MIT | Academy of Engineering

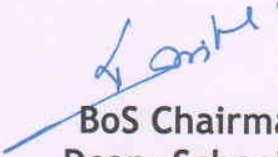# MIT ACADEMY OF ENGINEERING, ALANDI
Savitribai Phule Pune University

Curriculum for
Bachelor of Technology in

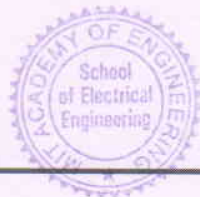# Electronics Engineering

(Choice Based Credit System)

2016-2020

BoS Chairman
Dean, School of
Electrical Engineering

Member Secretary
Academic Council
Dean Academics

Chairman
Academic Council
Director MITAOE

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**

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)

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**
RELEASE DATE	:	**1/06/2016**
REVISION NO.	:	**1.0**

FIRST YEAR BACHELOR OF TECHNOLOGY

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

	COURSE SYLLABI (2016 – 2020)
MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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

	COURSE SYLLABI (2016 – 2020)
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.

	COURSE SYLLABI (2016 – 2020)
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**	**COURSE SYLLABI**	
	(An autonomous Institute Affiliated to SPPU)	**(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		EXAMINATION SCHEME AND MARKS						
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL	
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION		
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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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.

<table>
<tr><td rowspan="4">MIT | Academy of Engineering
(An autonomous Institute Affiliated to SPPU)</td><td colspan="2">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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

	COURSE SYLLABI
MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**(2016 – 2020)**

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2016 - 2017

	COURSE NAME	Mathematics II
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE CODE**	AS104
	COURSE CREDITS	5
RELEASED DATE : 01/06/2016	**REVISION NO**	0.0

TEACHING SCHEME		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		**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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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, 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)

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

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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.

<table>
<tr><td rowspan="4">MIT | Academy of Engineering
(An Autonomous Institute Affiliated to SPPU)</td><td colspan="3">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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.

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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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, 2nd or 3rd edition, McGraw-Hill Education, ISBN-10: 1259025977 ISBN-13: 978-1259025976.
2. Charles Rothl, Digital System Design using VHDL, 2nd 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, 2nd 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.

<table>
<tr><td rowspan="5">MIT | Academy of Engineering
(An autonomous Institute Affiliated to SPPU)</td><td colspan="2" align="center">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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, Tamil-nadu.(http://aurovillebamboocentre.org/)

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.

<table>
<tr><td rowspan="3">MIT | Academy of Engineering
(An Autonomous Institute Affiliated to SPPU)</td><td colspan="3">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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

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

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		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		**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.

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		**EXAMINATION SCHEME AND MARKS**						
(HOURS/WEEK)		**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, 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	COURSE SYLLABI
	(An autonomous Institute Affiliated to SPPU)	**(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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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

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

	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

<table>
<tr><td rowspan="4">MIT | Academy of Engineering
(An autonomous Institute Affiliated to SPPU)</td><td colspan="3">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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.

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		EXAMINATION SCHEME AND MARKS						
(HOURS/WEEK)		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

	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=PLw540Wq5kay 866m6A6xI7KOwEAh7is4m

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

<table>
<tr><td rowspan="4">MIT Academy of Engineering
(An autonomous Institute Affiliated to SPPU)</td><td colspan="3">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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

		COURSE SYLLABI (2016 – 2020)		

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

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						
LECTURE	PRACTICAL	THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL	
		MSE	ESE	IA				
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

<table>
<tr><td colspan="2" rowspan="2">MIT | Academy of Engineering
(An autonomous Institute Affiliated to SPPU)</td><td colspan="3">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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	EXAMINATION SCHEME AND MARKS						
(HOURS/WEEK)		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

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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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.

<table>
<tr><td rowspan="4">MIT | Academy of Engineering
(An autonomous Institute Affiliated to SPPU)</td><td colspan="4">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		**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

		COURSE SYLLABI (2016 – 2020)
MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)		
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/ 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.

<table>
<tr><td colspan="2">MIT | Academy of Engineering
(An autonomous Institute Affiliated to SPPU)</td><td colspan="2">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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)

CURRICULUM STRUCTURE (2016 - 2020)

MIT | Academy of Engineering (An Autonomous Institute)

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

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.

<table>
<tr><td colspan="2" rowspan="2">MIT Academy of Engineering
(An autonomous Institute Affiliated to SPPU)</td><td colspan="3">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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					
LECTURE	PRACTICAL	THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		MSE	ESE	IA			
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.

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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.

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL	
LECTURE	PRACTICAL	MSE	ESE	IA				
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).

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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	COURSE SYLLABI
	(An autonomous Institute Affiliated to SPPU)	**(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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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.

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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.

<table>
<tr><td colspan="2" rowspan="2">MIT | Academy of Engineering

(An autonomous Institute Affiliated to SPPU)</td><td colspan="3">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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 .

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		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		**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

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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

	COURSE SYLLABI
MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**(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		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		**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		EXAMINATION SCHEME AND MARKS						
(HOURS/WEEK)		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.

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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 | **COURSE SYLLABI** |
| (An autonomous Institute Affiliated to SPPU) | **(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	EXAMINATION SCHEME AND MARKS						
(HOURS/WEEK)		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

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.

	COURSE SYLLABI (2016 – 2020)
MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	

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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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

<table>
<tr><td rowspan="4">MIT | Academy of Engineering
(An autonomous Institute Affiliated to SPPU)</td><td colspan="3">COURSE SYLLABI
(2016 – 2020)</td></tr>
</table>

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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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, 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)

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 Date:	MIT AOE Seal

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.

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**

		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