ME201.CO.2: Apply fundamentals of IC engines to enhance its performance-emission
3. characteristics.
4. ME201.CO.3: Develop models and simulate them for diesel engine, petrol engine, gas engine.

5. ME201.CO.4: Demonstrate the emission controlling methods and emission standards for various engines.

THEORY:

Unit I	**Measurement & Testing**	**6 Hours**
Introduction, engine performance parameters, measurement and testing, engine operating characteristics, performance maps, Mathematical models of SI and CI Engines.		
Unit II	**Alternate Fuels**	**6 Hours**
Solid fuels, liquid fuels, gaseous fuels, hydrogen engines, new generation alternative fuels.		
Unit III	**Engine Design**	**6 Hours**
Preliminary analysis, cylinder number, size and arrangement, experimental development.		
Unit IV	**Electronic Injection System**	**6 Hours**
Gasoline injection, EFI system, MPFI system, electronic control system, injection timing, electronic diesel injection system and control.		
Unit V	**Engine Emissions & Control**	**6 Hours**
Air pollution due to IC engines, norms, engine emissions, HC, CO, NOx, particulates, other emissions, emission control methods, exhaust gas recirculation, modern methods, crankcase blow by. EURO and Bharat norms for emission.		
Unit VI	**Simulation Technique**	**6 Hours**
Application of simulation technique for engine tuning, engine selection parameters, recent trends in IC engines. Detail study of VVT, VGT, DTSI, HCCI. Details mechanism of NVH (Noise vibration and Harshness) in engine.		

TEXT BOOK:

1. V Ganesan, “Internal Combustion Engines”, 4th edition, Tata McGraw Hill, 2012, (ISBN-10: 1259006190)
2. Jack Erjavec and Rob Thompson, “Automotive Technology”, 6th edition, Delmar Thomson Learning, 2014, (ISBN-10: 1133933734)
3. Mathur M. L., “Internal Combustion Engine”, 4th edition, Dhanpat Rai Publication, (ISBN-10: 8189928465)

4. Shyam K. Agrawal. , “Internal Combustion Engine”, 4th edition, New Age publishers, 2007, (ISBN-10: 8122417825)

REFERENCES:

1. Charles Fayette Taylor, ”The Internal Combustion Engine in Theory and Practice”, Volume I & II, 2nd The MIT Press, 1985, (ISBN: 9780262200523)
2. Bosch Gmbh, Robert Bosch GmbH, “Gasoline Engine Management, Bosch handbook”,2nd edition, Professional Engineering Publishing, 2004, (ISBN 10: 1860584349)
3. Gordon P Blair, “Design and Simulation of four stroke engines”, 4th edition, SAE International, 1999, (ISBN-10: 0768004403)

MIT Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2020)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
S.Y. MTECH			**COURSE NAME**	**:**	Energy Conservation and Management
			COURSE CODE	**:**	ME 632
			COURSE CREDITS	**:**	3
RELEASE DATE	**:**	**01/06/2017**	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	-	40	50	10	-	NIL	100

PRE-REQUISITE:
NIL

COURSE OBJECTIVES:

5. ME 521.CEO.1 To remember importance of energy conservation and management.
6. ME 521.CEO.2 To understand the concept of thermal and electrical systems.
7. ME 521.CEO.3 To apply knowledge of various modes of energy conservation.
8. ME 521.CEO.4 To analyze the energy management and economics.

COURSE OUTCOMES:

The students after completion of the course will be able to

5. ME502.CO.1: Recall importance of energy conservation and management.
6. ME502.CO.2: Understand the concept of thermal and electrical systems.
7. ME502.CO.3: Apply knowledge of various modes of energy conservation.
8. ME502.CO.4: Analyze the energy management and economics.

THEORY:		
Unit I	**Importance of Energy Conservation and Management**	**6 Hours**
World, national Energy consumption, environmental aspects, Energy prices, policies, Energy auditing: methodology, analysis, energy accounting-Measurements- Thermal and Electrical.		
Unit II	**Electrical Systems**	**6 Hours**
AC / DC current systems, Demand control, power factor correction, load Management, Motor drives : motor efficiency testing, energy efficient motors, motor speed control, Lighting : lighting levels, efficient options, day lighting, timers, Energy efficient windows electrical distribution systems, Transformers, Power quality, harmonic distortion.		
Unit III	**Thermal Systems**	**6 Hours**
Boiler efficiency testing, excess air control, Steam distribution & use, steam traps, condensate recovery, flash steam utilization, Thermal Insulation. Heat exchanger networking, concept of pinch, target settling, problem table approach.		
Unit IV	**Energy Conservation**	**6 Hours**
Boundary layer assumptions, equations, Flow over a flat plate, Similarity (Blasius) solution, Falkner-Skan Energy conservation in Pumps, Fans (flow control) and blowers, Compressed Air Systems, Refrigeration and air conditioning systems, Waste heat recovery recuperators, heat sheets, heat pipes, heat pumps.		
Unit V	**Energy Management, Economics**	**6 Hours**
Energy resource management, Energy Management information systems, Computerized energy management, Energy economics, discount rate, payback period, internal rate of Return, life cycle costing, financing energy conservation Projects.		

TEXT BOOK:

1. L.C. Witte, P.S. Schmidt, D.R. Brown, “Industrial Energy Management and Utilisation”, Hemisphere Publication, Washington, 1988, (ISBN 0891163220)
2. O. Callaghn, P.W., “Design and Management for Energy Conservation”, Pergamon Press, Oxford, 1981, (ISBN: 0080272878)

REFERENCES:

1. G.C. Dryden, “The Efficient Use of Energy”, Publ. Butterworth-Heinemann, London, 1982, (ISBN 1483107914)
2. W.C. turner, “Energy Management Hand book”, Wiley, New York, 1982, (ISBN 1466578289)
3. W.R. Murphy and G. Mc KAY, “Energy Management”, Butterworth’s, London 1982, (ISBN 0408005084)

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Computational Fluid Dynamics
			COURSE CODE	**:**	ME633
			COURSE CREDITS	**:**	3
RELEASE DATE	**:**	**01/06/2017**	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	--	40	50	10	----	---	100

PRE-REQUISITE:

1. ME512- Advanced Heat Transfer
2. ME521- Advanced Fluid Mechanics

COURSE OBJECTIVES:

1. ME 633.CEO.1 Recall the knowledge of fluid mechanics and heat transfer.
2. ME 633.CEO.2 Develop a two dimensional flow problem by using CFD.
3. ME 633.CEO.3 Apply the Discretization scheme to solve Navier-stokes equation and Reynold's transport theorem.
4. ME 633.CEO.4 Analyze different turbulence models to the flow problems

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME 633.CO.1 Identify the key aspects of fluid mechanics and heat transfer relevant to the setting up of a problem for CFD, and to the interpretation of the results.
2. ME 633.CO.2 Develop a two-dimensional flow problem for CFD solution, including geometry, boundary conditions, flow models and solution parameters.
3. ME 633.CO.3 Appreciate the significance of error control and validation in CFD.

4. ME 633.CO.4 Describe the nature of turbulent flows and explain why 'turbulence models' are necessary to many CFD solutions

THEORY:		
Unit I	**Introduction to CFD**	**8 Hours**
Governing equations: the continuity equation, momentum equation and energy equations, convective forms of the equations and general description, Reynolds transport theorem. Classification of partial differential equations; physical examples of elliptic, parabolic and hyperbolic equations. Mathematical nature of the flow equations & their boundary conditions. Discretization: Basic discretization techniques applied to model equations and systems of equations: finite difference, finite volume and finite element methods.		
Unit II	**Finite Difference Methods and Finite Volume Methods**	**8 Hours**
Finite Difference Methods Taylor series expansion, different means for formula ting finite difference equation; accuracy of finite difference method. Finite Volume Methods: Finite volume methods; approximation of surface and volume integrals; interpolation methods; central, upwind and hybrid formulations and comparison for convection-diffusion problem. Analysis of numerical schemes: Concept of consistency, accuracy, stability andconvergence; Error and stability analysis; some applications.		
Unit III	**Euler's equations and Navier-Stokes Equations**	**8 Hours**
Solution to Euler's equations: Formulations of Euler equations, Discretization methods for Euler equations. High resolution schemes and TVD Navier-Stokes Equations: Governing equation, Properties of Navier-Stokes equation, discretization of NS equation, Boundary Condition, Convergence acceleration techniques. Numerical Grid Generation: Structuredgrid generation: a) Algebraic method, b) Ellipticgeneration systems. Unstructured grid generation: Voronoi diagram and Delaunay triangulation; Advancing frontgrid generation.		
Unit IV	**Turbulence Modeling**	**6 Hours**
Introduction, Statistical representation of turbulent flows: General Properties of turbulent quantities, Closure problem: Necessity of turbulence modeling, Reynolds average Navier stokes (RANS) equation,		

Different types of turbulence model: Eddy viscosity models, Mixing lengths model, Turbulentkineticenergyanddissipation,Theκ-εmodel,Advantagesanddisadvantages of κ-ε model, Two-equation models: κ-ε model and κ-ω model, Reynolds stress equation model (RSM).

TEXT BOOKS:

1. Taylor, C and Hughes J.B., “Finite Element Programming of the Navier Stock Equation”, Pineridge Press Ltd. U.K., 1st Edition 1981, (ISBN: 0-906674-16-6)
2. Fletcher C. A. J., “Computational Techniques for Fluid Dynamics: Fundamental and General Techniques”, Springer-Verlag, 1st Edition, 1987, (ISBN: 0387181512/ 978-0387181516)
3. Bose T. K., “Numerical Fluid Dynamics”, Narosa Publishing House, 1st Edition, 1997, (ISBN: 8173191662, 9788173191664)

REFERENCES:

1. Versteeg H. K., Malalasekera. W., “ An introduction to computational fluid dynamics: The finite volume method”, Prentice Hall, 2nd Edition, 2007, (ISBN: 9780131274983/ 978-0131274983)
2. Anderson, D.A., Tannehill, I.I., and Pletcher, R.H., “Computational Fluid Mechanics and Heat Transfer”, Hemisphere Publishing Corporation, New York, USA, 3rd Edition, 2012, (ISBN: 1591690374/ 978-1591690375)
3. Niyogi P., Laha M.K., Chakrabarty S.K., “Introduction to Computational Fluid Dynamics”, Pearson Education, India, 1st Edition, (ISBN: 8177587641/ 9788177587647)
4. Muralidhar, K and Sundararajan T., “Computational Fluid Flow and Heat Transfer”, Narosa Publishing House, New Delhi, 1st Edition, 2003, (ISBN: 1842651722)
5. Ghoshdastidar, P. S., “Computer Simulation of flow and heat transfer”, Tata McGraw-Hill Publishing Company Ltd.,1st Edition, 1998, (ISBN: 0074631500/9780074631508)

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
S.Y. MTECH			**COURSE NAME**	**:**	Compressible Fluid Flow and Gas Dynamics
			COURSE CODE	**:**	ME634
			COURSE CREDITS	**:**	3
RELEASE DATE	**:**	**01/06/2017**	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	-	30	50	20	NIL	-	100

PRE-REQUISITE:

1. ME521- Advanced Fluid Mechanics

COURSE OBJECTIVES:

5. ME 634.CEO.1 To basic fundamentals of compressible flow concepts
6. ME634.CEO.2 To understand non-dimensional numbers in compressible flow and to solve the simple compressible flow problems.
7. ME 634.CEO.3 To apply the effect of compressibility in nozzles and diffusers, design criteria of nozzles and diffusers.
8. ME 634.CEO.4 To analyze isentropic compressible flow problems
9. ME 634.CEO.5 To judge fluid properties, and their static-dynamic nature.

COURSE OUTCOMES:

The students after completion of the course will be able to

4. ME634.CO.1: Understanding of fluid properties, and their static-dynamic nature.
5. ME634.CO.2: Understanding fundamental behavior of compressible fluid.
6. ME634.CO.3: Ability to apply their understanding in solving real life problem.

7. ME 634.CO.4 Analyze isentropic compressible flow problems
8. ME 634.CO.5 Judge fluid properties, and their static-dynamic nature.

THEORY:

Unit I	**Basic concepts and isentropic flows**	**8 Hours**

Energy and momentum equations of compressible fluid flows – Stagnation states, Mach waves and Mach cone – Effect of Mach number on compressibility – Isentropic flow through variable ducts – Nozzle and Diffusers – Use of Gas tables.

Unit II	**Flow through Constant Area Ducts**	**8 Hours**

Flows through constant area ducts with heat transfer (Rayleigh flow) and Friction (Fanno Flow) – variation of flow properties – Use of tables and charts – Generalized gas dynamics.

Unit III	**Normal Shock**	**6 Hours**

Governing equations – Variation of flow parameters across the normal and oblique shocks – Prandtl – Meyer relations – Use of table and charts – Applications.

Unit IV	**Jet propulsion**	**6 Hours**

Theory of jet propulsion – Thrust equation – Thrust power and propulsive efficiency –Operation principle, cycle analysis and use of stagnation state performance of ram jet, turbojet, turbofan and turbo prop engines.

Unit V	**Space propulsion**	**8 Hours**

Types of rocket engines – Propellants-feeding systems – Ignition and combustion –Theory of rocket propulsion – Performance study – Staging – Terminal and characteristic, Velocity – Applications – space flights.

TEXT BOOK:

1. J. D. Anderson, “Modern Compressible flow”, McGraw Hill, 3rd Edition, 2003, (ISBN-13: 978-0072424430)
2. H. Cohen, G.E.C. Rogers and Saravanamutto, “Gas Turbine Theory”, Longman Group Ltd., 2008. ISBN-13: 978-0132224376

3. J. D .Anderson, “Fundamentals of Aerodynamics”, McGraw Hill, 5th Edition, (ISBN-13: 978-0073398105)

REFERENCES:

1.G.P. Sutton, “Rocket Propulsion Elements”, Oscar Biblarz, 2010, (ISBN-13: 978-0470080245)

2. A.H. Shapiro, “Dynamics and Thermodynamics of Compressible fluid Flow”, John Wiley & Sons; Volume 1 edition (1 March 1977), (ISBN-13: 978-0471066910)
3. Robert D. Zucker Oscar Biblarz, “Fundamentals of Gas Dynamics”, Wiley; 2 edition (July 15, 2002), (ISBN-13: 978-0471059677)
4. N.J. Zucrow, “Aircraft and Missile Propulsion”, vol.1 & II, John Wiley, 1975, (ISBN-13: 978-1124142098)
5. Gas Turbines, V. Ganesan, Tata McGraw Hill Publishing Co., New Delhi, 1999. (ISBN: 9780070681927)

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
S.Y. MTECH			**COURSE NAME**	**:**	Advanced Air Conditioning and Refrigeration Technology
			COURSE CODE	**:**	ME 641
			COURSE CREDITS	**:**	3
RELEASE DATE	**:**	01/06/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	0	40	50	10	NIL	NIL	100

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

1. ME 641.CEO.1 To Tell variety of air conditioning systems and its applications
2. ME 641.CEO.2 To state complete control systems and its choice
3. ME 641.CEO.4 To Apply various methods in duct system design.
4. ME 641.CEO.5 To Solve numericals on Applied Psychrometry and summer and winter load calculations

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME641.CO.1: Solve numericals on Applied Psychrometry and summer and winter load calculations
2. ME641.CO.2: Apply various methods in design of duct system

3. ME641.CO.3: State variety of air conditioning systems, its applications, complete control systems and its choice

THEORY:

Unit I	**Psychrometry**	**6 Hours**

Composition of moist air, Important psychrometric properties, Methods for estimating moist air properties, Ideal Adiabatic saturation process, Relationship between Wet-Bulb Temperature and Thermodynamic Wet -Bulb Temperature, Sling and Aspiration psychrometers, Relations between psychrometric properties, Psychrometric chart, ASHRAE Psychrometric charts. Use of psychrometric charts and moist air tables, Goff and Gratch tables. Psychrometric Processes, Air washer, Bypass Factor, ADP, Applied Psychrometry –RSHF, GSHF and ESHF. Numerical on Applied Psychrometry.

Unit II	**Thermal Comfort**	**6 Hours**

Thermal comfort, Heat transfer from human body by sensible and latent heat transfer. Metabolic heat generation, steady state and unsteady state model for heat transfer, effect of clothing and definition of effective temperatures. PMV and PPD. ASHRAE comfort chart, Infiltration and ventilation, Indoor Air Quality (IAQ), Sources of indoor air pollution, Methods of control of IAQ, Fresh air requirements for IAQ.

Unit III	**Heating and Cooling load calculations**	**6 Hours**

Differences between winter and summer load calculations, Inside and Outside design conditions, Various sources of the internal and external heat gains, heat losses, Solar radiation, Solar radiation through glass, SHGC and shading coefficients, Heat transfer through building structure, Methods of heat load calculations, Numerical on summer and winter load calculations.

Unit IV	**Duct systems**	**6 Hours**

Frictional pressure drops in straight ducts of circular and rectangular cross-section, equivalent diameter for rectangular duct, Pressure losses in fittings, due to sudden enlargements, contractions, Sizing of ducts, Velocity Reduction method, Equal friction method, Static Regain method, Selection of fans, Fan laws and fan characteristic curves, Air distribution in rooms, Selection and location of supply and return grills, diffusers etc.

Unit V	**Air conditioning systems**	**6 Hours**

All air systems, All water systems, Air water systems, Direct Refrigerant, Unitary systems, Chilled ceilings and chilled beams, displacement ventilation, VAV Air Conditioning, Air cooled VRV (VRF)

systems, Water cooled VRV (VRF), Two stage Evaporative cooling, Desiccant Dehumidification, Heat Pumps and their types Air Conditioning applications –Supermarkets, Restaurants, Kitchen exhaust ventilation systems Hospitals, Office buildings.		
Unit VI	**Control systems for Refrigeration and Air conditioning applications**	**6 Hours**
Closed loop and open loop control systems, Choice of control systems, Types of control action, Energy sources, controllers and controlled devices, Control based on space temperature, Control based on outside temperature, Control based on heating and cooling medium, Control of humidity, Complete control systems.		

TEXT BOOK:

1. Jan F.Kredier, “Handbook of Heating, Ventilation and Air Conditioning” CRC Press LLC, 1st edition, Year-2000, (ISBN 9780849395840).
2. C P Arora, “Refrigeration and Air conditioning”, Tata McGraw Hill Publication, 3rd edition,Year-2008, (ISBN-13:9780070083905).

REFERENCES:

1. Jones W. P., “Air conditioning Applications and Design”, Edward Arnold Publishers Ltd.,2nd edition,Year-2011, (ISBN-13: 978-0415502931).
2. R.C. Arora, Ramesh Chandra, “Refrigeration and Air conditioning”, Publisher-PHI Learning Pvt. Ltd., Eastern economy edition, Year-2010, (ISBN: 978-81-203-3915-6).
3. Robert McDowall, “Fundamentals of HVAC systems”, Publisher-Elsevier Science; SI Ed edition,, Robert McDowall(editor), Year-2007, (ISBN-13: 978-0123739988).
4. ASHRAE Handbooks,ASHRAE, Cdr edition,Year-2014, (ISBN: 9781936504725).

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
S.Y. MTECH			**COURSE NAME**	**:**	Industrial Hydraulics and Pneumatics
			COURSE CODE	**:**	ME 642
			COURSE CREDITS	**:**	3
RELEASE DATE	**:**	01/06/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ITA	**ETA**	**IA**			
3	0	30	50	20	NIL	NIL	100

PRE-REQUISITE:

1. ME521- Advanced Fluid Mechanics

COURSE OBJECTIVES:

1. ME 642. CEO.1: To identify various components used for hydraulic and pneumatic systems.
2. ME 642.CEO.2 To select appropriate components required for hydraulic and pneumatic systems
3. ME 642.CEO.3 To examine the hydraulic or pneumatic circuit for its functionality.
4. ME 642.CEO.4 To evaluate the hydraulic or pneumatic devices for their performance.
5. ME 642.CEO.5 To design suitable hydraulic and pneumatic circuit for given application

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME642.CO.1: Identify various components used for hydraulic and pneumatic systems.
2. ME642.CO.2: Select appropriate components required for hydraulic and pneumatic systems.
3. ME642.CO.3: Examine the hydraulic or pneumatic circuit for its functionality.
4. ME642.CO.4: Evaluate the hydraulic or pneumatic devices for their performance.
5. ME642.CO.5: Design suitable hydraulic and pneumatic circuit for given application.

THEORY:

Unit I	**Introduction to Industrial Fluid Power Systems**	

Power transmission modes and comparison. Fluid power and its history. Definition and interrelationships of various terms (properties) used in hydraulics and pneumatics. Laws governing fluid flow: Pascal's law, continuity equation, Bernoulli's theorem, Boyle's, Charles's, Gay-Lussac's laws). Flow through pipes - types, pressure drop in pipes. Working fluids used in hydraulic & pneumatic systems- types, ISO/BIS standards and designations, properties, advantages and limitations. Hydraulic systems - concept, application areas, advantages and limitations. Pneumatic systems - concept, application areas, advantages and limitations.

Unit II	**Hydraulics and pneumatics systems**	

Basic Hydraulic System. Types, Construction, Working, Applications and Selection criteria of Hydraulic pipes, Hydraulic Pumps, Hydraulic Actuators, cylinder cushions and mountings. Hydraulic Control valves, Hydraulic Accessories

Basic Pneumatic System. Pneumatic Pipes - materials, designations, standards, properties and piping layout. Types, construction, working, specifications, selection criteria and Applications of following air preparation and conditioning elements: Air compressors. Air receivers and air dryers. Air Filters, Regulators, Lubricators (FRL unit). Pneumatic Actuators, Pneumatic Control valves.

Unit III	**Hydraulic and pneumatic circuits**	

ISO symbols used in hydraulic and pneumatic circuits. Guiding rules/ norms/ steps/ methods for designing hydraulic and pneumatic circuit. Basic Hydraulic Circuits – intensifier, regenerative, synchronizing, sequencing, speed control, safety, circuit diagram, components, working and applications. Basic Pneumatic Circuits - speed control, two step feed control, automatic cylinder reciprocation, time delay, quick exhaust, circuit diagram, components, working and applications. Pneumatic Logic circuit design.

Unit IV	**Hydraulic and pneumatic devices**	

Concept and applications. Construction, working principle, major elements, performance variables and applications of following devices: Automotive hydraulic brake. Industrial Fork lift. Hydraulic jack. Hydraulic press. Automotive power steering. Automotive pneumatic brake. Automotive air suspension. Pneumatic drill. Pneumatic gun (tools).

Unit V	Installation of hydraulic and pneumatic system	
Causes and remedies for common troubles arising in hydraulic elements. Maintenance of hydraulic systems. Maintenance schedule. Troubleshooting of hydraulic system. Causes and remedies for troubles arising in pneumatic elements. Maintenance of pneumatic system. Maintenance schedule. Troubleshooting of pneumatic system.		
Unit VI	**Hydro-pneumatics**	
Concept, advantages and disadvantages. Types, construction, working, Circuit diagram and application of following hydro pneumatic elements: Air oil reservoir. Hydraulic series check unit. Hydraulic parallel check unit. Hydro pneumatic cylinder. Air oil intensifier. Comparison between hydro pneumatic, hydraulic and pneumatic systems.		

REFERENCES:

1. Andrew Jaico, “Hydraulic And Pneumatics A Technician’s & Engineer’s Guide”,Butterworth-Heinemann; 3 edition (March 11, 2011) Publishing House, 2/e, 2013, (ISBN-13: 978-0080966748)
2. Noah Manring, “Hydraulic Control Systems”, Wiley; 1 edition (April 15, 2005), (ISBN-13: 978-0471693116)
3. Fluid Power Generation, Transmission and Control Jagadeesha, T. Universities Press (India) Private Limited, 1/e, 2014, (ISBN: 9788126539543)

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2020)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Cryogenics and Vacuum Technology
			COURSE CODE	**:**	ME 643
			COURSE CREDITS	**:**	3
RELEASE DATE	**:**	**01/06/2017**	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	--	40	50	10	----	---	100

PRE-REQUISITE:
NIL

COURSE OBJECTIVES:

1. ME 643.CEO.1 To recall the fundamentals of cryogenic and air gas Liquefaction system
2. ME 643.CEO.2 To classify Gas Separation and Purification Systems
3. ME 643.CEO.3 To summarize various Vacuum Process and cryogenic fluid storage system
4. ME 643.CEO.4 To identify the advance application of Cryogenic Engineering

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME 643.CO.1 Analyze the cryogenic and air gas liquefaction system using thermodynamic cycle
2. ME 643.CO.2 Measure the performance of gas separation and purification system with respect to thermodynamically ideal Separation System
3. ME 643.CO.3 Design the Cryogenic fluid storage system
4. ME 643.CO.4 Adapt the advanced cryogenic system in various industrial and domestic applications

THEORY:

Unit I	**Introduction to Cryogenic Systems and Air –Gas Liquefaction**	**8 Hours**

Introduction to Cryogenic Systems: Definition, cryogenic temperature scale, History of cryogenics, Properties of materials at Low temperature, Properties of Cryogenic Fluids.

Air and Gas Liquefaction Systems: Thermodynamically ideal system, Production of low temperatures. Liquefaction systems for gases other than neon, hydrogen and helium, liquefaction Systems for neon hydrogen and helium. Cryogenic Refrigeration System.

Unit II	**Gas Separation and Purification System**	**8 Hours**

Gas separation and Gas Purification systems: The thermodynamically ideal separation System Properties of mixtures, Principles of gas separation, air separation systems, Hydrogen, Argon, helium air separation systems, Gas purification methods.

Unit III	**Vacuum Techniques**	**6 Hours**

Vacuum Techniques: System for production of high vacuum such as mechanical, diffusion, ion and cryopumps. Cryogenics Measurement Systems: Temperature pressure, flow rate, liquid level measurement, Introduction to Cryocoolers.

Cryogenic fluid storage systems: Introduction, Basic storage vessels, inner vessels, outer vessel design, piping, access manways, safety device. Cryogenic Insulations, gas filled powders and fibrous materials, solid foam, selection and comparison of insulations. Cryogenic fluid transfer systems. Transfer through uninsulated line vacuum insulated lines porous insulated lines etc

Unit IV	**Advances in Cryogenics**	**6 Hours**

Vortex tube and applications, Pulse tube refrigerator Cryogenic Engine for space vehicles Cryogenic Applications: Applications in gas industry cryogenic fluids space research, Cryobiology, food processing, electronics nuclear and high energy physics, chemical Processing metal manufacturing cryogenic power generation, medicine, analytical Physics and chemistry.

REFERENCES:

1. Barron R. F., “Cryogenic Systems”, 2nd Ed., Oxford University Press, 1985, (ISBN-0-19-503567-4).
2. Timmerhaus K. D. and Flynn T. M., “Cryogenic Process Engineering”, 1st ed., Springer, 1989, ISBN-0-19-503567-4. ISBN-10: 1468487582, (ISBN-13: 978-1468487589.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016 - 2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
S.Y. MTECH			**COURSE NAME**	**:**	Steam Engineering
			COURSE CODE	**:**	ME 644
			COURSE CREDITS	**:**	3
RELEASE DATE	**:**	01/06/2017	**REVISION NO.**	**:**	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**TUTORIALS**	**TOTAL**
		ICE	**ECE**	**IA**			
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

ME511 Advanced Thermodynamics and Combustion Technology.

COURSE OBJECTIVES:

1. ME 644.CEO.1 To recall the fundamentals of different boilers and significance of mountings and accessories.
2. ME 644.CEO.2 To explain fundamentals energy conservation.
3. ME 644.CEO.3 To analyze thermal systems for energy conservation.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME644.CO.1: Recall basics of steam piping system, its components for a process and also economical and effective insulation.
2. ME644.CO.2: Apply knowledge of thermal system for sources of waste heat design a systems for waste heat recovery.
3. ME644.CO.3: Develop controls and instrumentation for effective monitoring of the process.

4. ME644.CO.4: Design a steam piping system, its components for a process and also economical and effective insulation.

THEORY:		
Unit I	**Introduction:**	**6 Hours**
Fundamentals of steam generation, Quality of steam, Use of steam table, Mollier Chart Boilers,Types, Mountings and Accessories, Combustion in boilers, Determination of adiabatic flame temperature, quantity of flue gases, Feed Water and its quality, Blow down; IBR, Boiler standards.		
Unit II	**Piping & Insulation:**	**6 Hours**
Water Line, Steam line design and insulation; Insulation-types and application, Economic thickness of insulation, Heat savings and application criteria, Refractory-types, selection and application of refractory, Heat loss.		
Unit III	**Steam Systems:**	**6 Hours**
Assessment of steam distribution losses, Steam leakages, Steam trapping, Condensate and flash steam recovery system, Steam Engineering Practices; Steam Based Equipment's / Systems.		
Unit IV	**Boiler Performance Assessment:**	**6 Hours**
Performance Test codes and procedure, Boiler Efficiency, Analysis of losses; performance evaluation of accessories; factors affecting boiler performance.		
Unit V	**Energy Conservation and Waste Minimization:**	**6 Hours**
Energy conservation options in Boiler; waste minimization, methodology; economic viability of waste minimization.		
Unit VI	**Instrumentation & Control:**	**6 Hours**
Process instrumentation; control and monitoring. Flow, pressure and temperature measuring and controlling instruments, its selection.		

TEXT BOOK:

1. T. D. Estop, A. McConkey, Applied Thermodynamics, Parson Publication.
2. Domkundwar; a Course in Power Plant Engineering; Dhanapat Rai and Sons.
3. Yunus A. Cengel and Boles, “Engineering Thermodynamics “, Tata McGraw-Hill Publishing Co. Ltd.

REFERENCES:

1. Energy Efficiency in Thermal Utilities; Bureau of Energy Efficiency.
2. Energy Performance Assessment for Equipment & Utility Systems; Bureau of Energy Efficiency.
3. Edited by J. B. Kitto & S C Stultz; Steam: Its Generation and Use; The Babcock and Wilcox Company.
4. P. Chatopadhyay; Boiler Operation Engineering: Questions and Answes; Tata McGrawHill Education Pvt Ltd, N Delhi.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2016-2018)		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	:	2017-18
SY MTECH			**COURSE NAME**	:	Project Work II
			COURSE CODE	:	ME604
			COURSE CREDIT	:	4
RELEASE DATE	:	**1/06/2017**	**REVISION NO.**	:	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
NIL	8	---	---	50	NIL	50	100

PREREQUISITES:

1. ME 523 Project Work I

COURSE OBJECTIVES:

1. ME604.CEO.1: To develop self-management, documentation & technical skills.
2. ME604.CEO.2: To Demonstrate a strong working knowledge of ethics and professional responsibility.

COURSE OUTCOMES:

The students after completion of the course will be able to

1. ME604.CO.1: Develop self-management, documentation & technical skills.
2. ME604.CO.2: Design, analyze & troubleshoot schematics, connection diagrams, block diagrams, timing diagrams for a given electronics circuit or system.

CONTENTS

Project Stage II is related with Goals and Objectives, System Architecture, Algorithm /Methodology. Project report submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- UML, DFD, Design Details
- Proposed Algorithm
- Expected Outcome and Result
- Preparation of manuscript (paper) on Literature survey

Final Project Stage II Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

MIT | Academy of Engineering (An Autonomous Institute)			**COURSE SYLLABI (2016-2018)**		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Project Work III
			COURSE CODE	**:**	ME611
			COURSE CREDIT	**:**	10
RELEASE DATE	**:**	**1/06/2017**	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
NIl	20	---	---	150	NIL	50	200

PREREQUISITES:

1. ME523 Project Work I
2. ME601 Project Work II

COURSE OBJECTIVES:

1. ME611.CEO.1: Demonstrate effective project execution and techniques that result in successful projects.

COURSE OUTCOME:

1. ME611.CO.1: To execute work within prescribed guidelines, project specifications, and within a proposed budget.

CONTENTS

Project Stage III is related with Design, Algorithm /Methodology Implementation Results. Project report submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- UML, DFD, Design Details
- Proposed Algorithm
- Methodology
- Implementation
- Results
- Preparation of manuscript (paper) on Literature survey as mentioned in Project Work II
- Preparation of manuscript (paper) on design
- Publication details of paper on Literature survey and Design (Peer reviewed International conference like IEEE, ACM, Elsevier, Springer etc)

Final Project Stage III Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry

MIT | Academy of Engineering (An Autonomous Institute)			**COURSE SYLLABI (2016-2018)**		
DEPARTMENT OF MECHANICAL ENGG.			**W.E.F.**	**:**	2017-18
SY MTECH			**COURSE NAME**	**:**	Project Work IV
			COURSE CODE	**:**	ME621
			COURSE CREDIT	**:**	10
RELEASE DATE	**:**	**1/06/2017**	**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ITA	**ETA**	**IA**			
NIL	20	---	---	200	NIL	100	300

PREREQUISITES:

1. ME523 Project Work I
2. ME601 Project Work II
3. ME611 Project Work III

COURSE OBJECTIVES:

1. ME621.CEO.1: Demonstrate effective project execution and techniques that result in successful projects.

COURSE OUTCOME:

1. ME621.CO.1: To execute work within prescribed guidelines, project specifications, and within a proposed budget.

CONTENTS

Project Stage IV is related with Algorithm /Methodology Implementation, Results, Result Analysis using various charts/ graphs. Project report submission and mid trimester presentation will be conducted by department based on following points.

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- UML, DFD, Design Details
- Proposed Algorithm
- Methodology
- Implementation
- Results
- Result Analysis
- Preparation of manuscript (paper) on Literature survey as mentioned in Project Work II
- Preparation of manuscript (paper) on design as mentioned in Project Work III
- Publication details of paper on Literature survey and Design (Peer reviewed International conference like IEEE, ACM, Elsevier, Springer etc) as mentioned in Project Work III
- Publication details of paper on Result analysis (Peer reviewed /Free International Journal)

Final Project Stage III Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.