MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

Bachelor of Technology

In

Chemical Engineering

(Choice Based Credit System)

2019-2023

BoS Chairman
Dean,
School of Chemical Engineering

CHAIRMAN
BOS-Chemical Engineering
MIT Academy of Engineering
(An Autonomous Institute)

Member Secretary
Academic Council
Dean, Academics

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

Chairman
Academic Council
Director, MITAoE

CHAIRMAN
Academic Council
MIT Academy of Engineering
(An Autonomous Institute)

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (Revision 2019)

CHEMICAL ENGINEERING

The Bachelor of Technology Program shall be based on the following type of courses

COURSE DISTRIBUTION: SEMESTER WISE									
S.N.	TYPE OF COURSE	NO. OF COURSES/SEMESTER							TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science (NSC)	2	2	1						**5**
2.	Engineering Science (ESC)	4	3		1					**8**
3.	Discipline Core (DC)			3	3	3	3	1	1	**14**
4.	Discipline Elective (DE)							1	1	**2**
5.	Open Elective (OE)					1	1	1		**3**
6.	Humanities and Social Science (HSS)		1		1	1	1		2	**6**
7.	Skill Development and Project (SDP)	3	2	2	2	3	1	13	3	**2**
TOTAL		**6**	**6**	**7**	**7**	**7**	**7**	**6**	**5**	**51**
Audit Course			**1**	**2**	**1**	**1**				**5**

CREDIT DISTRIBUTION: SEMESTER WISE											
1 Lecture hour = 1 Credit **2 Lab Hours = 1 Credit** **1 Tutorial Hour = 1 Credit**											
S.N.	TYPE OF COURSE	NO. OF CREDITS/SEMESTER								TOTAL	%
		1	2	3	4	5	6	7	8		
1.	Natural Science (NSC)	8	8	4						**20**	**12.5**
2.	Engineering Science (ESC)	13	9		4					**26**	**16.25**
3.	Discipline Core (DC)			12	12	11	11	4	4	**54**	**33.75**
4.	Discipline Elective (DE)							3	3	**6**	**3.75**
5.	Open Elective (OE)					4	4	4		**12**	**7.5**
6.	Humanities and Social Science (HSS)	0	2		2	2	2		4	**12**	**7.5**
7.	Skill Development and Project (SDP)			5	3	4	4	10	4	**30**	**18.75**
TOTAL		**21**	**19**	**21**	**21**	**21**	**21**	**21**	**15**	**160**	**100**

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	19	**40**
2.	Second Year	21	21	**42**
3.	Third Year	21	21	**42**
4.	Final Year	21	15	**36**
TOTAL				**160**

CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	29/27	28/30	**57**
2.	Second Year	31	31	**62**
3.	Third Year	27	30	**57**
4.	Final Year	25	20	**45**
TOTAL				**221**

ABBREVATIONS		
1.	MSE	Mid Semester Exam
2.	ESE	End Semester Exam
3.	IA	Internal Assessment
4.	T/P	Term Work / Practical
5.	DM	Demonstration
6.	L	Lecture
7.	P	Practical
8.	T	Tutorial
9.	Lab	Laboratory

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	CREDIT
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	30	30	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	30	30	40	50	-	150	4
ESC1	EX102	Electrical & Electronic Engineering	3	2	-	30	30	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development - C	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**90**	**190**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (Version I)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	CREDIT
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	30	30	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	30	30	40	50	-	150	4
ESC5	CV102	Applied Mechanics	3	2	-	30	30	40	50	-	150	4
ESC6	CS102	Application Programming - Python	1	4	-	-	40	-	100	-	140	3
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC7	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**11**	**16**	**1**	**90**	**130**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	CREDIT
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	30	30	40	50	-	150	4
NSC2	CH101	Science of Nature	3	2	-	30	30	40	50	-	150	4
ESC1	CV102	Applied Mechanics	3	2	-	30	30	40	50	-	150	4
ESC2	CS101	Logic Development - C	1	4	-	-	40	-	100	-	140	3
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**90**	**130**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						
PE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTA L	CREDIT
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	30	30	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	30	30	40	50	-	150	4
ESC1	EX102	Electrical & Electronic Engineering	3	2	-	30	30	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC6	CS102	Application Programming - Python	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**90**	**190**	**160**	**390**	**60**	**890**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN CHEMICAL ENGINEERING	RELEASE DATE	:	01/07/2020
	REVISION NO.	:	1.0

SEMESTER: III												
INTERNSHIP (CH200)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC6	ME221	Material Engineering	3	2	-	35	35	30	0	50	150	4
DC01	CH221	Material and Energy Balance	3	0	-	35	35	30	0	0	100	3
DC02	CH222	Inorganic and Analytical Chemistry	3	2	-	35	35	30	50	0	150	4
DC03	CH223	Momentum transfer	3	2	-	35	35	30	50	0	150	4
DC04	CH224	Chemical Engineering Thermodynamics	3	0	-	35	35	30	0	0	100	3
SDP1	ET235	Rapid Prototyping	0	4	-	0	0	0	0	75	75	2
SDP2	CH230	Minor Project - Design	0	2	-	0	0	0	0	50	50	1
ESC7	CV203	Environmental Science	1	0	-	-	-	-	-	-	Audit	
TOTAL			**16**	**12**	**0**	**175**	**175**	**150**	**100**	**175**	**775**	**21**

SEMESTER: IV												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS203	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC05	CH231	Heat Transfer	3	2	-	35	35	30	50	0	150	4
DC06	CH232	Advanced Chemistry	3	2	-	35	35	30	50	0	150	4
DC07	CH233	Mass Transfer	3	2	-	35	35	30	50	0	150	4
HSS3	HP202	Professional Skills	0	4	-	0	0	25	0	50	75	2
SDP3	ET224	Digital Prototyping	0	4	-	0	0	0	0	75	75	2
SDP4	CH240	Minor Project - Implementation	0	2	-	0	0	0	0	50	50	1
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**145**	**200**	**175**	**800**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY IN CHEMICAL ENGINEERING	RELEASE DATE	:	01/07/2021
	REVISION NO.	:	1.0

SEMESTER: V

INTERNSHIP (CH300)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC08	CH341	Chemical Engineering Operations	3	2	-	35	35	30	50	0	150	4
DC09	CH342	Separation Process	3	2	-	35	35	30	50	0	150	4
DC10	CH343	Chemical Reaction Engineering	3	2	-	35	35	30	50	0	150	4
OE01	CH351/ CH352	Process Engineering / Energy Technology	3	2	-	35	35	30	50	0	150	4
HSS5	HP304	Project Management	2	0	-	0	50	25	0	0	75	2
SDP5	CH344	Skill Development Lab (CFD)	0	4	-	0	0	25	50	0	75	2
SDP6	CH345	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			**14**	**16**	**0**	**140**	**190**	**195**	**250**	**50**	**825**	**22**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC11	CH361	Process Dynamics and Control	3	2	-	35	35	30	50	0	150	4
DC12	CH362	Chemical Equipment Design I	3	2	-	35	35	30	50	0	150	4
DC13	CH363	Chemical Process Technology	3	0	-	35	35	30	0	0	100	3
OE02	CH371 / CH372	Process Modelling and Simulation / Energy Modeling and Simulation	3	2	-	35	35	30	50	0	150	4
HSS6	HP305	Employability and Career Development	0	4	-	0	0	25	0	50	75	2
SDP7	CH364	Skill Development Lab (ASPEN ONE)	0	4	-	0	0	25	50	0	75	2
SDP8	CH365	Project Implementation	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN CHEMICAL ENGINEERING	RELEASE DATE	:	01/07/2022
	REVISION NO.	:	1.0

SEMESTER: VII

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CH461	Plant Design and Piping	1	4	-	0	30	20	50	25	125	3
DE01	CH48#	Refer Annexure	3	0	-	35	35	30	0	0	100	3
OE03	CH471 / CH472	Process Intensification and Integration / Energy Management and Audit	3	2	-	35	35	30	50	0	150	4
SDP9	CH463	Skill Development Lab (Aspen EDR)	0	4	-	0	0	25	50	0	75	2
SDP10	CH470	Project Evaluation	0	8	-	0	0	50	0	100	150	4
SDP11	CH400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**7**	**18**	**0**	**70**	**100**	**155**	**150**	**275**	**750**	**20**

SEMESTER: VIII (PART A)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC15	CH462	Chemical Equipment Design II	3	2	-	35	35	30	50	0	150	4
DE02	CH49#	Refer Annexure	3	0	-	35	35	30	0	0	100	3
HSS7	HP405	Engineering Economics	2	0	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	0	-	0	50	25	0	0	75	2
SDP12	CH480	Capstone Work	-	8	-	0	0	50	0	100	150	4
TOTAL			**10**	**10**	**0**	**70**	**170**	**160**	**50**	**100**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**						**CREDIT**
TYPE	**CODE**	**NAME**	**Hour/Week**			**THEORY**			**PRACT**		**TOTAL**	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC15	CH462	Chemical Equipment Design II	3	2	-	35	35	30	50	0	150	4
DE02	CH49#	Refer Annexure	3	0	-	35	35	30	0	0	100	3
SDP13	CH467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP14	CH468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**70**	**70**	**60**	**50**	**300**	**550**	**15**

Discipline Elective (DE): 2 Courses and 6 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	CH481	Introduction to Paint Technology	3
	CH483	Petroleum Refining Technology	
	CH484	Biochemical Engineering	
	CH485	Environmental Engineering	
2.	CH491	Paint Manufacturing Process	3
	CH493	Petrochemical Technology	
	CH494	Bioprocess Technology	
	CH495	Chemical Process Safety	
	CHSWAYAM01	Membrane Technology	
	CHSWAYAM02	Environmental Quality Monitoring and Analysis	
	CHSWAYAM03	Biomass Conversion and Biorefinery	

Natural Science (NSC): 5 Courses and 20 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	AS105	Calculus and Differential Equations	4
2.	AS106	Engineering Physics	4
3.	CH101	Science of Nature	4
4.	AS107	Statistics and Integral Calculus	4
5.	AS203/04	Applied Mathematics	4

Humanities and Social Science (HSS): 6 Courses and 12 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	HP103	English for Engineers	2
	HP104	German	
	HP105	Japanese	
Audit	HP106	Indian Constitution	Audit
2.	HP202	Professional Skills	2
Audit	HP203	Liberal Learning	Audit
3.	CS361	Project Management	2
4.	HP305	Employability and Career Development	2
5.	HP405	Engineering Economics	2
6.	HP406	Psychology	2

Engineering Science (ESC): 8 Courses and 26 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	EX102	Electrical and Electronics Engineering	4
2.	CV102	Applied Mechanics	4
3.	ME104	Engineering Graphics	4
4.	ME105	Experimental Tools and Techniques	2
5.	ME106	Design Thinking	2
6.	CS101	Logic Development - C Programming	3
7.	CS102	Application Programming - Python	3
8.	ME221	Material Engineering	4
	IT221	Engineering Informatics	
Audit	CV203	Environmental Sciences	Audit

Discipline Core (DC): 15 Courses and 56 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	CH221	Material and Energy Balance	3
2.	CH222	Inorganic and Analytical Chemistry	4
3.	CH223	Momentum Transfer	4
4.	CH224	Chemical Engineering Thermodynamics	3
5.	CH231	Heat Transfer	4
6.	CH232	Advanced Chemistry	4
7.	CH233	Mass Transfer	4
8.	CH341	Chemical Engineering Operations	4
9.	CH342	Separation Process	4
10.	CH343	Chemical Reaction Engineering	4
11.	CH361	Process Dynamics and Control	4
12.	CH362	Chemical Equipment Design I	4
13.	CH363	Chemical Process Technology	3
14.	CH461	Plant Design and Piping	3
15.	CH462	Chemical Equipment Design II	4

Skill Development and Project (SDP): 14 Courses and 36 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ET235	Rapid Prototyping	2
2.	CH230	Minor Project – Design	1
3.	ET224	Digital Prototyping	2
4.	CH240	Minor Project – Implementation	1
5.	CH344	Skill Development Lab (CFD)	2
6.	CH345	Project Design	2
7.	CH364	Skill Development Lab (Aspen ONE)	2
8.	CH365	Project Implementation	2

9.	CH463	Skill Development Lab (Aspen EDR)	2
10.	CH470	Project Evaluation	4
11.	CH400	Summer Internship	4
12.	CH480	Capstone Work	4
13.	CH467	Semester Long Internship – Design	4
14.	CH468	Semester Long Internship - Implementation	4
Audit	CH200	SY Summer Internship	Audit
Audit	CH300	TY Summer Internship	Audit

List of Skill Development Courses				
Programme Name	Skill Development Course 1	Skill Development Course 2	Skill Development Course 3	Skill Development Course 4
Chemical	CFD	ASPEN ONE	Aspen EDR	Plant Design and Piping
Civil	REVIT/ MS EXCEL	ETABS	Open Road Designer/Water GEMs	CFD / QGIS
Computer and Information Technology	CPP/Core Java	RHA I/ Web Technology	Adv. Java/ .Net Core/RHA II	AWS cloud services/ Android App Development
Mechanical	Industrial Measurements & Instrumentation	Computer Aided Product Design	Mechanical Simulations	Object Oriented Programing with Python
Electronics Engineering and ENTC	Data Structures and Algorithms	OOP JAVA / C++	Networking Data Science	EMB Linux/Cloud Computing/System Verilog

Open Electives (OE): 03 Courses and 12 Credits							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Chemical Engineering	Process Engineering	CH351	Process Engineering	CH371	Process Modeling and Simulation	CH471	Process Intensification and Integration
	Energy Engineering	CH352	Energy Technology	CH372	Energy Modeling and Simulation	CH472	Energy Management and Audit
Civil Engineering	Project Management	CV325	Planning and Management	CV332	Operation Research	CV422	Financial Management
	Environmental Engineering	CV326	Solid Waste Management	CV333	Unit Operations for Liquid Waste/Effluent Treatment	CV423	Environmental Impact assessment and Climate Change
Computer Engineering	Data science	CS351	Descriptive Analytics	CS354	Predictive Analysis	CS461	Big Data Analytics
	Artificial Intelligence and Machine Learning	CS352	Artificial Intelligence	CS355	Machine Learning	CS462	Deep Learning
	Cloud Computing	CS353	Cloud Computing Foundation	CS356	Cloud Native Application Development	CS463	Cloud Native DevOps
Electronics Engineering	Robotics and Automation	ME352	Robot Fundamentals and Kinematics	EX371	Robot Dynamics and Control	EX471	AI in Robotics

Open Electives (OE)							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Electronics & Tele-communication	Healthcare Technology	ET351	Fundamentals of Healthcare Technology	ET371	Healthcare Informatics	ET471	AI in Healthcare
	Internet of Things	ET352	IoT Architecture and Sensors	ET372	IoT Network & Protocols	ET472	Data Management and Analytics
Information Technology	Computer Security	IT351	Cryptography and System Security	IT352	Cyber Security and Forensics	IT461	Ethical Hacking & Cyber Laws
Mechanical Engineering	Computer Aided Engineering	ME351	Finite Element Analysis	ME361	Computational Fluid Dynamics	ME491	Advanced Fluid Dynamics
	Robotics and Automation	ME352	Robot Fundamentals and Kinematics	EX371	Robot Dynamics and Control	EX471	AI in Robotics
	Automobile Engineering	ME354	Automobile System Design	ME364	Vehicle Dynamics	ME494	Autotronics and e-Vehicles
Entrepreneurship Cell	Innovation and Entrepreneurship	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation

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

2019-2023

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF ENGINEERING SCIENCES AND HUMANITIES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (Version I)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
PE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**11**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF ENGINEERING SCIENCES AND HUMANITIES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
PE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
SS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Calculus and Differential Equations
	COURSE CODE	AS105
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	TUTORIAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS105.CEO.1: Classify and solve first order and first degree ordinary differential equations.
AS105.CEO.2: Categorize and inspect the applications of first order differential equations.
AS105.CEO.3: Inspect and solve linear differential equations of second and higher order.
AS105.CEO.4: Apply the concepts of partial differentiation.
AS105.CEO.5: Demonstrate an understanding towards the applications of partial differentiation.
AS105.CEO.6: Identify and classify first order linear and nonlinear partial differential equations.

COURSE OUTCOMES :

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

AS105.CO.1: Solve first order and first degree ordinary differential equations.
AS105.CO.2: Analyze and solve real world phenomenon governed by first order ordinary differential equations.
AS105.CO.3: Apply concepts of linear differential equations of second and higher order to solve different systems in engineering world.
AS105.CO.4: Infer the problems based on properties of partial differentiation.
AS105.CO.5: Examine the applications of partial differentiation.
AS105.CO.6: Solve and examine the solution of partial differential equations by theoretical methods.

THEORY COURSE CONTENT		
UNIT 1	**Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors, Linear differential equations, Differential equations reducible to linear form.		
UNIT 2	**Applications of Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Orthogonal Trajectories, Newton's law of cooling, Growth & Decay, Electric circuits, Chemical applications- Mixing problems.		
UNIT 3	**Linear Differential Equation of Second Order and Higher Order**	**7 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters, Equations reducible to linear differential equations with constant coefficients: Cauchy and Legendre's linear differential equation, Simultaneous linear differential equations, Applications.		
UNIT 4	**Partial Differentiation**	**7 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables, Homogeneous functions, Euler's Theorem, Differentiation of Implicit functions.		
UNIT 5	**Applications of Partial Differentiation**	**6 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function using Jacobians, Functional dependence, Maxima and Minima of functions of two variables.		
UNIT 6	**Partial Differential Equations**	**7 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration, Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors.		
TUTORIAL NO.02		**1 HOURS**
Linear differential equations, Differential equations reducible to linear form.		
TUTORIAL NO.03		**1 HOURS**
Orthogonal Trajectories, Newton's law of cooling, Growth & Decay		
TUTORIAL NO.04		**1 HOURS**
Electric circuits, Chemical applications- Mixing problems.		

TUTORIAL NO.05		**1 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		
TUTORIAL NO.06		**1 HOURS**
Cauchy and Legendre's linear differential equation, Simultaneous linear differential equations, Applications.		
TUTORIAL NO.07		**1 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables.		
TUTORIAL NO.08		**1 HOURS**
Homogeneous functions, Euler's Theorem, Differentiation of Implicit functions.		
TUTORIAL NO.09		**1 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function.		
TUTORIAL NO.10		**1 HOURS**
Functional dependence, Maxima and Minima of functions of two variables.		
TUTORIAL NO.11		**1 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration.		
TUTORIAL NO.12		**1 HOURS**
Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1

REFERENCE BOOK

1. G.B. Thomas, Maurice D. Weir, Joel R. Hass, Thomas' Calculus, 12 th edition, Pearson Education, 2002, ISBN: 9789332519091
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house , 2010, ISBN: 8173194203.
4. Peter V. O'Neil, Advanced Engineering Mathematics, 7 th edition, Cenage Learning, 2012, ISBN: 13: 9788131503102.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Physics
	COURSE CODE	AS106
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS106.CEO.1: Make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.

AS106.CEO.2: Analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.

AS106.CEO.3: Apply the concept of behavior of light and understand the polarization phenomena.

AS106.CEO.4: Classify and understand the difference of classical mechanics and quantum mechanics.

AS106.CEO.5: Derive the basic laws governing the motion of quantum particles.

AS106.CEO.6: Apply the concept of quantum mechanics to different applications and supplement the reasoning.

COURSE OUTCOMES :

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

AS106.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.

AS106.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.

AS106.CO.3: Apply that light is transverse in nature.

AS106.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.

AS106.CO.5:	Evaluate and apply the Schrödinger's equation to the motion of an electron orbiting round the shell.
AS106.CO.6:	Apply the concepts of Quantum Physics in different branches of engineering.

THEORY COURSE CONTENT		
UNIT 1	**Measurement and importance of span (order) of physical quantities**	**6 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. 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 Electromagnetic wave**	**6 HOURS**
Polarization of electromagnetic wave, Production and analysis of polarized electromagnetic wave, Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.		
UNIT 4	**Quantum Mechanics-I**	**7 HOURS**
Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Planck's quantum law of blackbody radiation, Matter-waves, De-Broglie's concept of matter waves, Heisenberg's Uncertainty Principle, Wave-function, Physical significance of wave function.		
UNIT 5	**Quantum Mechanics-II**	**8 HOURS**
Schrodinger's 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 Bohr's atomic model.		
UNIT 6	**LASER and Optical Fiber**	**5 HOURS**
Stimulated Absorption, Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einstein's coefficients), Principle and working of LASER (Ruby Laser), Application of LASER in optical fiber communication.		

PRACTICAL		
PRACTICAL NO.01	**Significant Figures**	**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02	**Interference of Light Waves**	**2 HOURS**
Calculate the refractive index of a given liquid using Newton Rings' Experiment.		
PRACTICAL NO.03	**Diffraction of Light Waves**	**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04	**Interference of Light Waves**	**2 HOURS**
Calculate the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05	**Phase and Phase Difference**	**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06	**Bohr's Atomic Model**	**2 HOURS**
Verification of Bohr's atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07	**Polarization**	**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08	**Stoke's Law**	**2 HOURS**
Calculation of wavelength of a laser beam using Lloyd's mirror arrangement.		
PRACTICAL NO.09	**Division of Amplitude of Light Waves**	**2 HOURS**
Determination of Radius of Curvature of a given planoconvex lens using Newton's Rings apparatus.		
PRACTICAL NO.10	**Diffraction as a Particular Case of Interference**	**2 HOURS**
Calculation of wavelength of different colors present in a white light.		

TEXT BOOK

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

REFERENCE BOOK

1. Alan S Morris, Butterworth Heinemann, Measurement and Instrumentation Principles,3rd Edition, Butterworth-heinmann,2001, ISBN 0750650818
2. Ajoy Ghatak ,Optics, 6th Edition Tata Mc Graw Hill Publishing Company. Ltd., 2016, ISBN-10-9339220900

3. Jenkins & White, Fundamentals of Optics, 4th Edition,Mc Graw Hill Science,2016, ISBN-0070853460.

4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-,6th Edition, Mc Graw Hill Education (India) Pvt. Ltd., 2009, ISBN-10- 0070151555.

5. L I Schiff ,Quantum Mechanics,3rd Edition, Tata Mc Graw Hill Education (India) Pvt. Ltd.,ISBN-10- 0070856435, ISBN- 13- 9780070856431.

6. PAM Dirac,Principles of Quantum Mechanics,4th Edition, CBS publishers and Distributors,2004, ISBN-10- 0195671074, ISBN- 13- 978019567107

7. D J Griffiths, Introduction to Quantum Mechanics,2nd Edition,Cambridge India ,2016,ISBN-9781316646513.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical and Electronics Engineering
	COURSE CODE	EX102
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX102.CEO.1: Impart knowledge of single-phase AC circuit and use of renewable energy systems.
EX102.CEO.2: Explain relations in three-phase systems and study power measurement methods.
EX102.CEO.3: Explain power supply components, electronic devices.
EX102.CEO.4: Summarize various Digital systems and application.
EX102.CEO.5: Build the knowledge of measuring system and signal conditioning circuits.
EX102.CEO.6: Get acquainted with different electrical machines.

COURSE OUTCOMES :

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

EX102.CO.1: Develop Renewable energy system (PV) & power factor improvement circuits.
EX102.CO.2: Distinguish behavior of three phase circuits & power measurement methods.
EX102.CO.3: Analyze analog circuits.
EX102.CO.4: Design Digital circuits.
EX102.CO.5: Demonstrate the use of Instrumentation system in various fields.
EX102.CO.6: Identify electrical machines used in typical domestic and industrial sector Application.

THEORY COURSE CONTENT		
UNIT 1	**AC Circuits**	**7 HOURS**
Energy Scenario, General structure of electrical power systems, A.C. fundamentals, RMS and average value, R-L,R-C,RLC series and parallel circuits, phasor diagram, power triangle and power factor, measures to improve power factor and its effects on Power system and consumer. Work, Power & Energy, costing of electricity, Application of Renewable Energy Systems, Design of PV system (offgrid), Battery selection and its series parallel connections		
UNIT 2	**Three Phase Circuit and Power Measurement**	**7 HOURS**
Three phase voltage generation and its waveform, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, three phase 4 wire system, Difference between neutral and ground conductors, Safety measures in electrical system, types of wiring, Active and Reactive Power measurement in single and three phase balanced system.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply, Clipper, Clamper. BJT - Structure and operation, CE, CB, CC configurations, biasing methods, DC Load Line, Transistor as a switch and Amplifier. Opto-electronic devices – Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Logic gates, Boolean algebra, KMap, SOP representation. Combinational circuit Design: Adder, Subtractor, MUX, DMUX, Comparator, Code converter Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor and Microcontroller based systems.		
UNIT 5	**Measuring System**	**7 HOURS**
Elements of measuring system, Sensors & Transducers –Temperature, Flow, Pressure, Level, 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, VA Rating, Efficiency and Voltage regulation, OC/SC Test on Transformer. Construction, principle of operation and types of DC motor, Speed Control, characteristics equation, PMDC, BLDC, Universal motor, Single phase Induction Motor, Stepper motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICAL:		
PRACTICAL NO.01	**Kirchhoff's laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoff's laws and Superposition theorem. To build and test both theorems.		
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 variations in X_L and X_C (3 cases) To justify the lagging and Leading nature for the three cases. To find power losses in total R, L and C and verify with total power consumed.		
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 between Line and Phase Quantities. To connect Bulb load in Delta connection and verify the relation between Line and Phase Quantities.		
PRACTICAL NO.05	**Power Measurement in Three Phase Balanced Circuit and Single Phase Circuit.**	**2 HOURS**
To measure active and reactive power by Two wattmeter method in three phase circuit. To measure reactive power by One wattmeter method in three phase circuit.		
PRACTICAL NO.06	**Open Circuit & Short Circuit Test on a Single Phase Transformer**	**2 HOURS**
To find iron losses and no load circuit parameters To find full load copper losses and Equivalent circuit parameters To determine efficiency and regulation of transformer at various different loading conditions.		
PRACTICAL NO.07	**Speed Control of D.C. Shunt Motor**	**2 HOURS**
To vary field current and measure speed To vary armature voltage and measure speed Draw conclusion from both the methods through graphs.		
PRACTICAL NO.08	**Step Angle Measurement of Stepper Motor.**	**2 HOURS**
To become familiar with the properties of Stepper Motor. To calculate the step angle of motor.		
PRACTICAL NO.09	**Electronics Components and Measuring Instruments**	**2 HOURS**
To study Passive components - Resistors, Capacitors & Inductor. To test semi-conducting components - Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		

PRACTICAL NO.10	D.C. Regulated Power Supply	2 HOURS
To design 12V/ 9V/ 5V 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 OP-AMP as summing and difference amplifier. To verify the application of OP-AMP 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 (Min.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.		

In addition to total 8 Experiments, two case study reports must be attached with Laboratory Course Record.

TEXT BOOK

1. Edward Hughes, "Electrical and Electronic Technology" 10th Edition, Pearson India, 2011, ISBN-13: 978-8131733660
2. Thomas L. Floyd, "Electronics Devices & Circuits", 5th Edition, Pearson Education India, 1998, ISBN-13: 978-0136491385.
3. A. Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, Prentice Hall of India, 2016, ISBN-13: 978-8120352681

REFERENCE BOOK

1. V. N. Mittle and Arvind Mittal, "Basic Electrical Engineering", 2nd Edition, McGraw Hill Education, 2005, ISBN-13: 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, "Electric Machines", 4th Edition, McGraw Hill, 2010, 978-0070699670.
3. Paul Horowitz, Winfield Hill, "The Art of Electronics", 3rd Edition, Cambridge University press, ISBN-13: 978-0521809269.
4. Thomas E. Kissell, "Industrial Electronics", 3rd Edition, Prentice Hall of India, 2003, ISBN-13:9788120322608
5. B. H. Khan, "Non-Conventional Energy Resources", 2nd Edition, Tata McGraw Hill, 2009, ISBN-13: 978-0070142763.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME104
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	NIL	60	40	60	40	200

PRE-REQUISITE : NIL

COURSE OBJECTIVES:

ME104.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME104.CEO.2: To develop & apply visualization skills to simple Objects.
ME104.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES:

The students after completion of the course will be able,

ME104.CO.1: Develop and/or comprehend a simple engineering drawing in both First and Third angle orthographic projections.
ME104.CO.2: Interpret engineering drawings.
ME104.CO.3: Apply visualization skills to development of surfaces.
ME104.CO.4: Analyze engineering drawings.
ME104.CO.5: Decide annotations for two dimensional drawings.
ME104.CO.6: Create manual drawing & CAD data using SP46 standards.

THEORY COURSE CONTENT		
UNIT 1	**Visual Thinking and Solid Geometry**	**12 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections and Sectional Views**	**4 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views, Missing views.		
UNIT 3	**Isometric Projections**	**4 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	**Development of Surfaces**	**2 HOURS**
Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.		
UNIT 5	**Auxiliary Projections**	**2 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View		
UNIT 6	**Freehand Sketching and 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.		

PRACTICAL: **Each Assignment carries 2 questions to be draws on A2 Size Drawing Sheet**		
ASSIGNMENT NO.1	Projection of Lines	**4 HOURS**
Two Questions on line inclined to both planes		
ASSIGNMENT NO.2	Projection of Planes	**2 HOURS**
Two Questions on plane inclined to both planes		
ASSIGNMENT NO.3	Projection of Solids	**2 HOURS**
Two Questions on solid inclined to both planes		
ASSIGNMENT NO.4	Orthographic Projections	**4 HOURS**
Two Questions on Orthographic Projection of Simple Mechanical Element		
ASSIGNMENT NO.5	Development of surface	**4 HOURS**
Two Questions on Development of regular Solids		
ASSIGNMENT NO.6	Isometric View	**6 HOURS**
Two Questions on Isometric view of Mechanical Element		

ASSIGNMENT NO.7	Auxiliary View	**4 HOURS**
Two Questions on auxiliary view of Mechanical Element		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 2D CAD software package**		
PRACTICAL NO. 1	Absolute & incremental drafting	**4 HOURS**
Drawing of two sketches using absolute and incremental commands		
PRACTICAL NO. 2	Draw commands, Modify commands, Array, fillet, offset commands	**6 HOURS**
Drawing of four sketches using draw & modify commands		
PRACTICAL NO. 3	Project Drafting	**2 HOURS**
Drafting of a small project using all drafting standards		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 3D CAD software package**		
PRACTICAL NO. 4	Sketching, Solid Modeling, Assembly	**12 HOURS**
Modeling of five Mechanical models using 3D Software package		
PRACTICAL NO. 5	Project Modeling	**4 HOURS**
Modeling of small Mechanical Project of Minimum three components		

TEXT BOOK

1. Dhanajay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD", 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 TextBook of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Logic Development- C Programming
	COURSE CODE	CS101
	COURSE CREDITS	3
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME & MARKS**						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS101.CEO.1: Develop programming skills using the fundamentals and basics of C Language.

CS101.CEO.2: Enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

CS101.CEO.3: Teach the issues in file organization and the usage of file systems.

COURSE OUTCOMES:

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

CS101.CO.1: List the various data types, control structures and looping structures supported by C language.

CS101.CO.2: Differentiate between various data types supported by C language.

CS101.CO.3: Implement the solutions for various algorithms in C language.

CS101.CO.4: Analyze various parameter passing methods to functions in C language.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of C Language**	**2 HOURS**
Overview of C, Character set, Constants, Variables and Keywords, Data types (Primitive and Derived), Operators (arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators) and Expressions (Type Conversion, precedence and order of evaluation), C Storage Classes, Managing Input and Output Operations, A structure of C Program, C Preprocessor, C Macro, Compilation, Execution, Debugging and Testing of C program.		
UNIT 2	**Control Structures**	**2 HOURS**
Decision Control Structure-If statement, if-else statement, Nested if-else statement, Ternary operator, Case Control structure- Switch Case Statements, GOTO statement, Loop Control Structure- while statement, do while statement, for statement, odd loop, nesting of loops, break and continue statement, finite & infinite Loop.		
UNIT 3	**Arrays and Functions**	**3 HOURS**
Arrays: Array Declaration and Initialization, Bounds Checking, Array arithmetic, One dimensional arrays and multi-dimensional Arrays, Strings - Standard Library String Functions, Array of strings. **Functions:** Function definition and prototype, Scope Rule of Functions, Calling Conventions, Passing Values between Functions - Call by Values and Call by References, Recursive functions, Passing Array Elements to a Function.		
UNIT 4	**Pointers**	**3 HOURS**
Pointers and Addresses, Pointer Notation & Arithmetic, Pointer to array, Array of pointers, Pointer to a function, Passing pointers as function arguments, Strings and Pointers, Structures and Pointers.		
UNIT 5	**User Defined Data Types**	**1 HOURS**
Structures & Union: Declaration of Structure and Union, Difference between Structure and Union, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures.		
UNIT 6	**File Handling**	**2 HOURS**
File Operations-open, read, write, append, delete, Error Handling, File Opening Modes Using command line argument(argc and argv), line input and output operations, Miscellaneous Functions.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
• Write a program in C to display "Hello World" • Write a menu driven program in C to display addition, subtraction, multiplication, division of two numbers		
PRACTICAL NO.02		**2 HOURS**
• Write a program in C to display the quotient and remainder after the division of two numbers • Write a menu driven program in C to demonstrate the use of left shift, right shift, and, or, xor operators		
PRACTICAL NO.03		**2 HOURS**
• Write a menu driven program in C to demonstrate the use of mathematical functions supported by math.h library • Write a program in C to display the grade obtained by the student in a course. The input will be the marks obtained and the output will be the grade obtained		
PRACTICAL NO.04		**2 HOURS**
• Write a program in C to display first N numbers on the screen using while, do while and for loop • Write a program in C to display first N number in reverse order on the screen using while, do while and for loop		
PRACTICAL NO.05		**2 HOURS**
Write a program in C display various patterns using *		
PRACTICAL NO.06		**2 HOURS**
• Write a program in C to display the addition of N numbers stored in an array • Write a program in C to copy the array of N numbers into another array in reverse order • Write a program in C to display the minimum and maximum element in an array		
PRACTICAL NO.07		**2 HOURS**
• Write a program in C to display the prime numbers within a given range • Write a program in C to display the fibonacci series within a given range		
PRACTICAL NO.08		**2 HOURS**
Write a menu driven program in C to perform addition, subtraction, division and transpose of matrices		

PRACTICAL NO.09		**2 HOURS**
• Write a program in C to convert every lowercase letter to uppercase letter and vice versa in a given string • Write a program in C to implement the string functions using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, sub string		
PRACTICAL NO.10		**2 HOURS**
• Write a program in C using functions to display addition, subtraction, multiplication, division of two numbers • Write a program in C using functions to display the minimum and maximum element in an array		
PRACTICAL NO.11		**2 HOURS**
Write a program in C using functions to implement the string functions without using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, string palindrome		
PRACTICAL NO.12		**2 HOURS**
• Write a program in C using functions and pointers to display addition, subtraction, multiplication, division of two numbers • Write a program in C using function and pointers to swap two numbers		
PRACTICAL NO.13		**2 HOURS**
Write a program in C using function and pointers to demonstrate the use of pointer arithmetic by taking input in an array		
PRACTICAL NO.14		**2 HOURS**
• Write a program in C using recursion to display the factorial of a number • Write a program in C using recursion to display fibonacci series within a given range		
PRACTICAL NO.15		**2 HOURS**
• Write a program in C to accept the information of single student and store it in structure and display the same • Write a program in C to accept the information of students and store it in array of structure and display the same		

PRACTICAL NO.16		2 HOURS
• Write a program in C to display Semester Grade Point Average (SGPA). Input will be stored in array of structure • Write a program in C to demonstrate the concept of union		
PRACTICAL NO.17		**2 HOURS**
Write a program in C to read a single line from the file using functions like fgetc, fgets, fscanf, and fread		
PRACTICAL NO.18		**2 HOURS**
Write a program in C to write a single string in a file using functions like fputc, fputs, fprintf and fwrite		
PRACTICAL NO.19		**2 HOURS**
Write a program in C to display contents of whole file on the screen		
PRACTICAL NO.20		**2 HOURS**
Write a program in C to read and write the record stored in structure from file		
PRACTICAL NO.21		**2 HOURS**
Write a program in C to implement student information system using array of structures		
PRACTICAL NO.22		**2 HOURS**
Write a program in C to implement Linear Search and Binary Search		
PRACTICAL NO.23		**2 HOURS**
Write a program in C to check whether a given matrix contains a saddle point		
PRACTICAL NO.24		**2 HOURS**
Write a program in C to implement union and intersection of two sets		

TEXT BOOK

1. E. Balguruswamy , "Programming in ANSI C" , Tata Mc-Graw Hill
2. Yashvant Kanitkar, "Let Us C" BPB Publication
3. "Programming With C", Schaum Series

REFERENCE BOOK

1. Kernighan and Ritchie , "The 'C' programming language" , Prentice Hall
2. V. Rajaraman , "Computer Programming in 'C' " , Prentice Hall
3. R.G. Dromey , "How to solve it by Computer", Pearson Education

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques
	COURSE CODE	ME105
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	60	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME105.CEO.1: Introduce different tools and study various measurement techniques.
ME105.CEO.2: Study different parts of the system along with its functions and applications.
ME105.CEO.3: List various tools used for the said application.
ME105.CEO.4: Identify the function of various parts of the system.
ME105.CEO.5: Impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME105.CEO.6: Apply the knowledge to find the solution for basic engineering problems.

COURSE OUTCOMES :

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

ME105.CO.1: Recall the tools required for the measurements.
ME105.CO.2: Summarize the application of various engineering tools used.
ME105.CO.3: Identify the right tools for selected purpose.
ME105.CO.4: Inspect various parts of the system.
ME105.CO.5: Justify the most appropriate technique which can be compatible with the existing environment.
ME105.CO.6: Develop the system which will give appropriate solution to the identified problem.

PRACTICAL:		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Any 6 Practicals from the following list)**	**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
16. Creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Any 06 practical's from the following list)**	**12 HOURS**

1. Study of basic electronics component and Switches.
2. PCB and Soldering Tools and Technique.
3. Relay and application.
4. Domestic wiring for Extension Board and Inverter.*
5. Load test of D.C. series motor.*
6. Brake test on D.C. Shunt motor.*
7. Load test on 3-phase induction motor.
8. V-I Characteristics of Thyristor & measurement of holding & latching current
9. V-I Characteristics of MOSFET.
10. V-I Characteristics of IGBT.
11. V-I Characteristics of TRIAC.
12. Solar cell and application (Generation of Energy).
13. Speed control of DC Motor (Toy Motor)
14. Actuators and application (Electrical and Mechanical).

15 Study of Virtual Instrumentation.

16 Open IT : Optical Mouse, Cathode Ray Oscilloscope, Study of Power Supply PA System, CD Player, TV, Microwave oven (Any Two)

PRACTICAL NO.03	**Mechanical Engineering (Any 6 practicals from the following list)**	**12 HOURS**

1. Linear and angular measurements.
2. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
3. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
4. Types of mechanism and making any one mechanism containing four links using cardboard.
5. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
6. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
7. Measurement of Relative humidity of air in the lab.
8. Measurement of hardness of Steel and Aluminum.
9. Measurement of stiffness of helical spring (compression or tension)
10. Servicing of 2 wheeler and 4 wheeler system.
11. Study of various components of automobile system.
12. Open IT: Mixer or kitchen machine, Refrigerator, Boiler and accessories thermal power plant (Mini), Two stroke and four stroke engine, Introduction to threaded fasteners and joints using threaded fasteners. Bearing and its lubrication, Bicycle /Two wheeler/ 4 wheeler(Any Two)

PRACTICAL NO.04	**Chemical Engineering (Any 3 practicals from the following)**	**6 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. Plate type heat exchanger
9. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Any 3 Practicals from the following)	6 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 parcel of land 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 life saving do s and don'ts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

Assessment	Common to all branches	4 HOURS

TEXT BOOK

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

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Statistics and Integral Calculus
	COURSE CODE	AS107
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	TUTORIAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS107.CEO.1: Study different statistical methods for solving problems.
AS107.CEO.2: Analyze different probability distribution functions.
AS107.CEO.3: Extend the basic concepts of integration for evaluation of complex integration problems.
AS107.CEO.4: Categorize and use equation of curves to trace the given curve.
AS107.CEO.5: Demonstrate an understanding towards evaluating multiple integrals.
AS107.CEO.6: Relate and examine the applications of multiple integrals.

COURSE OUTCOMES:

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

AS107.CO.1: Assess statistical problems.
AS107.CO.2: Solve the probability distribution problems.
AS107.CO.3: Evaluate complex integrals.
AS107.CO.4: Sketch curves by analyzing the given equation of curves.
AS107.CO.5: Evaluate the multiple integrals.
AS107.CO.6: Apply the knowledge of multiple integrals to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Statistics**	**6 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearson's coefficient of correlation) and regression		
UNIT 2	**Probability**	**6 HOURS**
Probability, probability density function, probability distribution: Binomial, Poisson, Normal		
UNIT 3	**Integral Calculus**	**7 HOURS**
Reduction formulae, Gamma function, Beta function, Differentiation under integral sign.		
UNIT 4	**Curve Tracing and Rectification**	**7 HOURS**
Tracing of Curves: Cartesian curves, Parametric curves, Polar curves. Rectification: Rectification of Cartesian, Parametric and Polar curves		
UNIT 5	**Multiple Integrals**	**7 HOURS**
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 6	**Applications of Multiple Integrals**	**6 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		

TUTORIAL: Problem solving session		
TUTORIAL NO.01		**1 HOURS**
Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.02		**1 HOURS**
Moments, skewness and kurtosis		
TUTORIAL NO.03		**1 HOURS**
Correlation and regression		
TUTORIAL NO.04		**1 HOURS**
Probability, probability density function, Probability distribution: Binomial		
TUTORIAL NO.05		**1 HOURS**
Probability distribution: Poisson, Normal. Reduction formulae, Gamma function		
TUTORIAL NO.06		**1 HOURS**
Beta function, DUIS Rule1 & 2.		

TUTORIAL NO.07		**1 HOURS**
Tracing of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.08		**1 HOURS**
Rectification of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.09		**1 HOURS**
Double Integration, Evaluation of Double Integration, Change the order of integration, Integration by transforming Cartesian to Polar Coordinate system		
TUTORIAL NO.10		**1 HOURS**
Triple integration, Integration by transforming to spherical and cylindrical polar coordinates. Applications of multiple integrals: To find Area, Volume		
TUTORIAL NO.11		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.12		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		

TEXT BOOK

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd, 2015, ISBN: 9788126554232, 8126554231,
2. B.S. Grewal ,Higher Engineering Mathematics ,39th edition, Khanna Publications,2005 , ISBN: 81-7409- 195-5

REFERENCE BOOK

1. G.B. Thomas & R.L.Finney, Calculus, 9th edition, Pearson Education, 2002, ISBN: 81-7758-325-5.
2. Dr. B.V. Ramana ,Higher Engineering Mathematics,4 th edition, Tata McGraw Hill,2016, ISBN: 978-0-07-063419-
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house,2002,ISBN No.0849324173
4. Peter V. O'Neil , Advanced Engineering Mathematics,7th Edition , Cenage Learning ,2012, ISBN-13: 9788131503102.
5. Dennis G. Zill & Warren S. Wright ,Advanced Engineering Mathematics ,4th edition ,Jones and Bartlett Publishers, 2011, ISBN-10: 0-7637-7966-0, ISBN – 13: 978-0-7637-7966-5.
6. Douglas C. montgomery , George C runger ,Applied statistics and probability for engineers, 5 th edition, wiley ,2012, ISBN No: 9788126537198, 8126537191 .
7. Richard A Johnson, Irwin Miller,John freund ,Miller & Freund's Probability and statistics for engineers 8th edition, Pearson, 2011,ISBN no:978-93325-5041-4.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Science of Nature
	COURSE CODE	CH101
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH101.CEO.1: Make students conversant with basic Biology regarding the life processes.

CH101.CEO.2: Study biology and engineering as biologically inspired technologies like designs in nature, bioenergetics, bioprocesses, biomaterials, biomechanics, bioinstrumentation.

CH101.CEO.3: Outline the technology involved in improving quality of water for its industrial use.

CH101.CEO.4: Illustrate the basic principles, instrumentation & applications of analytical techniques.

CH101.CEO.5: Get familiarize with the new concepts of Nano Science and Technology.

CH101.CEO.6: Define the basic aspects and applications of polymers, biomaterials & composites.

COURSE OUTCOMES :

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

CH101.CO.1: Explain natural biological processes and their technical aspects in view of optimizing Engineering solutions.

CH101.CO.2: Explain important biological inventions that changed the human life and their impact on engineering.

CH101.CO.3: Identify different methodologies for water quality analysis for industrial application.

CH101.CO.4: Apply basic concepts of analytical techniques for analysis of various chemical compounds.

CH101.CO.5: Apply the knowledge of nano science for betterment of the society.

CH101.CO.6: Categorize the different engineering materials and to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Science of Nature**	**7 HOURS**
The basics of science of nature. Exploring science in nature, specially symmetry, spiral, golden ratio, pattern and fractal. The phenomenon observed in nature viz., Physical, Chemical and Biological. Case studies and Applications. The diversity and commonality of cells, protein structure and function, basic molecular genetic mechanisms, bio membranes and cell architecture, transport of ions and small molecules across Cell membranes, cellular energetics, cell birth, lineage and death.		
UNIT 2	**Applications of Biology**	**6 HOURS**
Physiologic Systems - An Outline of Cardiovascular Structure and Function, Endocrine System, Nervous System, Vision System, Defense mechanisms in plants and animals. Introduction to Bio Sensors, Performance Factors, Factors Affecting the Performance of Sensors, Areas of Application. Biological Sensing Elements, Biological transducers. Discovery and Innovations in applications of Biology.		
UNIT 3	**The Role of Chemistry for Engineers**	**7 HOURS**
(A) **Introduction:** This section is an introduction to chemistry and chemical methods for engineering students. It describes how chemistry is used in engineering and how chemical principles aid engineers in the choice of materials for a particular application. Principles of Green chemistry are reviewed. The classification of separation methods used for mixtures. (B) **Periodic Table:** This section covers the names and symbols of the elements. The basic structure of the atom is reviewed including an explanation of isotopes. A discussion of the atomic structure describes electronic shells, subshells, their quantum numbers, orbital shapes, electron filling order, and the determination of the complete electron configuration of the elements. General description of the modern periodic table. Correlation between the valence electron configurations and the chemical properties of the elements. The periodic trends according to the position of the elements in the periodic table.		
UNIT 4	**Chemical Bonding - The Formation of Materials**	**8 HOURS**
(A) **The Formation of Materials:** This section covers chemical bonding and its effect on the chemical properties of the elements. Ionic bonding & covalent bonding are compared in terms of the octet rule and valence bond theory. Polar and non-polar covalent bonds. Molecular orbital theory is introduced to explain magnetism, bond order and hybridization helpful in Carbon chemistry. Intermolecular forces, including hydrogen bonding, are discussed with a special Case Study focusing on the special properties of water. (B) **Engineering Materials:** This section covers the Resources of Natural Materials, Introduction to Material Sciences viz. Polymers, Specialty polymers, Biomaterials, Nano materials and Smart materials with their examples and applications.		
UNIT 5	**Chemical Analysis and Instrumentation**	**6 HOURS**
Schrodinger's 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 Bohr's atomic model.		

UNIT 6	Water Treatment and Effluent Management	5 HOURS
This chapter covers types of impurities in water & the conventional water treatment methods. Hardness, Alkalinity and Chloride content of water, its causes, types and volumetric methods for their determinations are reviewed along with numerical. Various water softening & treatment methods which includes filtration methods by Carbon adsorption, ion-exchange methods and membrane techniques are explained		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Distillation**	**2 HOURS**
Separation of two miscible liquids using distillation process		
PRACTICAL NO.02	**Polymerization**	**2 HOURS**
Synthesis by condensation polymerization reaction		
PRACTICAL NO.03	**Nano Particle**	**2 HOURS**
Synthesis of nano particles using reduction method		
PRACTICAL NO.04	**pH Metry**	**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.05	**Paper Chromatography**	**2 HOURS**
Separation of inorganic cations by paper chromatography		
PRACTICAL NO.06	**TLC**	**2 HOURS**
Separation of organic compounds by TLC		
PRACTICAL NO.07	**Conductometry**	**2 HOURS**
Conductometric titration for mixture of acids.		
PRACTICAL NO.08	**Colorimetry / Spectrophotometry**	**2 HOURS**
Absorption studies		
PRACTICAL NO.09	**Hardness of Water**	**2 HOURS**
Determination of Hardness of water by EDTA method		
PRACTICAL NO.10	**Alkalinity**	**2 HOURS**
Determination of alkalinity of water by neutralization titration		
PRACTICAL NO.11	**Adsorption Studies**	**2 HOURS**
Water purification by activated charcoal		

PRACTICAL NO.12	Physical Phenomenon	2 HOURS
Case Studies of Physical Phenomenon		
PRACTICAL NO.13	**Chemical Phenomenon**	**2 HOURS**
Case Studies of Chemical Phenomenon		
PRACTICAL NO.14	**Biological Phenomenon**	**2 HOURS**
Case Studies of Biological Phenomenon		

TEXT BOOK

1. Jain & Jain, "Engineering Chemistry", 16th Edition, Dhanpat Rai Publications company,2015, ISBN: 978-93-5216-000-6
2. S.M. Khopkar , "Basic Concept of Analytical Chemistry",3rd edition, New Age International (P) Ltd., 2008, ISBN-10: 81-224-2092-3; ISBN-13: 978- 81-224-2092-0
3. Dr. B. S. Chauhan , "Engineering Chemistry", 3rd Edition, University Science Press (Laxmi Publications Pvt. Ltd).,2009, ISBN: 978-81-318-0579-4.
4. Lodish H, Berk A, Zipursky SL, et al., "Molecular Cell Biology", 5th Ed., W. H. Freeman publications, 2000.
5. Palsson B.O. and Bhatia S.N., "Tissue Engineering", Pearson, 2009,
6. Brian R. Eggins, "CHEMICAL SENSORS AND BIOSENSORS", JOHN WILEY & SONS, LTD, 2004.

REFERENCE BOOK

1. Jeffrey S. Gaffney and Nancy A. Marley General Chemistry for Engineers, Elsevier, 2018, ISBN: 978- 0-12-810425-5
2. Skoog, West, Holler, Crouch, "Fundamentals of Analytical Chemistry", 8th Edition Cengage Learning, 2009, ISBN-13: 978—81-315-0051-4, ISBN-10: 81-315-0051-9
3. Willard, Merritt, Dean and Settle, "Instrumental Methods of analysis (Chemistry)", 6th edition, Wadsworth Publishing Co., 1988, 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, ISBN: 0495668028.
5. O. G. Palanna, "Engineering Chemistry", 1st Edition, Tata McGraw Hill education Pvt. Ltd., 2009, ISBN-13: 978-0-07-014610-5, ISBN (10): 0-07-014610-1.
6. Pradeep T., "A Text Book of Nanoscience and Nanotechnology", Tata McGraw Hill, New Delhi, 2012.
7. Reece, J. B., Taylor, M. R., Simon, E. J. and Dickey, J. L. (2013) Campbell Biology: Concepts and Connections (Seventh Edition) (Pearson) ISBN 1292026359

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV102
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	20	40	40	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV102.CEO.1: Classify force systems and explain the conditions of equilibrium.
CV102.CEO.2: Illustrate laws of friction.
CV102.CEO.3: Demonstrate the concepts of Centroid and moment of inertia.
CV102.CEO.4: Describe kinematic parameters of motion.
CV102.CEO.5: Make use of laws of motion for kinetics.
CV102.CEO.6: Explain energy and momentum methods.

COURSE OUTCOMES:

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

CV102.CO.1: Determine the resultant and support reactions.
CV102.CO.2: Equilibrium Analysis of bodies involving frictional forces.
CV102.CO.3: Evaluate Centroid of bodies and moment of inertia of sections.
CV102.CO.4: Identify the type of motion and its kinematic parameters.
CV102.CO.5: Analyze the motion under action of constant and variable forces.
CV102.CO.6: Apply energy and momentum methods for kinetics problems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Statics**	**8 HOURS**
Basic concepts in mechanics, Fundamental principles/laws of mechanics, Force, moment of a force and couple, Resolution and composition of forces, Resultant of coplanar forces, Free body diagrams, Equilibrium of coplanar forces, Applications to simple beams and cables. **Further Reading:** *Self study-Application to jib crane.		
UNIT 2	**Friction**	**6 HOURS**
Introduction to friction, Types of friction, Laws of friction- coefficient of friction, Theory of friction- angle of friction, angle of repose, cone of friction, Engineering applications - Block and wedge friction, ladder friction, Belt Friction. **Further Reading:** *Self study-Screw friction.		
UNIT 3	**Properties of Surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity. Centroid of standard objects, Centroid of composite 1D and 2D objects, Concept of area moment of inertia, Radius of gyration and its significance, Parallel and perpendicular axis theorems, Moment of inertia of standard and composite 2D figures. **Further Reading:** *Self study- Mass moment of Inertia.		
UNIT 4	**Kinematics of Planar Motions**	**7 HOURS**
Basic concepts in kinematics, Rectilinear motion with uniform and variable acceleration, Motion under Gravity, Motion curves, Curvilinear Motion in Rectangular and path coordinates, Projectile motion. **Further Reading:** *Self study- Curvilinear motion in polar coordinates.		
UNIT 5	**Kinetics- Force and Acceleration**	**6 HOURS**
Newton's second laws of Motion, Free body diagram equation- Rectilinear motion, Concept of dynamic equilibrium. Motion of connected bodies, Equations of motion in rectangular and path coordinates for curvilinear motion. **Further Reading:** *Self study- Free Vibrations.		
UNIT 6	**Kinetics Energy and Momentum**	**6 HOURS**
Concepts of Work, power and energy, Work done by gravity, spring and frictional forces, Principle of work and Energy, Conservation of mechanical energy, Concept of Impulse and linear momentum, Impulse-momentum theorem, Conservation of linear momentum, Collisions- Types of collisions, Coefficient of restitution, Applications to vehicles and sports. **Further Reading:** *Self study- Space mechanics.		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Basic Principles/Laws**	**2 HOURS**
To verify basic laws of mechanics.		
ACTIVITY NO.01	**Exploring Scientific Calculator**	**2 HOURS**
To complete the given task of calculations in a stipulated time with desired accuracy using a scientific calculator.		
PRACTICAL NO.02	**Friction**	**2 HOURS**
To determine coefficient of friction for a given surfaces		
ACTIVITY NO.02	**Presentations**	**2 HOURS**
To prepare and deliver a PPT presentation on engineering application of friction.		
PRACTICAL NO.03	**Centroid**	**2 HOURS**
To determine Centroid of a given 1D object		
ACTIVITY NO.03	**Act of Balancing**	**2 HOURS**
To cut a 2D figure precisely and locate a balancing point on it.		
PRACTICAL NO.04	**Motions**	**2 HOURS**
To study and analyze a given set of motion.		
ACTIVITY NO.04	**Graphing the Motion**	**2 HOURS**
To draw x-t, v-t, a-t graphs for given description of motion in stipulated time.		
PROJECT		**10 HOURS**
To fabricate a model of simple structure or mechanism from low cost materials.		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", 1st edition ,Tata McGraw-Hill Education, 2009, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics: Statics and Dynamics ",12th edition, Pearson Education, 2010, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II",10th edition, Tata Mc-Graw-Hill Education, 2012, ISBN: 978-0077402327
2. Ferdinand Singer, "Engineering Mechanics Statics and Dynamics", 3rd edition Harper and Row, 1994 ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics",1st edition, Cengage Learning, 2009, ISBN:8131509907

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applications Programming-Python
	COURSE CODE	CS102
	COURSE CREDITS	3
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS102.CEO.1: Get familiar with basics of Python programming.
CS102.CEO.2: Understand usage of conditional and looping statements in Python.
CS102.CEO.3: Learn different simple data structure supported in Python.
CS102.CEO.4: Acquire knowledge and skills of strings and dictionary.
CS102.CEO.5: Implement Object Oriented Programming concepts using Python.
CS102.CEO.6: Introduce the concepts of Pandas & NumPy.

COURSE OUTCOMES :

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

CS102.CO.1: Debug syntax and semantics in Python programs.
CS102.CO.2: Demonstrate proficiency in handling strings and file system.
CS102.CO.3: Implement the programs using core data structures like Lists and Dictionaries.
CS102.CO.4: Interpret the concepts of Object Oriented Programming in Python
CS102.CO.5: Develop solution for real life problems using Python.

THEORY COURSE CONTENT		
UNIT 1	**Python Fundamentals and Data Handling**	**2 HOURS**
Introduction, Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types ,Mutable and immutable types, Input output operation , Comments, Reserved words, Indentation, Operators and expressions.		
UNIT 2	**Decision and Iterative Statements**	**2 HOURS**
Introduction to Decision Statements: Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. **Introduction to Iterative Statements:** Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, break, continue, pass, else statement used with loops.		
UNIT 3	**List manipulation, Tuples and Python Function**	**2 HOURS**
List: Introduction, creating & accessing lists, list operations, working with lists, list functions & methods. **Tuples:** Introduction, creating & accessing tuples, tuples operations, tuples functions & methods. **Functions:** Need for functions, definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.		
UNIT 4	**Strings and Dictionary**	**3 HOURS**
Strings: Introduction, string operations- concatenation, appending, multiplication and slicing. Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, Iterating strings, the string module. **Dictionary:** Introduction, working with dictionaries, dictionary functions and methods		
UNIT 5	**Object Oriented Programming**	**2 HOURS**
Programming Paradigms-monolithic, procedural, structured and object oriented, Features of Object oriented programming-classes, objects, methods and message passing, inheritance, polymorphism, containership, reusability, delegation, data abstraction and encapsulation. Classes and Objects: classes and objects, class method and self-object, class variables and object variables, public and private members, class methods		
UNIT 6	**Data Structure and Libraries in Python**	**2 HOURS**
Introduction to data structure, pandas, NumPy.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mc2 where m is the mass of the object and c is its velocity.		
PRACTICAL NO.02		**2 HOURS**
Write a Python program for following conditions. • If n is single digit print square of it. • If n is two digit print square root of it. • If n is three digit print cube root of it.		
PRACTICAL NO.03		**4 HOURS**
Solve the Fibonacci sequence using recursive function in Python.		
PRACTICAL NO.04		**4 HOURS**
Write a Python program to print different patterns.		
PRACTICAL NO.05		**2 HOURS**
To accept student's five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade if first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division.		
PRACTICAL NO.06		**4 HOURS**
To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.		
PRACTICAL NO.07		**2 HOURS**
Write a program in Python to enter two unequal nos. if first no. is greater than display square of the smaller no. and cube of the greater no. otherwise vice-versa. If no. are equal display the message both no. are equal find square, square root and cube root of a number.		
PRACTICAL NO.08		**4 HOURS**
Write a Python program to perform following string operations. a) String concatenation b) String Reverse c) String compare d) String length e) Palindrome f) Case change.		
PRACTICAL NO.09		**2 HOURS**
Select the number from the entered list and find its position in Python (use Linear Search).		
PRACTICAL NO.10		**4 HOURS**
Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain) using dictionary.		

PRACTICAL NO.11		6 HOURS

1. Write Python class for bank customer with withdraw and deposit operations (use inheritance) (Introduce class, object concepts).
2. Using concepts of polymorphism write Python application program.

Write a Python program to perform addition and multiplication of 2 matrices.

PRACTICAL NO.12		4 HOURS

Write a Python program to convert a Panda module Series to Python list and it's type.

PRACTICAL NO.13		4 HOURS

Write a NumPy program for Plotting and analyzing data.

Mini Project:

1. Project is for a period of 2 weeks.
2. Group of two or three has to choose project topic from the list designed by concerned faculty of particular division.
3. Each group has to collect requirements for project and get approved by concerned teachers in first weeks.
4. implementation and testing need to be performed in second week.
5. Demonstration along with presentation need to be given as final project submission.
6. Project carries 20 Marks.

TEXT BOOK

1. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1st Edition, Create Space Independent Publishing Platform, 2016. (http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf) (Chapters 1 – 13, 15)
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2ndEdition, Green Tea Press, 2015. http://greenteapress.com/thinkpython2/thinkpython2.pdf) (Chapters 15, 16, 17) (Download pdf files from the above links)

REFERENCE BOOK

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014.
2. Mark Lutz, "Programming Python", 4th Edition, O'Reilly Media, 2011.ISBN-13: 978-9350232873
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1stEdition, Wiley India Pvt Ltd, 2016. ISBN-13: 978- 8126562176.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	German Language
	COURSE CODE	HP104
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP104.CEO.1: To introduce German as a foreign language and enhance knowledge, communication and intellectual capabilities which helps to improve cognitive skills and creativity vital for problem solving and innovation.

HP104.CEO.2: To develop an awareness of German culture along with providing better career opportunities later in life.

COURSE OUTCOMES:

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

HP104.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics

HP104.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively

HP104.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Germany

HP104.CO.4: Enhance their knowledge of German culture and society

THEORY COURSE CONTENT		
UNIT 1		**2 HOURS**
Introduction- Alphabets, Numbers 0-20, Self Introduction and Introducing third person. Grammar- wh Questions(w-frage), pronouns.		
UNIT 2		**4 HOURS**
Greetings, Speaking about different Languages and Countries, numbers above 20, seasons Grammar- Yes or no Questions, Sentence Construction verbs and conjugations of regular verbs		
UNIT 3		**4 HOURS**
Speaking about hobbies and interests, different professions, weekdays, months Grammar- Nouns, Articles, conjugations of irregular verbs		
UNIT 4		**6 HOURS**
Vocabulary related to food, different places in the city, transport Grammar- Imperative sentence		
UNIT 5		**4 HOURS**
Relations, understanding clock timings Grammar- Cases, Nominative case, nominative verbs pronouns and articles		
UNIT 6		**6 HOURS**
Body parts, directions, asking for the address email address and telephone number Grammar- Accusative case, accusative verbs pronouns and articles		

TEXT BOOK

1. Netzwerk Deutsch als Fremdsprache- Kursbuch A1(Stefanie Dengler), Goyal Publications.

REFERENCE BOOK

1. https://www.klett-sprachen.de , https://www.duolingo.com/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Japanese Language
	COURSE CODE	HP105
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP105.CEO.1: To perform daily basic activities including below mentioned.
HP105.CEO.2: Self Introduction, Greetings in Japanese.
HP105.CEO.3: Introduction to Japanese scripts- Hiragana, Katakana, Kanji.
HP105.CEO.4: Develop basic vocabulary throughgroup activities, videos.
HP105.CEO.5: Develop an understanding business etiquette.
HP105.CEO.6: Introduce topics related daily conversation, listening skills, cultural awareness.

COURSE OUTCOMES:

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

HP105.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics.
HP105.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively.
HP105.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Japan.
HP105.CO.4: Enhance their knowledge of Japanese culture and society.

THEORY COURSE CONTENT		
UNIT 1		**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 2	**Hiragana, vocabulary and listening.**	**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 3		**4 HOURS**
Hiragana and Katakana, and Japanese games.		
UNIT 4		**4 HOURS**
Family Members understanding in Japanese. and Vocab.		
UNIT 5		**5 HOURS**
Japanese cultures study, and business etiquette.		
UNIT 6		**5 HOURS**
Daily conversation and cultural study.		

TEXT BOOK

1. Minna Na Nihongo, Goyal Publications.

REFERENCE BOOK

1. Nil

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME106
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	NIL	60	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME106.CEO.1: Disseminate the philosophy of design thinking.
ME106.CEO.2: Impart the information regarding User centric approach.
ME106.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME106.CEO.4: Enhance thinking in order to inspect diverse solutions.
ME106.CEO.5: Sensitize about the feasibility, desirability and viability criteria's for selection of Appropriate solution.
ME106.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES:

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

ME106.CO.1: Recall fundamental principles of design thinking.
ME106.CO.2: Explain all the dimensions of user and his needs using design thinking approach.
ME106.CO.3: Outline user centric problem by using information gathering techniques.
ME106.CO.4: Compare multiple solutions through ideation process.
ME106.CO.5: Interpret most appropriate solution for defined user centric problem.
ME106.CO.6: Develop the most optimum solution.

PRACTICAL:		
PRACTICAL NO.01	**Human Centred Design**	**2 HOURS**
Introduction to Human Centred Design, Human Centred Design Phases, Human Centred Design Process, Human Centred Design case study		
PRACTICAL NO.02	**Research Methodology (Problem Definition, Information Gathering)**	**4 HOURS**
Design thinking Models & Methodology - General Problem Statement, Random check list, mind mapping Categorization of random check list. Brainstorming of problem areas, Research Methodology - Information gathering - Primary, Secondary Sources, data presentation, Preparation of survey forms, Survey Analysis, Drawing Inference.		
PRACTICAL NO.03	**Ideation**	**4 HOURS**
SWOT analysis, Vein Diagram (User Desirability, Feasibility, Viability check) Drawing inferences, Translation of inferences into design criteria, specific problem statement, Ideation – free hand sketching drawing of simple form of products (Isometric views, layout, circuit diagram, Ideation sketches), Ergonomic and aesthetic consideration in design.		
PRACTICAL NO.04	**Prototyping**	**2 HOURS**
Concept validation, evaluation and detailing, Different methods of Prototyping, selection of right method of prototyping.		
PROJECT		**40 HOURS**
PRACTICAL NO.05	**Phase 1 : General Problem Statement and problem background**	**4 HOURS**
PRACTICAL NO.06	**Phase 2 : Research methodology**	**4 HOURS**
PRACTICAL NO.07	**Phase 3 : Product Specification**	**4 HOURS**
PRACTICAL NO.08	**Phase 4 : Ideation**	**6 HOURS**
PRACTICAL NO.09	**Phase 5 : Concept Evaluation, Validation and Concept detailing**	**8 HOURS**
PRACTICAL NO.10	**Phase 6 : Prototyping**	**10 HOURS**
PRACTICAL NO.11	**Phase 7 : Documentation**	**4 HOURS**

TEXT BOOK

1. Emrah Yayici, Design Thinking Methodology Book, Amazon Digital Services LLC - Kdp Print Us, 2016, ISBN: 6058603757, 9786058603752
2. Idris Mootee, Design Thinking for Strategic Innovation, Wiley (2017), ISBN-13: 978-8126572694
3. Thomas Lockwood, Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Allworth Press; Original edition (10 November 2009), ISBN-13: 978-1581156683

REFERENCE BOOK

1. Harper Perennial, Lateral Thinking: Creativity Step by Step; Reissue edition, 2015 (Perennial Library).
2. John Chris Jones, Design Methods, John Wiley & Sons, David Fulton Publishers, London, 1980, ISBN 0-471-28496-3.
3. Nigel Cross, Design Thinking: Understanding How Designers Think and Work, Berg Publishers (May 15, 2011), ISBN-13: 978-1847886361
4. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Published September 29th 2009 by Harper Business, ISBN 0061766089

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Indian Constitution (Audit Course)
	COURSE CODE	HP106
	COURSE CREDITS	NIL
RELEASE DATE : 01/07/2019	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP106.CEO.1: To realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.

HP106.CEO.2: To identify the importance of fundamental rights as well as fundamental duties.

HP106.CEO.3: To understand the functioning of Union, State and Local Governments in Indian federal system

HP106.CEO.4: To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure

COURSE OUTCOMES:

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

HP106.CO.1: Understand and explain the significance of Indian Constitution as the fundamental law of the land.

HP106.CO.2: Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.

HP106.CO.3: Analyze the Indian political system, the powers and functions of the Union, State and Local Governments in detail.

HP106.CO.4: Understand Electoral Process, Emergency provisions and Amendment procedure.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Indian Constitution**	**2 HOURS**
Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India, Salient features and characteristics of the Constitution of India, Scheme of the fundamental rights, The scheme of the Fundamental Duties and its legal status, The Directive Principles of State Policy – Its importance and implementation.		
UNIT 2	**Federal Structure and Amendment**	**4 HOURS**
Federal structure and distribution of legislative and financial powers, between the Union and the States, Parliamentary Form of Government in India – The constitution powers and status of the President of India, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India.		
UNIT 3	**Emergency Provisions**	**2 HOURS**
Emergency Provisions: National Emergency, President Rule, Financial Emergency.		
UNIT 4	**Constitutional Schemes**	**4 HOURS**
Local Self Government – Constitutional Scheme in India, 13. Scheme of the Fundamental Right to Equality, Scheme of the Fundamental Right to certain Freedom under Article 19, Scope of the Right to Life and Personal Liberty under Article 21.		

TEXT BOOK

1. D. D. Basu, Introduction to the Constitution of India, LexisNexis.
2. Granville Austin, The Constitution of India: Cornerstone of a Nation, Oxford University Press.

REFERENCE BOOK

1. Subhash Kashyap, Our Constitution, National Book Trust.
2. M.P. Jain, Indian Constitutional Law, LexisNexis.
3. V .N.Slmkla , Constitution of lndia , Ea stern Book Co mpany.
4. P.M. Bak shi , The Constitution of India , Universal Law Publishing.
5. M.V.Pylee, Constitutional Government in India , S. Chand.
6. V. S. Khare, Dr. B.R. Ambedkar and India ' s National Security.

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

Second Year

Bachelor of Technology in Chemical Engineering

2019-2023

(With Effect from Academic Year: 2020-2021)

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN CHEMICAL ENGINEERING	RELEASE DATE	:	01/07/2020
	REVISION NO.	:	1.0

SEMESTER: III												
INTERNSHIP (CH200)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC6	ME221	Material Engineering	3	2	-	35	35	30	0	50	150	4
DC01	CH221	Material and Energy Balance	3	0	-	35	35	30	0	0	100	3
DC02	CH222	Inorganic and Analytical Chemistry	3	2	-	35	35	30	50	0	150	4
DC03	CH223	Momentum transfer	3	2	-	35	35	30	50	0	150	4
DC04	CH224	Chemical Engineering Thermodynamics	3	0	-	35	35	30	0	0	100	3
SDP3	ET235	Rapid Prototyping	0	4	-	0	0	0	0	75	75	2
SDP4	CH230	Minor Project - Design	0	2	-	0	0	0	0	50	50	1
ESC7	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			**16**	**12**	**0**	**175**	**175**	**150**	**100**	**175**	**775**	**21**

SEMESTER: IV												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS203	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC05	CH231	Heat Transfer	3	2	-	35	35	30	50	0	150	4
DC06	CH232	Advanced Chemistry	3	2	-	35	35	30	50	0	150	4
DC07	CH233	Mass Transfer	3	2	-	35	35	30	50	0	150	4
HSS3	HP202	Professional Skills	0	4	-	0	0	25	0	50	75	2
SDP5	ET224	Digital Prototyping	0	4	-	0	0	0	0	75	75	2
SDP6	CH240	Minor Project - Implementation	0	2	-	0	0	0	0	50	50	1
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**145**	**200**	**175**	**800**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME221
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	NIL	50	150

PRE-REQUISITE :

COURSE OBJECTIVES:

ME221.CEO.1: To illustrate the fundamental properties of various engineering materials and demonstrate the need and applications of different heat treatment processes to it.

ME221.CEO.2: To explain the structure- property co relationship as a basis for performance of materials.

ME221.CEO.3: To identify the most appropriate material and the required manufacturing process for the given project in the industry/research fields.

ME221.CEO.4: To categorize the various material testing methods and characterization techniques and make use of it to apply for given component/product.

COURSE OUTCOMES:

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

ME221.CO.1: Relate the applications of various engineering materials and heat treatment processes in material processing industry.

ME221.CO.2: Interpret the specifications, composition, concepts and fundamental properties of engineering materials applied in industrial/research field.

ME221.CO.3: Select the suitable materials, manufacturing process for specified application to meet the product performance requirements within its product service life.

ME221.CO.4: Analyze the suitable material testing and characterization technique to ensure service life for specific product without any failure or deterioration in its performance.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**14 HOURS**

Basics of extractive metallurgy-

Importance of metallurgy in day to day life and in industry, Overview or introduction of raw material processes of steel (Melting, Continuous casting, rolling)

Ferrous metals-

Steels-Classifications and specifications of steels and cast iron as per ASTM, SAE and Indian Standard designation system. Iron (Fe)-Iron Carbide (Fe3C) equilibrium diagram, Critical cooling rate, transformation products of Austenite-Pearlite-Martensite, Alloy steels- High Strength Low Alloy (HSLA), Boron steel, Stainless steel- Austenitic, Ferritic, Martensitic, Maraging steels- Significance, composition and applications.

Cast Irons- Classification, Manufacturing, Composition, Properties & applications of white C.I., Grey cast iron, malleable C.I., S.G. cast iron, chilled and alloy cast iron, effect of various parameters on structure and properties of cast irons. Specific applications such as machine tools, automobiles, pumps, valves etc.

Heat treatment of steels- Time- Temperature Transformation Diagram, Annealing-Conventional, Normalizing, Comparison of Annealing and Normalizing, Hardening- effects of different media- water, oil, salt bath, Vacuum Hardening (Latest oxygen free Heat treatment), Tempering- High-medium-low temperature Defects due to heat treatment- Quench cracks, oxidation, overheating. Classification of surface hardening treatments- Carburizing, Nitriding, Carbonitriding, flame hardening, induction hardening, Anodizing

Non-ferrous metals- Classification, Composition, Properties & applications of: Copper and Its Alloys-Alpha, beta and gamma brasses, Nickel and Its alloys-Inconel- Monel-Invar-Elnivar-Alnico, Aluminium and Its alloys-LM6-LM11- LM13-LM14-Hinduminium (RR350).

Bearing materials and its applications- Properties of bearing materials, Materials-Tin based babbits, Lead based babbits, Gray Cast Iron, Non-metallic bearings-Nylon, Polyamide, Self-lubricating bearings-powder metallurgical bearings

UNIT 2	**Non-metallic materials-Polymers, Ceramics and Composites**	**8 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, Barium Zirconium Titanate and Barium Calcium Titanate(BZT-BCT) Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications. **High Performance Polymers:** Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation

Composites: Need of composites, fabrication and testing of composite material, Particle-reinforced composites, large-particle composites, dispersion-strengthened, Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic matrix composites, carboncarbon composites, structural composites, laminar composites. Case study for industrial applications.

UNIT 3	Strength of materials	6 HOURS

Strengthening mechanisms: Refinement of grain size, Cold working/strain hardening, Solid solution strengthening, Dispersion strengthening. Heat treatment of nonferrous metals: Precipitation, Age hardening and homogenization Creep strength, High temperature-intergranular and low temperature-trans granular fracture of materials, Fracture toughness properties of materials applied in cryogenic and high temperature- rocket and aerospace applications, Fracture toughness improvement methods-shot peening

UNIT 4	Powder metallurgical materials	8 HOURS

Basic steps of powder metallurgy process, classification & methods of powder manufacturing, characteristics of metal powders, Conditioning of metal powders (Screening, Blending & mixing, annealing), Compaction techniques (cold compaction, hot compaction, Isostatic compaction & powder rolling), mechanism & importance of sintering, Pre-sintering & sintering secondary operations.

Advantages, limitations and applications of powder metallurgy. Production of typical P/M components (with flow charts), self-lubricated bearing, cemented carbides, cermets, refractory metals, electrical contact materials, friction materials, and diamond impregnated tools, friction plate, clutch plate, commutator brushes.

UNIT 5	Corrosion and its prevention techniques	6 HOURS

Classification of corrosion- Dry corrosion & wet corrosion, Mechanism of corrosion, Types of corrosion: Pitting corrosion, stress corrosion, season cracking, Cavitation corrosion, caustic embrittlement, intergranular corrosion, crevice corrosion, erosion corrosion, uniform corrosion, galvanic corrosion,

Corrosion prevention methods- classification of different methods, e.g. inhibitors, Cathodic & anodic protection, internal & external coatings, Low & High temperature corrosion. Design against corrosion.

UNIT 6	Introduction to Advanced Materials-Nanomaterials, Magnetic, Piezoelectric materials	6 HOURS

Nanomaterials-Basic concepts of Nano science and Nanotechnology,Nanomaterials synthesis methods- Top down and bottom up approach, Sol gel technique, solution blending, laser vaporization, arc discharge method Carbon nanotubes and its classification, Graphene 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.AFSEM-Correlative SEM-AFM analysis

Magnetic materials- Soft & Hard Ferrites, Vibrating Sample Magnetometer for studying hysteresis curve of magnetic materials.

Dielectric material- Piezo electric and Ferro electric materials and their applications, superconductors. Modern Materials for high, low temperatures and Cryogenic applications

PRACTICAL: **Perform the following experiments.**		
PRACTICAL NO. 1	Jominy End Quench Test	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO. 2	Izod Impact Test	**2 HOURS**
Izod impact test		
PRACTICAL NO. 3	Charpy Impact Test	**2 HOURS**
Charpy impact test		
PRACTICAL NO. 4	Hardness Test	**2 HOURS**
Vickers hardness test		
PRACTICAL NO. 5	Hardness Test	**2 HOURS**
Rockwell hardness test		
PRACTICAL NO. 6	Hardness Test	**2 HOURS**
Poldi hardness test		
PRACTICAL NO. 7	Dye Penetrant Test	**2 HOURS**
Dye Penetrant Test for detection of surface level flaws in materials		
PRACTICAL NO. 8	Ultra-sonic Test	**2 HOURS**
Ultra-sonic test for detection of internal flaws in materials.		
PRACTICAL NO. 9	Case study-based experimentation	**4 HOURS**
Selection and performance of suitable hardness testing method for the given industrial components.		
PRACTICAL NO. 10	Microstructural analysis of steels	**2 HOURS**
Microstructural analysis of steels		
PRACTICAL NO. 11	Microstructural analysis of Cast irons	**2 HOURS**
Microstructural analysis of Cast irons		

TECHNICAL PAPER PRESENTATION/PUBLICATION ASSESSMENT PROCESS

1. Course champion should conduct meetings with faculty members, students from all disciplines for the given semester regarding following points-Importance of paper publication at SY level for placements/research work, plagiarism, research ethics, technical paper formation and publication process, demonstration of experimental and review paper formation.
2. Each faculty member should form students groups in practical session as per students interest domain selected from any content form the syllabus or from content beyond syllabus.
3. Each student groups will download the research papers, discuss the various technical points and doubts with peers and faculty member during the time left after conduction of practical in laboratory session as a continuous process for all weeks during semester.
4. In case of doubts are unsolved within particular practical session, then doubts are discussed within course meeting held weekly and the information is conveyed back to students to complete the loop.
5. Faculty members should display the list of Scopus/web of science indexed journals with no article processing fee or SPPU UGC CARE included journals list and list of conferences scheduled within the semester to students and motivate students to prepare drafts.
6. The drafts are prepared by students and reviewed by faculty member, team of materials Engineering and then DRC should be done to receive suggestions on the paper draft.
7. The evaluation of the assessment can be said as complete if students groups are able to
   (a) Publish the paper in journal or conference proceedings which are Scopus indexed or web of science indexed
   (b) Students group has received the acceptance for the publication of their paper.
8. In case any students group is not able to publish or receive the acceptance then minimum criteria is to communicate the paper and receive at least review 1 from reviewers of the paper with no major corrections. Communication to the journal for the paper with no major corrections and possibility of publication is mandatory for all project groups.

PROJECT BASED LEARNING- CONTENT BEYOND SYLLABUS

A group of 3 students will be given following set of experiments which needs to be performed to prepare a review report based on the practical observations, literature review discussions among peers and faculty members:

1. Identification of failure mode (cup/cone/brittle/ductile) of the given failed component obtained from any manufacturing company or workshop
2. Selection of suitable destructive and non-destructive testing method for the given component which has defects obtained from any manufacturing company or workshop

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 SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Material and Energy Balance
	COURSE CODE	CH221
	COURSE CREDITS	3
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH221.CEO.1: Develop ideas in dimensional analysis and to be familiar with different unit systems and conversion from one set of system to another.

CH221.CEO.2: Understand the various unit operations and unit processes performed in chemical industry.

CH221.CEO.3: Learn the fundamentals of stoichiometry.

CH221.CEO.4: Apply different laws of conservation to solve material and energy balance problems.

CH221.CEO.5: Learn the general energy balance equation to precisely calculate the energy requirement for the given unit operation or process.

COURSE OUTCOMES :

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

CH221.CO.1: Interpret the data presented in different unit systems.

CH221.CO.2: Apply the various gas laws to calculate the unknowns in the given system.

CH221.CO.3: Develop the material balance equation for the given system.

CH221.CO.4: Analyze the heating value of the given fuel.

CH221.CO.5: Calculate the heat of reaction for the given reaction at the specific conditions.

CH221.CO.6: Calculate the energy requirement for the given system.

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

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Inorganic and Analytical Chemistry
	COURSE CODE	CH222
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH101 - Science of Nature

COURSE OBJECTIVES :

CH222.CEO.1: Understand the basic concepts of bonding of molecules in organic and inorganic compounds.
CH222.CEO.2: Learn transition metals and coordination compounds.
CH222.CEO.3: State the formation of different types of solutions.
CH222.CEO.4: Learn the technique of identification of organic molecules.
CH222.CEO.5: Study the different analytical techniques.
CH222.CEO.6: Impart the basic concept of biomolecules.

COURSE OUTCOMES :

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

CH222.CO.1: Predict the geometry of various chemical compounds.
CH222.CO.2: Appreciate the importance and applications of transition metals and coordination compounds in our day to day life.
CH222.CO.3: Describe Colligative properties of solutions and correlate these with molar masses of the solutes.
CH222.CO.4: Describe the basic principle of different analytical techniques.
CH222.CO.5: Suggest possible analytical techniques for identification and quantification of organic compounds.
CH222.CO.6: Apply the knowledge of various Biomolecules used in biochemical processes.

THEORY COURSE CONTENT		
UNIT 1	**Chemical Bonding and Molecular Structure**	**7 HOURS**
Valence Bond theory VSEPR and Molecular orbital theory, MO structures of s-s, s-p, p-p overlaps, molecular orbital structure of butadiene, benzene, MO energy diagrams for diatomic molecules H2, N2, O2, CO and NO.		
UNIT 2	**Transition Metals and Co-ordinaion Chemistry**	**7 HOURS**
Electronic configuration of first series transition metals shapes of d- orbital characteristics (variable oxidation states, magnetic property, colour of transition metal compounds) Nomenclature of complexes, Chelates, Theories of co-ordination- i) Werner ii) EAN iii) CFT (including crystal field splitting in octahedral field and tetrahedral field, CFSE for octahedral complexes , applications of CFT) electronic and magnetic properties of the complexes. Metal-metal bonds in alloys.		
UNIT 3	**Solutions**	**7 HOURS**
Solution of gas in gas, gases in liquid, Henry's law, the ideal solution, Raoult'1s law of ideal solution, solutions of liquids in liquids, theory of dilute solution. Colligative properties, osmosis, osmotic pressure, Colligative properties of dilute solution- lowering of vapor pressure, elevation of boiling point and thermodynamic derivation, depression in freezing point and thermodynamic derivation. Abnormal behavior of solutions of electrolytes, vant Hoff factor. Numericals on all above. Solid-Solid solutions and concept of alloys for use in metallurgy.		
UNIT 4	**Spectroscopy Techniques**	**7 HOURS**
Spectroscopic Techniques: Infra-Red Spectroscopy & FTIR, Basic Principles, working & Applications & Interpretation of IR Spectra.		
UNIT 5	**Chromatographic Techniques**	**7 HOURS**
TLC, GC, GPC, HPLC. Theory, instrumentation and applications.		
UNIT 6	**Bio Molecules**	**7 HOURS**
Four major biomolecules- Carbohydrates, Proteins, Introduction to Enzymes, fermentation and bio-catalysis Lipids and Nucleic acids: Molecular structure, classification and biological role.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Preparation of tris ethylene diamine nickel (II) thiosulphate.		
PRACTICAL NO.02		**2 HOURS**
Preparation of tetramine copper (II) sulphate, pot. trioxalato aluminate.		
PRACTICAL NO.03		**2 HOURS**
To determine molecular weight of solid by Elevation in B.P		

PRACTICAL NO.04		**2 HOURS**
To find molecular wt. of solute by depression in freezing point of solvent.		
PRACTICAL NO.05		**2 HOURS**
Estimation of Cu2+/Ni2+ ions by spectrophotometer.		
PRACTICAL NO.06		**2 HOURS**
Preparation of osazone derivative of glucose.		
PRACTICAL NO.07		**2 HOURS**
Interpretation of IR Spectrum.		
PRACTICAL NO.08		**2 HOURS**
Analysis of sample on GC.		
PRACTICAL NO.09		**2 HOURS**
Analysis of sample on HPLC.		
PRACTICAL NO.10		**2 HOURS**
Separation of organic compound by column chromatography		
PRACTICAL NO.11		**2 HOURS**
Preparation and Properties of Biodiesel		

TEXT BOOKS

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

REFERENCE BOOKS

1. Lee J.D, Inorganic chemistry , 5th Edition, (ELBS) Chapman & Hall.ISBN : 9780412402906.
2. Cotton, Wilkinson, Basic Inorganic chemistry , 3rd Edition, Wiley India Pvt. Ltd. ISBN 9780471505327.
3. Skoog and West, Fundamentals of Analytical Chemistry, 8th Edition, Thomson Asia. ISBN : 9780495558286.
4. P. S. Kalsi, Spectroscopy of Organic compounds New age international ISBN: 8122415431.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Momentum Transfer
	COURSE CODE	CH223
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH223.CEO.1: Understand the basic concepts of fluid mechanics and its application.
CH223.CEO.2: Understand the fluid statics and principles of various pressure measuring devices.
CH223.CEO.3: Learn the fundamentals of fluid, valves and pumps used in pipelines.
CH223.CEO.4: Know about dimensional analysis and principles of similarity.
CH223.CEO.5: Understand the basic energy balance equations and their applications.
CH223.CEO.6: Learn the basic concepts of flow through pipelines.

COURSE OUTCOMES :

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

CH223.CO.1: Apply concepts of momentum transfer to different processes in chemical engineering.
CH223.CO.2: Find out the dimensions of unknown variable by using dimensional analysis.
CH223.CO.3: Calculate pressure drop by setting momentum balance.
CH223.CO.4: Perform design calculations related to flow measurements and pumping of fluids.
CH223.CO.5: Calculate different losses in piping.
CH223.CO.6: Apply the equation of motion.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**7 HOURS**
Properties of fluids: Characteristics of fluids. Fluid Kinematics: Types of flows- visualization of flow-field (stream, path and streak Line), Stream function and velocity potential function, Newtons law of viscosity, rheological classification of fluids. Concept of atmospheric, gauge and absolute pressure, manometers, pressure measurement by simple and differential manometer.		
UNIT 2	**Fluid Dynamics**	**7 HOURS**
Continuity equation, equation of motion, Bernoulli equation, Eulers and Navier - Stokes equations, flow measurement using venturimeter, orificemeter, rotameter and pitot tube, flow through notches and weirs.		
UNIT 3	**Flow of incompressible Fluid through Pipe**	**7 HOURS**
Shear stress distribution, relation between skin friction and wall shear, friction factor, laminar flow through circular pipe, on inclined plane, relation between average and maximum velocity, major And minor losses, Darcy Weisbach equation, friction factor chart.		
UNIT 4	**Boundary Layer and Dimensional Analysis**	**7 HOURS**
Concept of hydrodynamic boundary layer, growth over a flat plate, different thickness of boundary layer. Fundamental dimensions of quantities, dimensional homogeneity, dimensional analysis by Rayleighs method and Buckinghams method, dimensionless numbers.		
UNIT 5	**Fluid Moving Machinery**	**8 HOURS**
Pumps: Types of pumps, centrifugal pump, performance of centrifugal pump. Compressors: Working and applications of Centrifugal and reciprocating compressors Valves : Gate Valve, Globe Vale, Butterfly valve, etc.		
UNIT 6	**Introduction to CFD**	**6 HOURS**
Governing equations of fluid flow, mass conservation, momentum and energy equation, differential and integral forms, conservation and non-conservation form. Characteristics of turbulent flows, time averaged Navier Strokes equations.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Estimation of kinematic viscosity of Oil		
PRACTICAL NO.02		**2 HOURS**
Calibration of Venturimeter & Orifice meter		
PRACTICAL NO.03		**2 HOURS**
Reynolds Experiment		
PRACTICAL NO.04		**2 HOURS**
Verification of Bernouli's equation		
PRACTICAL NO.05		**2 HOURS**
Calibration of Rotameter		
PRACTICAL NO.06		**2 HOURS**
Calibration of Notches		
PRACTICAL NO.07		**2 HOURS**
Minor & Major losses in Pipe flow		
PRACTICAL NO.08		**2 HOURS**
Characteristics of Centrifugal Pump		
PRACTICAL NO.09		**2 HOURS**
Introduction to Ansys - Geometry Modelling, Meshing Approach & Mesh and Creating a Structured Grid		
PRACTICAL NO.10		**2 HOURS**
Basic approaches to integrating experiments in fluid mechanics with CFD		
PRACTICAL NO.11		**2 HOURS**
Study of flow through circular pipe using CFD		
PRACTICAL NO.12		**2 HOURS**
Study of flow in inclined plane using CFD		

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Engineering Thermodynamics
	COURSE CODE	CH224
	COURSE CREDITS	3
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : 11th and 12th Standard Chemistry

COURSE OBJECTIVES :

CH224.CEO.1: Know the concept of thermodynamics and its applications in chemical engineering.
CH224.CEO.2: Get information about the various thermodynamic properties and their applications.
CH224.CEO.3: Get knowledge about heat effects and applications.
CH224.CEO.4: Understand the phase and chemical reaction equilibrium with its applications.
CH224.CEO.5: Learn the various thermodynamic relations.
CH224.CEO.6: Know the real thermodynamic applications.

COURSE OUTCOMES :

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

CH224.CO.1: State the importance of thermodynamic laws and their applications in chemical engineering.
CH224.CO.2: Evaluate the thermodynamic properties of pure substances as well as mixtures.
CH224.CO.3: Apply the knowledge of thermodynamics in chemical engineering problems.
CH224.CO.4: Use appropriate thermodynamic models to predict the equilibrium characteristics of a system.
CH224.CO.5: Implement knowledge of heat cycles in day to day applications.
CH224.CO.6: Evaluate the feasibility of a reaction using thermodynamic concepts.

THEORY COURSE CONTENT		
UNIT 1	**Basic Concepts and Laws of Thermodynamics**	**7 HOURS**
First law for thermodynamics - flow process, non-flow process, cyclic process; Internal energy, Enthalpy, Heat capacity, Processes involving ideal gases isochoric process, isobaric process, isothermal process, adiabatic process; Second law of thermodynamics, Entropy, Carnot principle, Clausius inequality, Third law of thermodynamics.		
UNIT 2	**Applications of Thermodynamic Laws**	**7 HOURS**
PVT behavior of pure fluids, Equations of state - Van der Waals equation, Soave-Redlich-Kwong equation, Peng-Robinson equation, virial equation; Compressibility charts, Heat effects accompanying chemical reactions - heat of formation, heat of combustion, heat of reaction, Hesss law of constant heat summation; Refrigeration - vapour compression, air refrigeration, absorption refrigeration; Heat pumps.		
UNIT 3	**Thermodynamic Properties of Pure Fluids**	**7 HOURS**
Helmholtz free energy, Gibbs free energy, Fundamental property relations, Maxwells equations, Clapeyron equation, Entropy-heat capacity relationships, Joule-Thomson coefficient, Gibbs-Helmholtz equation, Fugacity, Fugacity coefficient, Activity, Residual properties.		
UNIT 4	**Solution Thermodynamics**	**7 HOURS**
Partial molar properties, Chemical potential, Fugacity in solutions, Lewis-Randall rule, Raoults law, Henrys law, Activity in solutions, Activity coefficients, Gibbs-Duhem equations, Property changes of mixing, Excess properties.		
UNIT 5	**Phase Equilibrium**	**7 HOURS**
Phase equilibria in single component systems, Phase equilibria in multi-component systems, Phase rule for non-reacting systems, Duhems theorem, Vapour-Liquid equilibria, Phase diagrams, Consistency tests for VLE data, VLE for systems of limited miscibility, Liquid-Liquid equilibria.		
UNIT 6	**Chemical Reaction Equilibrium**	**7 HOURS**
Equilibrium constant and standard free energy change, Effect of temperature on equilibrium constant, Effect of pressure on equilibrium constant, Other factors affecting equilibrium conversion, Heterogeneous reaction equilibria, Simultaneous reactions, Phase rule for reacting systems.		

TEXT BOOKS

1. Narayanan K. V., A Textbook of Chemical Engineering Thermodynamics, PHI Learning Pvt. Ltd., 2nd Edition, 2013, ISBN: 9788120347472.
2. Rao Y. V. C., Chemical Engineering Thermodynamics, Universities Press, 1st Edition, 1997, ISBN:9788173710483.

REFERENCE BOOKS

1. Smith J. M., Van Ness H. C., Abbott M. M., Swihart M. T., Introduction to Chemical Engineering Thermodynamics, McGraw-Hill Education, 8th Edition, 2017, ISBN:9781259696527.
2. Koretsky M. D., Engineering and Chemical Thermodynamics, Wiley, 2nd Edition, 2012, ISBN: 9780470259610.
3. Daubert T. E., Chemical Engineering Thermodynamics, McGraw-Hill, 1st Edition, 1985, ISBN:9780070154131.
4. Sandler S. I., Chemical and Engineering Thermodynamics, John Wiley & Sons, 3rd Edition, 1998, ISBN1:9780471182108.
5. Walas S. M., Phase Equilibria in Chemical Engineering, Butterworth-Heinemann, 1st Edition, 1985, ISBN1:9780750693134.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Rapid Prototyping
	COURSE CODE	ET235
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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 : NIL

COURSE OBJECTIVES :

ET235.CEO.1: To learn about materiality and techniques.
ET235.CEO.2: To justify the product development cycle through prototype project.
ET235.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET235.CEO.4: To 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,

ET235.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET235.CO.2: Apply acquired skills to the construction of a prototype project.
ET235.CO.3: Develop a prototype project by performing tasks in team.
ET235.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. Civil Prototyping (CP)

In Mechanical prototyping, students will learn rapid prototyping skills. Students will focus on basics of CAD modeling, hands on practice on CAD software, 3D Modeling , 3D Printing, Fabrication of prototype and testing etc.

On the contrary in civil prototyping students will learn developing bamboo structures by testing and analyzing bamboo, designing bamboo joinery, and testing of bamboo structures.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Rapid Prototyping, Semester - III

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Civil Prototyping (CP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Civil Prototyping (CP)	

MODULE: 1/2	Mechanical Prototyping (MP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to prototyping	04 HOURS

1. Introduction to different prototyping, traditional prototyping vs. advance rapid prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Different types of materials used in prototyping model.
3. Introduction of multi axis (4D and 5D) machines used in prototyping and machining.
4. Making of paper prototyping (virtual or physical).
5. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.

PRACTICAL NO. 2a	Basics of CAD modeling	04 HOURS

1. Introduction of CAD software.
2. Introduction of 2D, 3D Modeling using CAD software package.
3. Hands on practice of CATIA or any other CAD software.
4. Formation of students group per project team.

PRACTICAL NO. 2b	3D Modeling for prototyping	04 HOURS

1. Introduction of 3D modelling and its interaction with prototype machine
2. Identify physical constraints of prototyping.
3. Sketcher-workbench and its applications
4. Part design workbench.
5. Preparation of 3D prototyping model by CAD software for final project

PRACTICAL NO. 03	Preprocessing of 3D printing slicing	03 HOURS

1. Generating STL files of 3D models from CAD software & working on STL files.
2. Pre-Processing the 3D Model in Cuba software / kisslicer - repeater for slicing.
3. Selection of orientation of model, support generation, skin and wall thickness- depth setting.
4. Setting of printing speed, flow rate, volume, mass and time require for printing or manufacturing.
5. Practice of slicing on 3D Cad model and decide optimize parameters.

PRACTICAL NO. 04	Orientation and support generation, manufacturing planning	03 HOURS

1. Suitable filament material for 3D printing and selection and its properties.
2. Selection of material and process for making physical models by other tradition methods (machining, wood, clay, paper, polymer, etc).
3. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Manufacturing and fabrication of model	06 HOURS

1. Introduction 3D printer machines, and other machines used for prototyping.
2. Demonstration of 3D printing machine pre-setting and filament material loading.
3. Hands on experience of rapid prototype machine for part/object/model, manufacturing of conventional prototype model if any, assembly if required.
4. Calculation of cost of product, financial aspect, Bill of material (BOM), testing for prototyping, Plan to promote product/model in market, etc.

PRACTICAL NO. 06	Project presentation	02 HOURS

1. Final Presentation and demonstration of models.
2. 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: 2/2	Civil Prototyping (CP))	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**02 HOURS**
Introduction of bamboo, its physical, mechanical properties, selection, seasoning and treatment, case studies of bamboo structures.		
PRACTICAL NO. 02	**Testing & Analysis of Bamboo**	**04 HOURS**
Study of different test on Bamboo & Analysis of structures made by bamboo.		
PRACTICAL NO. 03	**Design of bamboo Joinery**	**04 HOURS**
Study of different bamboo structures, Hands on different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo structures**	**08 HOURS**
Making of bamboo structures		
PRACTICAL NO. 05	**Testing on bamboo structure (Post Testing)**	**04 HOURS**
Testing of different bamboo structures		
PRACTICAL NO. 06	**Final project presentation**	**04 HOURS**
Comparative study of analytical and test results of the bamboo Structure, 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.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Minor Project - Design
	COURSE CODE	CH230
	COURSE CREDITS	1
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH230.CEO.1: To categorize and define a problem to be solved.
CH230.CEO.2: To realize the ethical principles in general and its importance.
CH230.CEO.3: To make the students aware of project requirement analysis, design and planning.
CH230.CEO.4: To appreciate the importance of documenting and ethics of writing.

COURSE OUTCOMES :

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

CH230.CO.1: Delineate the problem to be solved.
CH230.CO.2: Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession.
CH230.CO.3: Embark project planning and design.
CH230.CO.4: Inculcate problem solving skills and critically analyze the options available to solve the problem.
CH230.CO.5: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

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. This will help students to understand the process of product/project development, best practices and encourage their creativity to solve real life problems. The students will learn effective team building, designing, budgeting, planning, engineering skills and processes, safety norms and standards while developing the application/ product. The students will be able to understand importance of documentation and professional ethics.

Guidelines

1. Every student shall undertake the Minor Project in semester III and IV.
2. Every student shall work on an approved project, a group of 03/04 students (maximum) shall be allotted for each minor project.
3. The group members may be from different programme to support the interdisciplinary functioning.
4. The students have to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
5. Collect the sufficient data and survey to establish the criticality of the problem to be solved.
6. Apply various tools for project planning and design.
7. Critically analyze various solutions/techniques to solve real world problems.
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use.
9. Learn and apply standards of engineering ethics and professional behavior.
10. Adherence to the highest principles of ethics, conduct and practices.

TIMELINE

The four member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Formation of Project Group: 2 Weeks (1^{st} week and 2^{nd} week)
2. Finalizing title, feasibility study and approval: 3 Weeks (3^{th} week to 5^{th} week)
3. Engineering Ethics: 3^{rd} week
4. Project Review 1 Presentation: 6^{th} week
5. Analysis and Design of the Project: 3 Weeks (7^{th} week to 9^{th} week)
6. Project Review 2 Presentation: 10^{th} week
7. Report Writing, Documentation and Presentation: 2 Weeks (11^{th} week and 12^{th} week)
8. Project Review 3 Presentation: 13^{th} week (Assessment by Guide)
9. Final Evaluation/Examination Presentation: 14^{th} week

Project Demonstration (50 Marks)

1. **Review 1 (Problem Statement and Literature Survey) (10 marks)**
2. **Review 2 (Project Modeling and Designing) (10 marks)**
3. **Project Activities (10 Marks)**
    - Quiz on Ethics
    - Drafting of Literature Review and Synopsis
    - Project Planning and Design
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration & Presentation (10 marks)**

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 1	Introduction to different forefront areas available within the School. Discussion on innovative application in domain area and resources such as Books, Blog, Publication Houses	To search the domain area of interest	At least 4 subtopics in area of interest (Template I)
Week 2	To brief at least two Innovative products with complete details and their Evolution	To search the domain area/innovative products of interest	Search in area of interest (Template II)
Week 3	Ethics, Morals, Values and Integrity, Work Ethic, Civic Virtue, Senses of Engineering Ethics, Business Ethics, Media Ethics, Environmental Ethics, Bio Ethics, Computer Ethics, Research Ethics	Graded Activity Quiz on Engineering Ethics	Understand the Ethics of an Engineer (Template III)
Week 4	Introduction to Research publication, its type, science citation index, methods to search Journals. Introduction to Ethics of writing(Plagiarism)	Search domain related five papers (from Journal Paper, Conference paper, Technical report, Manual, Thesis)	Student will learn searching SCI journal and understand Ethics of writing
Week 5	Presentation on how to make Project Presentation. Title, problem statement, objective, Scope etc (Select suitable topic of domain and explain it as per the template-IV)	Graded Activity on background study (market survey, customer survey, literature Survey) of domain area of interest	Drafting literature review and Synopsis (Template IV)
Week 6	NIL	Project Review 1 Presentation	Problem Definition and Objectives

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 7	Guidelines and tools for Analysis and Design of the Project and problem solving sessions	Analysis and Design of the Project	Best practices for Analysis and Design
Week 8	Guidelines and tools for the Project Planning, Introduction to Block Diagram, System Architecture	Make use of Project Planning Tools and Design Tools	Best practices for Project Planning and Design
Week 9	Presentation, discussion and doubt clearing based on • Working on Algorithms • Working on Design/ System Architecture • Working on Analysis/ CAD modeling	Graded Activity on Project Design and Planning	Best practices of Project Planning and Design
Week 10	NIL	Project Review 2 Presentation	Project Planning, Design of a solution
Week 11	Guidelines and tools for report writing	Project Report Writing	Effective Report Writing Practices
Week 12	How to give effective presentation on project	Report Writing and Presentation	Effective Documentation of the Project
Week 13	NIL	Project Review 3 Presentation	Final Report and Presentation
Week 14	NIL	Examination: Final Demonstration and Presentation	Problem Statement, Objectives, Design and Planning

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Environmental Science
	COURSE CODE	CV203
	COURSE CREDITS	AUDIT
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV203.CEO.1: Create awareness about environmental problems among future citizens.
CV203.CEO.2: Interpret basic knowledge about the environment and its allied problems.
CV203.CEO.3: Develop an attitude of responsibility for the environment and society.
CV203.CEO.4: Acquire skills to identify and solve environmental problems.
CV203.CEO.5: Perceive the importance of sustainable development
CV203.CEO.6: Strive to attain harmony with nature.

COURSE OUTCOMES :

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

CV203.CO.1: summarize the importance of ecosystem and biodiversity for maintaining ecological balance.
CV203.CO.2: identify environmental problems arising due to engineering and technological activities and the science behind those problems
CV203.CO.3: categorize the major pollutants along with sources and abatement devices for the environmental management.
CV203.CO.4: analyze material balance for different environmental systems.
CV203.CO.5: perceive the social and professional responsibility towards the environment.
CV203.CO.6: appraise the environmental factors so as to ensure sustainable development

Activity Based Learning and Evaluation		
Activity No. 1	**Any of the following activity can be selected by students**	**2 HOURS**
Students have to select any one of the following activities and prepare the detailed report on it along with the statistics or photos. This could be completed individually or in group of students: 1. Calculate individual (per capita) use of water for a day and find ways to reduce that use. 2. Make presentations for awareness regarding water resources among students, villagers and local people (at least 10 households). 3. Find out individual activities which lead to various types of pollution and suggest possible preventive measures for it. 4. Explore and register varieties of plants in the institute campus or Alandi city or its surroundings and prepare the biodiversity register. 5. Study any threatened bird or animal.		
Activity No. 2	**Site Visit**	**2 HOURS**
Students have to visit any one non hazardous polluted site for finding the various reasons of its pollution and suggest preventive measures for it. Prepare the detailed report on it along with the photos. This could be completed in a group.		
Activity No. 3	**Any of the following activity can be organized by students**	**4 HOURS**
Students have to organize any one of the following activities in the institute and prepare a detailed report on their experience of organizing the activity, its possible benefits to the environment along with the photos. This could be completed in group of students: 1. No Car and Bike Day 2. Shutting down the fans and air conditioning systems of the campus for an hour. 3. Environmental awareness programs like organizing essay competition, poster competition, slogan making competition or any other related to it. 4. Celebrating various environmental days. 5. Any other similar activity related to the environment.		
Activity No. 4	**Expert Lecture**	**2 HOURS**
Instructor has to plan an expert lecture on use of recent technologies for environmental monitoring. Students have to prepare a detailed report on it.		
Activity No. 5	**Project Work**	**10 HOURS**
Students have to identify the real life environmental problems from their daily observations and try to find out the various feasible solutions for it as their project work. They are supposed to prepare the prototype or poster, detailed report and present it to the evaluators. The project should be related to the below mentioned heads: 1. Reuse, Recycle and Reduce 2. Environmental Pollution Monitoring and Control 3. Material Balance Concept 4. Sustainable Development 5. Environmental Innovations The evaluation is based on at least two number of project presentation reviews apart from the final project presentation.		

TEXT BOOK

1. R. J. Ranjit Daniels and Jagdish Krishnaswamy, Environmental Studies, Wiley India Publications, ISBN: 9788126519439.
2. Rao C.S. Environmental Pollution Control Engineering, Wiley Eastern Publications, ISBN: 9780470217634.
3. Cunningham W.P. and Cunningham M.A., Principles of Environmental Science, Tata McGraw-Hill Publishing Company, New Delhi, 2002.
4. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co., ISBN-10: 1111988935 ISBN: 9781111988937.

REFERENCE BOOK

1. H. S. Peavy, D. R. Rowe and G. Tchobanoglous, Environmental Engineering, McGraw Hill, ISBN: 84-282-0447-0.
2. Helen Kavitha Principles of Environmental Science, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
3. Henry J.G. and Heinke G.W., Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
4. Metcalf Eddy Wastewater engineering: Treatment and reuse, McGraw Hill, ISBN: 007041878.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2019 - 2020
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Student Internship Program (Life/Soft Skills)
	COURSE CODE	CH200
	COURSE CREDITS	Audit
RELEASE DATE : 01/07/2019	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH200.CEO.1: To develop good bahavioural practices
CH200.CEO.2: To gain learning and living experience
CH200.CEO.3: To get acquainted with online learning platforms
CH200.CEO.4: To recognize the latest trend and understand the requirements for professional life
CH200.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CH200.CO.1: Manage emotions, health, finances, relationships, performance extracurricular activities
CH200.CO.2: Increase knowledge of emotional competency and emotional intelligence
CH200.CO.3: Develop interpersonal skills and adopt good leadership behavior
CH200.CO.4: Reduce negative stress while promoting energy or positive stress
CH200.CO.5: Inculcate a sense of sportsmanship, better physical health and competitive spirit

INTRODUCTION:

The main aim of this internship is to assist all Second Year B.Tech. students to acquire the skills required for personal stability and professional growth. The ultimate goal is to imbue students with professionalism and life skills. Using this internship, MITAoE students will enhance their professional skills, making themselves more marketable in todays competitive world. The students can develop various extracuurricular skills for working on emotional intelligence and sportsman spirit.

SCOPE AND STRUCTURE OF SIP:

Student Internship Program (Life/Soft Skills) is offered to entrants of Second Year B.Tech. (after semester II) that meet the eligibility criteria stated below:
Second Year B.Tech. entrants should apply for 3 to 4 weeks duration life skill courses during June-July of every academic year.This is an audit course.

The scope of this internship is limited to identifying life skill development opportunities and assisting MITAoE students to apply for such courses.

STUDENT ELIGIBILITY CRITERIA:

Students applying for internship must meet the following criteria:
After completion of second academic semester, First Year B.Tech. students (Second Year B.Tech. entrants) of all schools are eligible to apply for 3 to 4 weeks duration internships under Student Internship Program.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS203
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS203.CEO.1: To evaluate the Laplace and inverse transform of functions.

AS203.CEO.2: To evaluate the Fourier series of periodic functions and Fourier transform of non-periodic functions.

AS203.CEO.3: To evaluate the derivative of vector-valued functions.

AS203.CEO.4: To evaluate the area and the surface integrals of the vector functions.

AS203.CEO.5: To apply numerical methods for solving the problems of general calculus and differential equations.

AS203.CEO.6: To execute the program on problems of numerical methods using MATLAB.

COURSE OUTCOMES :

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

AS203.CO.1: Evaluate the Laplace and Inverse Laplace transform and will solve the differential equations.

AS203.CO.2: Rewrite the periodic and non-periodic functions as a series of sines and cosines.

AS203.CO.3: Differentiate a vector valued function in plane or space.

AS203.CO.4: Solve and compute the area and volume of the objects.

AS203.CO.5: Apply the numerical methods to problems of calculus and differential equations.

AS203.CO.6: Execute the program codes using MATLAB.

THEORY		
UNIT 1	**Laplace Transform and its Applications to LDE**	**9 HOURS**
Introduction of Laplace Transform, Properties: First shifting, Change of scale, Linearity, Multiplication by t, Division by t. Laplace Transform of derivatives, Unit Step function, Impulse Function and Periodic Functions. Introduction of Inverse Laplace Transform, Properties: First shifting, Change of scale, Linearity, Multiplication by s, Division by s. Derivatives, Integration. Use of partial fractions to find Inverse Laplace Transform. Applications of Laplace Transfrom to find Solution of linear differential equations.		
UNIT 2	**Vector Differentiation**	**6 HOURS**
Vectors in 2-D and 3-D, Scalar Product, Vector Product, Vector/scalar functions and fields, Derivative of vectors, Velocity and Acceleration, Gradient of a Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field.		
UNIT 3	**Vector Integration**	**6 HOURS**
Line Integration, Line Integrals Independent of Path, Double Integrals Green's Theorem in the Plane, Surfaces for Surface Integrals. Surface Integrals, Volume Integrals, Divergence Theorem, Stoke's Theorem.		
UNIT 4	**Fourier Series and Fourier Transform**	**9 HOURS**
Periodic functions, Fourier series, Dirichlets conditions, determination of Fourier constants, Half ranges series, arbitrary period functions series. Introduction of Fourier Transform, Fourier Integral Theorem (without proof), Fourier transform and its properties, Fourier Sine Transform, Fourier Cosine Transform, and Inverse Fourier transforms.		
UNIT 5	**Numerical Methods I**	**6 HOURS**
Numerical Differentiation and Integration, Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method, LU-Decomposition method.		
UNIT 6	**Numerical Methods II**	**6 HOURS**
Solution of Ordinary differential equations by Eulers, Modified Eulers, Runge-Kutta 4th order methods, Adams-Bashforth Predictor and Corrector Method, Solution of Partial Differential equations by Numerical method: Crank Nicholson method .		

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. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232.
2. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0.
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2010, ISBN-13: 978-0-470-76785-6.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Heat Transfer
	COURSE CODE	CH231
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH231.CEO.1: Learn the different modes of heat transfer and the concept of conductive heat transfer..

CH231.CEO.2: Understand the concept of convection and overall combined heat transfer coefficient for conduction-convection in process heat exchangers.

CH231.CEO.3: Learn heat transfer involving phase changes such as condensation and boiling.

CH231.CEO.4: Study concept of radiation energy and the radiation between surfaces including various theories related to heat radiation.

CH231.CEO.5: Study various heat exchange equipment used in process industry.

CH231.CEO.6: Provide the basic tools those are used in thermal system design and to expose students to heat transfer applications in industry.

COURSE OUTCOMES :

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

CH231.CO.1: Identify the different modes of heat transfer and use the conduction calculations for various geometries.

CH231.CO.2: Apply the principles of convection for thermal systems.

CH231.CO.3: Implement the concepts of heat transfer with phase changes.

CH231.CO.4: Analyze the systems involving radiation and to solve problems pertaining to them.

CH231.CO.5: Analyze different types of heat exchangers based on fundamental concepts.

CH231.CO.6: Develop the basic designs of heat transfer equipment.

THEORY COURSE CONTENT		
UNIT 1	**Conduction**	**7 HOURS**
Importance of heat transfer in chemical engineering operations, modes of heat transfer, concept of heat conduction, Fouriers law of heat conduction, one dimensional steady state heat conduction equation for flat plate, hollow cylinder, hollow sphere, heat conduction through a series of resistances, analogy between flow of heat and flow of electricity, thermal conductivity measurement, effect of temperature on thermal conductivity, conduction through liquids, two dimensional steady state conduction, transient heat conduction, conduction with heat source.		
UNIT 2	**Convection**	**7 HOURS**
Concept of heat transfer by convection, natural and forced convection, application of dimensional analysis for convection, equations for forced convection under laminar, transition and turbulent conditions, equations for natural convection, individual and overall heat transfer coefficients and the relationship between them , Combined natural and forced convection.		
UNIT 3	**Heat Transfer with Phase Change**	**7 HOURS**
Heat transfer from condensing vapors, heat transfer to boiling liquids, influence of boundary layer on heat transfer, heat transfer to molten metals, heat transfer in packed and fluidized beds, thermal contact resistance, Heat conduction in bodies with heat sources.		
UNIT 4	**Radiation**	**7 HOURS**
Basic ideas, spectrum, basic definitions, laws of radiation, black body radiation, plancks law, Stefan boltzman law, wiens displacement law, lambert cosine law, radiation exchange between black surfaces, shape factor, radiation exchange between gray surfaces radiosity-Irradiation method, Parallel plates, enclosures, radiation shields, basics of radiative heat transfer and application to furnace design, electrical network for radiation through absorbing and transmitting medium.		
UNIT 5	**Heat Exchangers**	**8 HOURS**
Parallel and counter flow heat exchangers, log mean temperature difference, single pass and multi pass heat exchangers, plate heat exchangers, use of correction factor charts, heat exchangers effectiveness, number of transfer unit, chart for different configurations, fouling factors and Wilsons plot, design of various types of heat exchangers, design of furnaces, design of condensers, design of tubular reactors, Heat transfer effectiveness and number of transfer units.		
UNIT 6	**Heat Transfer in Agitated Vessels**	**6 HOURS**
Heat transfer in agitated vessels: coils, jackets, limped coils, calculation of heat transfer coefficients, heating and cooling times, applications to batch reactors and batch processes, Agitation of liquids or heterogeneous systems.		

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

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Advanced Chemistry
	COURSE CODE	CH232
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH222: Inorganic and Analytical Chemistry

COURSE OBJECTIVES :

CH232.CEO.1: Study the kinetics of various possible chemical reactions and the factors that influences them.
CH232.CEO.2: Impart the basic concepts of physical and analytical chemistry.
CH232.CEO.3: Develop understanding about concepts on mechanisms of organic reactions.
CH232.CEO.4: Study the different optical, analytical and thermal characterization methods.

COURSE OUTCOMES :

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

CH232.CO.1: Predict the rates of given chemical and photochemical processes.
CH232.CO.2: Recognize how the MSDS improves your access to vital safety, health, and environmental information about chemicals used in the workplace.
CH232.CO.3: Apply adsorption & catalysis technique for purification & unit processes.
CH232.CO.4: Predict the mechanism of given organic reaction.
CH232.CO.5: Interpret spectral data and identify unknown compounds.
CH232.CO.6: Interpret the thermograms, analyze and present the result of the measurements.

THEORY COURSE CONTENT		
UNIT 1	**KInetics and Photochemistry**	**7 HOURS**
A) Kinetics: Rate of reaction, rate constant, order of reaction, kinetics of first and second order reactions, numerical on above, Activated complex theory of reaction rates, kinetics of complex reactions, Unimolecular reactions. B) Introduction and importance, Stark-Einstein law, photochemical rate law, examples of photochemical reactions kinetics of i) H2, Cl2 reaction ii) dimerization of anthracene.		
UNIT 2	**Material Safety Data Sheet and Phase Rule**	**7 HOURS**
A) Understanding the Material Safety Data Sheet, first aid measures, fire and fire fighting, handling and storage of chemicals and good safety practices. B) Phase Rule: Gibbs Phase rule & terms involved it with examples. Phase rule for Chemical reaction equilibrium. One component system- water. Reduced phase rule. Applications & limitations of phase rule.		
UNIT 3	**Adsorption and Catalysis**	**7 HOURS**
Adsorption: Introduction to Freundlich and Langmuir theories of adsorption, adsorption from solution, B.E.T. Theory of adsorption of gases, activation energy, numerical on above. Catalysis: characteristics, types, adsorption theory of catalysis, promoters, poisons, industrial applications of catalysts; acid base catalysis Biological catalysis- Kinetics of enzyme catalyzed reaction. Zeolites- structure, properties applications as catalyst for various reactions		
UNIT 4	**Reaction Mechanisms**	**7 HOURS**
Substitution at saturated carbon (SN1, SN2) (Self Study) - mechanism, kinetics, stereochemistry, factors favoring it. Electrophilic aromatic substitution in benzene and mono substituted benzenes, activating and deactivating groups, nitration, Friedel-Craft reactions, sulphonation, and diazotization. Nucleophilic substitution on carbonyl carbon. Addition of HX on C=C, 1, 2-Eliminations- E1 mechanism, E2, (Saytzeff, Hoffman products), factors favoring it. Rearrangement reactions.		
UNIT 5	**Advanced Spectroscopy**	**7 HOURS**
Diamagnetism and paramagnetism, nuclear spin, NMR spectroscopy, chemical shift, nuclear spin - spin coupling, Interpretation of NMR spectra. Introduction to mass spectroscopy.		
UNIT 6	**Atomic Spectometric and Thermal Methods**	**7 HOURS**
Atomic Absorption Spectrophotometry & SEM Principles, Instrumentation & applications Thermal Methods: Thermogravimetric Analysis (TGA) Differential thermal Analysis (DTA), Differential Scanning Calorimetry (DSC).		

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

TEXT BOOKS

1. Mehta & Mehta, Organic Chemistry, PHI Learning Pvt. Ltd., 2005, ISBN : 9788120324411.
2. Puri, Sharma & Pathania, Inorganic Chemistry, Shoban Lal Nagin Chand & Co. ISBN : 9788188646999.
3. Gary D. Christian, Analytical Chemistry, 6th Edition, John Wiley and Sons Inc. ISBN : 9780471214724.
4. Soni P. L. Physical Chemistry, S. Chand & Company, ISBN 9788180545870.
5. Br.Puri, Lr Sharma, Madan S Pathania, Principles of Physical Chemistry, Vishal Publishing Co. ISBN-13: 9789382956785.

REFERENCE BOOKS

1. Finar I.L, Organic chemistry, Vol. I and II, ELBS Longman Limited.ISBN :9788177585421.
2. Lee J.D, Inorganic chemistry, 5th Edition, (ELBS) Chapman & Hall.ISBN :9780412402906.
3. Cotton, Wilkinson, Basic Inorganic chemistry, 3rd Edition, Wiley India Pvt. Ltd. ISBN: 9780471505327.
4. Skoog and West, Fundamentals of Analytical Chemistry, 8th Edition, Thomson Asia, ISBN: 9780495558286.
5. P. S. Kalsi, Spectroscopy of Organic compounds New age international, ISBN:8122415431.
6. Sykes Peter, Reaction mechanism, 6th Edition, Orient Longman Private Ltd.ISBN: 9780582266445.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Mass Transfer
	COURSE CODE	CH233
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	0.1

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH223: Momentum Transfer

COURSE OBJECTIVES :

CH233.CEO.1: Understand the concept and use of separation processes.
CH233.CEO.2: Learn the basics of diffusion and the empirical laws that govern diffusion.
CH233.CEO.3: Understand the analogies between momentum, mass and heat transfer.
CH233.CEO.4: Understand the concept and importance of mass transfer coefficient.
CH233.CEO.5: Understand the mechanism of all simultaneous heat and mass transfer operations.
CH233.CEO.6: Understand the uses and design concept of separation processes.

COURSE OUTCOMES :

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

CH233.CO.1: Calculate the molar flux for different systems.
CH233.CO.2: Determine the individual and overall transfer coefficients.
CH233.CO.3: Use the Psychrometric chart for humidification operations.
CH233.CO.4: Analyze the drying rate of the given material.
CH233.CO.5: Develop the equilibrium data for crystallization operation.
CH233.CO.6: Design equipment for various mass transfer operations.

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

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

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP 202
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP202.CEO.1: To increase students confidence during everyday communication.

HP202.CEO.2: To increase impact of students communication during presentations and public speaking.

HP202.CEO.3: To develop Leadership qualities among students.

COURSE OUTCOMES :

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

HP202.CO.1: Express themselves effectively in routine and real-world interactions through verbal and written communication.

HP202.CO.2: Show Confident Public Speaking skills.

HP202.CO.3: To showcase leadership qualities during tough tasks, make decisions and actions effectively within time.

TUTORIALS: (SECTION A)		
TUTORIAL NO.01	**Role Plays and Picture Description**	**4 HOURS**
It helps students to sharpen their extempore skills with effective articulation and logical sequencing of content.		
TUTORIAL NO.02	**Creative Writing Skills and Presentation Skills**	**8 HOURS**
It aims at evolving effective writing skills and presentation skills.		
TUTORIAL NO.03	**Voice Modulation and Audio - Video Listening and Debate**	**8 HOURS**
To enhance listening skills and to teach the students the basic components of voice modulations and helping them practice it. It helps overcome stage fear and learn audience engagement		
TUTORIAL NO.04	**Leadership**	**6 HOURS**
Leadership qualities helps person to lead a team in achieving the set vision. It helps in planning to execute it, utilizing resources and motivating people involved in it.		
TUTORIAL NO.05	**Decision Making**	**4 HOURS**
It helps to make necessary courageous and difficult decisions and carry them into action.		
TUTORIAL NO.06	**Time Management**	**6 HOURS**
It helps organizing and planning how to divide valuable time between specific activities and prioritizing activities.		
SECTION B:	**Verbal, Reasoning and Aptitude Training through BtechGuru**	**12 HOURS**

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Simon Wootton and Terry Horney, Strategic Thinking A Nine Step Approach to Strategy and Leadership for Managers and Marketer, ISBN13: 9780749460778.
5. Lorin Woolfe, The Bible on Leadership: From Moses to Matthew – Management Lessons for Contemporary Leaders, ISBN-10 : 0814439438; ISBN-13 : 978-0814439432.

REFERENCE BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Garr Reynolds, Presentation Zen: Simple Ideas on Presentation Design and Delivery (Voices That Matter) , New Riders; 2 edition (8 December 2011), ISBN-10: 0321811984.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Prototyping
	COURSE CODE	ET224
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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 : NIL

COURSE OBJECTIVES :

ET224.CEO.1: To learn about materiality and techniques.
ET224.CEO.2: To justify the product development cycle through prototype project.
ET224.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET224.CEO.4: To 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,

ET224.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET224.CO.2: Apply acquired skills to the construction of a prototype project.
ET224.CO.3: Develop a prototype project by performing tasks in team.
ET224.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. Hardware Prototyping (HP)
2. Software Prototyping(SP)

In the module hardware prototyping students will develop a prototype of electronic product. Student will be acquiring different skills in electronics like Soldering, Wiring and PCB Design using Electronic Design Automated tools, Assembly of electronic product, Testing and troubleshooting, requirement Analysis , Product concept development in electronic product design.

On the other hand in software prototyping students will learn Software development life cycle (SDLC) concepts, AEIOU framework, UML diagrams, Requirement analysis, data flow diagrams, creating high fidelity prototypes, Testing and Analysis etc.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Digital Prototyping, Semester - III

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Software Prototyping (SP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Software Prototyping (SP)	

MODULE: 1/2	Hardware Prototyping (HP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to design and construction of electronic prototyping	02 HOURS

1. Gain familiarity with basic product design stages; Conceptualization, Detailed Design and Implementation. Form a group of students. (04 max)
2. Acquire concepts of basic processes in electronic prototyping. Develop Concept Description Sheet (CDS) for product to be designed.
3. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span. Hence draw Physical and Mechanical Drawing.
4. Perform Customer Survey and Competitor Analysis
5. Develop Specifications and Make requirement analysis. Hence develop Bill of Material.
6. 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.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	06 HOURS

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

PRACTICAL NO. 04	PCB fabrication	06 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
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.
8. Develop Customer feedback sheet and Take feedback from Customers.
9. Make Customer feedback Analysis based on ratings.

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.
6. Present Customer feedback analysis.

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: 2/2	**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	**Requirement analysis**	**04 HOURS**
Find the requirement specification of given problem statement and formulate the feasible solution.		
PRACTICAL NO. 03	**Design UML Diagrams for given problem statement**	**06 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. 04	Design analysis	02 HOURS
Create High Fidelity Prototype		
PRACTICAL NO. 05	**Prototype Implementation**	**06 HOURS**
Use of prototype development tools such as Proto.io, Invision		
PRACTICAL NO. 06	**Presentation**	**04 HOURS**
Each group will be given 10 min to present their work.		

REFERENCE BOOK

1. Software Engineering A practitioners Approach, Roger S, Pressman, 7th Edition, ISBN: 9780073375977
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Minor Project-Implementation
	COURSE CODE	ME240
	COURSE CREDITS	1
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME240.CEO.1: To understand the Intellectual property rights, trademarks, copyrights etc

ME240.CEO.2: To make the students more effective problem solvers with broader perspective of thinking.

ME240.CEO.3: To engage them in creative thinking to improve the project performance using recent trends.

ME240.CEO.4: To design working model for the solution of the problem.

ME240.CEO.5: To Evaluate the model built for its correctness, reliability and sustainability.

ME240.CEO.6: To be more self efficient to solve problem in real time design environment.

COURSE OUTCOMES :

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

ME240.CO.1: Select appropriate method for making of solution.

ME240.CO.2: Compare various engineering tools/technique to develop solution.

ME240.CO.3: Justify the selected method/tools opted for making of solution.

ME240.CO.4: Develop tangible solution to defined problem.

ME240.CO.5: Test the developed solution.

ME240.CO.6: Document solution in the form of Project report / IPR drafts.

COURSE ABSTRACT

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. This will help students to understand the process of product/project development, best practices and encourage their creativity to solve real life problems. The students will learn effective team building, designing, budgeting, planning, engineering skills and processes, safety norms and standards while developing the application/ product. The students will be able to understand importance of documentation and professional ethics.

Guidelines

1. Every student shall undertake the Minor Project in semester III and IV.
2. Every student shall work on an approved project, a group of 03/04 students (maximum) shall be allotted for each minor project.
3. The group members may be from different programme to support the interdisciplinary functioning.
4. The students have to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
5. Collect the sufficient data and survey to establish the criticality of the problem to be solved.
6. Apply various tools for project planning and design.
7. Critically analyze various solutions/techniques to solve real world problems.
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use.
9. Learn and apply standards of engineering ethics and professional behavior.
10. Adherence to the highest principles of ethics, conduct and practices.

TIMELINE

1. IPR Activity on Earlier allocated Group : 2 Weeks (1^{st} ,2^{nd} week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (4^{th}, 5^{th} week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (9^{th}, 10^{th} week)
4. Preparation of Project Progress Report I (week 11^{th} and 12^{th}) Project Phase-II
5. Project Review III (10 marks) (week 11^{th})
6. Evaluation by external examiner (End Semester by 12^{th}, 13^{th} week)

Demonstration and Presentation (50 Marks)

1. **Review 1 (Project Implementation) (10 marks)**
2. **Review 2 (Project Demostration) (10 marks)**
3. **Project Activities (10 Marks)**
    - Quiz on IPR (5 marks)
    - Patent Drafting (5 marks)
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration and Presentation (10 marks)**

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Introduction to IPR (Patent & Right) (30 min) Videos on Patent: (30 min)	Student will attempt Quiz-I IPR after the lecture Graded Activity 5marks Template I	Student will learn the patents and how to search patent
Week 2	How to check patent through CDAC online portal.	Student will do prior art search for their project, and try to generate patent Abstract as per the (Template- II)	Submission of Patent Abstract as per the prescribed Template.
Week-3	Design, Architectural overview /feasibility analysis of the project, Recent trends available to improve the performance.	Discussion on system architecture/ design method/ feasibility of project idea.	Student will implement the best feasible method to generate prototype
Week-4	NIL	Review I -Presentation	Student will present progress done in project prototype building.
Week-5	Searching of Patents, Drafting of Patents , Filing of Patents , types of patent Application, Patent Documents. Expert lecture on above topic.	Final Drafting of complete patent document (05 marks) Graded Activity	Student will understand the basics of drafting patents, important of filling patent Submission in LMS
Week-6	Presentation, discussion and doubt clearing based on • Working on Algorithms / Design • Working on Analysis • Developing Prototype / Programming/ Circuits etc	As per department / school	Student will learn to prevent design flaws.

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week-7	Presentation, discussion and doubt clearing based on • Working on Algorithms/Design • Working on Analysis • Testing of Prototype/ Code/ Circuits of project	As per department / school	Student will analyze for project outcome
Week-8	NIL	Review-II (10 Marks)	Student will work for performance improvement if project not working satisfactorily.
Week-9	Regarding Final PPT For Project Faculty himself gives a presentation based on how to make effective presentation on research topics.	(GRADED ACTIVITY) (5 marks) Student will submit the Draft PPT through LMS at the end of Week-10	Student will learn to generate PPT covering all final outcomes of the project.
Week-10	Regarding Final report Generation For Project Faculty himself gives a presentation based on how to make effective project report should explain all guidelines to be followed while preparing report	(GRADED ACTIVITY)(5 marks) Student will submit the Draft Project report through LMS at the end of Week-10	Student report are expected to have design Analysis, and the project should be expected to one year with the same guide
Week-11	NIL	Review-III (10 Marks)	Students are expected to prepare a detailed project report and Project PPT , they should also check for plagiarism.
Week-12	Final Project presentation and project report submission to the project coordinator. Faculty will review the student projects with external examiner	Presentation and demonstration of project.	Prototypes/Software and Final Project report

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Liberal Learning
	COURSE CODE	HP203
	COURSE CREDITS	AUDIT
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP203.CEO.1: To create awareness about joy of learning among students
HP203.CEO.2: To teach the skills necessary to be a lifelong learner
HP203.CEO.3: To provide students with broad knowledge of the wider worlds.
HP203.CEO.4: To develop a sense of social responsibility as well as strong and transferable intellectual and practical skills.
HP203.CEO.5: To inculcate intellectual, civic, and practical capacities in students.

COURSE OUTCOMES :

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

HP203.CO.1: Develop a skill in the domain of their interest.
HP203.CO.2: Demonstrate the skills learnt in the course.
HP203.CO.3: Apply the concepts learnt in real-life situations.

NOTE : Students may select any one of the following tracks

COURSE CONTENTS

Track 1	**Introduction to photography**	**12 HOURS**

Types of camera, Basic camera controls. Light & Lenses, Understanding the Exposure Triangle. Aperture, Shutter Speed, and ISO. Auto and manual focus, Depth of field Landscape & nature photography, Creative aspects.

Track 2	**Dance**	**12 HOURS**

Study and demonstration of various dance forms such as classical, Bollywood, street dance, ballroom dance and Contemporary.

Track 3	**Creative Writing**	**12 HOURS**

Introduction to Creative Writing-How, literary aspects, different genres, forms of writing and script writing, Short Story Writing. Blog Writing.

Track 4	**Guitar**	**12 HOURS**

Parts of guitar, Names of strings, Proper right hand techniques, Proper left hand techniques, Tuning Guitar, Tuning by Ear, Tuning to a keyboard

Introduction to guitar fret board & The Chromatic Scale- The Chromatic Scale, Fret board, How to read Guitar Tablature, Finger exercises, how to read Chord Blocks.

Track 5	**Art and Craft**	**12 HOURS**

Sketching & Drawing, Elements of Art, types of art forms, types of Painting, Craft, Wrap in scrap, Best out of waste, Paper craft, Cloth craft & Rangoli.

Track 6	**Robotics**	**12 HOURS**

Introduction to Robotics, Robotics Links and joints, Selection & types of sensors, Actuators.

Track 7	**Drama**	**12 HOURS**

Learning & practicing narrations, craft and art conceptualization as an effective presentation, Survey for identification of social and global issues as a concept in script writing, Sound and illumination measures.

Understanding the audition for various sections like drama & film.

Illustrating the dialog delivery, expressions, volume, pitch in the dialog, Expression through photography and editing skill with an expertise in handling cameras, microphone, effective management skill enabling the justification through foundation till representation.

Track 8	**Yoga and Meditation**	**12 HOURS**

Concept of mind, Consciousness. Concentration techniques, Breathing exercises, Visualizations, Walking meditations. Simple yoga, Meditation and prayer, Asana and its types , Pranayama, its types and principles.

Track 9	**Automotive Skills**	**12 HOURS**

Introduction to Automotive system, Brake system, Power train of automotive, Suspension system, Computer Aided Engineering, Manufacturing and safety, Assembly and finishing.

Track 10	**Empathy & Compassion**	**12 HOURS**

Importance of Empathy, Role of empathy and compassion for engineers, Empathy activities, Skepticism About the Self, Free Will and the Situation, Recognizing emotions reading body language, improving listening skills, mindful self compassion, Compassionate Leadership,Origins of Morality, joy of giving, social responsibility, exercising social services.

Track 11	**Singing**	**12 HOURS**

Vocal cords, Voice types, Female: Soprano or alto, Male: Tenor, baritone or bass, Breathing Techniques, Role of breathing in singing, types of scales and pitches, Musical notes foundation of any song, warm-up exercises: Humming exercise, tongue twisters, vowels, Tempo of song, Tempo Markings, Practicing all octaves, analysis of songs, practicing songs.

Track 12	**Chess**	**12 HOURS**

Introduction to game of Chess. Rules, movement of pieces, strengths and weaknesses of all pieces. Stalemate, touch move, etiquette, pawn promotion and zugzwang, square of the pawn. Fundamental checkmate patterns, basic rules, special moves and rules such as castling, promotion, EnPassant, good moves for the opening.

Track 13	**RC Plane**	**12 HOURS**

Introduction to RC planes, study with categorization of planes and study of control forces on RC plane. Study of control surfaces. Study of airfoil, Studying the concepts of take-off, cruising, landing and motions during flight. Study of graphs. Study on factors affecting the flight of plane. Control and propulsion system of RC aircraft. Introduction and making of Electrical glider.

Track 14	Drone Making	12 HOURS

Three thumb rules, Basic of FAA, Combination of electronics, Frame design , Motor stator reading and dimension, Basic of electronics, Introduction to Drones, Fundamental of Flight, Airframes and Electric Motors, ESC and flight controller, Receivers And Transmitter, Battery and chargers, Basic building Tutorial with working on software(Betaflight), FPV and LOS Simulations, Working on development of Betaflight.

NOTE : More tracks will be added as per demand of the students

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

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Curriculum

For

Third Year

Bachelor of Technology in Chemical Engineering

2019-2023

(With Effect from Academic Year: 2021-2022)

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY IN CHEMICAL ENGINEERING	RELEASE DATE	:	01/07/2021
	REVISION NO.	:	1.0

SEMESTER: V

INTERNSHIP (CH300)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC08	CH341	Chemical Engineering Operations	3	2	-	35	35	30	50	0	150	4
DC09	CH342	Separation Process	3	2	-	35	35	30	50	0	150	4
DC10	CH343	Chemical Reaction Engineering	3	2	-	35	35	30	50	0	150	4
OE01	CH351 / CH352	Process Engineering / Energy Technology	3	2	-	35	35	30	50	0	150	4
HSS5	HP304	Project Management	2	0	-	0	50	25	0	0	75	2
SDP7	CH344	Skill Development Lab (CFD)	0	4	-	0	0	25	50	0	75	2
SDP8	CH345	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			**14**	**16**	**0**	**140**	**190**	**195**	**250**	**50**	**825**	**22**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC11	CH361	Process Dynamics and Control	3	2	-	35	35	30	50	0	150	4
DC12	CH362	Chemical Equipment Design I	3	2	-	35	35	30	50	0	150	4
DC13	CH363	Chemical Process Technology	3	0	-	35	35	30	0	0	100	3
OE02	CH371 / CH372	Process Modelling and Simulation / Energy Modeling and Simulation	3	2	-	35	35	30	50	0	150	4
HSS6	HP305	Employability and Career Development	0	4	-	0	0	25	0	50	75	2
SDP9	CH364	Skill Development Lab (ASPEN ONE)	0	4	-	0	0	25	50	0	75	2
SDP10	CH365	Project Implementation	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Engineering Operations
	COURSE CODE	CH341
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH223: Momentum Transfer, CH231: Heat Transfer

COURSE OBJECTIVES :

CH341.CEO.1: Understand solid storage and transportation systems.
CH341.CEO.2: Demonstrate parts of various equipments used in solid-fluid operation.
CH341.CEO.3: Calculate energy required for size reduction and for mixing operation.
CH341.CEO.4: Apply various mathematical equations for calculate pressure drop across systems.
CH341.CEO.5: Select proper impellers and mixer for given application
CH341.CEO.6: Select Proper equipments for solid-solid and solid- fluid separation

COURSE OUTCOMES :

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

CH341.CO.1: Explain parts of equipments used in Solid-solid, solid-fluid separation.
CH341.CO.2: Distinguish between various solid transportation equipments.
CH341.CO.3: Calculate power requirement for various equipments with laws.
CH341.CO.4: Classify size reduction, mixing and solid-fluid separation equipments.
CH341.CO.5: Calculate pressure drop across solid- fluid systems.
CH341.CO.6: Select appropriate equipments for solid-solid and solid-fluid separation.

THEORY COURSE CONTENT		
UNIT 1	**Particle Screening and size reduction**	**10 HOURS**
Particle size and shape, Mixtures of particles, Determination of particle size, Standard screen series, screen analysis, Screen effectiveness and capacity, Industrial screening equipments. Crushing efficiency, energy requirements calculations by using different crushing laws, Size reduction equipments: Primary crushers, secondary crushers, Intermediate & fine grinders, Ultra fine grinders, Cutting machines.		
UNIT 2	**Handling And Transport of Solids**	**6 HOURS**
Storage of solids, characteristics of Bulk solids. Conveyors: Working principles, Construction, Advantages, Disadvantages and design calculation of Screw conveyors, Belt Conveyors, Chain & Flight conveyors, Bucket elevators, Pneumatic conveyors. Introduction to two phase flow and slurry flow pumps.		
UNIT 3	**Mixing and Agitation**	**6 HOURS**
Necessity of mixing & agitation in chemical industries, Types of Impellers & propellers, Different flow patterns in mixing, Calculation of power requirement of mixing equipment, Mixing equipment of pastes & viscous material, Solid Solid Mixing, segregation mechanisms for solid mixture, mixing mechanisms for mixing solids, Agitator selection		
UNIT 4	**Fluidization**	**4 HOURS**
Flow through packed beds (Kozeny-Carman and Erguns Equation), characteristics of fluidized systems, minimum fluidization velocity, Types of fluidization (homogenous and bubbling fluidization) spouted beds and fixed bed.		
UNIT 5	**Filtration**	**7 HOURS**
Filter media and filter aids, classification of filtration, pressure drop through filter cake, filter medium resistance, specific cake resistance, Continuous Filtration, Washing and dewatering of filter cakes, Centrifugal filtration.		
UNIT 6	**Fluid Solid systems**	**10 HOURS**
A: Liquid Solid Separation Gravity settling method: Terminal velocity, Stokes law and Newtons law, free settling, sink and float method, differential settling. Sedimentation and thickening: Batch sedimentation, equipments for sedimentation, Kynch theory of sedimentation, calculation of area and depth of continuous thickeners, batch thickeners, and continuous thickeners. B: Gas Solid Separation Different types of separation efficiency (Target efficiency, grade efficiency, Total efficiency of separation), Gas-cyclone, Bag house filter, Electrostatic Precipitator, Venturi scrubber.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Jaw Crusher		
PRACTICAL NO.02		**2 HOURS**
Batch Ball Mill		
PRACTICAL NO.03		**2 HOURS**
Trommel		
PRACTICAL NO.04		**2 HOURS**
Power Consumption in Agitated Vessels		
PRACTICAL NO.05		**2 HOURS**
Plate and Frame Filter Press		
PRACTICAL NO.06		**2 HOURS**
Vacuum Leaf Filter		
PRACTICAL NO.07		**2 HOURS**
Cyclone Separator		
PRACTICAL NO.08		**2 HOURS**
Simulation of Cyclone Separator		
PRACTICAL NO.09		**2 HOURS**
Simulation Screening of Solid		
PRACTICAL NO.10		**2 HOURS**
Simulation of Filtration		

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Separation Process
	COURSE CODE	CH342
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH233: Mass Transfer

COURSE OBJECTIVES :

CH342.CEO.1: Understand the concept of vapor-liquid equilibrium and distillation.
CH342.CEO.2: Learn the various separation processes used in chemical industry.
CH342.CEO.3: Understand the equilibrium data and its application in the design.
CH342.CEO.4: Understand the mechanism of absorption, extraction, leaching & adsorption.
CH342.CEO.5: Introduce advanced separation techniques.
CH342.CEO.6: Study the working and design concept of various separation processes.

COURSE OUTCOMES :

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

CH342.CO.1: Generate the vapor - liquid equilibrium data for the given system.
CH342.CO.2: Perform material balance for batch and continuous distillation.
CH342.CO.3: Calculate the mass transfer coefficient for the different system.
CH342.CO.4: Analyze the effectiveness of the given separation column.
CH342.CO.5: Perform material balance calculations for different types of extraction units.
CH342.CO.6: Design equipment for various separation process.

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

PRACTICAL		
PRACTICAL NO.01	**Refractive Index Vs Composition**	**2 HOURS**
Estimation of the composition Vs Refractive Index for the given system		
PRACTICAL NO.02	**Simple Distillation**	**2 HOURS**
Simple Distillation to verify Rayleighs equation		
PRACTICAL NO.03	**Steam Distillation**	**2 HOURS**
Steam Distillation to find actual distillation temperature, thermal and vaporization efficiency		
PRACTICAL NO.04	**Vapour Liquid Equilibria**	**2 HOURS**
Estimation of VLE data for given system (Methanol Water) and determination of Van - Laar constants		
PRACTICAL NO.05	**Wetted Wall Column**	**2 HOURS**
Estimation of mass transfer coefficient in wetted wall column for air water system		
PRACTICAL NO.06	**Simple Leaching**	**2 HOURS**
Estimation of separation efficiency for single / multi stage leaching		
PRACTICAL NO.07	**Counter Current Leaching**	**2 HOURS**
Counter current leaching in 3 stages for the given system		
PRACTICAL NO.08	**LLE for extraction**	**2 HOURS**
Liquid - Liquid Equilibrium for the given system and plot the binodal curve		
PRACTICAL NO.09	**Plait Point Estimation**	**2 HOURS**
Identification of plait point for the given system		
PRACTICAL NO.10	**Adsorption**	**2 HOURS**
Batch adsorption studies and identification of Langmuir isotherm constants		
PRACTICAL NO.11	**Simulation of Distillation Column**	**2 HOURS**
Simulation studies of distillation column using Aspen One		
PRACTICAL NO.12	**Simulation of Absorption column**	**2 HOURS**
Simulation studies of absorption column using Aspen One		

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Reaction Engineering
	COURSE CODE	CH343
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH224: Chemical Engineering Thermodynamics; CH232: Advanced Chemistry

COURSE OBJECTIVES :

CH343.CEO.1: Learn about reaction kinetics for different types of reactions.
CH343.CEO.2: Solve problems involving mass and energy balance with reaction.
CH343.CEO.3: Design chemical reactors such as batch reactor, mixed reactor and plug flow reactor.
CH343.CEO.4: Determine reaction mechanism using experimental data.
CH343.CEO.5: Develop critical and creative thinking skills related to reaction engineering.

COURSE OUTCOMES :

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

CH343.CO.1: Identify different reaction types and mechanisms.
CH343.CO.2: Classify the various reactor types and their applications.
CH343.CO.3: Apply rate equations to determine the kinetic parameters of a reaction.
CH343.CO.4: Compare the behavior of different reaction order systems.
CH343.CO.5: Analyze the data obtained for different reactor systems.
CH343.CO.6: Design a reactor based on the reaction kinetic data.

THEORY COURSE CONTENT		
UNIT 1	**Interpretation of Batch Reactor Data**	**7 HOURS**
Constant volume and variable volume batch reactor, liquid phase and gas phase reactions, integral method and differential method of analysis, irreversible and reversible reactions, single and multiple reactions, elementary and non-elementary reactions rate equation, fractional conversion, zero order reactions, first order reactions, second order reactions, fractional order reactions, reactions in series, parallel reactions, homogeneous catalyzed reactions.		
UNIT 2	**Ideal Reactors and Non-idealities in Real Reactors**	**7 HOURS**
Introduction to flow reactors, constant density and changing density systems, ideal batch reactor, steady state mixed flow reactor, steady state plug flow reactor performance equation, space time & space velocity, size comparison of single reactors. Non-ideal flow, Residence Time Distribution (RTD), State of aggregation, Earliness of mixing, Exit age distribution, dispersion model, tanks-in-series model.		
UNIT 3	**Reactor Combinations and Multiple Reactions**	**7 HOURS**
Plug flow reactors in series/parallel, mixed flow reactors in series, reactors of different types in series, recycle reactor, parallel reactions, reactions in series, two step irreversible series-parallel reactions contacting patterns, selectivity, product distribution, instantaneous and overall fractional yield, operating conditions.		
UNIT 4	**Solid Catalyzed Reactions**	**10 HOURS**
Rate equation for solid catalyzed reaction, measures of reaction rates, pore diffusion resistance with surface kinetics, Thiele modulus, effectiveness factor, Wagner modulus, pore resistance limits, particles of different sizes, spherical and cylindrical particles, arbitrary reaction kinetics, performance equations for reactors containing catalyst particles, adiabatic packed bed reactor, slurry reactor.		
UNIT 5	**Fluid-Solid Reactions**	**6 HOURS**
Progressive conversion model (PCM), shrinking core model (SCM), spherical particles of changing and unchanging sizes, determination of rate controlling step gas film diffusion, ash layer diffusion, surface reaction, combination of resistances, mixture of particles of different sizes, fluidized bed reactor.		
UNIT 6	**Fluid-Fluid Reactions**	**5 HOURS**
Rate equation for mass transfer with reaction, kinetic regimes, liquid film enhancement factor, significance of Hatta number, towers for absorption.		

PRACTICAL		
PRACTICAL NO.01	**Isothermal Batch Reactor**	**2 HOURS**
To study the kinetics of a reaction at isothermal conditions using batch reactor.		
PRACTICAL NO.02	**Continuous Stirred Tank Reactor (CSTR)**	**2 HOURS**
To study the kinetics of a reaction at ambient conditions using CSTR.		
PRACTICAL NO.03	**Plug Flow Reactor (PFR)**	**2 HOURS**
To study the kinetics of a reaction at ambient conditions using PFR.		
PRACTICAL NO.04	**Combined Flow Reactor**	**2 HOURS**
To study the kinetics of a reaction using a PFR followed by CSTR.		
PRACTICAL NO.05	**Cascade CSTR**	**2 HOURS**
To study the kinetics of a reaction using three CSTRs in series.		
PRACTICAL NO.06	**RTD Studies in PFR (Pulse input)**	**2 HOURS**
To study the residence time distribution in PFR for pulse input.		
PRACTICAL NO.07	**RTD Studies in CSTR (Step input)**	**2 HOURS**
To study the residence time distribution in CSTR for step input.		
PRACTICAL NO.08	**Packed Bed Reactor**	**2 HOURS**
To study the kinetics of a homogeneous reaction using a packed bed reactor.		
PRACTICAL NO.09	**Catalytic Reactor**	**2 HOURS**
To study the kinetics of a homogeneous/solid catalyzed reaction.		
PRACTICAL NO.10	**Stirred Cell Reactor**	**2 HOURS**
To study the kinetics of a gas-liquid reaction using a stirred cell reactor.		
PRACTICAL NO.11	**Simulation of Reactors - I**	**2 HOURS**
To study the steady state simulation of equilibrium and conversion reactors in Aspen Hysys.		
PRACTICAL NO.12	**Simulation of Reactors - II**	**2 HOURS**
To study the steady state simulation of CSTR and PFR in Aspen Hysys.		

TEXT BOOK

1. O Levenspiel, Chemical Reaction Engineering, 3rd edition, John Willey & sons, 1998, ISBN-13:9788126510009.

REFERENCE BOOKS

1. H Scott Fogler, "Elements of Chemical Reaction Engineering" , Prentice Hall; 4th edition, 2005, ISBN-13: 9780130473943.
2. J M Smith, Chemical Engineering Kinetics, 3rd edition, McGraw-Hill Inc., 1990, ISBN-13:9780070665743.
3. C G Hill, "An Introduction to Chemical Reaction Kinetics and Reactor Design", John Wiley & sons; 1st edition, 1977, ISBN-13: 978-1118368251.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Process Engineering
	COURSE CODE	CH351
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH223: Momentum Transfer, CH231: Heat Transfer, CH233: Mass Transfer

COURSE OBJECTIVES :

CH351.CEO.1: Learn the fundamentals of process engineering and understand the role of process engineer.
CH351.CEO.2: Know the basis of PFD and P&ID diagrams.
CH351.CEO.3: Learn the process for design of piping, fluid moving devices and flow meters.
CH351.CEO.4: Understand the sizing and designing of equipment.
CH351.CEO.5: Learn the selection of equipment as per requirement.
CH351.CEO.6: Understand the design procedure of process equipment.

COURSE OUTCOMES :

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

CH351.CO.1: Relate the role of process engineer.
CH351.CO.2: Implement the appropriate symbol in process diagram.
CH351.CO.3: Correlate the devices in process designing.
CH351.CO.4: Calculate the process synthesis and equipment data.
CH351.CO.5: Evaluate the data for process development.
CH351.CO.6: Design the process equipment as per given requirement.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Process Engineering & Operation**	**7 HOURS**
Overview of process industry and role & responsibilities of process engineer, alternate routes in process engineering, generalized approach to chemical plant design, preparation of operating instructions manual, conductance of performance test runs, troubleshooting, cost cutting measures, green engineering.		
UNIT 2	**Process Synthesis & Development**	**8 HOURS**
Preliminary database creation- Thermo-physical-chemical property data, Safety data, Prices data, Experiments, Process synthesis, Synthesis steps / tree. Expertise for chemical process synthesis: selection of raw materials & reaction paths, distribution (excess / inert) of constituents, separation processes, reactor heating & cooling systems, heat exchangers & fired heaters.		
UNIT 3	**Process Diagram in Process Engineering**	**8 HOURS**
Relevant codes and standards used in industry, symbols for P&ID, PFD and P&ID for process equipments, need of PFD and P&ID, block diagram, development and utility of PFD , piping and instrumentation diagram. Material selection, MSD (Material selection Diagram), DPDT Diagram (Design Pressure, Design Temperature Diagram)		
UNIT 4	**Process design of Piping and Fluid Moving Devices**	**7 HOURS**
Process design of piping, fluid moving devices, pumps performances with viscous liquids, power required in fan, blower & compressors.		
UNIT 5	**Sizing and Design of Equipments**	**7 HOURS**
Sizing of valve, Safety valve sizing; pump selection and sizing; reactor sizing, pump design, pumps and control valve hydraulic calculations, process designing calculations guidelines for separators, columns, HE, etc, utility packages / utility selection / utility sizing.		
UNIT 6	**Process Design of Equipment**	**8 HOURS**
Design of Liquid-Liquid Extractor: Industrial applications of Liquid-Liquid Extraction, phase equilibrium, desirable solvent properties, design of counter current multistage extractor, industrially importance extractors. Design and Operation of Adsorption Equipment: Selection criteria and design of selection, pressure swing adsorption.		

PRACTICAL		
PRACTICAL NO.01	**Process Flow Diagram**	**2 HOURS**
Development of PFD for a given process.		
PRACTICAL NO.02	**Process & Instrumentation Diagram**	**2 HOURS**
Development of P&ID for a given process		
PRACTICAL NO.03	**Process Data Sheet**	**2 HOURS**
Development of process data sheets		
PRACTICAL NO.04	**Design of Jackets**	**2 HOURS**
Design of various types of jackets		
PRACTICAL NO.05	**Creating a Material Stream**	**2 HOURS**
Defining Simulation Configuration Wizard window & adding a stream to the flow sheet in DWSIM		
PRACTICAL NO.06	**Introduction to Flow sheeting**	**2 HOURS**
Adding mixer to the flow sheet adding streams connecting the material streams defining single phase and two phase streams in DWSIM		
PRACTICAL NO.07	**Simulation of Reactors**	**2 HOURS**
Simulation and defining reaction of Plug Flow Reactor (PFR) /Continuous Stirred Tank Reactor (CSTR) / Equilibrium Reactor with DWSIM		
PRACTICAL NO.08	**Absorption Column**	**2 HOURS**
DWSIM Simulation of Absorption column		
PRACTICAL NO.09	**Unit Operation and Developing Process Simulation**	**2 HOURS**
Adding various unit operation and developing process simulation with PRO II		
PRACTICAL NO.10	**Comprehensive Process Simulation**	**2 HOURS**
PRO II Comprehensive Process Simulation		

TEXT BOOKS

1. Thakore & Bhatt, Introduction to Process Engineering and Design, Tata McGraw-Hill Education, 2007, ISBN: 0070634157, 9780070634152.
2. A. Kayode Coker, Ludwig's Applied Process Design for Chemical and Petrochemical Plants, Gulf Professional Publishing; 4th edition, 2007, ISBN : 075067766X, 9780750677660.
3. Stanley M. Walas, Chemical Process Equipment - Selection and Design, Butterworth-Heinemann, 1988, ISBN: 0750693851, 9780750693851.
4. Robin Smith, Chemical Process: Design and Integration, WileyBlackwell; Subsequent edition , 2005, ISBN : 978-0471486817.

REFERENCE BOOKS

1. Harry Silla, Chemical Process Engineering Design and Economics, CRC Press, 2003,ISBN: 0824756444, 9780824756444.
2. James Douglas, Conceptual Design of Chemical Processes, McGraw-Hill Chemical Engineering Series, 1988, ISBN: 0070177627, 978-0070177628.
3. Dale F. Rudd, Charles Churchill Watson, Strategy of Process Engineering Paperback, John Wiley & Sons Inc, 1971, ISBN: 0471744506, 9780471744504.
4. Daniel R. Lewin, J.D. Seader and Warren D Seider, Product and Process Design Principles: Synthesis, Analysis and Design, 2015, ISBN: 9780470472910.
5. Richard Turton, Joseph A. Shaeiwitz, Debangsu Bhattacharyya, Wallace B. Whiting, Analysis, Synthesis and Design of Chemical Processes, 5th Edition, Prentice Hall, 2018, ISBN: 0134177657, 9780134177656.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Energy Technology
	COURSE CODE	CH352
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH224: Chemical Engineering Thermodynamics, CH231: Heat Transfer

COURSE OBJECTIVES :

CH352.CEO.1: Know the conventional and renewable energy sources.
CH352.CEO.2: Understand the various ways to harness energy.
CH352.CEO.3: Understand the energy conservation and conversion techniques.
CH352.CEO.4: Develop the insight to use proper energy techniques tools.

COURSE OUTCOMES :

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

CH352.CO.1: Classify the conventional and renewable energy sources.
CH352.CO.2: State the various applications of each form of energy.
CH352.CO.3: Make appropriate use of the energy conversion tools.
CH352.CO.4: Develop a system based on non-conventional energy sources.

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

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Adiabatic Turbine		
PRACTICAL NO.02		**2 HOURS**
Rankine Power Generation Cycle		
PRACTICAL NO.03		**2 HOURS**
Organic Rankine Cycle		
PRACTICAL NO.04		**2 HOURS**
Properties of Coal		
PRACTICAL NO.05		**2 HOURS**
Design of Biogas Plant		
PRACTICAL NO.06		**2 HOURS**
Design of Solar Collector		
PRACTICAL NO.07		**2 HOURS**
Design of Fuel Cell		
PRACTICAL NO.08		**2 HOURS**
Design of Energy Storage System		

TEXT BOOK

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Management
	COURSE CODE	HP304
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	NA	NA	50	25	NA	NA	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP304.CEO.1: Create awareness of organizational strategy for project implementation.
HP304.CEO.2: Understand the rules for creating a Work Breakdown Structure for a Project. .
HP304.CEO.3: Illustrate approaches for risk identification, analysis, and assessment.
HP304.CEO.4: Identify key characteristics of a high-performance project team.
HP304.CEO.5: Understand the critical success factors in project management.

COURSE OUTCOMES :

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

HP304.CO.1: Identify the Project Management Knowledge Areas and Processes.
HP304.CO.2: Classify the responsibilities while designing the Project Master Plan.
HP304.CO.3: Outline the Cost Estimating and Cost Escalation Process.
HP304.CO.4: Demonstrate and highlight The Processes of Project Quality Management.
HP304.CO.5: Analyze Management of a Project and Maturity Models.

THEORY :		
UNIT 1	**Basics of Project Management**	**6 HOURS**
Contents: Introduction, Need for Project Management, SMART Project, Knowledge Areas and Processes, The Project Manager and Project Management Office, Phases of Project Management Life Cycle, Project environments, Impact of Delays in Project Completions **Case Study:**		
UNIT 2	**Systems and Procedures for Planning and Control**	**5 HOURS**
Contents: Type of Projects, The Project Master Plan, The Project Charter, Project Organization and Responsibilities, Work Breakdown Structure (WBS), Networks Diagrams, The Critical Path, Gantt Charts and Calendar Schedules, CPM, PERT (Project Management Tools: GanttProject, OpenProj) **Case Study:**		
UNIT 3	**Cost Estimating, Budgeting and Risk Management**	**5 HOURS**
Contents: Cost Estimating and Cost Escalation, Cost Estimating Process, Elements of Budgets and Estimates, Risk Management process, Project Risk by Phases, Risk Assessment, Risk Response Planning, Risk Tracking and Response **Case Study:**		
UNIT 4	**Project Quality Management and Organization Behavior**	**5 HOURS**
Contents: The Concept of Quality, The Processes of Project Quality Management, Techniques for Quality Assurance during System Development, Stakeholders, Managing Participation, Teamwork and Conflict. **Case Study:**		
UNIT 5	**The Corporate Context**	**5 HOURS**
Contents: Project Management Maturity and Maturity Models, Knowledge and Time Management, International Projects and associated problems, Entrepreneurs and Startup. **Case Study:**		

TEXT BOOK

1. Project Management for Business, Engineering, and Technology, 3rd Edition, John M. Nicholas and Herman Steyn ELSEVIER ISBN: 978-0-7506-8399-9.
2. Project Management Planning and Control, Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards, Seventh Edition, Eur Ing Albert Lester, B H Copyright 2017 Elsevier Ltd, ISBN: 978-0-08-102020-3.
3. Project Management in Product Development, George Ellis, Copyright 2016 Elsevier Inc, ISBN: 978-0-12-802322-8.
4. Project Management best Practices, 4th Edition, HAROLD KERZNER, Wiley Copyright 2018, ISBN 978-111-9-46885-1.

REFERENCES

1. Project Management Toolbox, Second Edition, Russ J. Martinelli, Dragan Z. Milosevic, Wiley Copyright 2018, ISBN 978-1-118-97312-7.
2. Project Management Essentials You Always Wanted To Know, Kalpesh Ashar, VIBRANT PUBLISHERS
3. The Practical guide to Project Management, 1st Edition, Christine Petersen, ISBN 978-87-403-0524-1
4. Beginning Project Management (e book), John M. Preston
5. Project Management from Simple to Complex, Russell W. Darnall, John M. Preston, The Open University of Hong Kong

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Skill Development Lab (CFD)
	COURSE CODE	CH344
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	25	50	NIL	75

PRE-REQUISITE : CH223: Momentum Transfer; CH231: Heat Transfer

COURSE OBJECTIVES :

CH344.CEO.1: Introduction to Computational Fluid Dynamics (CFD).
CH344.CEO.2: CFD workflow or steps involved in CFD analysis.
CH344.CEO.3: CAD preparation and Mesh generation in CFD.
CH344.CEO.4: Simulation and Post-processing in CFD.
CH344.CEO.5: Turbulence modeling basics.
CH344.CEO.6: Heat transfer modeling.

COURSE OUTCOMES :

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

CH344.CO.1: Use a CAD tool for preparing CFD specific CAD models.
CH344.CO.2: Create high quality CFD simulation meshes from imported CAD geometry.
CH344.CO.3: Complete a basic CFD simulation including defining the problem, calculating the solution and post-processing the results.
CH344.CO.4: Learn to interpret the results by qualitative and quantitative post-processing.
CH344.CO.5: Perform all steps of a CFD simulation from CAD import to meshing to solution to results.
CH344.CO.6: Perform a flow and heat transfer simulation.

PRACTICAL		
PRACTICAL NO.01	**Creating a T-Junction CAD Model**	**4 HOURS**
Understanding the GUI layout and basics of sketching for creating a simple T-Junction CAD model		
PRACTICAL NO.02	**Repairing Imported CAD and Fluid Volume Extraction**	**4 HOURS**
Importing a CAD file, repairing the model and extracting the fluid volume for internal flow		
PRACTICAL NO.03	**Mesh generation: T-Junction model**	**4 HOURS**
Understand the mesh generation workflow for a simple T-Junction model. Mesh sizes to be given and different mesh types that could be used.		
PRACTICAL NO.04	**Mesh generation: Imported CAD model**	**4 HOURS**
Generate mesh for the previously imported CAD model wherein fluid volume is already extracted. Apply inflation layers on the boundaries and region-specific surface and volume refinement.		
PRACTICAL NO.05	**Solution workflow: T-Junction model**	**4 HOURS**
Solution workflow with regards to problem definition, specifying boundary conditions, material specification, specifying type of flow and performing simulation with the default solver settings.		
PRACTICAL NO.06	**Solution: Imported CAD model**	**4 HOURS**
Simulating the imported CAD model and understanding the effect of different solver parameters on the results.		
PRACTICAL NO.07	**Post-processing: T-Junction model**	**4 HOURS**
Understanding different qualitative and quantitative post-processing that could be done on a CFD simulation.		
PRACTICAL NO.08	**Turbulence modeling: T-Junction model**	**4 HOURS**
Understanding turbulence modeling and simulating the effect of different turbulence models on the results.		
PRACTICAL NO.09	**Heat transfer simulation: T-Junction model**	**4 HOURS**
Understanding heat transfer modeling and simulating a simple heat transfer problem for the T-Junction model.		
PRACTICAL NO.10	**Project Work**	**4 HOURS**
Students will be given the Project Topics / Case Studies related to preferably Fluid Flow and Heat Transfer applications in Chemical Engineering. The results from the simulation would be compared with literature or hand calculation values. Examples: Flow in different types of Static Mixers, CSTR, Flow and Heat transfer in double pipe heat exchangers.		

TEXT BOOKS

1. H K Versteeg and W Malalasekera. (2008), An Introduction to Computational Fluid Dynamics, 2nd Ed., Pearson Education, ISBN-13: 978-8131720486.
2. Joel H. Ferziger, Milovan Peri, Robert L. Street, Computational Methods for Fluid Dynamics, Springer Publication, ISBN-13: 978-3319996912.

REFERENCE BOOKS

1. Elizabeth Marden Marshall and Andr Bakker (2002), Computation Fluid Mixing, 1st Ed., Fluent, Incorporated, ISBN 0971953201, 9780971953208.
2. John Matsson (2019), An Introduction to ANSYS Fluent 2019, SDC Publications, ISBN-13: 978-1630573300.

MIT | Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CHEMICAL ENGINEERING	**COURSE NAME**	Project Design
	COURSE CODE	CH345
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH345.CEO.1: To embrace innovation and creativity in project design while empathizing real world needs.

CH345.CEO.2: To acquaint with requirement analysis process and techniques.

CH345.CEO.3: To inculcate the agile project management tools for project design and planning.

CH345.CEO.4: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

CH345.CO.1: Delineate the problem to be solved.

CH345.CO.2: Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges.

CH345.CO.3: Carry out systematic literature review, planning and project design.

CH345.CO.4: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation. To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation. The first phase of Project Design mainly focuses on formulating systems requirement, background/literature review, and defining scope, objective and apply project management/modeling tools to design proposed solution. This enables students to apply their technical acumen and innovativeness in proposing methodology, milestones, and expected outcome.

GUIDELINES

1. Every project group should consist of minimum 03 and maximum of 04 students.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Project group members and title of the project need to be approved by Project Guide and School.
4. Projects should preferably have a national/international industry/academic/research collaboration.
5. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
6. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
7. Define proposed solution and apply project management/modeling tools for project planning and design.
8. Critically analyze various solutions/techniques to solve real world problems and perform feasibility study to select and justify proposed solution.
9. Define outcome, milestones, definite roadmap for project design, implementation, evaluation and documentation.

Collaborative/Sponsored Project

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for final project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization, anytime before the commencement of the sixth semester.
3. Proposed Collaborative Project work need to reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of minimum 12 months to 18 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Exploration of fore front research/specialization areas and opportunities in the various fields.
2. Formation of Project Group. Finalization of area of work/title as per forefront areas.
3. Exploration of abridged courses, valid resources, challenges, relevance with current opportunities.
4. Project Review I Presentation.
5. Background study Systematic literature review.
6. Literature review documentation for Project Report and Research Article.
7. Define problem statement and objectives.
8. Define scope of the work and Outline of the work.
9. Project Review II Presentation.
10. Project Design, Modelling, Simulation etc.
11. Proposed Methodology of the solution and its documentation.
12. Project Documentation: Project Report Writing, Final Synopsis
13. Project Documentation: Ethics in Writing
14. Project Review III Presentation

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Internal Assessment (25 Marks)
   (a) Project Review I: Problem Identification, Motivation and Relevance
   (b) Synopsis
   (c) Project Review II: Background Study, Literature Review and Problem Definition
   (d) Background Study and Literature Review
   (e) Project Review III: Project Planning, Analysis and Design
2. Project Demonstration (50 Marks)
   (a) Project Report
   (b) Final Presentation and Demonstration

REFERENCE BOOKS

1. Nicholas John M.,"Project Management for Engineering, Business and Technology", Butterworth Heinemann, ISBN: 9780080967042
2. Michelle Reid, "Report Writing (Pocket Study Skills)"', Second Edition, Macmillan Eduation.
3. Sara Efrat Efron, Ruth David, "Writing the Literature Review : A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
4. Leslie Lamport,"LaTeX: A document preparation system, Users guide and reference manual", Second Edition 1994, Addison Wesley, ISBN: 978-0201529838.
5. Michel Goossens, Frank Mittelbach, Sebastian Rahtz, Denis Roegel and Herbert Voss,"The LaTeX Graphics Companion", Second Edition 2007, Addison-Wesley Professional, ISBN: 078-5342508925.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Student Internship Program (Soft Skill/Technical Skills)
	COURSE CODE	CH300
	COURSE CREDITS	Audit
RELEASE DATE : 01/07/2020	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH300.CEO.1: To develop good bahavioural practices
CH300.CEO.2: To gain learning and living experience
CH300.CEO.3: To get acquainted with online learning platforms
CH300.CEO.4: To recognize the latest trend and understand the requirements for professional life
CH300.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CH300.CO.1: Manage emotions, health, finances, relationships, performance extracurricular activities
CH300.CO.2: Increase knowledge of emotional competency and emotional intelligence
CH300.CO.3: Develop interpersonal skills and adopt good leadership behavior
CH300.CO.4: Reduce negative stress while promoting eustress, or positive stress
CH300.CO.5: Inculcate a sense of sportsmanship, better physical health and competitive spirit

INTRODUCTION:

The main aim of this internship is to assist all Third Year B.Tech. students to acquire the skills required for personal stability and professional growth. The ultimate goal is to imbue students with professionalism and technical skills. Using this internship, MITAoE students will enhance their professional skills, making themselves more marketable in todays competitive world. The students can develop various extracuurricular skills for working on emotional intelligence and sportsman spirit.

SCOPE AND STRUCTURE OF SIP:

This internship is offered to entrants of Third Year B.Tech. (after semester IV) that meet the eligibility criteria stated below:
Third Year B.Tech. entrants should apply for 3 to 4 weeks duration training or certification courses during June-July of every academic year. This is an audit course.

The scope of this internship is limited to identifying soft skill/ technical skill development opportunities and assisting MITAoE students to apply for such courses.

STUDENT ELIGIBILITY CRITERIA:

Students applying for internship must meet the following criteria:
After completion of fourth academic semester, Second Year B.Tech. students (Third Year B.Tech. entrants) of all schools are eligible to apply for 3 to 4 weeks duration internships under student internship program.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	COURSE NAME	Process Dynamics and Control
	COURSE CODE	CH361
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH342: Separation Process

COURSE OBJECTIVES :

CH361.CEO.1: Make aware of dynamics of different systems.
CH361.CEO.2: Learn about the use of computer application in control system design.
CH361.CEO.3: Application of the system stability criterion.
CH361.CEO.4: Develop the plant wide control system.

COURSE OUTCOMES :

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

CH361.CO.1: Experiment transfer functions of different systems and their response required for stability analysis.
CH361.CO.2: Categorize controller tuning for stable systems in chemical process plants.
CH361.CO.3: Apply various softwares used for control systems.
CH361.CO.4: Identify multiple loops and use the computers in process control in chemical process industries.
CH361.CO.5: Compare stable & unstable systems by Bode Stability criterion.
CH361.CO.6: Evaluate control system for various process operations.

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

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Dynamic Response of Thermometer (First Order)		
PRACTICAL NO.02		**2 HOURS**
Dynamic Response of Thermocouple (First Order)		
PRACTICAL NO.03		**2 HOURS**
Time Constant of Thermometer - Second Order System		
PRACTICAL NO.04		**2 HOURS**
Temperature Control Study		
PRACTICAL NO.05		**2 HOURS**
Time Constant of Manometer		
PRACTICAL NO.06		**2 HOURS**
Two Tank Interacting System		
PRACTICAL NO.07		**2 HOURS**
Two Tank Non-Interacting System		
PRACTICAL NO.08		**2 HOURS**
Feedback Flow Experiment on SCADA		
PRACTICAL NO.09		**2 HOURS**
Feedback Level Experiment on SCADA		
PRACTICAL NO.10		**2 HOURS**
Feedback Pressure Experiment on SCADA		
PRACTICAL NO.11		**2 HOURS**
Level Control Systems by Python Coding/Aspen/PLC SCADA Software		
PRACTICAL NO.12		**2 HOURS**
Temperature Control Systems by Python coding/Aspen/PLC SCADA Software		
PRACTICAL NO.13		**2 HOURS**
Cascade Control System		
PRACTICAL NO.14		**2 HOURS**
Various Chemical Engineering Control System Case studies by PROSIM Software		

TEXT BOOKS

1. Stephanopoulos George Chemical Process Control, PHI publication, (ISBN 8120306651).
2. Coughanour Donald R. Process System Analysis & Control, Mc Graw Hill.

REFERENCE BOOKS

1. Bequette B. Wayne Process Control Modeling, Design & Control , PHI Publication, Hardcover, (ISBN 0133536408).
2. MellichampDancan A., Edgar Thomal F., Seborg Dale E Process Dynamics & Control.
3. Ray W. Harmon, Ogunnaike Babatunde A., Process Dynamics, Modeling & Control, Oxford University Press Inc.
4. Chindambaram M. Computer Control of Processes, Alpha Science International Ltd.
5. Liptak Bella G. Instrument Engineers Handbook (Process Control), Elsevier, (ISBN 0849310822).

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Equipment Design I
	COURSE CODE	CH362
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH231: Heat Transfer, CH341: Chemical Engineering Operations

COURSE OBJECTIVES :

CH362.CEO.1: Give comprehensive knowledge of various process equipment used in the chemical industries.
CH362.CEO.2: Provide knowledge about design principles of pressure vessels used in chemical plants.
CH362.CEO.3: Impart knowledge about mechanical design of equipment.
CH362.CEO.4: Impart the knowledge of various design aspects and specifications used for process equipment.
CH362.CEO.5: Explain and calculate various design parameters for process equipment.
CH362.CEO.6: Implement the knowledge of mechanical design of various process equipment.

COURSE OUTCOMES :

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

CH362.CO.1: Describe the basics of process equipment design and important parameters of equipment design.
CH362.CO.2: Design different types of pressure vessels.
CH362.CO.3: Apply the complete knowledge of equipment fabrication and testing methods.
CH362.CO.4: Implement the various codes and standards used for equipment design.
CH362.CO.5: Find out the suitable material of construction, fabrication methods for various process equipment.
CH362.CO.6: Apply their knowledge for designing of process equipment.

THEORY COURSE CONTENT		
UNIT 1	**General Concepts and Methods of Mechanical Design of Pressure Equipments**	**8 HOURS**
Introduction about Process Industry and EPC(Engineering procurement and construction),List of Equipments used in Industries, their Introduction & Applications, Relevant Codes and Standards used in Industry. Stress Strain Diagram, Material Selection for Different Temperature & Services, Loads and Stresses: Elements of Stress Analysis, Stress Categorization, Load Conditions & Failure Modes, theories of failure. Design Methods: DBF(Design by formula), DBA(Design by analysis) and Design by Experiment.		
UNIT 2	**Fabrication and Codes for Pressure Vessel**	**8 HOURS**
Plate rolling, Plate Bending, Welding Methodologies (STAW, GTAW, GMAW, SMAW), Welded Joints: Butt Welded Joints of unequal Thicknesses & Welding Symbols, Fabrication Sequences , Fabrication Schedules, Plate Forming, Cutting etc. Testing of Pressure Vessel, Painting and Coating for Corrosion Protection, Impact Testing, PWHT along with Heating Rates and Cooling Rates, Hydro Test Pressure & Stamping of Vessels. Introduction to Engineering Standards used in Design of Process Equipment's, ASME, TEMA, and API etc. Conditions/Clauses Governing Pressure Vessel Design under ASME		
UNIT 3	**Mechanical Design of Pressure Vessels**	**8 HOURS**
Design of Pressure Vessel for Internal & External Pressure, Design of Cylindrical and spherical Vessels & Dished. Role of MAP, MAWP, Design Pressure & Design Temperatures, Allowable Stresses, Corrosion Allowance and Loadings as per ASME in PV Design, Joint Efficiency. Flange joints, Nozzle Openings and Reinforcements. Various Types of Supports: Leg, Bracket, saddle and skirt Supports.		
UNIT 4	**Tall Columns and Thick Wall Pressure Vessels**	**8 HOURS**
Design of tall vessels: Introduction, axial stress due to dead loads, axial stresses due to pressures, longitudinal bending stresses due to dynamic loads, design considerations of distillation/Absorption column (tall tower), Design of high pressure monoblock and multilayer vessels.		
UNIT 5	**Heat Exchangers**	**8 HOURS**
Review of process design of shell and tube heat exchanger: Types of heat exchanger, limitations in the use of heat exchangers, Components of Heat Exchangers, general design considerations - LMTD correction factor, fluid allocation, fluid velocities, stream temperatures. Mechanical design of shell and tube heat exchanger: Thickness of shell and shell cover, channel cover, tube sheet, size and number of tie rods and spacers etc. Design of double pipe heat exchanger, Plate heat exchanger: advantages, disadvantages, design procedure, temperature correction factor, heat transfer coefficients, pressure drop.		
UNIT 6	**Auxiliary Process Vessels**	**8 HOURS**
Study of auxiliary equipments for separation of liquid-solid, gas-solid and gas-liquid separators Cyclone, Decanters , Electrostatic Precipitator (ESP), etc.		

PRACTICAL		
PRACTICAL NO.01	**Design & Drawing of Flanges**	**2 HOURS**
Flanges drawings, final drawings can be created using CAD/CATIA softwares		
PRACTICAL NO.02	**Heads**	**2 HOURS**
Pressure vessel heads (CAD/CATIA drawings)		
PRACTICAL NO.03	**Pressure Vessels**	**2 HOURS**
Pressure vessel design (CAD/CATIA drawings)		
PRACTICAL NO.04	**Supports**	**2 HOURS**
Design of supports & drawing with CAD/CATIA		
PRACTICAL NO.05	**Tall Vessels**	**2 HOURS**
Tall vessels (CAD/CATIA drawings)		
PRACTICAL NO.06	**Heat Exchanger**	**2 HOURS**
Double Pipe Heat Exchanger (CAD/CATIA drawings)		
PRACTICAL NO.07	**Heat Exchanger**	**2 HOURS**
Shell and Tube Heat Exchanger (CAD/CATIA drawings)		
PRACTICAL NO.08	**Cyclone Separator**	**2 HOURS**
Cyclone Separator (CAD/CATIA drawings)		
PRACTICAL NO.09	**Industrial Drawing of Equipments**	**2 HOURS**
Hand Drawing of industrial equipments with standard P&ID symbols		

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Process Technology
	COURSE CODE	CH363
	COURSE CREDITS	3
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : CH341: Chemical Engineering Operaations, CH342: Separation Process

COURSE OBJECTIVES :

CH363.CEO.1: Understand standard equipment symbols, process control and instrumentation symbols used for flow sheeting.
CH363.CEO.2: Recognize different industry, their products and role of chemical engineer in industry.
CH363.CEO.3: Know manufacturing of various chemicals and sequence of operations and their importance.
CH363.CEO.4: Analyze importance of raw material quality and specification.
CH363.CEO.5: Understand selection of process and effect of operating parameters.
CH363.CEO.6: Know major engineering problems.

COURSE OUTCOMES :

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

CH363.CO.1: Classify chemical industries.
CH363.CO.2: Interpret manufacturing Flowsheet.
CH363.CO.3: Recognize specification of different raw material and its importance.
CH363.CO.4: Evaluate effect of operating parameter on quality.
CH363.CO.5: Apply appropriate parameters for process selection.
CH363.CO.6: Interpret major engineering problems associated with process.

THEORY COURSE CONTENT		
UNIT 1	**Basic Concepts of Process Industries**	**7 HOURS**
A. Theory of Unit operations and industrial equipment and systems used in large scale plants; Unit processes, Development of ow diagram, schematic representation and application for unit operations and unit processes. B. Study the selection and process specific applications knowing available industrial equipment and plant accessories..		
UNIT 2	**Sulfur and Sugar Industry**	**7 HOURS**
A. Importance, manufacturing of sulfur by Frasch process, technology for the manufacturing of sulfuric acid. Detailed study and comparison between chamber and DCDA processes; process economics. B. Sugar Industry: Manufacture of sugar and engineering problems associated Dextrin and starch derivatives..		
UNIT 3	**Nitrogen and Cement Industry**	**7 HOURS**
A. Role of nitrogen in fertilizers, manufacturing of ammonia, nitric acid, urea, the above study must involves different routes adopted, limitations, advantages and disadvantages of the process; steamreforming process technology. B. Importance of Cement and Lime and Production of Cement by rock beneficiation process and Portland cement. Importance of Lime and Manufacturing of lime.		
UNIT 4	**Phosphorus and Paper Pulp Industry**	**7 HOURS**
A. Importance, manufacturing of super phosphate, triple super phosphate, phosphoric acid, Electro thermal processes and NPK fertilizers, Flow sheet and process for manufacture of Phosphoric acid from phosphate rock. B. Production of pulp, engineering problems involved, paper manufacturing from pulp comparison of methods of manufacturing.		
UNIT 5	**Chlor-Alkali and Steel Industry**	**7 HOURS**
A. Chlor-alkali chart and importance of chlor-alkali industry, manufacturing processes process economics, and plants in India and a few examples of latest technology used in other nations;Manufacturing of soda ash, caustic soda, chlorine and engineering problems. B. Blast Furnace construction details and Uses. Manufacturing of Iron and steel.		
UNIT 6	**Organic Industry**	**7 HOURS**
A: Petroleum Refinery: Cracking: Thermal and catalytic cracking, FCC, Reforming B: Petrochemical: Methanol production, ethylene production, Polythene production.		

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	COURSE NAME	Process Modeling and Simulation
	COURSE CODE	CH371
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : AS203: Applied Mathematics, CH351: Process Engineering

COURSE OBJECTIVES :

CH371.CEO.1: Know the types of models and its applications.
CH371.CEO.2: Understand the steps involved in building mathematical model.
CH371.CEO.3: Understand the selection of models for various chemical process.
CH371.CEO.4: Learn the development of mathematical model for various operations.
CH371.CEO.5: Execute model using numerical techniques and software.
CH371.CEO.6: Optimize the process parameters using optimization techniques.

COURSE OUTCOMES :

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

CH371.CO.1: Construct mathematical model and exercise model building procedure for steady and unsteady processes.
CH371.CO.2: Formulate material, energy and momentum balance equations for chemical processes.
CH371.CO.3: Develop mathematical model for heat and mass transfer operations.
CH371.CO.4: Formulate model for chemical reactor systems.
CH371.CO.5: Simulate the model using numerical techniques and software.
CH371.CO.6: Optimize the various parameters to enhance the efficiency of the process.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Process Modeling**	**5 HOURS**
Definition of process model, use and scope of mathematical modeling, principles of model formulation, classification of models, development of mathematical model, degrees of freedom analysis, parameter estimation, selection of design variables, review of numerical techniques, introduction to simulation, role and importance of steady-state and dynamic simulations.		
UNIT 2	**Fundamental Laws**	**7 HOURS**
Continuity equation, energy equation, equation of motion, transport equation, equations of state, phase and chemical equilibrium, chemical kinetics, review of thermodynamic correlations, selection of thermodynamic property methods.		
UNIT 3	**Modeling of Chemical Processes**	**10 HOURS**
Agitated vessel, pressure change equipment, mixing process, two heated tanks, heat exchanger, single and multiple effect evaporators, batch distillation, continuous distillation for binary and multicomponent systems, single stage and multi-stage extraction, absorber and stripper, batch reactor, constant/variable volume CSTR, gas-phase pressurized CSTR, non-isothermal CSTR, reactor combinations.		
UNIT 4	**Process Simulation**	**6 HOURS**
Simulation of process models, sequential modular approach, equation oriented approach, partitioning and tearing: steady-state lumped system-partitioning equation, tearing equation, simultaneous equations, decomposition of networks, introduction to various professional process simulation software.		
UNIT 5	**Applications of Modeling and Simulation**	**7 HOURS**
Examples of mathematical models of chemical engineering systems, wastewater treatment plant, use of numerical methods to solve different process models.		
UNIT 6	**Basics of Process Optimization**	**7 HOURS**
Features of optimization problems, general procedure for solving optimization problems, obstacles to optimization, fitting functions to empirical data, formulation of various process optimization problems.		

PRACTICAL		
PRACTICAL NO.01	**Material Balance**	**2 HOURS**
Development of a mathematical model for mass balance		
PRACTICAL NO.02	**Component Balance**	**2 HOURS**
Development of a mathematical model for component balance		
PRACTICAL NO.03	**Energy Balance**	**2 HOURS**
Development of a mathematical model for energy balance		
PRACTICAL NO.04	**Heat Transfer Equipment**	**2 HOURS**
Development of a mathematical model for heat transfer equipment		
PRACTICAL NO.05	**Mass Transfer Equipment**	**2 HOURS**
Development of a mathematical model for mass transfer equipment		
PRACTICAL NO.06	**Reaction Equipment and Systems**	**2 HOURS**
Development of a mathematical model for reactors and reaction systems		
PRACTICAL NO.07	**Chemical Process Plant**	**2 HOURS**
Development of a mathematical model for a chemical process plant		
PRACTICAL NO.08	**Parameter Optimization**	**2 HOURS**
Optimization of process parameters using optimization techniques		
PRACTICAL NO.09	**Optimization of Unit Operations**	**2 HOURS**
Optimization of various unit operations		
PRACTICAL NO.10	**Optimization of Reactors**	**2 HOURS**
Optimization of ideal batch and flow reactors		

TEXT BOOKS

1. Luyben W. L., Process Modelling, Simulation and Control for Chemical Engineers, McGraw-Hill Education, 2nd ed., 1989 (ISBN-13: 978-0070391604).
2. Chidambaram M., Mathematical Modelling and Simulation in Chemical Engineering, Cambridge University Press, 2018, (ISBN-13: 978-1108470407).

REFERENCE BOOKS

1. Westerberg A.W., Hutchison H.P., Motard R.L., Winter P., Process Flowsheeting, Cambridge University Press, 1st ed., 2011 (ISBN-13: 978-0521279154).
2. Chapra S.C., Canale R. P., Numerical Methods for Engineers, McGraw-Hill Education, 7th ed., 2016 (ISBN-13: 978-9352602131).
3. Dorfman K. D., Daoutidis P., Numerical Methods with Chemical Engineering Applications, Cambridge University Press, 1st ed., 2017 (ISBN-13: 978-1107135116).
4. Edgar T. F., Himmelblau D. M., Optimization of Chemical Processes, McGraw Hill Education, 2nd ed., 2001 (ISBN-13: 978-0070393592).

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Energy Modeling and Simulation
	COURSE CODE	CH372
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH231: Heat Transfer, CH352: Energy Technology

COURSE OBJECTIVES :

CH372.CEO.1: Know energy analysis.
CH372.CEO.2: Recognize component of wind energy systems.
CH372.CEO.3: Understand concept of nuclear energy.
CH372.CEO.4: Know various modeling techniques.
CH372.CEO.5: Apply various simulation software for energy system.
CH372.CEO.6: Know optimization importance for energy systems.

COURSE OUTCOMES :

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

CH372.CO.1: Understand energy analysis.
CH372.CO.2: Design wind energy systems.
CH372.CO.3: Understand concept of nuclear energy.
CH372.CO.4: Apply various modeling techniques for energy systems.
CH372.CO.5: Apply various simulation tools for energy systems.
CH372.CO.6: Understand optimization tools for energy applications.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Energy Modeling Tools**	**8 HOURS**
Why do we need energy modeling software, modeling inputs in general, Residential building energy modeling tools, commercial building energy modeling tools, common energy models and renewable measures, introduction to residential stock modeling tools, Introduction to renewable energy modeling tools, system advisor model for modeling renewable energy.		
UNIT 2	**Wind Energy**	**8 HOURS**
Wind resource assessment, Power Conversion Technologies and applications, Wind Power estimation techniques, Principles of Aerodynamics of wind turbine blade, Various aspects of wind turbine design, Wind Turbine Generators: Induction, Synchronous machine, constant V & F and variable V & F generations, Reactive power compensation. Site Selection, Concept of wind form & project cycle, Cost economics & viability of wind farm.		
UNIT 3	**Nuclear Energy**	**8 HOURS**
Potential of Nuclear Energy, International Nuclear Energy Policies and Regulations. Nuclear Energy Technologies Fuel enrichment, Different Types of Nuclear Reactors, Nuclear Waste Disposal, and Nuclear Fusion.		
UNIT 4	**Mathematical Modeling and Analysis in Renewable Energy**	**8 HOURS**
Covers effective storage and generation of power through renewable energy generation sources., Provides real life applications and problems based on renewable energy, Covers new ways of applying mathematical techniques for applications in diverse areas of science and engineering, Case study: analysis of RSM method in optimization of ultrasound assisted KOH catalyzed biodiesel production from waste cotton seed cooking oil.		
UNIT 5	**Economic Environmental Energy Interactions**	**8 HOURS**
The Evolution of Economic-Energy-Environmental Modelling, Composite Scenarios for Long-term Environmental and Energy Policies, Economics of Alternative Energy Sources, The environmental impact issues in energy development, Feasibility of Application, Economics of Energy Sources, Composite Scenarios for Long-term Environmental and Energy Policies.		
UNIT 6	**Applied Data Analysis and Modeling for Energy Engineers**	**8 HOURS**
Risk analysis, types of decision making problems and applications, engineering decisions involving discrete alternatives, modeling risk attitudes, modeling problem structure using influence diagram and decision trees, formal treatment of risk analysis, decision making while operating an engineering system.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Determining efficiency of lighting system/loads		
PRACTICAL NO.02		**2 HOURS**
Determining efficiency of lighting system/loads		
PRACTICAL NO.03		**2 HOURS**
Determining efficiency of lighting system/loads		
PRACTICAL NO.04		**2 HOURS**
Wind power and annual energy estimation from wind data		
PRACTICAL NO.05		**2 HOURS**
Fuel: Density, Viscosity, Flash-point, Fire-point Pour-point		
PRACTICAL NO.06		**2 HOURS**
Fuel: ASTM distillation of liquid fuels; Proximate and Ultimate analysis, calorific value of solid fuels		
PRACTICAL NO.07		**2 HOURS**
Pinch analysis		
PRACTICAL NO.08		**2 HOURS**
Heat Exchanger Network (HEN)		
PRACTICAL NO.09		**2 HOURS**
Modelling of energy system (HVAC)		
PRACTICAL NO.10		**2 HOURS**
Simulation of heat exchanger		

TEXT BOOKS

1. Energy for a sustainable world: Jose Goldenberg, Thomas Johansson, A.K.N.Reddy, Robert Williams (Wiley Eastern).
2. Rao S. S. (2004); Engineering Optimization: Theory and Practice, Third Edition, New Age International.
3. Sundaram R. K. (1996); A First Course in Optimization Theory, Cambridge University Press.

REFERENCE BOOKS

1. Wind Turbine Technology: Fundamental concepts of wind turbine technology Spera D.A. (ASME Press, NY, 1994).
2. Meier P. (1984); Energy Systems Analysis for Developing Countries, Springer Verlag.
3. Ravindran A. Ragsdell K. M. and Reklaitis G. V. (2006); Engineering Optimization:methods and applications, Second Edition, Wiley.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Employability and Career Development
	COURSE CODE	HP305
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

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

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

COURSE OBJECTIVES :

HP305.CEO.1: Define the importance of professional skills in students life.
HP305.CEO.2: Explain them necessary, specific professional skills.
HP305.CEO.3: Appraise students for placements through acquisition of professional skills.
HP305.CEO.4: 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,

HP305.CO.1: Relate the importance of professional skills.
HP305.CO.2: Build necessary, specific professional skills.
HP305.CO.3: Analyze the environment of employ-ability.
HP305.CO.4: Develop various techniques of effective team building in their professional life.

PRACTICALS: (SECTION A)		
PRACTICAL NO.01	**Self Awareness**	**2 HOURS**
Concept of JohariWindow, 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 BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Skill Development Lab (Aspen ONE)
	COURSE CODE	CH364
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : CH231: Heat Transfer, CH342: Separation Process

COURSE OBJECTIVES :

CH364.CEO.1: Illustrate the basis of chemical engineering softwares such as Aspen HYSIS.
CH364.CEO.2: Learn the application of simulation software for solution of engineering problems.
CH364.CEO.3: Construct a bridge between manual calculation and computer simulation.
CH364.CEO.4: Develop an ability to effectively use computational techniques to solve chemical engineering problems.

COURSE OUTCOMES :

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

CH364.CO.1: Identify the operation/process required to solve an engineering problem.
CH364.CO.2: Match manual calculation with computer simulation.
CH364.CO.3: Apply the knowledge of chemical engineering basics to computational techniques.
CH364.CO.4: Categorize different types of equipments based upon application.
CH364.CO.5: Assess complex chemical engineering problems.
CH364.CO.6: Evaluate a chemical engineering process/plant.

PRACTICAL		
PRACTICAL NO.01	**Introduction**	**2 HOURS**
Introduction to Aspen HYSYS(Fluid Package & Component Addition)		
PRACTICAL NO.02	**Software Tools & Basic Component Drawing**	**2 HOURS**
Interface of Software: Different tools available,Basic Component & commands		
PRACTICAL NO.03	**Refrigeration Cycle**	**6 HOURS**
Propane Refrigeration Cycle, Industrial Application		
PRACTICAL NO.04	**Refrigerated Gas Plant**	**6 HOURS**
Refrigerated Gas Plant,Logical operation in Hysys,Interconnection of different equipments		
PRACTICAL NO.05	**Optimization by Simulation**	**4 HOURS**
Simulation & optimization of process parameters in given process flowsheet		
PRACTICAL NO.06	**Natural Gas Sweetening**	**4 HOURS**
Refinery operation process for purification(Sweetening) of natural gas using amine		
PRACTICAL NO.07	**Natural Gas Fractionation**	**6 HOURS**
NGL fractionation train(Introduction to industry application, requirement, and problem statement), Quiz based on last two sessions		
PRACTICAL NO.08	**Glycol Dehydration**	**6 HOURS**
Glycol dehydration process(utilization and application in industry), practical example based on project already executed by Chemsys		
PRACTICAL NO.09	**Distillation**	**4 HOURS**
Case studies on Azeotropic & Extractive Distillation		
PRACTICAL NO.10	**Chemical Products**	**4 HOURS**
Simulation Case studies on Urea/H2SO4/Methanol /Ethylene Manufacturing		
PRACTICAL NO.11	**Liquifaction of LNG**	**4 HOURS**
Simulation Case studies on Liquified Natural Gas		
PRACTICAL NO.12	**Project**	**12 HOURS**
Students will be given the ProjectTopics /Case Studies related to Chemical Engineering Problems. They are supposed to prepare flow sheet & solve the problem by using Aspen HYSIS Software		

TEXT BOOKS

1. Aspentech Getting Started Aspen Hysys V8 Manual.
2. Process Simulation using Hysys V8 by Ahmed Deyab fares.

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CHEMICAL ENGINEERING	COURSE NAME	Project Implementation
	COURSE CODE	CH365
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	REVISION NO	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH365.CEO.1: To understand latest techniques, algorithms, models and design process in the field of project

CH365.CEO.2: To implement/develop/experiment/simulate techniques, algorithms and processes in software and real time

CH365.CEO.3: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

CH365.CO.1: Analyze techniques, algorithms and design process relate to the project

CH365.CO.2: Implement/develop/experiment/simulate/test techniques/process and infer conclusions from it.

CH365.CO.3: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project design phase in Sem V (project design), next step is project implementation (Sem VI). The goal of this phase of the project is to implement/develop/experiment/simulate/test the techniques/processes of the project and give a mature shape. The implementation can be a combination of algorithms, techniques, processes, testing etc. This will also include drawing inferences from the results and discussing them.

GUIDELINES

1. Preferably project group students of Sem V would be continued in this semester VI.
2. Every project group should consist of minimum 03 and maximum of 04 students.
3. The group members may be from different programs to support the interdisciplinary functioning.
4. Project group members and title of the project need to be approved by Project Guide and School.
5. Projects should preferably have a national/international, industry/academic/research collaboration.
6. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
7. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
8. Define proposed solution and apply project management/modeling tools for project planning and design.
9. Define outcome, milestones, definite roadmap for project design, implementation, tools, resources, performance evaluation and documentation.
10. Perform refinement of System architecture & methodology.
11. Students should give a mature shape to their idea in terms of implementation. This is expected in this semester. This may include one or many of these points. Implementation /development/experimentation/simulation/testing/building the techniques/processes

COLLABORATIVE/SPONSORED PROJECT

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization at the start of semester VI.
3. Proposed Collaborative Project work need to be reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of 12 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Freezing of project groups and titles. Refinement of title and objectives from Sem V should freezed by the time of first review.
2. Final Synopsis of the project. (To be done at guide level)
3. Methodology / System Design / Block Diagram should be properly explained by the student
4. Project Review I Presentation.
5. Project Implementation: Students should take the work in one and/more of the points. Like Implementation/development/experimentation/simulation/testing/experimental yield/building the techniques/processes etc
6. Based on the points discussed in 5, student would be able to get results and discuss them. Students should be able to draw inferences from results.
7. Project Review II Presentation.
8. Quality of Publication and Researchers: Students would be educated on different technical papers and their importance (article types, journal metrics etc) along with author/researcher credentials.
9. Project Documentation: Project Report Writing

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I: Problem Statement and objectives, Implementation plan & action (algorithms/techniques/models/mathematical understanding/implementation) (10 Marks)
2. An activity on illustrating methodology. This may inlcude paper reading activity: Read and Summarize a paper in 1 page (Individual to every student of the group). Any other activity can also be taken take would illustrate methodology (10 marks)
3. Project Review II: Results and Implementation, Observations, Inferences, Discussion on algorithms / techniques /models / testing) (10 Marks)
4. Article Quality and Author Credentials: Information about Research Article types, paper quality metrics (SCI/SCOPUS/WOS) and Author Credentials (Citation count, h-index, I10 index etc) (5 marks)
5. Project Report (10 Marks)
6. Project: Documentation Final Presentation and Demonstration (30 Marks)

(Parameters of evaluation: Final implemented work, report, presentation and paper drafted based on work)

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Larsen Samuel Bruning, "Doing Projects And Reports In Engineering", Macmillan Education UK, Bloomsbury Publishing PLC, 2019, ISBN: 9781352005639, 1352005638.
3. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
4. Sara Efrat Efron and Ruth David, "Writing the Literature Review: A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
5. Helmut Kopka and Patrick Daly, "A Guide to Latex: Document preparation for beginners and advanced users", Addison Wesley, 1999.

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 Chemical Engineering

2019-2023

(With Effect from Academic Year: 2022-2023)

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN CHEMICAL ENGINEERING	RELEASE DATE	:	01/07/2022
	REVISION NO.	:	1.0

SEMESTER: VII

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CH461	Plant Design and Piping	1	4	-	0	30	20	50	25	125	3
DE01	CH48#	Refer Annexure	3	0	-	35	35	30	0	0	100	3
OE03	CH471 / CH472	Process Intensification and Integration / Energy Management and Audit	3	2	-	35	35	30	50	0	150	4
SDP11	CH463	Skill Development Lab (Aspen EDR)	0	4	-	0	0	25	50	0	75	2
SDP12	CH470	Project Evaluation	0	8	-	0	0	50	0	100	150	4
SDP13	CH400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**7**	**18**	**0**	**70**	**100**	**155**	**150**	**275**	**750**	**20**

SEMESTER: VIII (PART A)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC15	CH462	Chemical Equipment Design II	3	2	-	35	35	30	50	0	150	4
DE02	CH49#	Refer Annexure	3	0	-	35	35	30	0	0	100	3
HSS7	HP405	Engineering Economics	2	0	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	0	-	0	50	25	0	0	75	2
SDP14	CH480	Capstone Work	-	8	-	0	0	50	0	100	150	4
TOTAL			**10**	**10**	**0**	**70**	**170**	**160**	**50**	**100**	**550**	**15**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Plant Design and Piping
	COURSE CODE	CH461
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	4	0	30	20	50	25	125

PRE-REQUISITE : CH363: Chemical Process Technology

COURSE OBJECTIVES :

CH461.CEO.1: Introduction to plant design and piping.
CH461.CEO.2: Understand the basis of chemical engineering software Pro simulator/Pro-pipe.
CH461.CEO.3: Learn the application of simulation software for solution of engineering problems.
CH461.CEO.4: Make operational awareness in the industrial process plant.
CH461.CEO.5: Identify troubleshoots in chemical process plant.
CH461.CEO.6: Learn fundamentals of piping design and construction.

COURSE OUTCOMES :

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

CH461.CO.1: Identify the operation/process required to solve an engineering problem.
CH461.CO.2: Complete conceptual or preliminary plant design.
CH461.CO.3: Analyze the basic instrumentation troubleshooting system.
CH461.CO.4: Design a piping layout and construction.
CH461.CO.5: Apply the knowledge of chemical engineering basics to computational techniques.
CH461.CO.6: Assess complex industrial refineries problems.

PRACTICAL		
PRACTICAL NO.01	**Study on Operability of Cement Process Plant**	**4 HOURS**
The primary objective Basic Cement Plant Program is to learn the operating fundamentals of a Cement Plant using dynamic simulation. The study on system monitoring and controlling of complete process plant.		
PRACTICAL NO.02	**Study on Operability of Ammonia Process Plant**	**4 HOURS**
Ammonia Synthesis Program is to learn the operating fundamentals of an Ammonia Synthesis Unit using dynamic simulation - to startup and shutdown the process. The study on system monitoring and controlling of complete process plant.		
PRACTICAL NO.03	**Study on Operability of Sulphuric Acid Process Plant**	**4 HOURS**
The primary objective of Sulphuric Acid Plant model is to learn the operating fundamentals of the Sulphuric Acid plant using dynamic simulation. The study on system monitoring and controlling of complete process plant.		
PRACTICAL NO.04	**Study on Operability of Crude Distillation Unit**	**4 HOURS**
Fundamentals of a Crude Distillation Unit using dynamic simulation. Pro Simulator provides opportunities to identify the main equipments associated with a Crude Distillation Unit, to describe the operations of a Crude Distillation Column. The study on system monitoring and controlling of complete process plant.		
PRACTICAL NO.05	**Study on Operability of Vacuum Distillation Unit**	**4 HOURS**
The primary objective of Vacuum Distillation Unit Plant Program is to learn the operating fundamentals of the plant using dynamic simulation. The study on system monitoring and controlling of complete process plant.		
PRACTICAL NO.06	**Study on Basic Instrumentation Troubleshooting System**	**4 HOURS**
The basic instrumentation troubleshooting system - dynamically simulates the control system. The study on controlling of basic instrumentation.		
PRACTICAL NO.07	**Study on Piping Design and Layout**	**4 HOURS**
Pipe line Size Selection and Layout, Piping Insulations, Modeling of Piping Plan and general drawings, etc.		
PRACTICAL NO.08	**Study on Piping Cost Analysis**	**4 HOURS**
Costing and piping systems		
PRACTICAL NO.09	**Study on Piping supports and Stress Analysis**	**4 HOURS**
Piping supports and span calculations, Stress and strain diagrams, Reinforcements, etc.		
PRACTICAL NO.09	**Industry 4.0 for Process Engineering**	**4 HOURS**
Tools and Systems in Industry 4.0 specially crafted for Process Industry, Data Analytics/Modeling, Deep Learning using Artificial Neural Networks, etc.		

TEXT BOOKS

1. Warren D. Seider, J. D. Seader, Daniel R. Lewin, Product and Process Design Principles: Synthesis, Analysis, and Evaluation, 2nd Edition, Wiley, ISBN: 9781119282631.
2. Richard Turton, Joseph A. Shaeiwitz, Debangsu Bhattacharyya, Wallace B. Whiting, Analysis, Synthesis and Design of Chemical Processes, 5th Edition, Prentice Hall, 2018, ISBN: 0134177657, 9780134177656.

REFERENCE BOOKS

1. Johnstone and Thring," Pilot Plants Models and Scale-up methods in Chemical Engg.", McGraw Hill, New York, 1962.
2. Coulson and Richardson's Chemical Engineering, Vol. 6: Chemical Engineering Design. By R.K. Sinnott, Butterworth-Heinemann, Oxford, 3rd, Ed., 1999, 1994.
3. Brannan, C., Rules of Thumb for Chemical Engineers, 4th Ed., Gulf Professional Publishing, Burlington, MA, 2005.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Petroleum Refining Technology
	COURSE CODE	CH483
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : CH233: Mass Transfer, CH342: Separation Process

COURSE OBJECTIVES :

CH483.CEO.1: Explain the market drivers for the refining industry.
CH483.CEO.2: Understand composition and characteristics of crude oils.
CH483.CEO.3: Understand various test for petroleum products.
CH483.CEO.4: Classify the processes used in petroleum refining.
CH483.CEO.5: Sketch a flow diagram that integrates all refining processes and the resulting refinery products.
CH483.CEO.6: Examine implications of changing crude oil feedstock on refinery configuration.

COURSE OUTCOMES :

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

CH483.CO.1: Apply characteristics of crude oil for classification and separation .
CH483.CO.2: Analyze the importance of pre refining operation.
CH483.CO.3: Interpret specification and test methods for fuel.
CH483.CO.4: Identify processes used in refinery with its importance.
CH483.CO.5: Build Hydrogen and sulphur production Flowsheet.
CH483.CO.6: Interpret Lube oil and Bitumen production Flowsheet and specification.

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

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Biochemical Engineering
	COURSE CODE	CH484
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : CH343: Chemical Reaction Engineering

COURSE OBJECTIVES :

CH484.CEO.1: Provide basic knowledge of biochemical engineering.
CH484.CEO.2: Understand the kinetics of enzymes.
CH484.CEO.3: Learn techniques and industrial applications of enzymes.
CH484.CEO.4: Relate Cell Kinetics study and design of fermentor.

COURSE OUTCOMES :

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

CH484.CO.1: Identify basics of biology and overview of biotechnology.
CH484.CO.2: Model cell and enzyme kinetics.
CH484.CO.3: Apply methods of immobilization.
CH484.CO.4: Illustrate sterilization methods.
CH484.CO.5: Inspect bio-product recovery & bio-separations for biochemical Products.
CH484.CO.6: Design, analyse and check the stability of bioreactors.

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

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Environmental Engineering
	COURSE CODE	CH485
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : CH233: Mass Transfer, CH341: Chemical Engineering Operations

COURSE OBJECTIVES :

CH485.CEO.1: Acquire knowledge about the importance of environment and environmental standards.
CH485.CEO.2: Ability to work & learn effectively on environmental issues such as air pollution.
CH485.CEO.3: Develop skills of design of control devices for air pollution.
CH485.CEO.4: Ability to apply quantitative reasoning skills to environmental problems including basic calculations related to water quality parameters.
CH485.CEO.5: Ability to work effectively on complex problem of waste water treatment.
CH485.CEO.6: Describe the impact of solid waste on land.

COURSE OUTCOMES :

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

CH485.CO.1: Understand the importance of environment and environmental standards.
CH485.CO.2: Identify the sources of Air pollution & suggest the steps to mitigate air pollution.
CH485.CO.3: Specify control devices for air pollution.
CH485.CO.4: Understand the different wastewater.
CH485.CO.5: Identify tools and techniques for tertiary waste water treatment.
CH485.CO.6: Understand the different strategies for solid waste management.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**
An overview of environmental engineering, pollution of air, water and soil, impact of population growth on environment, environmental impact of thermal, hydro and nuclear energy, chemical pollution, solid wastes, prevention and control of environmental pollution, water and air pollution laws and standards, clean development mechanisms (CDM), Kyoto protocol. Plum behavior.		
UNIT 2	**Air Pollution**	**6 HOURS**
Definition of air pollution, sources scales of concentration and classification of air pollutants. Effects of air pollutants on human health, plants, animals, materials, Economic effects of air pollution, sampling and measurement of air pollutants, air pollution control standards: WHO, BIS, MPCB, CPCB.		
UNIT 3	**Air Pollution Control Methods and Equipment**	**6 HOURS**
Particulate pollution: cleaning methods, collection efficiency, particulate collection systems, Basic design, stack height and operating principles of settling chamber, cyclone separator, fabric filter, electrostatic precipitator. Operating principles of spray tower, centrifugal scrubber, venturi scrubber, selection of particulate collector. Gaseous pollution: Principles of control by absorption, adsorption, combustion or catalytic oxidation, removal of SOx, NOx. Numerical problems based on the theory.		
UNIT 4	**Water Pollution and Wastewater Treatment**	**6 HOURS**
Domestic and industrial wastewater, types, sources and effects of water pollutants. Waste water characteristicsDO, BOD, COD, TOC, total suspended solids, colour and odour, bacteriological quality, oxygen deficit, determination of BOD constants. Water quality standards: ICMR, WHO, MPCB and CPCB. Principles of primary treatment and secondary treatment, process design and basic operating principles of activated sludge (suspended growth) process, sludge treatment and disposal, trickling filter. Advanced methods of waste water treatment: UASB, photo catalytic reactors, wet-air oxidation, and biosorption.		
UNIT 5	**Tertiary Water Treatment**	**6 HOURS**
Tertiary treatment: disinfection by chlorine, ozone and hydrogen peroxide, UV rays, recovery of materials from process effluents, micro-screening, biological nitrification and denitrification, granular medium filtration, membrane separation processes, ion exchange.		
UNIT 6	**Land Pollution and Solid Waste Management**	**6 HOURS**
Land Pollution: Sources and classification of solid wastes, disposal methods, incineration, composting, recovery and recycling. Plastic waste management, e-waste management, ISO 1401, ISO 2015, Environmental Impact Assessment (EIA).		

TEXT BOOKS

1. Rao C. S. Environmental Pollution Control Engineering, Wiley Eastern Publications, (ISBN:0470217634).
2. R. W. Gaikwad and R. S. Sapkal, Environmental Engineering, Denett & Co, (ISBN: 9788190322836).

REFERENCE BOOKS

1. Benny Joseph, Environmental Science and Engineering, Tata McGraw-Hill, New Delhi, (2006).2nd edition, (ISBN: 9780070648135).
2. Rajagopalan, R, Environmental Studies-From Crisis to Cure, Oxford University Press, Third Edition, (ISBN: 9780199459759).
3. G. Kiely, Environmental Engineering, McGraw Hill 1997, (ISBN: 9780071164245).
4. Gilbert M.Masters, Introduction to Environmental Engineering and Science, 3rd edition, Pearson Education (2004), (ISBN:9780131481930).

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	COURSE NAME	Process Intensification and Integration
	COURSE CODE	CH471
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH362: Chemical Equipment Design I

COURSE OBJECTIVES :

CH471.CEO.1: Examine the concept of process integration and intensification.
CH471.CEO.2: Consider the reactor synthesis and reaction network in process industries.
CH471.CEO.3: Estimate the minimum utility targets.
CH471.CEO.4: Study heat and mass integration.
CH471.CEO.5: Study water pinch analysis.
CH471.CEO.6: Learn process intensified equipments and features.

COURSE OUTCOMES :

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

CH471.CO.1: Apply the concept of process integration and intensification.
CH471.CO.2: Interpret the pinch analysis and methodology.
CH471.CO.3: Apply process integration approach to given process.
CH471.CO.4: Identify bottlenecks in process for minimization of energy requirements.
CH471.CO.5: Design optimal process route.
CH471.CO.6: Synthesize the reactor with given process requirements.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Process Integration**	**6 HOURS**
Process Integration (PI), A brief history of the development of Process Integration, Various aspects of PI, Techniques available for PI, Basic concept of process design & onion diagram, Concept of pinch analysis for maximizing energy efficiency, Problem addressed by pinch technology and energy savings, Pinch Technology and targeting Heat Recovery: the thermodynamic roots.		
UNIT 2	**Synthesis of Reactor Networks Design**	**6 HOURS**
Objectives, Reaction models / types of reactors, Reaction kinetics, Locating the Separation Section with Respect to the Reactor Section, Optimal Reactor Conversion, Reactor Design for Complex Configurations, Reactor Network Design Using the Attainable Region. Heat integrated in distillation operations and sequences.		
UNIT 3	**Synthesis of Heat Exchange Networks**	**8 HOURS**
Objectives, Heat integration, Basic Heat Exchange Network Synthesis (HENS), Minimum Utility Targets, Temperature Interval Method, Hohmann / Lochart Composite Curves (HCC), Grand Composite Curves (GCC), Pinch Design Approach to Inventing a Network, Networks for Maximum Energy Recovery, Minimum Number of Exchangers, Stream Splitting, Threshold and Optimum Approach Temperature.		
UNIT 4	**Synthesis of Mass Exchange Networks**	**8 HOURS**
Objectives, Minimum Mass Separating Agent, Minimum Number of Mass Exchangers, Cost optimization of minimum composition approach, Graphical approach to targeting of Mass Exchange Network Synthesis (MENS), Composition Interval Diagram (CID), Algebraic approach to targeting of MENS.		
UNIT 5	**Synthesis of Water Design Networks**	**7 HOURS**
Objectives, Water pinch analysis, Industrial water usage and operations, Water management and minimization, Targeting maximum water reuse for single contaminants, Design for maximum water reuse for single contaminants, Targeting minimum wastewater treatment for single contaminants, Network water design.		
UNIT 6	**Introduction to Process Intensification**	**7 HOURS**
Brief history of Process intensification (PIs), Applications and its benefits of PIs, Process intensifying equipments and methods, Techniques of process intensification application case studies on reactive separations, intensive mixing and novel reactors etc.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Heat integration in distillation operation		
PRACTICAL NO.02		**2 HOURS**
Process heat recovery in sour water stripping process		
PRACTICAL NO.03		**2 HOURS**
Heat exchange pinch analysis		
PRACTICAL NO.04		**2 HOURS**
Heat Exchanger Network		
PRACTICAL NO.05		**2 HOURS**
Synthesis of mass exchange networks		
PRACTICAL NO.06		**2 HOURS**
Synthesis of water pinch network		
PRACTICAL NO.07		**2 HOURS**
Intensification of mass transfer operation - Divided wall distillation		
PRACTICAL NO.08		**2 HOURS**
Intensification of reactive separation system - Reactive distillation		
PRACTICAL NO.09		**2 HOURS**
Process integration and intensification for petrochemical plant - Case study		
PRACTICAL NO.10		**2 HOURS**
Process integration and intensification in pharmaceutical industries Case study		

TEXT BOOKS

1. Mahmoud M. El-Halwagi, Process Integration-Process Systems Engineering, Volume 7, Academic Press, 2006, ISBN: 9780123705237.
2. R. Smith, Chemical Process: Design and Integration, 1st Edition, Wiley, 2005, ISBN: 9781118699096.
3. David Reay, Colin Ramshaw, Adam Harvey, Process Intensification, 2nd Edition, Butterworth Heinemann, 2008, ISBN: 9870080983042.

REFERENCE BOOKS

1. Ian C. Kemp, Pinch Analysis and Process Integration: A User Guide on Process Integration, 2nd Edition, Butterworth Heinemann, Elsevier, 2007, ISBN: 9780750682602.
2. Stankiewicz, A. and Moulijn,Re-engineering the Chemical Process Plants, Process Intensification, Marcel Dekker, 2003, ISBN: 0203913299.
3. U. V. Shenoy, Heat Exchanger Network Synthesis: Process Optimization by Energy and Resource Analysis, Gulf Professional Publishing, 1995 ISBN: 0884153916.
4. Warren D. Seider, J. D. Seader, Daniel R. Lewin, Product and Process Design Principles: Synthesis, Analysis, and Evaluation, 2nd Edition, Wiley, ISBN: 978111928263.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Energy Management and Audit
	COURSE CODE	CH472
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH352: Energy Engineering

COURSE OBJECTIVES :

CH472.CEO.1: Learn to conserve energy through planning and management.
CH472.CEO.2: Understand Energy Audit procedure along with relevant technologies/tools.
CH472.CEO.3: Develop Energy Audit Report writing skills.
CH472.CEO.4: Improve the thermal efficiency by designing suitable systems for heat recovery and co-generation.

COURSE OUTCOMES :

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

CH472.CO.1: State the need for energy management and audit.
CH472.CO.2: Execute proper energy management and planning.
CH472.CO.3: Carry out the cost- benefit analysis of various investment alternatives for meeting the energy needs.
CH472.CO.4: Design suitable energy monitoring system to analyze and optimize the energy consumption.

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

PRACTICAL		
PRACTICAL NO.01	**Case Study on Audit Report of Industry**	**4 HOURS**
Prepare audit report for Chemical Industry		
PRACTICAL NO.02	**Case Study on Energy Analyzer**	**4 HOURS**
Prepare report on energy analyzer for any process industry through software		
PRACTICAL NO.03	**Case Atudy on Analyzer Star Labeled Apparatus**	**4 HOURS**
Analyze star labeled electrical apparatus and compare the data sheet (Pamphlet) of various star ratings		
PRACTICAL NO.04	**Case Study on Energy Saving**	**4 HOURS**
Determine Net Energy Saving by Lamp replacements		
PRACTICAL NO.05	**Case study on Energy Conservation**	**4 HOURS**
Determine Energy conservation in Fan by using Electronic Regulator		

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Skill Development Lab (Aspen EDR)
	COURSE CODE	CH463
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : CH231: Heat Transfer, CH364: Skill Development Lab (Aspen ONE)

COURSE OBJECTIVES :

CH463.CEO.1: Understand the basis of chemical engineering softwares such as Aspen EDR.
CH463.CEO.2: Learn the application of simulation software for solution of engineering problems.
CH463.CEO.3: Make aware about the chemical engineering concepts in efficient problem solving.
CH463.CEO.4: Construct a bridge between manual calculation and computer simulation.
CH463.CEO.5: Develop an ability to effectively use computational techniques to solve chemical engineering problems.
CH463.CEO.6: Learn the design aspects of chemical process plant.

COURSE OUTCOMES :

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

CH463.CO.1: Identify the operation/process required to solve an engineering problem.
CH463.CO.2: Match manual calculation with computer simulation.
CH463.CO.3: Apply the knowledge of chemical engineering basics to computational techniques.
CH463.CO.4: Categorize different types of equipments based upon application.
CH463.CO.5: Assess complex chemical engineering problems.
CH463.CO.6: Design a chemical engineering process/plant.

PRACTICAL		
PRACTICAL NO.01	**Introduction**	**2 HOURS**
Introduction to ASPEN HYSYS Exchanger and Design Rating		
PRACTICAL NO.02	**Awareness for Software Tools and Basic Components**	**2 HOURS**
Interface of Software: Different tools available, Basic Component & commands		
PRACTICAL NO.03	**Shell & Tube Heat Exchanger Design**	**2 HOURS**
Stepwise Aspen Simulation of Shell & Tube Heat Exchanger Design		
PRACTICAL NO.04	**Plate Exchanger Design**	**2 HOURS**
Aspen Simulation of Plate Exchanger Design		
PRACTICAL NO.05	**Air Cooled Exchanger**	**2 HOURS**
Aspen Simulation of Air Cooled Exchanger		
PRACTICAL NO.06	**Plate Fin Exchanger**	**2 HOURS**
Aspen Simulation of Plate Fin Exchanger		
PRACTICAL NO.07	**Fired Heater**	**2 HOURS**
Aspen Simulation of Fired Heater		
PRACTICAL NO.08	**Evaporator**	**2 HOURS**
Aspen Simulation of Evaporator		
PRACTICAL NO.09	**Evaporator Energy Management**	**2 HOURS**
Optimize energy use, predict and eliminate energy waste through use of an integrated design and modeling tool		
PRACTICAL NO.10	**Project**	**2 HOURS**
Students will be given the Project Topics / Case Studies related to Chemical Engineering Problems. They are supposed to prepare flow sheet & solve the problem by using Aspen HYSYS Software		

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CHEMICAL ENGINEERING	COURSE NAME	Project Evaluation
	COURSE CODE	CH470
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	REVISION NO	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	8	NIL	NIL	NIL	NIL	150	150

COURSE OBJECTIVES :

CH470.CEO.1: To understand how to carry out performance evaluation and comparative analysis in appropriate form.

CH470.CEO.2: To know about standard industry practices.

CH470.CEO.3: To become familiar with the steps involved in identifying and selecting a good platform to present the work done.

COURSE OUTCOMES :

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

CH470.CO.1: Interpret findings, compare them with results in the literature, identify weaknesses and limitations, and propose improvements.

CH470.CO.2: Make use of standard industry practices.

CH470.CO.3: Decide appropriate platform for presenting the work done.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop an alytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project implementation (Sem VI), next step is project evaluation (Sem VII). The goal of this phase of the project is to draw Inferences and Detail Analysis/Final Testing/Re-development/etc. Showcasing the work - Technical documentation in Conferences/Journal/Patent/Product/Working model.

GUIDELINES

1. Project group students of Sem VI would be continued in this semester VII.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Projects should preferably have a national/international, industry/academic/research collaboration.
4. Students should do extended implementation of their project in consultation with their advisor.
5. For extended implementation, objectives of Sem V and Sem VI should have been already achieved.
6. Every project should follow at least one standard industry practice while implementing. For example, below are some of the standard industry practices followed by Electrical engineers:
   (a) If writing a Matlab code, follow **MathWorks Advisory Board (MAB)** Guidelines
   (b) For embedded c coding, **Motor Industry Software Reliability Association (MISRA)** standards can be used
   (c) If antenna is manufactured, then get **EMI/EMC** testing certificate from National Accreditation Board for Testing and Calibration Laboratories.
7. Performance evaluation and Comparative analysis of results should be carried out and presented in appropriate form.
8. Carry out detail analysis to improve performance w.r.t Final Testing/Re-development/etc.
9. Showcase the work in Conferences/Journal/Patent/Product/Working model.

Note: *For guideline 6, every school should identify standard industry practices and try to incorporate in the projects.*

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I (Internal): (20 Marks)
2. Activity (Standard industry practices): (20 Marks)
3. Project Review II (External): (20 Marks)
4. Project Report: (20 Marks)
5. Every project group should publish paper in National conference / International conference / Participate in technical project competition (with achievement) / File a patent/etc.: (20 Marks)
6. Project: Final Presentation and Demonstration (External) (50 Marks)

Note:

- Report should be prepared in LaTeX.
- External examiner for Review 2 and Final Demo should be allocated same group.
- Report will be jointly evaluated by External examiner and Internal examiner.

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
3. Leslie Lamport, "A Document Preparation System LaTeX: User's Guide and Reference Manual", Pearson, 2011.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	2021 - 2022 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	COURSE NAME	Student Internship Program (Technical/ Research Skills)
	COURSE CODE	CH400
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH400.CEO.1: To get acquainted with the professional organization structure
CH400.CEO.2: To enable students to apply their knowledge for development of product/system/software
CH400.CEO.3: To work individually as well as in groups
CH400.CEO.4: To get Hands-on experience in the related field
CH400.CEO.5: To formulate the engineering problem statement

COURSE OUTCOMES :

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

CH400.CO.1: Analyze a given engineering problem
CH400.CO.2: Identify an appropriate problem solving methodology
CH400.CO.3: Cultivate hands-on professional work experience prior to their graduation
CH400.CO.4: Understand the real time technical, managerial and communication skills required at the job
CH400.CO.5: Develop appropriate workplace attitudes and understand the importance of ethics in professional life

INTRODUCTION:

The main aim of Student Internship Program (SIP) is to assist all Final Year B.Tech. students to obtain internships at various centers of excellence in the industry and the academia. The ultimate goal is to imbue students with professionalism and networking capabilities using internships as a tool for providing comprehensive practical experience. Using SIP, MITAoE students will enhance their academic and professional skills, making themselves more marketable in todays competitive world. The students can harness this lucrative opportunity to apply the knowledge they acquired all through the academic career in the professional realm.

SCOPE AND STRUCTURE OF SIP:

Summer Internship Program (SIP) is offered to entrants of Final Year B.Tech. (after semester VI) that meet the eligibility criteria stated below:

Final year B.TECH entrants should apply for 4 to 6 weeks duration internships during June-July of every academic year. For this internship, REGULAR credits will be awarded. (Credit Based Internship - 4 Credits). This internship is compulsory for all the entrants of final year B.TECH. Awarded credits will be considered for the calculation of final year CGPA and will be reflected in Regular Grade Card. Student has to work for 160 hours minimum as an Intern during the said period.

MITAoE will be responsible for identifying internship oppportunities and assisting students to apply for such positions. However, any financial liability, including but not limiteed to travel, accomodation, insurance etc. incurred as direct or indirect consequence of such a position is the sole responsibility of the student and his/her guardians.

STUDENT ELIGIBILITY CRITERIA:

Students applying for internships must meet the following criteria:

After completion of sixth academic semester, Third Year B. Tech. students (Final Year B. Tech. entrants) of all schools are eligible to apply for 4 to 6 weeks duration internships under SIP. All students have to complete the internship successfully as stated in the scope of Student Internship Program. However, students who fail to earn the 4 credits for any reason, shall be required to earn the same at a later instant of time to be eligible for the award of degree as per the internship policy.

RULES FOR APPLICATION TO SIP:

Students applying to the Student Internship Program are required to adhere the following rules and need to go through SIP policy document:

1. Students must complete an undertaking to abide by the rules and regulations of the institution / industry for which they are applying for SIP.

2. Students must obtain academic and school clearances to ensure completion of prerequisite courses or other requirements as a part of their application to SIP.

3. Students must submit a well formatted CV, requisite form, financial declaration, if any, along with the undertaking stated above to the Internship Coordinator through Faculty Mentor before April 30 of every year.

4. Last date for completing all relevant formalities pertaining to SIP is 15 days prior to the start of the internship.

5. Within the first week of the internship, students are required to submit their supervisor's contact information to the Faculty Mentor and Internship Coordinator.

6. **During the internship, students must submit brief fortnightly report duly signed by their supervisor to the Faculty Mentor.**

7. **Annexure IV is the final approval for the SIP and without which no internship is approved and no queries will be entertained at a later stage.**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Chemical Equipment Design II
	COURSE CODE	CH462
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CH362: Chemical Equipment Design I, CH363: Chemical Process Technology

COURSE OBJECTIVES :

CH462.CEO.1: Understand the concept of storage vessels and applications.
CH462.CEO.2: Get information about the heating system used in reaction vessel.
CH462.CEO.3: Get knowledge about the auxiliary process vessel and its applications.
CH462.CEO.4: Learn designing of tray column and its applications.
CH462.CEO.5: Learn the designing of packed column.
CH462.CEO.6: Learn the cost estimating & management process.

COURSE OUTCOMES :

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

CH462.CO.1: Apply the concept for designing storage vessel.
CH462.CO.2: Analyze key criteria involved for the heating system used in reaction vessel.
CH462.CO.3: Apply knowledge about the designing tray column used in chemical processes.
CH462.CO.4: Design the Piping for Equipment.
CH462.CO.5: Design of packed column.
CH462.CO.6: Demonstrate the cost estimating process.

THEORY COURSE CONTENT		
UNIT 1	**Storage Vessels**	**7 HOURS**
Study of various types of storage vessels and applications, Atmospheric vessels, vessels for storing volatile and non-volatile liquids, storage of gases, Losses in storage vessels, Various types of roofs used for storage vessels, Design of cylindrical storage vessels as per IS: 803- design of base plates, shell plates, roof plates, wind girders, curb angles for self-supporting and column supported roofs. Design of rectangular tanks as per IS: 804.		
UNIT 2	**Reaction Vessels and Agitators**	**7 HOURS**
Reaction vessels: introduction, classification, heating systems, design of vessels, study and design of various types of jackets like plain, half coil, channel, limpet oil, study and design of internal coil reaction vessels, heat transfer coefficients in coils. Agitators: Study of various types of agitators, baffling, agitator shaft diameter calculations such as twisting moment, equivalent bending moment, power requirement calculations for agitation systems .		
UNIT 3	**Design of Tray Column**	**7 HOURS**
Continuous distillation, Design variables in distillation, Design methods for binary systems, Multi-component distillation: general considerations, short-cut methods for stage and reflux requirements, rigorous solution procedures, Plate efficiency, Approximate column sizing, Plate contactors, Plate hydraulic design.		
UNIT 4	**Packed Column**	**7 HOURS**
Packed column: choices of plates or packing, packed column design procedure, packed bed height (distillation and absorption), HTU, Cornells method, column diameter, column internals, wetting rates, column auxiliaries.		
UNIT 5	**Piping Design for Equipment**	**7 HOURS**
A brief revision covering friction factor, pressure drop for flow of non-compressible and compressible fluids, (Newtonian Fluids), pipe sizing, economic velocity. Pipe line networks and their analysis for flow in branches, restriction orifice sizing. Pipe supports, NonNewtonian fluids types with examples, pressure drop calculations for Non-Newtonian fluids. Pipe line design on fluid dynamic parameter.		
UNIT 6	**Project Cost Estimation**	**7 HOURS**
Cost estimating and cost management definitions and timelines, cost estimating & management process, project complexity and impact on estimation and risk management process, risk strategy, management support for estimating and cost management practices.		

PRACTICAL		
PRACTICAL NO.01	**Design of Storage Vessels**	**2 HOURS**
Design and drawing of storage vessel used in oil industry		
PRACTICAL NO.02	**Roofs Used for Storage Vessels**	**2 HOURS**
Various types of roofs used for storage vessels		
PRACTICAL NO.03	**Sieve Plate Design for Column**	**2 HOURS**
Sieve plate design for column		
PRACTICAL NO.04	**Reaction Vessel Design: Jackets**	**2 HOURS**
Design of various types of jackets		
PRACTICAL NO.05	**Reaction Vessel Design: Agitator**	**2 HOURS**
Required power calculations for agitation systems		
PRACTICAL NO.06	**Pipe Line Network**	**2 HOURS**
Pipe line Network		
PRACTICAL NO.07	**Design of Distillation Column**	**2 HOURS**
Simulation of Shortcut / Rigorous distillation column		
PRACTICAL NO.08	**CHEMSEP Distillation Column**	**2 HOURS**
Simulation of CHEMSEP Distillation Column		
PRACTICAL NO.09	**Packed Column**	**2 HOURS**
Simulation of Absorption Column		

TEXT BOOKS

1. Joshi M.V, Mahajani V.V, Process Equipment Design, 5th Edition, MacMillan Publishers India limited. (ISBN : 9780333924181).
2. Dawande S.D, Process Design of Equipment, Central Techno Publications, Nagpur, 2000. (ISBN :8190322885).
3. Max Peters, Klaus Timmerhaus , Ronald West; Plant Design and Economics for Chemical Engineers, McGraw Hill Education; 5th edition (2017) (ISBN-13 : 978-1259002113).

REFERENCE BOOKS

1. Sinnott R.K; Chemical Engineering Series, Vol. 6, 4 th Edition, Butterworth Heinemann. (ISBN :9780080418667).
2. Richardson J.F, Harker J.H. and Backhurst J.R, Chemical Engineering, Vol. 2, 5 th Edition, Butterworth-Heinemann. (ISBN : 9780750644457).
3. James R Couper, Walas S.M, Chemical Process Equipment: Selection and Design, Gulf Professional Publishing, 1988. (ISBN : 9780409901313).
4. Brownell L.E. and Young H.E,Process Equipment Design, John Wiley, 2004. (ISBN :9780471113195).
5. 5. Pipe Drafting and Design by Roy A Parisher & Robert A. Rhea, Gulf Professional Publishing, 2012. (ISBN : 978-0123847003).

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Petrochemical Technology
	COURSE CODE	CH493
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : CH233: Mass Transfer, Ch342: Separation Process, CH483: Petroleum Refining Technology

COURSE OBJECTIVES :

CH493.CEO.1: Apply knowledge of petroleum refining operation and process to obtain various raw materials.
CH493.CEO.2: Understand various unit operations and processes used in Petrochemical industry.
CH493.CEO.3: Identify and understand manufacturing of various petrochemicals.
CH493.CEO.4: Apply proper unit operation for desired separation.
CH493.CEO.5: Understand importance of raw material quality on product specification.
CH493.CEO.6: Understand the safety considerations in Petrochemical industry.

COURSE OUTCOMES :

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

CH493.CO.1: Understand Indian and world scenario for production and demand for Petrochemical.
CH493.CO.2: Understand specification of different raw material and its importance.
CH493.CO.3: Select proper unit operation and processes in synthesis of various Petrochemicals.
CH493.CO.4: Interpret the petrochemical Flowsheet and its major engineering problems.
CH493.CO.5: Select proper process from available process.
CH493.CO.6: Understand uses of petrochemicals product.

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

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Bioprocess Technology
	COURSE CODE	CH494
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : CH484: Biochemical Engineering

COURSE OBJECTIVES :

CH494.CEO.1: Develop bioprocess product manufacturing Skills.
CH494.CEO.2: Understand engineering principles to address issues in bioprocessing.
CH494.CEO.3: Estimate kinetics parameters from raw fermentation data.
CH494.CEO.4: Identify limiting factors in downstream processing.

COURSE OUTCOMES :

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

CH494.CO.1: Identify role of bioprocess engineering.
CH494.CO.2: Select Appropriate Bioreactor Configurations and Operation.
CH494.CO.3: Interpret preliminary design for a bioreactor.
CH494.CO.4: Compare which unit operations are required before and after a bioreactor.
CH494.CO.5: Develop block flow diagram and process flow diagram for bioprocesses.
CH494.CO.6: Analyze kinetics of cell growth.

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

TEXT BOOKS

1. Glick BR & Pasternak JJ, Molecular Biotechnology, 3rd Edition, ASM Press, 1998, ISBN: 9781555811365.
2. Voet D, Voet JG & Pratt CW, Fundamentals of Biochemistry, 2nd Edition. Wiley 2006.

REFERENCE BOOKS

1. J. E. Bailey & D. F. Ollis, Biochemical Engineering Fundamentals , McGraw Hill Book Company, 1986, ISBN: 9780070701236.
2. Michael L. Shuler & Fikret Kargi, Bioprocess Engineering Basic Concepts, 2 nd edition, Prentice Hall of India, New Delhi, 2002, ISBN: 9788120321106.
3. Wiseman A (Ed.), Topics in enzyme and fermentation Bio-technology, Ellis mand Harwood, U.K. Vol-5, ISBN: 9885177332121.
4. Campbell AM & Heyer LJ, Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition. Benjamin Cummings 2007, ISBN: 9780805382198.
5. Brown TA, Genomes, 3rd Edition. Garland Science 2006, ISBN: 9780815345244.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	COURSE NAME	Chemical Process Safety
	COURSE CODE	CH495
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : CH363: Chemical Process Technology

COURSE OBJECTIVES :

CH495.CEO.1: Know various process utilities.
CH495.CEO.2: Understand about safety aspects in industry.
CH495.CEO.3: Understand the importance of loss of prevention.
CH495.CEO.4: Understand about hazard analysis and toxicology.
CH495.CEO.5: Learn about storage and handling of hazardous chemicals.
CH495.CEO.6: Learn about risk and hazard analysis.

COURSE OUTCOMES :

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

CH495.CO.1: Apply the basic principles of safety.
CH495.CO.2: Develop the roots for hazard analysis.
CH495.CO.3: Identify the event tree and fault tree analysis.
CH495.CO.4: Analyze the hazards in a given process and assess them to provide solutions for operating safely.
CH495.CO.5: Knowledge to choose the safety requirements for storage and handling of a given chemical.
CH495.CO.6: Formulate the important of risk factors and factors.

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

TEXT BOOKS

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

REFERENCE BOOKS

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP405
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP405.CEO.1: To study the basic concepts of economics
HP405.CEO.2: To use the practical applications of economic feasibility
HP405.CEO.3: To understand the concept of banking and features
HP405.CEO.4: To illustrate the financial planning and saving options

COURSE OUTCOMES :

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

HP405.CO.1: Relate the basic concepts of engineering economics
HP405.CO.2: Apply the economic viability of firm/organization under different market conditions
HP405.CO.3: Explain the bank structures and its schemes
HP405.CO.4: Execute the effective way of financial budget and skills

THEORY		
UNIT 1	**Introduction to Economics**	**6 HOURS**
Economic issues and concepts; How economist work, Theory of demand and supply; meaning, Determinants, Equilibrium between demand and supply; Elasticity of demand; Price elasticity; Income elasticity; Cross elasticity, Characteristics of an Indian economy, Concepts of foreign trade, Goods and Services Tax (GST), Globalization, Liberalization, Privatization, Global market indices, Foreign Direct Investment (FDI). **Case studies:** Housing market, General raw products/fuel market, Electronic devices, Startups, etc. **Further readings:** Introduction to Crypto-currency, Impact and analysis in the foreign market.		
UNIT 2	**Micro Economics and Macro Economy**	**6 HOURS**
Revenue concepts, Cost concepts, Short run and long run cost concepts and curves, Opportunity cost. Markets; meaning, types of markets and their characteristics, National Income (NI); meaning, stock and ow concept, NI at current price, NI at constant price, Gross National Product (GNP), Gross Domestic Product (GDP), Net National Product (NNP), Net Domestic Product (NDP), Personal income, Disposal income, Inflation: meaning, types, causes, measures to control. **Case studies:** Economics network, Economic influences of COVID-19 pandemic, etc.		
UNIT 3	**Capital Cost Estimation and Economic Viability Study**	**5 HOURS**
Typical capital cost component, Cost Index (CI), Typical operating cost components, Classes of cost estimates, Cost estimation by applying factors, Detailed cost estimation method, Financial viability calculation (Payback period, Break-even point, Internal rate of return (IRR) and Net present value (NPV); numerical), Cash flow diagrams, Profitability criteria Project evaluation and index. **Case studies:** Detailed spreadsheet of product cost, Determination of project cost, Net profit/loss, etc.		
UNIT 4	**Introduction to Banking & Money Market**	**5 HOURS**
Banking; meaning, types, functions, Commercial banks- Instruments in operation of an account, Central bank- Reserve Bank of India (RBI); its functions, Concepts and influences- Cash Reserve Ratio (CRR), Bank rate, Repo rate, Reverse repo rate, Statutory Liquidity Ratio (SLR), Introduction to money and capital market, Introduction to fiscal policy- meaning and tools. **Further readings:** Retail banking, Demonetization, Banking management, etc.		
UNIT 5	**Financial Literacy and Planning**	**6 HOURS**
Importance of financial planning, literacy and budgeting, Savings related products, Insurance related products, Pension, Retirement and estate planning, Borrowing related products, Basic and advanced investing, Government schemes for various savings and investment options, Tax savings options. **Case studies:** Shore Financial, Real life examples, Goal-Planning, etc. **Self studies:** Protect your family financial and retirement planning.		

REFERENCE BOOKS

1. N G. Mankiw: Economics: Principles of Economics, Cengage Learning (2003), ISBN: 1305585127.
2. J. Bradfield, Introduction to the Economics of Financial Markets, Oxford University Press, New York (2007), ISBN: 9780195310634.
3. F. Vega-Redondo, Economics and the theory of games, Cambridge University Press (2003), ISBN: 9780521775908.
4. C. S. Park, Fundamentals of Engineering Economics, Prentice Hall (2003), ISBN: 9780130307910.
5. D. E. O'Connor, The Basics of Economics, Greenwood Publisher (2004), ISBN: 9780313325205.
6. V. V. Mahajani, S. M. Mokashi, Chemical Project Economics, Macmillan India Ltd. (2005), ISBN: 1403928142.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Psychology
	COURSE CODE	HP406
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP406.CEO.1: To introduce the basic concept of Psychology.

HP406.CEO.2: To explain how learning and conditioning occurs in everyday life through both nature and nurture factors.

HP406.CEO.3: To know the main schools of thought and prime contributors to the theory of workplace motivation.

HP406.CEO.4: To develop insight into ones own and others behavior and underlying mental processes.

HP406.CEO.5: To develop Positive Psychology interventions to increase personal well-being.

COURSE OUTCOMES :

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

HP406.CO.1: Explain the basic concepts of Psychology.

HP406.CO.2: Apply the concept of conditioning in day to day life.

HP406.CO.3: Explain the main schools of thought and prime contributors to the theory of workplace motivation.

HP406.CO.4: Demonstrate effetely the personality traits in regular life.

HP406.CO.5: Employ Positive Psychology interventions to increase personal well-being.

THEORY

UNIT 1	Basics of Psychology	6 HOURS

Meaning, Nature, Objective of Psychology, Learning: meaning, classical conditioning, operant conditioning; Attention and Perception: definition, types of attention, determinants of attention.

UNIT 2	Social Interactions	6 HOURS

Conformity, Compliance, Obedience, Stereotypes, Attitudes: nature, characteristics, attitude formation and attitude change; Prejudice and Discrimination- characteristics and types of prejudice, development and maintenance of prejudice and discrimination, manifestation of prejudice, methods of reducing prejudice and discrimination.

UNIT 3	Need and Motivation	6 HOURS

Meaning; extrinsic and intrinsic motivation, Vrooms Expectancy Theory of Motivation, Herzberg's Motivators and Hygiene Factors, Maslow's Hierarchy of Needs.

UNIT 4	Self and Identity	6 HOURS

Meaning and Need, Erik Eriksons Stages of Psychosocial Development, Carl Rogers' Theory of Personality, Thomas Harriss Transactional Analysis, Johari Window, SWOT .

UNIT 5	Positive Psychology	4 HOURS

Introduction to Positive Psychology; From Learned Helplessness to Learned Optimism, Building the Skill of Gratitude, VIA Classification of Character Strengths and Virtues, Identifying and Using Your Signature Strengths, Resilience and Optimism, Cognitive Strategies to Increase Optimism and Resilient Thinking, Managing Anxiety and Increasing Positive Emotions .

TEXT BOOK

1. S. Cicearelli, J. Noland White, Psychology 4th Edition, Pearson Publisher, ISBN-13:9780208972241.
2. Robert A. Baron, Introduction to Psychology 3rd Edition, Pearson Education Company, ISBN-10:0536813906.
3. Stephen P. Robbins, Timothy. A. Judge, Organizational Behavior 15th Edition, Pearson Education Inc., ISBN-10:0-13-283487-1.
4. Robert. A. Baron, Nyla. R. Branscombe, Social Psychology 13th Edition, Pearson Education India, ISBN-13:978-9332569911.

REFERENCE BOOK

1. Kathleen M. Galotti, Cognitive Psychology 2nd Edition, SAGE Publications India Pvt. Ltd. ISBN:978-93-515-0277-7.
2. Robert S. Feldman, Understanding Psychology 10th Edition, McGraw Hill Education (India) ISBN:10: 1-25-900305-1.
3. Elliot Aronson, Timothy D. Wilson, Robin M. Akert, Social Psychology 8th Edition, Pearson Education, ISBN:9788131730898.
4. Calvin S. Hall, Gardner Lindzey, John B. Campbell, Theories of Personality 4th Edition Choudhary Press, Delhi, ISBN: 978-81-265-1092-4.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	COURSE NAME	Capstone Work
	COURSE CODE	CH480
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	REVISION NO	0.0

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

PREREQUISITE : NIL

COURSE OBJECTIVES :

XX480.CEO.1: Improve individual perspectives to find solutions at different scales

XX480.CEO.2: Identify the capstone work, formulate the methodology along with a significant collection of artifacts and outcomes.

XX480.CEO.3: Synthesize a reflective report to effectively communicate and explore findings.

XX480.CEO.4: Create a professional portfolio that technically, graphically and verbally describes pertinent achievements and the progressive growth during the program.

COURSE OUTCOMES :

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

XX480.CO.1: Portray individual skill for solving the problem. (L4)

XX480.CO.2: Showcase the best techniques and suitable methodology. (L5)

XX480.CO.3: Cognize the significance of report and comprehend its reflections. (L4)

XX480.CO.4: Assimilate digital and visual literacies. (L5)

COURSE ABSTRACT

Capstone work is an individual, self-identified project that focuses on technical/non-technical issues. Capstone work requires taking risks, high productivity, strong design research, quick turnaround times, creating an advanced design. A Digital portfolio is an integrative collection of work that draws together skills gained from across the taught phase of the program. It comprises a structured set of papers that enabled application and critical reflection. It is an amalgamation of both written and visual content that draws out the evolution of thinking around the ways in which design, social constructs, and emerging technologies intercept. It exposed process, critical thinking, as well as final artifacts, concepts, and its contents articulated in depth. The student enables to learn powerful new methods to promote his online self-design profile. It will help to established a professional voice by writing a personal design philosophy and a reflective article for the Linked In profile page. The opportunity to choose the project,formulate solution, negotiate deliverable, work individually, and present digitally is what makes the Capstone portfolio unique.

Capstone portfolio is divided into two section

a) Capstone work

b) Digital Portfolio

CAPSTONE WORK

Individual student can choose the topic from one of the below capstones to carry out the work during the entire semester

1. Technical Capstone
    - Industry identified problem
    - Institute identified problem
    - Urban city identified problems
    - Rural Development
    - Environmental related problems
    - Student Conceived problems
    - Satisfactory solution to Open ended problems
    - Innovative Design stemming from Student/Faculty
    - Product Development
    - App/ Software Development
    - Multidisciplinary approach to existing problem
    - Modeling/Optimization/Analysis study

2. Writing Intensive Capstone
    - Design
    - Literature Survey
    - Commercial Survey
    - Social media Survey
    - Idea/ Design Philosophy
    - Research Methodology
    - Consultancy Project work
    - Collaborative Project work
    - Laboratory/Digital classroom
    - Manage/lead any Event/activity
3. General Capstone
    - State of art
    - Creating YouTube channel
    - Design Blog/Forum
    - Challenges and Prospect of Technology (Engineering) Education in Primary and Secondary Schools
    - Market Statistics

DIGITAL PORTFOLIO

Individual student should create there own digital portfolio by using the standard professional platforms/blogs based on the record during their entire Under Graduate program. Digital portfolio should be professional, amalgamation of technical, written, graphical/Visual content and Verbal culmination of the skills and knowledge that students have developed over their under graduate program.

1. Process Portfolio
2. Show case Portfolio
3. Hybrid Portfolio

GUIDELINES

1. Individual student will work for Capstone work for entire semester.
2. Individual student will create their own digital portfolio.
3. Individual student should choose the title of the capstone work with approval from the Supervisor and School Dean
4. Student should work on the topic approved with all necessary information, evidences and the measurable outcomes.
5. Student will have to write the graduation book on the capstone work.
6. Students have to follow the guidelines of plagiarism for graduation book.
7. If Student perceive exemplary achievement it can can consider as capstone work review 2. This will ensure the competency of students which they have learn during their undergraduate program. However supervisor can take stand if the capstone work is remarkable, he/she may ask to write a small report for the record.However supervisor can take stand if the capstone work is good, he/she may ask to write one small report.
    - Published Article in Scopus Index Journal
    - Approved Research Proposal
    - Winner for Design Competitions/Tech fest/ Workshop
    - Winner for State/National/International Event (Technical/Non-technical)
    - Valid score in Competitive exams (GATE/CAT/GRE-TOEFL/IELTS)
8. Capstone work and Digital portfolio need to be reviewed by supervisor and one faculty of same department to ensure whether student have followed all the guideline and work is appropriate and worth for evaluation.
9. Final examination will be conducted in the presence of Jury.

ASSESSMENT and EVALUATION

The Jury will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the Capstone work supervisor. Assessment shall be done jointly by the supervisor and jury members.

1. Capstone work Review 1 (25 Marks)
2. Capstone work Review 2 (25 Marks)
3. Creating Digital Portfolio (50 Marks)
4. Graduation book (25 Marks)
5. Final Demonstration (25 Marks)

REFERENCES

1. https://design.berkeley.edu/
   Berkeley M.Des. University of California, U.S.
2. https://design.gatech.edu/
   Georgia Institute of Technology, College of Design Atlanta, U.S.
3. https://www.apus.edu/
   American Public University
4. https://msu.edu/
   Michigan State Universitys US
5. https://www.cranfield.ac.uk
   Cranfield University, Shrivenham Swindon UK
6. https://my.bulbapp.com/personalized-learning/assessment-infographic-blog/
7. https://edtechjeffco.weebly.com
8. https://www.invisionapp.com/inside-design/10-portfolio-websites-to-show-off-your-design-work/

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MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum

For

Final Year

Bachelor of Technology in

Chemical Engineering

(Amendments for Semester Long Internship)

2019-2023

(With Effect from Academic Year: 2022-2023)

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**						**CREDIT**
TYPE	**CODE**	**NAME**	**Hour/Week**			**THEORY**			**PRACT**		**TOTAL**	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC15	CH462	Chemical Equipment Design II	3	2	-	35	35	30	50	0	150	4
DE02	CH49#	Refer Annexure	3	0	-	35	35	30	0	0	100	3
SDP16	CH467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP17	CH468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**70**	**70**	**60**	**50**	**300**	**550**	**15**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	W.E.F	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	COURSE NAME	Semester Long Internship Program (SLIP)-Design
	COURSE CODE	CH467
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH467.CEO.1: To get acquainted with the organization structure
CH467.CEO.2: To gain learning and living experience
CH467.CEO.3: To develop appropriate workplace attitudes
CH467.CEO.4: To get Hands-on experience in the related field to relate and reinforce what has been taught at the university
CH467.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CH467.CO.1: Analyze a given engineering problem
CH467.CO.2: Identify an appropriate problem solving methodology
CH467.CO.3: Prepare themselves to work in cross-cultural, multi-national environment
CH467.CO.4: Improve self-confidence and independency
CH467.CO.5: Develop ability to work individually as well as in groups

ELIGIBILITY:

I. No live backlogs

II. 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.

APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including the 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 corporatee relations (CR) coordinator. The application must be prescibed in the SLIP policy.

TIMELINE:

The Semester Long Internship Program (SLIP) is carried out in two phases viz. SLIP - Design and SLIP - Implementation. SLIP - Design is a mandatory phase.

ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

I. Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel. The Panel for the evaluation should be 3 members or 4 members. The composition of the team would be as follows:

a. Dean, Respective School
b. Project Guide
c. CR Coordinator / Project Coordinator
d. Project Guide (Industry)
e. The domain expert

II. Presentation I in the mid of the internship and Presentation II at the end of the internship combined to a total weightage of 4 credits. **In grade card it will be mentioned as SLIP - Design.**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF CHEMICAL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CHEMICAL ENGINEERING	**COURSE NAME**	Semester Long Internship Program (SLIP)-Implementation
	COURSE CODE	CH468
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH468.CEO.1: To get acquainted with the organization structure
CH468.CEO.2: To gain learning and living experience
CH468.CEO.3: To develop appropriate workplace attitudes
CH468.CEO.4: To get Hands-on experience in the related field to relate and reinforce what has been taught at the university
CH468.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CH468.CO.1: Analyze a given engineering problem
CH468.CO.2: Identify an appropriate problem solving methodology
CH468.CO.3: Prepare themselves to work in cross-cultural, multi-national environment
CH468.CO.4: Improve self-confidence and independency
CH468.CO.5: Develop ability to work individually as well as in groups

ELIGIBILITY:

I. No live backlogs

II. Semester Long Internship Program (SLIP) - Design must be completed.

III. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student).

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

ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

I. Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel. The Panel for the evaluation should be 3 members or 4 members. The composition of the team would be as follows:

a. Dean, Respective School

b. Project Guide

c. CR Coordinator / Project Coordinator

d. Project Guide (Industry)

e. The domain expert

II 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 4 credits and should be as per the template.

In grade card it will be mentioned as SLIP - Project Implementation.

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Curriculum For

Bachelor of Technology in

Civil Engineering

(Choice Based Credit System)

2019-2023

BoS Chairman **Dean** **SMCE (Civil Engg)**	**Member Secretary** **Academic Council** **Dean Academics**	**Chairman** **Academic Council** **Director, MITAOE**

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to Savitribai Phule Pune University

COMMON CURRICULUM FRAMEWORK (Revision 2019)

The Bachelor of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION: SEMESTER WISE										
S.N.	TYPE OF COURSE	NO. OF COURSES/SEMESTER								TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science (NSC)	2	2		1					**5**
2.	Engineering Science (ESC)	4	3	1						**8**
3.	Discipline Core (DC)			3	3	3	3	1	1	**14**
4.	Discipline Elective (DE)							1	1	**2**
5.	Open Elective (OE)					1	1	1		**3**
6.	Humanities and Social Science (HSS)		1		1	1	1		2	**6**
7.	Skill Development and Project (SDP)			3	2	2	2	3	1	**13**
TOTAL		**6**	**6**	**7**	**7**	**7**	**7**	**6**	**5**	**51**
Audit Course			1	1	2		1			**5**

CREDIT DISTRIBUTION: SEMESTER WISE											
1 Lecture hour = 1 Credit		**2 Lab Hours = 1 Credit**				**1 Tutorial Hour = 1 Credit**					
S.N.	TYPE OF COURSE	NO. OF CREDITS/SEMESTER								TOTAL	%
		1	2	3	4	5	6	7	8		
1.	Natural Science (NSC)	8	8		4					**20**	**12.5**
2.	Engineering Science (ESC)	13	9	4						**26**	**16.25**
3.	Discipline Core (DC)			12	12	11	11	4	4	**54**	**33.75**
4.	Discipline Elective (DE)							3	3	**6**	**3.75**
5.	Open Elective (OE)					4	4	4		**12**	**7.5**
6.	Humanities and Social Science (HSS)		2		2	2	2		4	**12**	**7.5**
7.	Skill Development and Project (SDP)			5	3	4	4	10	4	**30**	**18.75**
TOTAL		**21**	**19**	**21**	**21**	**21**	**21**	**21**	**15**	**160**	**100**

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	19	**40**
2.	Second Year	21	21	**42**
3.	Third Year	21	21	**42**
4.	Final Year	21	15	**36**
TOTAL				**160**

CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	29/27	28/30	**57**
2.	Second Year	31	31	**62**
3.	Third Year	27	30	**57**
4.	Final Year	25	20	**45**
TOTAL				**221**

ABBREVIATIONS		
1.	MSE	Mid Semester Exam
2.	ESE	End Semester Exam
3.	IA	Internal Assessment
4.	T/P	Term Work / Practical
5.	DM	Demonstration
6.	L	Lecture
7.	P	Practical
8.	T	Tutorial
9.	Lab	Laboratory

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	:	2019-2020
FIRST YEAR BACHELOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (PART I)

INDUCTION PROGRAM (Universal Human Values): 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (PART I)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC5	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC6	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
ESC7	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**11**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	:	2019-2020
FIRST YEAR BACHELOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (PART II)

INDUCTION PROGRAM (Universal Human Values): 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC5	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
ESC7	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (PART II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
PE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC6	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT | Academy of Engineering **Autonomous Institute Affiliated to SPPU**	**COURSE STRUCTURE (REVISION 2019)**		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**:**	**2020-2021**
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**RELEASE DATE**	**:**	**01/06/2020**
	REVISION NO.	**:**	**1.0**

SEMESTER: III

SUMMER INTERNSHIP (Audit: CV200**)**

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC8	ME221	Material Engineering	3	2	-	35	35	30	50	0	150	4
DC01	CV204	Geotechnical Engineering	3	2	-	35	35	30	50	0	150	4
DC02	CV205	Building Design & Construction	3	2	-	35	35	30	50	0	150	4
DC03	CV206	Mechanics of Solids	3	2	-	35	35	30	50	0	150	4
SDP1	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP2	CV230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP3	CV23#	Skill Development Course-1 (Excel / REVIT)	0	4	-	0	0	25	0	50	75	2
ESC9	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

SEMESTER: IV

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS203/4	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC04	CV214	Mechanics of Fluids	3	2	-	35	35	30	50	0	150	4
DC05	CV215	Surveying & Geospatial Engineering	3	2	-	35	35	30	50	0	150	4
DC06	CV216	Structural Analysis	3	2	-	35	35	30	50	0	150	4
SDP4	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP5	CV240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

MIT | Academy of Engineering **Autonomous Institute Affiliated to SPPU**	**COURSE STRUCTURE (REVISION 2019)**		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**:**	**2021-2022**
THIRD YEAR BACHLEOR OF TECHNOLOGY IN CIVIL ENGINEERING	**RELEASE DATE**	**:**	**01/06/2020**
	REVISION NO.	**:**	**1.0**

SEMESTER: V

SUMMER INTERNSHIP (Audit: CV300**)**

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	CV305	Concrete Technology	3	2	-	35	35	30	50	0	150	4
DC08	CV306	Drinking Water & Sanitary Engineering	3	2	-	35	35	30	50	0	150	4
DC09	CV307	Design of Steel Structure	3	0	-	35	35	30	0	0	100	3
OE01	CV32#	Open Elective-01 (CPM / EE)	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP6	CV342	Skill Development Course – 2 (ETABS)	0	4	-	0	0	25	50	0	75	2
SDP7	CV350	Project Design	0	4	-	0	0	25	0	50	75	2
TO0TAL			**15**	**12**	**0**	**140**	**190**	**195**	**200**	**50**	**775**	**21**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	CV312	Design of Reinforced Concrete Structure	3	2	-	35	35	30	50	0	150	4
DC11	CV313	Transportation Engineering	3	2	-	35	35	30	50	0	150	4
DC12	CV314	Water Resources Engineering	3	0	-	35	35	30	0	0	100	3
OE02	CV33#	Open Elective-02 (CPM / EE)	3	2	-	35	35	30	50	0	150	4
SDP8	CV34#	Skill Development Course – 3 (OpenRoad Designer / WATERGEMS)	0	4	-	0	0	25	50	0	75	2
SDP9	CV360	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability and Career Development	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: VII

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC13	CV405	Estimating and Costing	3	2	-	35	35	30	50	0	150	4
DE01	CV47#	Discipline Elective - 1	3	-	-	35	35	30	0	0	100	3
OE03	CV42#	Open Elective-03 (CPM / EE)	3	2	-	35	35	30	50	0	150	4
SDP10	CV43#	Skill Development Course – 4 (CFD / QGIS)	-	4	-	0	0	25	50	0	75	2
SDP11	CV470	Project Evaluation	-	8	-	0	0	50	0	100	150	4
SDP12	CV400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CV406	Design of Hydraulic Structures	3	2	-	35	35	30	50	-	150	4
DE02	CV47#	Discipline Elective - 2	3	-	-	35	35	30	-	-	100	3
SDP13	CV480	Capstone Portfolio	-	8	-	-	-	-	-	150	150	4
HSS7	HP405	Engineering Economics	2	-	-	-	50	25	-	-	75	2
HSS8	HP406	Psychology	2	-	-	-	50	25	-	-	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**110**	**50**	**150**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CV406	Design of Hydraulic Structures	3	2	-	35	35	30	50	-	150	4
DE02	CVSWAYAM#	Discipline Elective - 2	3	-	-	35	35	30	-	-	100	3
SDP14	CV467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP15	CV468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**35**	**35**	**30**	**-**	**300**	**550**	**15**

Discipline Elective (DE) : 2 Courses			
Sl. No.	**Course Code**	**Course Name**	**Course Credit**
1.	CV471	Building Services	3
	CV472	Structural Dynamics & Earthquake Engineering	
	CV473	Railway Engineering	
	CV474	Numerical Methods in Civil Engineering	
2.	CV475	Foundation Engineering	3
	CV476	Geospatial Tools and Techniques	
	CV477	Air and Noise Pollution	
	CV478	Finite Element Methods	
	CVSWAYAM01	Discipline Elective Swayam MOOC Courses	
	CVSWAYAM02	Discipline Elective Swayam MOOC Courses	
	CVSWAYAM03	Discipline Elective Swayam MOOC Courses	

Natural Science (NSC) : 5 Courses			
Sl. No.	**Course Code**	**Course Name**	**Course Credit**
1.	AS105	Calculus and Differential Equations	4
2.	AS106	Engineering Physics	4
3.	CH101	Science of Nature	4
4.	AS107	Statistics and Integral Calculus	4
5.	AS203/04	Applied Mathematics	4

Humanities and Social Science (HSS) : 6 Courses			
Sl. No.	**Course Code**	**Course Name**	**Course Credit**
1.	HP103	English for Engineers	2
	HP104	German	
	HP105	Japanese	
Audit	HP106	Indian Constitution	Audit
2.	HP202	Professional Communication	2
Audit	HP203	Liberal Learning	Audit
3.	HP304	Project Management	2
4.	HP305	Professional Skills	2
5.	HP405	Engineering Economics	2
6.	HP406	Psychology	2

Engineering Science (ESC): 8 Courses and 26 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	EX102	Electrical and Electronics Engineering	4
2.	CV102	Applied Mechanics	4
3.	ME104	Engineering Graphics	4
4.	ME105	Experimental Tools and Techniques	2
5.	ME106	Design Thinking	2
6.	CS101	Logic Development - C Programming	3
7.	CS102	Application Programming - Python	3
8.	ME221	Material Engineering	4
	IT221	Engineering Informatics	
Audit	CV203	Environmental Sciences	Audit

Discipline Core (DC): 14 Courses			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	CV204	Geotechnical Engineering	4
2.	CV205	Building Design & Construction	4
3.	CV206	Mechanics of Solid	4
4.	CV214	Mechanics of fluids	4
5.	CV215	Geospatial Engineering	4
6.	CV216	Structural Analysis	4
7.	CV305	Concrete Technology	4
8.	CV306	Drinking Water & Sanitary Engineering	4
9.	CV307	Design of Steel Structures	3
10.	CV312	Design of Reinforced Concrete Structures	4
11.	CV313	Transportation Engineering	4
12.	CV314	Water Resources Engineering	3
13.	CV405	Estimating and Costing	4
14.	CV406	Design of Hydraulics Structures	4

Skill Development and Project (SDP) : 15 Courses				
Sl. No.	**Course Code**	**Course Name**		Course Credit
1.	ET224	Digital Prototyping		2
2.	CV230	Minor Project Design		1
3.	CV231	Skill Development Course 1	MS Excel	2
	CV232		Revit	2
4.	ET235	Rapid Prototyping		2
5.	CV240	Minor Project Implementation		1
6.	CV342	Skill Development Course 2 (ETABS)		2
7.	CV350	Project Design		2
8.	CV343	Skill Development Course 3	OpenRoad Designer	2
	CV344		WaterGEMS	2
9.	CV360	Project Implementation		2
10.	CV433	Skill Development Course 4	CFD	2
	CV434		QGIS	2
11.	CV470	Project Evaluation		4
12.	CV400	B. Tech Summer Internship		4
13.	CV480	Capstone Portfolio		4
14.	CV467	Semester Long Internship Design		4
15.	CV468	Semester Long Internship Implementation		4
Audit	CV200	SY Summer Internship		Audit
Audit	CV300	TY Summer Internship		Audit

Programme Name	Skill Development Course 1	Skill Development Course 2	Skill Development Course 3	Skill Development Course 4
Chemical	CFD	ASPEN ONE	Aspen EDR	Plant Design Piping
Civil	MS EXCEL / REVIT	ETABS	OpenRoad Designer / WaterGEMS	CFD / QGIS
Computer and Information Technology	CPP/Core Java	RHA I/ Web Technology	Adv. Java/ .Net Core/RHA II	AWS cloud services/ Android App Development
Mechanical	Industrial Measurements & Instrumentation	Computer Aided Product Design	Mechanical Simulations	Object Oriented Programing with Python
Electronics Engineering and ENTC	Data Structures and Algorithms	OOP JAVA / C++	Networking Data Science	EMB Linux/Cloud Computing/System Verilog

Open Electives (OE): 03 Courses and 12 Credits							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Chemical Engineering	Process Engineering	CH351	Process Engineering	CH371	Process Modeling and Simulation	CH471	Process Intensification and Integration
	Energy Engineering	CH352	Energy Technology	CH372	Energy Modeling and Simulation	CH472	Energy Management and Audit
Civil Engineering	Project Management	CV325	Planning and Management	CV332	Operation Research	CV422	Financial Management
	Environmental Engineering	CV326	Solid Waste Management	CV333	Unit Operations for Liquid Waste/Effluent Treatment	CV423	Environmental Impact assessment and Climate Change
Computer Engineering	Data science	CS351	Descriptive Analytics	CS354	Predictive Analysis	CS461	Big Data Analytics
	Artificial Intelligence and Machine Learning	CS352	Artificial Intelligence	CS355	Machine Learning	CS462	Deep Learning
	Cloud Computing	CS353	Cloud Computing Foundation	CS356	Cloud Native Application Development	CS463	Cloud Native DevOps
Electronics Engineering	Robotics and Automation	ME352	Robot Fundamentals and Kinematics	EX371	Robot Dynamics and Control	EX471	AI in Robotics

Open Electives (OE)							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Electronics & Tele-communication	Healthcare Technology	ET351	Fundamentals of Healthcare Technology	ET371	Healthcare Informatics	ET471	AI in Healthcare
	Internet of Things	ET352	IoT Architecture and Sensors	ET372	IoT Network & Protocols	ET472	Data Management and Analytics
Information Technology	Computer Security	IT351	Cryptography and System Security	IT352	Cyber Security and Forensics	IT461	Ethical Hacking & Cyber Laws
Mechanical Engineering	Computer Aided Engineering	ME351	Finite Element Analysis	ME361	Computational Fluid Dynamics	ME491	Advanced Fluid Dynamics
	Robotics and Automation	ME352	Robot Fundamentals and Kinematics	EX371	Robot Dynamics and Control	EX471	AI in Robotics
	Automobile Engineering	ME354	Automobile System Design	ME364	Vehicle Dynamics	ME494	Autotronics and e-Vehicles
Entrepreneurship Cell	Innovation and Entrepreneurship	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Calculus and Differential Equations
	COURSE CODE	AS105
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS105.CEO.1: Classify and solve first order and first degree ordinary differential equations.
AS105.CEO.2: Categorize and inspect the applications of first order differential equations.
AS105.CEO.3: Inspect and solve linear differential equations of second and higher order.
AS105.CEO.4: Apply the concepts of partial differentiation.
AS105.CEO.5: Demonstrate an understanding towards the applications of partial differentiation.
AS105.CEO.6: Identify and classify first order linear and nonlinear partial differential equations.

COURSE OUTCOMES :

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

AS105.CO.1: Solve first order and first degree ordinary differential equations.
AS105.CO.2: Analyze and solve real world phenomenon governed by first order ordinary differential equations.
AS105.CO.3: Apply concepts of linear differential equations of second and higher order to solve different systems in engineering world.
AS105.CO.4: Infer the problems based on properties of partial differentiation.
AS105.CO.5: Examine the applications of partial differentiation.
AS105.CO.6: Solve and examine the solution of partial differential equations by theoretical methods.

THEORY COURSE CONTENT		
UNIT 1	**Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors, Linear differential equations, Differential equations reducible to linear form.		
UNIT 2	**Applications of Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Orthogonal Trajectories, Newton's law of cooling, Growth & Decay, Electric circuits, Chemical applications- Mixing problems.		
UNIT 3	**Linear Differential Equation of Second Order and Higher Order**	**7 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters, Equations reducible to linear differential equations with constant coefficients: Cauchy and Legendre's linear differential equation, Simultaneous linear differential equations, Applications.		
UNIT 4	**Partial Differentiation**	**7 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables, Homogeneous functions, Euler's Theorem, Differentiation of Implicit functions.		
UNIT 5	**Applications of Partial Differentiation**	**6 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function using Jacobians, Functional dependence, Maxima and Minima of functions of two variables.		
UNIT 6	**Partial Differential Equations**	**7 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration, Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors.		
TUTORIAL NO.02		**1 HOURS**
Linear differential equations, Differential equations reducible to linear form.		
TUTORIAL NO.03		**1 HOURS**
Orthogonal Trajectories, Newton's law of cooling, Growth & Decay		
TUTORIAL NO.04		**1 HOURS**
Electric circuits, Chemical applications- Mixing problems.		

TUTORIAL NO.05		**1 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		
TUTORIAL NO.06		**1 HOURS**
Cauchy and Legendre's linear differential equation, Simultaneous linear differential equations, Applications.		
TUTORIAL NO.07		**1 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables.		
TUTORIAL NO.08		**1 HOURS**
Homogeneous functions, Euler's Theorem, Differentiation of Implicit functions.		
TUTORIAL NO.09		**1 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function.		
TUTORIAL NO.10		**1 HOURS**
Functional dependence, Maxima and Minima of functions of two variables.		
TUTORIAL NO.11		**1 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration.		
TUTORIAL NO.12		**1 HOURS**
Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1

REFERENCE BOOK

1. G.B. Thomas, Maurice D. Weir, Joel R. Hass, Thomas' Calculus, 12 th edition, Pearson Education, 2002, ISBN: 9789332519091
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house , 2010, ISBN: 8173194203.
4. Peter V. O'Neil, Advanced Engineering Mathematics, 7 th edition, Cenage Learning, 2012, ISBN: 13: 9788131503102.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Physics
	COURSE CODE	AS106
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS106.CEO.1: Make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.

AS106.CEO.2: Analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.

AS106.CEO.3: Apply the concept of behavior of light and understand the polarization phenomena.

AS106.CEO.4: Classify and understand the difference of classical mechanics and quantum mechanics.

AS106.CEO.5: Derive the basic laws governing the motion of quantum particles.

AS106.CEO.6: Apply the concept of quantum mechanics to different applications and supplement the reasoning.

COURSE OUTCOMES :

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

AS106.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.

AS106.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.

AS106.CO.3: Apply that light is transverse in nature.

AS106.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.

AS106.CO.5: Evaluate and apply the Schrödinger's equation to the motion of an electron orbiting round the shell.
AS106.CO.6: Apply the concepts of Quantum Physics in different branches of engineering.

THEORY COURSE CONTENT		
UNIT 1	**Measurement and importance of span (order) of physical quantities**	**6 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. 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 Electromagnetic wave**	**6 HOURS**
Polarization of electromagnetic wave, Production and analysis of polarized electromagnetic wave, Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.		
UNIT 4	**Quantum Mechanics-I**	**7 HOURS**
Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Planck's quantum law of blackbody radiation, Matter-waves, De-Broglie's concept of matter waves, Heisenberg's Uncertainty Principle, Wave-function, Physical significance of wave function.		
UNIT 5	**Quantum Mechanics-II**	**8 HOURS**
Schrodinger's 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 Bohr's atomic model.		
UNIT 6	**LASER and Optical Fiber**	**5 HOURS**
Stimulated Absorption, Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einstein's coefficients), Principle and working of LASER (Ruby Laser), Application of LASER in optical fiber communication.		

PRACTICAL		
PRACTICAL NO.01	**Significant Figures**	**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02	**Interference of Light Waves**	**2 HOURS**
Calculate the refractive index of a given liquid using Newton Rings' Experiment.		
PRACTICAL NO.03	**Diffraction of Light Waves**	**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04	**Interference of Light Waves**	**2 HOURS**
Calculate the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05	**Phase and Phase Difference**	**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06	**Bohr's Atomic Model**	**2 HOURS**
Verification of Bohr's atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07	**Polarization**	**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08	**Stoke's Law**	**2 HOURS**
Calculation of wavelength of a laser beam using Lloyd's mirror arrangement.		
PRACTICAL NO.09	**Division of Amplitude of Light Waves**	**2 HOURS**
Determination of Radius of Curvature of a given planoconvex lens using Newton's Rings apparatus.		
PRACTICAL NO.10	**Diffraction as a Particular Case of Interference**	**2 HOURS**
Calculation of wavelength of different colors present in a white light.		

TEXT BOOK

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

REFERENCE BOOK

1. Alan S Morris, Butterworth Heinemann, Measurement and Instrumentation Principles,3rd Edition, Butterworth-heinmann,2001, ISBN 0750650818
2. Ajoy Ghatak ,Optics, 6th Edition Tata Mc Graw Hill Publishing Company. Ltd., 2016, ISBN-10-9339220900

3. Jenkins & White, Fundamentals of Optics, 4th Edition,Mc Graw Hill Science,2016, ISBN-0070853460.

4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-,6th Edition, Mc Graw Hill Education (India) Pvt. Ltd., 2009, ISBN-10- 0070151555.

5. L I Schiff ,Quantum Mechanics,3rd Edition, Tata Mc Graw Hill Education (India) Pvt. Ltd.,ISBN-10- 0070856435, ISBN- 13- 9780070856431.

6. PAM Dirac,Principles of Quantum Mechanics,4th Edition, CBS publishers and Distributors,2004, ISBN-10- 0195671074, ISBN- 13- 978019567107

7. D J Griffiths, Introduction to Quantum Mechanics,2nd Edition,Cambridge India ,2016,ISBN-9781316646513.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical and Electronics Engineering
	COURSE CODE	EX102
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX102.CEO.1: Impart knowledge of single-phase AC circuit and use of renewable energy systems.
EX102.CEO.2: Explain relations in three-phase systems and study power measurement methods.
EX102.CEO.3: Explain power supply components, electronic devices.
EX102.CEO.4: Summarize various Digital systems and application.
EX102.CEO.5: Build the knowledge of measuring system and signal conditioning circuits.
EX102.CEO.6: Get acquainted with different electrical machines.

COURSE OUTCOMES :

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

EX102.CO.1: Develop Renewable energy system (PV) & power factor improvement circuits.
EX102.CO.2: Distinguish behavior of three phase circuits & power measurement methods.
EX102.CO.3: Analyze analog circuits.
EX102.CO.4: Design Digital circuits.
EX102.CO.5: Demonstrate the use of Instrumentation system in various fields.
EX102.CO.6: Identify electrical machines used in typical domestic and industrial sector Application.

THEORY COURSE CONTENT		
UNIT 1	**AC Circuits**	**7 HOURS**
Energy Scenario, General structure of electrical power systems, A.C. fundamentals, RMS and average value, R-L,R-C,RLC series and parallel circuits, phasor diagram, power triangle and power factor, measures to improve power factor and its effects on Power system and consumer. Work, Power & Energy, costing of electricity, Application of Renewable Energy Systems, Design of PV system (offgrid), Battery selection and its series parallel connections		
UNIT 2	**Three Phase Circuit and Power Measurement**	**7 HOURS**
Three phase voltage generation and its waveform, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, three phase 4 wire system, Difference between neutral and ground conductors, Safety measures in electrical system, types of wiring, Active and Reactive Power measurement in single and three phase balanced system.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply, Clipper, Clamper. BJT - Structure and operation, CE, CB, CC configurations, biasing methods, DC Load Line, Transistor as a switch and Amplifier. Opto-electronic devices – Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Logic gates, Boolean algebra, KMap, SOP representation. Combinational circuit Design: Adder, Subtractor, MUX, DMUX, Comparator, Code converter Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor and Microcontroller based systems.		
UNIT 5	**Measuring System**	**7 HOURS**
Elements of measuring system, Sensors & Transducers –Temperature, Flow, Pressure, Level, 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, VA Rating, Efficiency and Voltage regulation, OC/SC Test on Transformer. Construction, principle of operation and types of DC motor, Speed Control, characteristics equation, PMDC, BLDC, Universal motor, Single phase Induction Motor, Stepper motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICAL:		
PRACTICAL NO.01	**Kirchhoff's laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoff's laws and Superposition theorem. To build and test both theorems.		
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 variations in X_L and X_C (3 cases) To justify the lagging and Leading nature for the three cases. To find power losses in total R, L and C and verify with total power consumed.		
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 between Line and Phase Quantities. To connect Bulb load in Delta connection and verify the relation between Line and Phase Quantities.		
PRACTICAL NO.05	**Power Measurement in Three Phase Balanced Circuit and Single Phase Circuit.**	**2 HOURS**
To measure active and reactive power by Two wattmeter method in three phase circuit. To measure reactive power by One wattmeter method in three phase circuit.		
PRACTICAL NO.06	**Open Circuit & Short Circuit Test on a Single Phase Transformer**	**2 HOURS**
To find iron losses and no load circuit parameters To find full load copper losses and Equivalent circuit parameters To determine efficiency and regulation of transformer at various different loading conditions.		
PRACTICAL NO.07	**Speed Control of D.C. Shunt Motor**	**2 HOURS**
To vary field current and measure speed To vary armature voltage and measure speed Draw conclusion from both the methods through graphs.		
PRACTICAL NO.08	**Step Angle Measurement of Stepper Motor.**	**2 HOURS**
To become familiar with the properties of Stepper Motor. To calculate the step angle of motor.		
PRACTICAL NO.09	**Electronics Components and Measuring Instruments**	**2 HOURS**
To study Passive components - Resistors, Capacitors & Inductor. To test semi-conducting components - Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		

PRACTICAL NO.10	D.C. Regulated Power Supply	2 HOURS
To design 12V/ 9V/ 5V 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 OP-AMP as summing and difference amplifier. To verify the application of OP-AMP 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 (Min.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.		

In addition to total 8 Experiments, two case study reports must be attached with Laboratory Course Record.

TEXT BOOK

1. Edward Hughes, "Electrical and Electronic Technology" 10th Edition, Pearson India, 2011, ISBN-13: 978-8131733660
2. Thomas L. Floyd, "Electronics Devices & Circuits", 5th Edition, Pearson Education India, 1998, ISBN-13: 978-0136491385.
3. A. Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, Prentice Hall of India, 2016, ISBN-13: 978-8120352681

REFERENCE BOOK

1. V. N. Mittle and Arvind Mittal, "Basic Electrical Engineering", 2nd Edition, McGraw Hill Education, 2005, ISBN-13: 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, "Electric Machines", 4th Edition, McGraw Hill, 2010, 978-0070699670.
3. Paul Horowitz, Winfield Hill, "The Art of Electronics", 3rd Edition, Cambridge University press, ISBN-13: 978-0521809269.
4. Thomas E. Kissell, "Industrial Electronics", 3rd Edition, Prentice Hall of India, 2003, ISBN-13:9788120322608
5. B. H. Khan, "Non-Conventional Energy Resources", 2nd Edition, Tata McGraw Hill, 2009, ISBN-13: 978-0070142763.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME104
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	NIL	60	40	60	40	200

PRE-REQUISITE : NIL

COURSE OBJECTIVES:

ME104.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME104.CEO.2: To develop & apply visualization skills to simple Objects.
ME104.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES:

The students after completion of the course will be able,

ME104.CO.1: Develop and/or comprehend a simple engineering drawing in both First and Third angle orthographic projections.
ME104.CO.2: Interpret engineering drawings.
ME104.CO.3: Apply visualization skills to development of surfaces.
ME104.CO.4: Analyze engineering drawings.
ME104.CO.5: Decide annotations for two dimensional drawings.
ME104.CO.6: Create manual drawing & CAD data using SP46 standards.

THEORY COURSE CONTENT		
UNIT 1	**Visual Thinking and Solid Geometry**	**12 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections and Sectional Views**	**4 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views, Missing views.		
UNIT 3	**Isometric Projections**	**4 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	**Development of Surfaces**	**2 HOURS**
Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.		
UNIT 5	**Auxiliary Projections**	**2 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View		
UNIT 6	**Freehand Sketching and 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.		

PRACTICAL: **Each Assignment carries 2 questions to be draws on A2 Size Drawing Sheet**		
ASSIGNMENT NO.1	Projection of Lines	**4 HOURS**
Two Questions on line inclined to both planes		
ASSIGNMENT NO.2	Projection of Planes	**2 HOURS**
Two Questions on plane inclined to both planes		
ASSIGNMENT NO.3	Projection of Solids	**2 HOURS**
Two Questions on solid inclined to both planes		
ASSIGNMENT NO.4	Orthographic Projections	**4 HOURS**
Two Questions on Orthographic Projection of Simple Mechanical Element		
ASSIGNMENT NO.5	Development of surface	**4 HOURS**
Two Questions on Development of regular Solids		
ASSIGNMENT NO.6	Isometric View	**6 HOURS**
Two Questions on Isometric view of Mechanical Element		

ASSIGNMENT NO.7	Auxiliary View	**4 HOURS**
Two Questions on auxiliary view of Mechanical Element		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 2D CAD software package**		
PRACTICAL NO. 1	Absolute & incremental drafting	**4 HOURS**
Drawing of two sketches using absolute and incremental commands		
PRACTICAL NO. 2	Draw commands, Modify commands, Array, fillet, offset commands	**6 HOURS**
Drawing of four sketches using draw & modify commands		
PRACTICAL NO. 3	Project Drafting	**2 HOURS**
Drafting of a small project using all drafting standards		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 3D CAD software package**		
PRACTICAL NO. 4	Sketching, Solid Modeling, Assembly	**12 HOURS**
Modeling of five Mechanical models using 3D Software package		
PRACTICAL NO. 5	Project Modeling	**4 HOURS**
Modeling of small Mechanical Project of Minimum three components		

TEXT BOOK

1. Dhanajay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD", 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 TextBook of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Logic Development- C Programming
	COURSE CODE	CS101
	COURSE CREDITS	3
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS101.CEO.1: Develop programming skills using the fundamentals and basics of C Language.

CS101.CEO.2: Enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

CS101.CEO.3: Teach the issues in file organization and the usage of file systems.

COURSE OUTCOMES:

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

CS101.CO.1: List the various data types, control structures and looping structures supported by C language.

CS101.CO.2: Differentiate between various data types supported by C language.

CS101.CO.3: Implement the solutions for various algorithms in C language.

CS101.CO.4: Analyze various parameter passing methods to functions in C language.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of C Language**	**2 HOURS**
Overview of C, Character set, Constants, Variables and Keywords, Data types (Primitive and Derived), Operators (arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators) and Expressions (Type Conversion, precedence and order of evaluation), C Storage Classes, Managing Input and Output Operations, A structure of C Program, C Preprocessor, C Macro, Compilation, Execution, Debugging and Testing of C program.		
UNIT 2	**Control Structures**	**2 HOURS**
Decision Control Structure-If statement, if-else statement, Nested if-else statement, Ternary operator, Case Control structure- Switch Case Statements, GOTO statement, Loop Control Structure- while statement, do while statement, for statement, odd loop, nesting of loops, break and continue statement, finite & infinite Loop.		
UNIT 3	**Arrays and Functions**	**3 HOURS**
Arrays: Array Declaration and Initialization, Bounds Checking, Array arithmetic, One dimensional arrays and multi-dimensional Arrays, Strings - Standard Library String Functions, Array of strings. **Functions:** Function definition and prototype, Scope Rule of Functions, Calling Conventions, Passing Values between Functions - Call by Values and Call by References, Recursive functions, Passing Array Elements to a Function.		
UNIT 4	**Pointers**	**3 HOURS**
Pointers and Addresses, Pointer Notation & Arithmetic, Pointer to array, Array of pointers, Pointer to a function, Passing pointers as function arguments, Strings and Pointers, Structures and Pointers.		
UNIT 5	**User Defined Data Types**	**1 HOURS**
Structures & Union: Declaration of Structure and Union, Difference between Structure and Union, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures.		
UNIT 6	**File Handling**	**2 HOURS**
File Operations-open, read, write, append, delete, Error Handling, File Opening Modes Using command line argument(argc and argv), line input and output operations, Miscellaneous Functions.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
• Write a program in C to display "Hello World" • Write a menu driven program in C to display addition, subtraction, multiplication, division of two numbers		
PRACTICAL NO.02		**2 HOURS**
• Write a program in C to display the quotient and remainder after the division of two numbers • Write a menu driven program in C to demonstrate the use of left shift, right shift, and, or, xor operators		
PRACTICAL NO.03		**2 HOURS**
• Write a menu driven program in C to demonstrate the use of mathematical functions supported by math.h library • Write a program in C to display the grade obtained by the student in a course. The input will be the marks obtained and the output will be the grade obtained		
PRACTICAL NO.04		**2 HOURS**
• Write a program in C to display first N numbers on the screen using while, do while and for loop • Write a program in C to display first N number in reverse order on the screen using while, do while and for loop		
PRACTICAL NO.05		**2 HOURS**
Write a program in C display various patterns using *		
PRACTICAL NO.06		**2 HOURS**
• Write a program in C to display the addition of N numbers stored in an array • Write a program in C to copy the array of N numbers into another array in reverse order • Write a program in C to display the minimum and maximum element in an array		
PRACTICAL NO.07		**2 HOURS**
• Write a program in C to display the prime numbers within a given range • Write a program in C to display the fibonacci series within a given range		
PRACTICAL NO.08		**2 HOURS**
Write a menu driven program in C to perform addition, subtraction, division and transpose of matrices		

PRACTICAL NO.09		**2 HOURS**
• Write a program in C to convert every lowercase letter to uppercase letter and vice versa in a given string • Write a program in C to implement the string functions using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, sub string		
PRACTICAL NO.10		**2 HOURS**
• Write a program in C using functions to display addition, subtraction, multiplication, division of two numbers • Write a program in C using functions to display the minimum and maximum element in an array		
PRACTICAL NO.11		**2 HOURS**
Write a program in C using functions to implement the string functions without using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, string palindrome		
PRACTICAL NO.12		**2 HOURS**
• Write a program in C using functions and pointers to display addition, subtraction, multiplication, division of two numbers • Write a program in C using function and pointers to swap two numbers		
PRACTICAL NO.13		**2 HOURS**
Write a program in C using function and pointers to demonstrate the use of pointer arithmetic by taking input in an array		
PRACTICAL NO.14		**2 HOURS**
• Write a program in C using recursion to display the factorial of a number • Write a program in C using recursion to display fibonacci series within a given range		
PRACTICAL NO.15		**2 HOURS**
• Write a program in C to accept the information of single student and store it in structure and display the same • Write a program in C to accept the information of students and store it in array of structure and display the same		

PRACTICAL NO.16		2 HOURS
• Write a program in C to display Semester Grade Point Average (SGPA). Input will be stored in array of structure • Write a program in C to demonstrate the concept of union		
PRACTICAL NO.17		**2 HOURS**
Write a program in C to read a single line from the file using functions like fgetc, fgets, fscanf, and fread		
PRACTICAL NO.18		**2 HOURS**
Write a program in C to write a single string in a file using functions like fputc, fputs, fprintf and fwrite		
PRACTICAL NO.19		**2 HOURS**
Write a program in C to display contents of whole file on the screen		
PRACTICAL NO.20		**2 HOURS**
Write a program in C to read and write the record stored in structure from file		
PRACTICAL NO.21		**2 HOURS**
Write a program in C to implement student information system using array of structures		
PRACTICAL NO.22		**2 HOURS**
Write a program in C to implement Linear Search and Binary Search		
PRACTICAL NO.23		**2 HOURS**
Write a program in C to check whether a given matrix contains a saddle point		
PRACTICAL NO.24		**2 HOURS**
Write a program in C to implement union and intersection of two sets		

TEXT BOOK

1. E. Balguruswamy , "Programming in ANSI C" , Tata Mc-Graw Hill
2. Yashvant Kanitkar, "Let Us C" BPB Publication
3. "Programming With C", Schaum Series

REFERENCE BOOK

1. Kernighan and Ritchie , "The 'C' programming language" , Prentice Hall
2. V. Rajaraman , "Computer Programming in 'C' " , Prentice Hall
3. R.G. Dromey , "How to solve it by Computer", Pearson Education

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques
	COURSE CODE	ME105
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	60	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME105.CEO.1: Introduce different tools and study various measurement techniques.
ME105.CEO.2: Study different parts of the system along with its functions and applications.
ME105.CEO.3: List various tools used for the said application.
ME105.CEO.4: Identify the function of various parts of the system.
ME105.CEO.5: Impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME105.CEO.6: Apply the knowledge to find the solution for basic engineering problems.

COURSE OUTCOMES :

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

ME105.CO.1: Recall the tools required for the measurements.
ME105.CO.2: Summarize the application of various engineering tools used.
ME105.CO.3: Identify the right tools for selected purpose.
ME105.CO.4: Inspect various parts of the system.
ME105.CO.5: Justify the most appropriate technique which can be compatible with the existing environment.
ME105.CO.6: Develop the system which will give appropriate solution to the identified problem.

PRACTICAL:		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Any 6 Practicals from the following list)**	**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
16. Creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Any 06 practical's from the following list)**	**12 HOURS**

1. Study of basic electronics component and Switches.
2. PCB and Soldering Tools and Technique.
3. Relay and application.
4. Domestic wiring for Extension Board and Inverter.*
5. Load test of D.C. series motor.*
6. Brake test on D.C. Shunt motor.*
7. Load test on 3-phase induction motor.
8. V-I Characteristics of Thyristor & measurement of holding & latching current
9. V-I Characteristics of MOSFET.
10. V-I Characteristics of IGBT.
11. V-I Characteristics of TRIAC.
12. Solar cell and application (Generation of Energy).
13. Speed control of DC Motor (Toy Motor)
14. Actuators and application (Electrical and Mechanical).

15 Study of Virtual Instrumentation.

16 Open IT : Optical Mouse, Cathode Ray Oscilloscope, Study of Power Supply PA System, CD Player, TV, Microwave oven (Any Two)

PRACTICAL NO.03	**Mechanical Engineering (Any 6 practicals from the following list)**	**12 HOURS**

1. Linear and angular measurements.
2. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
3. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
4. Types of mechanism and making any one mechanism containing four links using cardboard.
5. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
6. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
7. Measurement of Relative humidity of air in the lab.
8. Measurement of hardness of Steel and Aluminum.
9. Measurement of stiffness of helical spring (compression or tension)
10. Servicing of 2 wheeler and 4 wheeler system.
11. Study of various components of automobile system.
12. Open IT: Mixer or kitchen machine, Refrigerator, Boiler and accessories thermal power plant (Mini), Two stroke and four stroke engine, Introduction to threaded fasteners and joints using threaded fasteners. Bearing and its lubrication, Bicycle /Two wheeler/ 4 wheeler(Any Two)

PRACTICAL NO.04	**Chemical Engineering (Any 3 practicals from the following)**	**6 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. Plate type heat exchanger
9. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Any 3 Practicals from the following)	6 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 parcel of land 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 life saving do s and don'ts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

Assessment	Common to all branches	4 HOURS

TEXT BOOK

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

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Statistics and Integral Calculus
	COURSE CODE	AS107
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS107.CEO.1: Study different statistical methods for solving problems.
AS107.CEO.2: Analyze different probability distribution functions.
AS107.CEO.3: Extend the basic concepts of integration for evaluation of complex integration problems.
AS107.CEO.4: Categorize and use equation of curves to trace the given curve.
AS107.CEO.5: Demonstrate an understanding towards evaluating multiple integrals.
AS107.CEO.6: Relate and examine the applications of multiple integrals.

COURSE OUTCOMES:

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

AS107.CO.1: Assess statistical problems.
AS107.CO.2: Solve the probability distribution problems.
AS107.CO.3: Evaluate complex integrals.
AS107.CO.4: Sketch curves by analyzing the given equation of curves.
AS107.CO.5: Evaluate the multiple integrals.
AS107.CO.6: Apply the knowledge of multiple integrals to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Statistics**	**6 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearson's coefficient of correlation) and regression		
UNIT 2	**Probability**	**6 HOURS**
Probability, probability density function, probability distribution: Binomial, Poisson, Normal		
UNIT 3	**Integral Calculus**	**7 HOURS**
Reduction formulae, Gamma function, Beta function, Differentiation under integral sign.		
UNIT 4	**Curve Tracing and Rectification**	**7 HOURS**
Tracing of Curves: Cartesian curves, Parametric curves, Polar curves. Rectification: Rectification of Cartesian, Parametric and Polar curves		
UNIT 5	**Multiple Integrals**	**7 HOURS**
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 6	**Applications of Multiple Integrals**	**6 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		

TUTORIAL: Problem solving session		
TUTORIAL NO.01		**1 HOURS**
Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.02		**1 HOURS**
Moments, skewness and kurtosis		
TUTORIAL NO.03		**1 HOURS**
Correlation and regression		
TUTORIAL NO.04		**1 HOURS**
Probability, probability density function, Probability distribution: Binomial		
TUTORIAL NO.05		**1 HOURS**
Probability distribution: Poisson, Normal. Reduction formulae, Gamma function		
TUTORIAL NO.06		**1 HOURS**
Beta function, DUIS Rule1 & 2.		

TUTORIAL NO.07		**1 HOURS**
Tracing of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.08		**1 HOURS**
Rectification of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.09		**1 HOURS**
Double Integration, Evaluation of Double Integration, Change the order of integration, Integration by transforming Cartesian to Polar Coordinate system		
TUTORIAL NO.10		**1 HOURS**
Triple integration, Integration by transforming to spherical and cylindrical polar coordinates. Applications of multiple integrals: To find Area, Volume		
TUTORIAL NO.11		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.12		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		

TEXT BOOK

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd, 2015, ISBN: 9788126554232, 8126554231,
2. B.S. Grewal ,Higher Engineering Mathematics ,39th edition, Khanna Publications,2005 , ISBN: 81-7409- 195-5

REFERENCE BOOK

1. G.B. Thomas & R.L.Finney, Calculus, 9th edition, Pearson Education, 2002, ISBN: 81-7758-325-5.
2. Dr. B.V. Ramana ,Higher Engineering Mathematics,4 th edition, Tata McGraw Hill,2016, ISBN: 978-0-07-063419-
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house,2002,ISBN No.0849324173
4. Peter V. O'Neil , Advanced Engineering Mathematics,7th Edition , Cenage Learning ,2012, ISBN-13: 9788131503102.
5. Dennis G. Zill & Warren S. Wright ,Advanced Engineering Mathematics ,4th edition ,Jones and Bartlett Publishers, 2011, ISBN-10: 0-7637-7966-0, ISBN – 13: 978-0-7637-7966-5.
6. Douglas C. montgomery , George C runger ,Applied statistics and probability for engineers, 5 th edition, wiley ,2012, ISBN No: 9788126537198, 8126537191 .
7. Richard A Johnson, Irwin Miller,John freund ,Miller & Freund's Probability and statistics for engineers 8th edition, Pearson, 2011,ISBN no:978-93325-5041-4.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Science of Nature
	COURSE CODE	CH101
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH101.CEO.1: Make students conversant with basic Biology regarding the life processes.
CH101.CEO.2: Study biology and engineering as biologically inspired technologies like designs in nature, bioenergetics, bioprocesses, biomaterials, biomechanics, bioinstrumentation.
CH101.CEO.3: Outline the technology involved in improving quality of water for its industrial use.
CH101.CEO.4: Illustrate the basic principles, instrumentation & applications of analytical techniques.
CH101.CEO.5: Get familiarize with the new concepts of Nano Science and Technology.
CH101.CEO.6: Define the basic aspects and applications of polymers, biomaterials & composites.

COURSE OUTCOMES :

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

CH101.CO.1: Explain natural biological processes and their technical aspects in view of optimizing Engineering solutions.
CH101.CO.2: Explain important biological inventions that changed the human life and their impact on engineering.
CH101.CO.3: Identify different methodologies for water quality analysis for industrial application.
CH101.CO.4: Apply basic concepts of analytical techniques for analysis of various chemical compounds.
CH101.CO.5: Apply the knowledge of nano science for betterment of the society.
CH101.CO.6: Categorize the different engineering materials and to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Science of Nature**	**7 HOURS**
The basics of science of nature. Exploring science in nature, specially symmetry, spiral, golden ratio, pattern and fractal. The phenomenon observed in nature viz., Physical, Chemical and Biological. Case studies and Applications. The diversity and commonality of cells, protein structure and function, basic molecular genetic mechanisms, bio membranes and cell architecture, transport of ions and small molecules across Cell membranes, cellular energetics, cell birth, lineage and death.		
UNIT 2	**Applications of Biology**	**6 HOURS**
Physiologic Systems - An Outline of Cardiovascular Structure and Function, Endocrine System, Nervous System, Vision System, Defense mechanisms in plants and animals. Introduction to Bio Sensors, Performance Factors, Factors Affecting the Performance of Sensors, Areas of Application. Biological Sensing Elements, Biological transducers. Discovery and Innovations in applications of Biology.		
UNIT 3	**The Role of Chemistry for Engineers**	**7 HOURS**
(A) **Introduction:** This section is an introduction to chemistry and chemical methods for engineering students. It describes how chemistry is used in engineering and how chemical principles aid engineers in the choice of materials for a particular application. Principles of Green chemistry are reviewed. The classification of separation methods used for mixtures. (B) **Periodic Table:** This section covers the names and symbols of the elements. The basic structure of the atom is reviewed including an explanation of isotopes. A discussion of the atomic structure describes electronic shells, subshells, their quantum numbers, orbital shapes, electron filling order, and the determination of the complete electron configuration of the elements. General description of the modern periodic table. Correlation between the valence electron configurations and the chemical properties of the elements. The periodic trends according to the position of the elements in the periodic table.		
UNIT 4	**Chemical Bonding - The Formation of Materials**	**8 HOURS**
(A) **The Formation of Materials:** This section covers chemical bonding and its effect on the chemical properties of the elements. Ionic bonding & covalent bonding are compared in terms of the octet rule and valence bond theory. Polar and non-polar covalent bonds. Molecular orbital theory is introduced to explain magnetism, bond order and hybridization helpful in Carbon chemistry. Intermolecular forces, including hydrogen bonding, are discussed with a special Case Study focusing on the special properties of water. (B) **Engineering Materials:** This section covers the Resources of Natural Materials, Introduction to Material Sciences viz. Polymers, Specialty polymers, Biomaterials, Nano materials and Smart materials with their examples and applications.		
UNIT 5	**Chemical Analysis and Instrumentation**	**6 HOURS**
Schrodinger's 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 Bohr's atomic model.		

UNIT 6	Water Treatment and Effluent Management	5 HOURS
This chapter covers types of impurities in water & the conventional water treatment methods. Hardness, Alkalinity and Chloride content of water, its causes, types and volumetric methods for their determinations are reviewed along with numerical. Various water softening & treatment methods which includes filtration methods by Carbon adsorption, ion-exchange methods and membrane techniques are explained		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Distillation**	**2 HOURS**
Separation of two miscible liquids using distillation process		
PRACTICAL NO.02	**Polymerization**	**2 HOURS**
Synthesis by condensation polymerization reaction		
PRACTICAL NO.03	**Nano Particle**	**2 HOURS**
Synthesis of nano particles using reduction method		
PRACTICAL NO.04	**pH Metry**	**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.05	**Paper Chromatography**	**2 HOURS**
Separation of inorganic cations by paper chromatography		
PRACTICAL NO.06	**TLC**	**2 HOURS**
Separation of organic compounds by TLC		
PRACTICAL NO.07	**Conductometry**	**2 HOURS**
Conductometric titration for mixture of acids.		
PRACTICAL NO.08	**Colorimetry / Spectrophotometry**	**2 HOURS**
Absorption studies		
PRACTICAL NO.09	**Hardness of Water**	**2 HOURS**
Determination of Hardness of water by EDTA method		
PRACTICAL NO.10	**Alkalinity**	**2 HOURS**
Determination of alkalinity of water by neutralization titration		
PRACTICAL NO.11	**Adsorption Studies**	**2 HOURS**
Water purification by activated charcoal		

PRACTICAL NO.12	Physical Phenomenon	2 HOURS
Case Studies of Physical Phenomenon		
PRACTICAL NO.13	**Chemical Phenomenon**	**2 HOURS**
Case Studies of Chemical Phenomenon		
PRACTICAL NO.14	**Biological Phenomenon**	**2 HOURS**
Case Studies of Biological Phenomenon		

TEXT BOOK

1. Jain & Jain, "Engineering Chemistry", 16th Edition, Dhanpat Rai Publications company,2015, ISBN: 978-93-5216-000-6
2. S.M. Khopkar , "Basic Concept of Analytical Chemistry",3rd edition, New Age International (P) Ltd., 2008, ISBN-10: 81-224-2092-3; ISBN-13: 978- 81-224-2092-0
3. Dr. B. S. Chauhan , "Engineering Chemistry", 3rd Edition, University Science Press (Laxmi Publications Pvt. Ltd).,2009, ISBN: 978-81-318-0579-4.
4. Lodish H, Berk A, Zipursky SL, et al., "Molecular Cell Biology", 5th Ed., W. H. Freeman publications, 2000.
5. Palsson B.O. and Bhatia S.N., "Tissue Engineering", Pearson, 2009,
6. Brian R. Eggins, "CHEMICAL SENSORS AND BIOSENSORS", JOHN WILEY & SONS, LTD, 2004.

REFERENCE BOOK

1. Jeffrey S. Gaffney and Nancy A. Marley General Chemistry for Engineers, Elsevier, 2018, ISBN: 978- 0-12-810425-5
2. Skoog, West, Holler, Crouch, "Fundamentals of Analytical Chemistry", 8th Edition Cengage Learning, 2009, ISBN-13: 978—81-315-0051-4, ISBN-10: 81-315-0051-9
3. Willard, Merritt, Dean and Settle, "Instrumental Methods of analysis (Chemistry)", 6th edition, Wadsworth Publishing Co., 1988, 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, ISBN: 0495668028.
5. O. G. Palanna, "Engineering Chemistry", 1st Edition, Tata McGraw Hill education Pvt. Ltd., 2009, ISBN-13: 978-0-07-014610-5, ISBN (10): 0-07-014610-1.
6. Pradeep T., "A Text Book of Nanoscience and Nanotechnology", Tata McGraw Hill, New Delhi, 2012.
7. Reece, J. B., Taylor, M. R., Simon, E. J. and Dickey, J. L. (2013) Campbell Biology: Concepts and Connections (Seventh Edition) (Pearson) ISBN 1292026359

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV102
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	30	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV102.CEO.1: Classify force systems and explain the conditions of equilibrium.
CV102.CEO.2: Illustrate laws of friction.
CV102.CEO.3: Demonstrate the concepts of Centroid and moment of inertia.
CV102.CEO.4: Describe kinematic parameters of motion.
CV102.CEO.5: Make use of laws of motion for kinetics.
CV102.CEO.6: Explain energy and momentum methods.

COURSE OUTCOMES:

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

CV102.CO.1: Determine the resultant and support reactions.
CV102.CO.2: Equilibrium Analysis of bodies involving frictional forces.
CV102.CO.3: Evaluate Centroid of bodies and moment of inertia of sections.
CV102.CO.4: Identify the type of motion and its kinematic parameters.
CV102.CO.5: Analyze the motion under action of constant and variable forces.
CV102.CO.6: Apply energy and momentum methods for kinetics problems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Statics**	**8 HOURS**
Basic concepts in mechanics, Fundamental principles/laws of mechanics, Force, moment of a force and couple, Resolution and composition of forces, Resultant of coplanar forces, Free body diagrams, Equilibrium of coplanar forces, Applications to simple beams and cables. **Further Reading:** *Self study-Application to jib crane.		
UNIT 2	**Friction**	**6 HOURS**
Introduction to friction, Types of friction, Laws of friction- coefficient of friction, Theory of friction- angle of friction, angle of repose, cone of friction, Engineering applications - Block and wedge friction, ladder friction, Belt Friction. **Further Reading:** *Self study-Screw friction.		
UNIT 3	**Properties of Surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity. Centroid of standard objects, Centroid of composite 1D and 2D objects, Concept of area moment of inertia, Radius of gyration and its significance, Parallel and perpendicular axis theorems, Moment of inertia of standard and composite 2D figures. **Further Reading:** *Self study- Mass moment of Inertia.		
UNIT 4	**Kinematics of Planar Motions**	**7 HOURS**
Basic concepts in kinematics, Rectilinear motion with uniform and variable acceleration, Motion under Gravity, Motion curves, Curvilinear Motion in Rectangular and path coordinates, Projectile motion. **Further Reading:** *Self study- Curvilinear motion in polar coordinates.		
UNIT 5	**Kinetics- Force and Acceleration**	**6 HOURS**
Newton's second laws of Motion, Free body diagram equation- Rectilinear motion, Concept of dynamic equilibrium. Motion of connected bodies, Equations of motion in rectangular and path coordinates for curvilinear motion. **Further Reading:** *Self study- Free Vibrations.		
UNIT 6	**Kinetics Energy and Momentum**	**6 HOURS**
Concepts of Work, power and energy, Work done by gravity, spring and frictional forces, Principle of work and Energy, Conservation of mechanical energy, Concept of Impulse and linear momentum, Impulse-momentum theorem, Conservation of linear momentum, Collisions- Types of collisions, Coefficient of restitution, Applications to vehicles and sports. **Further Reading:** *Self study- Space mechanics.		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Basic Principles/Laws**	**2 HOURS**
To verify basic laws of mechanics.		
ACTIVITY NO.01	**Exploring Scientific Calculator**	**2 HOURS**
To complete the given task of calculations in a stipulated time with desired accuracy using a scientific calculator.		
PRACTICAL NO.02	**Friction**	**2 HOURS**
To determine coefficient of friction for a given surfaces		
ACTIVITY NO.02	**Presentations**	**2 HOURS**
To prepare and deliver a PPT presentation on engineering application of friction.		
PRACTICAL NO.03	**Centroid**	**2 HOURS**
To determine Centroid of a given 1D object		
ACTIVITY NO.03	**Act of Balancing**	**2 HOURS**
To cut a 2D figure precisely and locate a balancing point on it.		
PRACTICAL NO.04	**Motions**	**2 HOURS**
To study and analyze a given set of motion.		
ACTIVITY NO.04	**Graphing the Motion**	**2 HOURS**
To draw x-t, v-t, a-t graphs for given description of motion in stipulated time.		
PROJECT		**10 HOURS**
To fabricate a model of simple structure or mechanism from low cost materials.		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", 1st edition ,Tata McGraw-Hill Education, 2009, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics: Statics and Dynamics ",12th edition, Pearson Education, 2010, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II",10th edition, Tata Mc-Graw-Hill Education, 2012, ISBN: 978-0077402327
2. Ferdinand Singer, "Engineering Mechanics Statics and Dynamics", 3rd edition Harper and Row, 1994 ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics",1st edition, Cengage Learning, 2009, ISBN:8131509907

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	English for Engineers
	COURSE CODE	HP103
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	CA	
NIL	4	NIL	NIL	NIL	NIL	60	40	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP103.CEO.1: Introduce a variety of English texts to the students.
HP103.CEO.2: Teach basic English grammar.
HP103.CEO.3: Enrich the vocabulary of the students with AWL and NAWL
HP103.CEO.4: Guide the students to write in English coherently and formally.
HP103.CEO.5: Improve the students' overall communicative competence in English through activities like group discussions and debates.
HP103.CEO.6: 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,

HP103.CO.1: Interpret texts written in English.
HP103.CO.2: Apply English grammar rules correctly.
HP103.CO.3: Choose and employ appropriate words from AWL and NAWL in communication.
HP103.CO.4: Develop sentence and text in English coherently and formally.
HP103.CO.5: Demonstrate overall improvement in communication skills.
HP103.CO.6: Analyze and infer from written, audio and video texts.

PRACTICAL:		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**4 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Parts of Speech**	**3 HOURS**
Use of parts of speech in a sentence composition		
PRACTICAL NO.03	**Tenses**	**5 HOURS**
Use of tenses in day to day communication and academic writing		
PRACTICAL NO.04	**Vocabulary Enrichment and Common Errors**	**8 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills and Common errors in grammar while speaking and writing English		
PRACTICAL NO.05	**Letter and Email Writing**	**4 HOURS**
How to write an email, characteristics and essentials of a good email, formal letter writing and layout of business letters		
PRACTICAL NO.06	**Essay Writing**	**4 HOURS**
What is an essay? Tips to write a good essay, Types of essays		
PRACTICAL NO.07	**Report Writing and Summarizing**	**4 HOURS**
Types of reports, format and writing a report, what is summarizing? Rules of summarizing		
PRACTICAL NO.08	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD – General, Creative and Technical, Dos and Don'ts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.09	**Presentation Skills**	**4 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.10	**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.11	**Debate**	**4 HOURS**
Concept, Dos and Don'ts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.12	**Listening Skills**	**4 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		

PRACTICAL NO.13	Reading Comprehension	4 HOURS
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Ashok Thorat and Munira Lokhandwala: Enriching Oral and Written Communication in English, ISBN 9788125037446
2. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
3. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
4. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
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 SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	German Language
	COURSE CODE	HP104
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP104.CEO.1: To introduce German as a foreign language and enhance knowledge, communication and intellectual capabilities which helps to improve cognitive skills and creativity vital for problem solving and innovation.

HP104.CEO.2: To develop an awareness of German culture along with providing better career opportunities later in life.

COURSE OUTCOMES:

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

HP104.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics

HP104.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively

HP104.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Germany

HP104.CO.4: Enhance their knowledge of German culture and society

THEORY COURSE CONTENT		
UNIT 1		**2 HOURS**
Introduction- Alphabets, Numbers 0-20, Self Introduction and Introducing third person. Grammar- wh Questions(w-frage), pronouns.		
UNIT 2		**4 HOURS**
Greetings, Speaking about different Languages and Countries, numbers above 20, seasons Grammar- Yes or no Questions, Sentence Construction verbs and conjugations of regular verbs		
UNIT 3		**4 HOURS**
Speaking about hobbies and interests, different professions, weekdays, months Grammar- Nouns, Articles, conjugations of irregular verbs		
UNIT 4		**6 HOURS**
Vocabulary related to food, different places in the city, transport Grammar- Imperative sentence		
UNIT 5		**4 HOURS**
Relations, understanding clock timings Grammar- Cases, Nominative case, nominative verbs pronouns and articles		
UNIT 6		**6 HOURS**
Body parts, directions, asking for the address email address and telephone number Grammar- Accusative case, accusative verbs pronouns and articles		

TEXT BOOK

1. Netzwerk Deutsch als Fremdsprache- Kursbuch A1(Stefanie Dengler), Goyal Publications.

REFERENCE BOOK

1. https://www.klett-sprachen.de , https://www.duolingo.com/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Japanese Language
	COURSE CODE	HP105
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP105.CEO.1: To perform daily basic activities including below mentioned.
HP105.CEO.2: Self Introduction, Greetings in Japanese.
HP105.CEO.3: Introduction to Japanese scripts- Hiragana, Katakana, Kanji.
HP105.CEO.4: Develop basic vocabulary throughgroup activities, videos.
HP105.CEO.5: Develop an understanding business etiquette.
HP105.CEO.6: Introduce topics related daily conversation, listening skills, cultural awareness.

COURSE OUTCOMES:

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

HP105.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics.
HP105.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively.
HP105.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Japan.
HP105.CO.4: Enhance their knowledge of Japanese culture and society.

THEORY COURSE CONTENT		
UNIT 1		**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 2	**Hiragana, vocabulary and listening.**	**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 3		**4 HOURS**
Hiragana and Katakana, and Japanese games.		
UNIT 4		**4 HOURS**
Family Members understanding in Japanese. and Vocab.		
UNIT 5		**5 HOURS**
Japanese cultures study, and business etiquette.		
UNIT 6		**5 HOURS**
Daily conversation and cultural study.		

TEXT BOOK

1. Minna Na Nihongo, Goyal Publications.

REFERENCE BOOK

1. Nil

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applications Programming-Python
	COURSE CODE	CS102
	COURSE CREDITS	3
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME & MARKS**						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS102.CEO.1: Get familiar with basics of Python programming.
CS102.CEO.2: Understand usage of conditional and looping statements in Python.
CS102.CEO.3: Learn different simple data structure supported in Python.
CS102.CEO.4: Acquire knowledge and skills of strings and dictionary.
CS102.CEO.5: Implement Object Oriented Programming concepts using Python.
CS102.CEO.6: Introduce the concepts of Pandas & NumPy.

COURSE OUTCOMES :

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

CS102.CO.1: Debug syntax and semantics in Python programs.
CS102.CO.2: Demonstrate proficiency in handling strings and file system.
CS102.CO.3: Implement the programs using core data structures like Lists and Dictionaries.
CS102.CO.4: Interpret the concepts of Object Oriented Programming in Python
CS102.CO.5: Develop solution for real life problems using Python.

THEORY COURSE CONTENT		
UNIT 1	**Python Fundamentals and Data Handling**	**2 HOURS**
Introduction, Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types ,Mutable and immutable types, Input output operation , Comments, Reserved words, Indentation, Operators and expressions.		
UNIT 2	**Decision and Iterative Statements**	**2 HOURS**
Introduction to Decision Statements: Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. **Introduction to Iterative Statements:** Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, break, continue, pass, else statement used with loops.		
UNIT 3	**List manipulation, Tuples and Python Function**	**2 HOURS**
List: Introduction, creating & accessing lists, list operations, working with lists, list functions & methods. **Tuples:** Introduction, creating & accessing tuples, tuples operations, tuples functions & methods. **Functions:** Need for functions, definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.		
UNIT 4	**Strings and Dictionary**	**3 HOURS**
Strings: Introduction, string operations- concatenation, appending, multiplication and slicing. Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, Iterating strings, the string module. **Dictionary:** Introduction, working with dictionaries, dictionary functions and methods		
UNIT 5	**Object Oriented Programming**	**2 HOURS**
Programming Paradigms-monolithic, procedural, structured and object oriented, Features of Object oriented programming-classes, objects, methods and message passing, inheritance, polymorphism, containership, reusability, delegation, data abstraction and encapsulation. Classes and Objects: classes and objects, class method and self-object, class variables and object variables, public and private members, class methods		
UNIT 6	**Data Structure and Libraries in Python**	**2 HOURS**
Introduction to data structure, pandas, NumPy.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mc2 where m is the mass of the object and c is its velocity.		
PRACTICAL NO.02		**2 HOURS**
Write a Python program for following conditions. • If n is single digit print square of it. • If n is two digit print square root of it. • If n is three digit print cube root of it.		
PRACTICAL NO.03		**4 HOURS**
Solve the Fibonacci sequence using recursive function in Python.		
PRACTICAL NO.04		**4 HOURS**
Write a Python program to print different patterns.		
PRACTICAL NO.05		**2 HOURS**
To accept student's five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade if first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division.		
PRACTICAL NO.06		**4 HOURS**
To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.		
PRACTICAL NO.07		**2 HOURS**
Write a program in Python to enter two unequal nos. if first no. is greater than display square of the smaller no. and cube of the greater no. otherwise vice-versa. If no. are equal display the message both no. are equal find square, square root and cube root of a number.		
PRACTICAL NO.08		**4 HOURS**
Write a Python program to perform following string operations. a) String concatenation b) String Reverse c) String compare d) String length e) Palindrome f) Case change.		
PRACTICAL NO.09		**2 HOURS**
Select the number from the entered list and find its position in Python (use Linear Search).		
PRACTICAL NO.10		**4 HOURS**
Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain) using dictionary.		

PRACTICAL NO.11		6 HOURS

1. Write Python class for bank customer with withdraw and deposit operations (use inheritance) (Introduce class, object concepts).
2. Using concepts of polymorphism write Python application program.

Write a Python program to perform addition and multiplication of 2 matrices.

PRACTICAL NO.12		4 HOURS

Write a Python program to convert a Panda module Series to Python list and it's type.

PRACTICAL NO.13		4 HOURS

Write a NumPy program for Plotting and analyzing data.

Mini Project:

1. Project is for a period of 2 weeks.
2. Group of two or three has to choose project topic from the list designed by concerned faculty of particular division.
3. Each group has to collect requirements for project and get approved by concerned teachers in first weeks.
4. implementation and testing need to be performed in second week.
5. Demonstration along with presentation need to be given as final project submission.
6. Project carries 20 Marks.

TEXT BOOK

1. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1st Edition, Create Space Independent Publishing Platform, 2016. (http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf) (Chapters 1 – 13, 15)
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2ndEdition, Green Tea Press, 2015. http://greenteapress.com/thinkpython2/thinkpython2.pdf) (Chapters 15, 16, 17) (Download pdf files from the above links)

REFERENCE BOOK

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014.
2. Mark Lutz, "Programming Python", 4th Edition, O'Reilly Media, 2011.ISBN-13: 978-9350232873
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1stEdition, Wiley India Pvt Ltd, 2016. ISBN-13: 978- 8126562176.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME106
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	NIL	60	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME106.CEO.1: Disseminate the philosophy of design thinking.
ME106.CEO.2: Impart the information regarding User centric approach.
ME106.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME106.CEO.4: Enhance thinking in order to inspect diverse solutions.
ME106.CEO.5: Sensitize about the feasibility, desirability and viability criteria's for selection of Appropriate solution.
ME106.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES:

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

ME106.CO.1: Recall fundamental principles of design thinking.
ME106.CO.2: Explain all the dimensions of user and his needs using design thinking approach.
ME106.CO.3: Outline user centric problem by using information gathering techniques.
ME106.CO.4: Compare multiple solutions through ideation process.
ME106.CO.5: Interpret most appropriate solution for defined user centric problem.
ME106.CO.6: Develop the most optimum solution.

PRACTICAL:		
PRACTICAL NO.01	**Human Centred Design**	**2 HOURS**
Introduction to Human Centred Design, Human Centred Design Phases, Human Centred Design Process, Human Centred Design case study		
PRACTICAL NO.02	**Research Methodology (Problem Definition, Information Gathering)**	**4 HOURS**
Design thinking Models & Methodology - General Problem Statement, Random check list, mind mapping Categorization of random check list. Brainstorming of problem areas, Research Methodology - Information gathering - Primary, Secondary Sources, data presentation, Preparation of survey forms, Survey Analysis, Drawing Inference.		
PRACTICAL NO.03	**Ideation**	**4 HOURS**
SWOT analysis, Vein Diagram (User Desirability, Feasibility, Viability check) Drawing inferences, Translation of inferences into design criteria, specific problem statement, Ideation – free hand sketching drawing of simple form of products (Isometric views, layout, circuit diagram, Ideation sketches), Ergonomic and aesthetic consideration in design.		
PRACTICAL NO.04	**Prototyping**	**2 HOURS**
Concept validation, evaluation and detailing, Different methods of Prototyping, selection of right method of prototyping.		
PROJECT		**40 HOURS**
PRACTICAL NO.05	**Phase 1 : General Problem Statement and problem background**	**4 HOURS**
PRACTICAL NO.06	**Phase 2 : Research methodology**	**4 HOURS**
PRACTICAL NO.07	**Phase 3 : Product Specification**	**4 HOURS**
PRACTICAL NO.08	**Phase 4 : Ideation**	**6 HOURS**
PRACTICAL NO.09	**Phase 5 : Concept Evaluation, Validation and Concept detailing**	**8 HOURS**
PRACTICAL NO.10	**Phase 6 : Prototyping**	**10 HOURS**
PRACTICAL NO.11	**Phase 7 : Documentation**	**4 HOURS**

TEXT BOOK

1. Emrah Yayici, Design Thinking Methodology Book, Amazon Digital Services LLC - Kdp Print Us, 2016, ISBN: 6058603757, 9786058603752
2. Idris Mootee, Design Thinking for Strategic Innovation, Wiley (2017), ISBN-13: 978-8126572694
3. Thomas Lockwood, Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Allworth Press; Original edition (10 November 2009), ISBN-13: 978-1581156683

REFERENCE BOOK

1. Harper Perennial, Lateral Thinking: Creativity Step by Step; Reissue edition, 2015 (Perennial Library).
2. John Chris Jones, Design Methods, John Wiley & Sons, David Fulton Publishers, London, 1980, ISBN 0-471-28496-3.
3. Nigel Cross, Design Thinking: Understanding How Designers Think and Work, Berg Publishers (May 15, 2011), ISBN-13: 978-1847886361
4. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Published September 29th 2009 by Harper Business, ISBN 0061766089

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020 (R2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Indian Constitution (Audit Course)
	COURSE CODE	HP106
	COURSE CREDITS	NIL
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP106.CEO.1: To realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.

HP106.CEO.2: To identify the importance of fundamental rights as well as fundamental duties.

HP106.CEO.3: To understand the functioning of Union, State and Local Governments in Indian federal system

HP106.CEO.4: To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure

COURSE OUTCOMES:

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

HP106.CO.1: Understand and explain the significance of Indian Constitution as the fundamental law of the land.

HP106.CO.2: Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.

HP106.CO.3: Analyze the Indian political system, the powers and functions of the Union, State and Local Governments in detail.

HP106.CO.4: Understand Electoral Process, Emergency provisions and Amendment procedure.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Indian Constitution**	**2 HOURS**
Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India, Salient features and characteristics of the Constitution of India, Scheme of the fundamental rights, The scheme of the Fundamental Duties and its legal status, The Directive Principles of State Policy – Its importance and implementation.		
UNIT 2	**Federal Structure and Amendment**	**4 HOURS**
Federal structure and distribution of legislative and financial powers, between the Union and the States, Parliamentary Form of Government in India – The constitution powers and status of the President of India, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India.		
UNIT 3	**Emergency Provisions**	**2 HOURS**
Emergency Provisions: National Emergency, President Rule, Financial Emergency.		
UNIT 4	**Constitutional Schemes**	**4 HOURS**
Local Self Government – Constitutional Scheme in India, 13. Scheme of the Fundamental Right to Equality, Scheme of the Fundamental Right to certain Freedom under Article 19, Scope of the Right to Life and Personal Liberty under Article 21.		

TEXT BOOK

1. D. D. Basu, Introduction to the Constitution of India, LexisNexis.
2. Granville Austin, The Constitution of India: Cornerstone of a Nation, Oxford University Press.

REFERENCE BOOK

1. Subhash Kashyap, Our Constitution, National Book Trust.
2. M.P. Jain, Indian Constitutional Law, LexisNexis.
3. V .N.Slmkla , Constitution of lndia , Ea stern Book Co mpany.
4. P.M. Bak shi , The Constitution of India , Universal Law Publishing.
5. M.V.Pylee, Constitutional Government in India , S. Chand.
6. V. S. Khare, Dr. B.R. Ambedkar and India ' s National Security.

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III

SUMMER INTERNSHIP (Audit: CV200**)**

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC8	ME221	Material Engineering	3	2	-	35	35	30	50	0	150	4
DC01	CV204	Geotechnical Engineering	3	2	-	35	35	30	50	0	150	4
DC02	CV205	Building Design & Construction	3	2	-	35	35	30	50	0	150	4
DC03	CV206	Mechanics of Solids	3	2	-	35	35	30	50	0	150	4
SDP1	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP2	CV230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP3	CV23#	Skill Development Course-1 (Excel / REVIT)	0	4	-	0	0	25	0	50	75	2
ESC9	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

SEMESTER: IV

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS203/4	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC04	CV214	Mechanics of Fluids	3	2	-	35	35	30	50	0	150	4
DC05	CV215	Surveying & Geospatial Engineering	3	2	-	35	35	30	50	0	150	4
DC06	CV216	Structural Analysis	3	2	-	35	35	30	50	0	150	4
SDP4	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP5	CV240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	2019 - 2020 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Student Internship Program (Life/Soft Skills)
	COURSE CODE	CV200
	COURSE CREDITS	Audit
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV200.CEO.1: To develop good bahavioural practices
CV200.CEO.2: To gain learning and living experience
CV200.CEO.3: To get acquainted with online learning platforms
CV200.CEO.4: To recognize the latest trend and understand the requirements for professional life
CV200.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CV200.CO.1: Manage emotions, health, finances, relationships, performance extracurricular activities
CV200.CO.2: Increase knowledge of emotional competency and emotional intelligence
CV200.CO.3: Develop interpersonal skills and adopt good leadership behavior
CV200.CO.4: Reduce negative stress while promoting energy or positive stress
CV200.CO.5: Inculcate a sense of sportsmanship, better physical health and competitive spirit

INTRODUCTION:

The main aim of this internship is to assist all Second Year B.Tech. students to acquire the skills required for personal stability and professional growth. The ultimate goal is to imbue students with professionalism and life skills. Using this internship, MITAoE students will enhance their professional skills, making themselves more marketable in today's competitive world. The students can develop various extracuurricular skills for working on emotional intelligence and sportsman spirit.

SCOPE AND STRUCTURE OF SIP:

Student Internship Program (Life/Soft Skills) is offered to entrants of Second Year B.Tech. (after semester II) that meet the eligibility criteria stated below:
Second Year B.Tech. entrants should apply for 3 to 4 weeks duration life skill courses during June-July of every academic year.This is an audit course.

The scope of this internship is limited to identifying life skill development opportunities and assisting MITAoE students to apply for such courses.

STUDENT ELIGIBILITY CRITERIA:

Students applying for internship must meet the following criteria:
After completion of second academic semester, First Year B.Tech. students (Second Year B.Tech. entrants) of all schools are eligible to apply for 3 to 4 weeks duration internships under Student Internship Program.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME221
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	NIL	50	150

PRE-REQUISITE :

COURSE OBJECTIVES:

ME221.CEO.1: To illustrate the fundamental properties of various engineering materials and demonstrate the need and applications of different heat treatment processes to it.

ME221.CEO.2: To explain the structure- property co relationship as a basis for performance of materials.

ME221.CEO.3: To identify the most appropriate material and the required manufacturing process for the given project in the industry/research fields.

ME221.CEO.4: To categorize the various material testing methods and characterization techniques and make use of it to apply for given component/product.

COURSE OUTCOMES:

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

ME221.CO.1: Relate the applications of various engineering materials and heat treatment processes in material processing industry.

ME221.CO.2: Interpret the specifications, composition, concepts and fundamental properties of engineering materials applied in industrial/research field.

ME221.CO.3: Select the suitable materials, manufacturing process for specified application to meet the product performance requirements within its product service life.

ME221.CO.4: Analyze the suitable material testing and characterization technique to ensure service life for specific product without any failure or deterioration in its performance.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**14 HOURS**

Basics of extractive metallurgy-

Importance of metallurgy in day to day life and in industry, Overview or introduction of raw material processes of steel (Melting, Continuous casting, rolling)

Ferrous metals-

Steels-Classifications and specifications of steels and cast iron as per ASTM, SAE and Indian Standard designation system. Iron (Fe)-Iron Carbide (Fe3C) equilibrium diagram, Critical cooling rate, transformation products of Austenite-Pearlite-Martensite, Alloy steels- High Strength Low Alloy (HSLA), Boron steel, Stainless steel- Austenitic, Ferritic, Martensitic, Maraging steels- Significance, composition and applications.

Cast Irons- Classification, Manufacturing, Composition, Properties & applications of white C.I., Grey cast iron, malleable C.I., S.G. cast iron, chilled and alloy cast iron, effect of various parameters on structure and properties of cast irons. Specific applications such as machine tools, automobiles, pumps, valves etc.

Heat treatment of steels- Time- Temperature Transformation Diagram, Annealing-Conventional, Normalizing, Comparison of Annealing and Normalizing, Hardening- effects of different media- water, oil, salt bath, Vacuum Hardening (Latest oxygen free Heat treatment), Tempering- High-medium-low temperature Defects due to heat treatment- Quench cracks, oxidation, overheating. Classification of surface hardening treatments- Carburizing, Nitriding, Carbonitriding, flame hardening, induction hardening, Anodizing

Non-ferrous metals- Classification, Composition, Properties & applications of: Copper and Its Alloys-Alpha, beta and gamma brasses, Nickel and Its alloys-Inconel- Monel-Invar-Elnivar-Alnico, Aluminium and Its alloys-LM6-LM11- LM13-LM14-Hinduminium (RR350).

Bearing materials and its applications- Properties of bearing materials, Materials-Tin based babbits, Lead based babbits, Gray Cast Iron, Non-metallic bearings-Nylon, Polyamide, Self-lubricating bearings-powder metallurgical bearings

UNIT 2	**Non-metallic materials-Polymers, Ceramics and Composites**	**8 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, Barium Zirconium Titanate and Barium Calcium Titanate(BZT-BCT) Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications. **High Performance Polymers:** Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation

Composites: Need of composites, fabrication and testing of composite material, Particle-reinforced composites, large-particle composites, dispersion-strengthened, Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic matrix composites, carbon–carbon composites, structural composites, laminar composites. Case study for industrial applications.

UNIT 3	Strength of materials	6 HOURS

Strengthening mechanisms: Refinement of grain size, Cold working/strain hardening, Solid solution strengthening, Dispersion strengthening. Heat treatment of nonferrous metals: Precipitation, Age hardening and homogenization Creep strength, High temperature-intergranular and low temperature-trans granular fracture of materials, Fracture toughness properties of materials applied in cryogenic and high temperature- rocket and aerospace applications, Fracture toughness improvement methods-shot peening

UNIT 4	Powder metallurgical materials	8 HOURS

Basic steps of powder metallurgy process, classification & methods of powder manufacturing, characteristics of metal powders, Conditioning of metal powders (Screening, Blending & mixing, annealing), Compaction techniques (cold compaction, hot compaction, Isostatic compaction & powder rolling), mechanism & importance of sintering, Pre-sintering & sintering secondary operations.
Advantages, limitations and applications of powder metallurgy. Production of typical P/M components (with flow charts), self-lubricated bearing, cemented carbides, cermets, refractory metals, electrical contact materials, friction materials, and diamond impregnated tools, friction plate, clutch plate, commutator brushes.

UNIT 5	Corrosion and its prevention techniques	6 HOURS

Classification of corrosion- Dry corrosion & wet corrosion, Mechanism of corrosion, Types of corrosion: Pitting corrosion, stress corrosion, season cracking, Cavitation corrosion, caustic embrittlement, intergranular corrosion, crevice corrosion, erosion corrosion, uniform corrosion, galvanic corrosion,
Corrosion prevention methods- classification of different methods, e.g. inhibitors, Cathodic & anodic protection, internal & external coatings, Low & High temperature corrosion. Design against corrosion.

UNIT 6	Introduction to Advanced Materials-Nanomaterials, Magnetic, Piezoelectric materials	6 HOURS

Nanomaterials-Basic concepts of Nano science and Nanotechnology,Nanomaterials synthesis methods- Top down and bottom up approach, Sol gel technique, solution blending, laser vaporization, arc discharge method Carbon nanotubes and its classification, Graphene 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.AFSEM-Correlative SEM-AFM analysis
Magnetic materials- Soft & Hard Ferrites, Vibrating Sample Magnetometer for studying hysteresis curve of magnetic materials.
Dielectric material- Piezo electric and Ferro electric materials and their applications, superconductors. Modern Materials for high, low temperatures and Cryogenic applications

PRACTICAL: **Perform the following experiments.**		
PRACTICAL NO. 1	Jominy End Quench Test	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO. 2	Izod Impact Test	**2 HOURS**
Izod impact test		
PRACTICAL NO. 3	Charpy Impact Test	**2 HOURS**
Charpy impact test		
PRACTICAL NO. 4	Hardness Test	**2 HOURS**
Vickers hardness test		
PRACTICAL NO. 5	Hardness Test	**2 HOURS**
Rockwell hardness test		
PRACTICAL NO. 6	Hardness Test	**2 HOURS**
Poldi hardness test		
PRACTICAL NO. 7	Dye Penetrant Test	**2 HOURS**
Dye Penetrant Test for detection of surface level flaws in materials		
PRACTICAL NO. 8	Ultra-sonic Test	**2 HOURS**
Ultra-sonic test for detection of internal flaws in materials.		
PRACTICAL NO. 9	Case study-based experimentation	**4 HOURS**
Selection and performance of suitable hardness testing method for the given industrial components.		
PRACTICAL NO. 10	Microstructural analysis of steels	**2 HOURS**
Microstructural analysis of steels		
PRACTICAL NO. 11	Microstructural analysis of Cast irons	**2 HOURS**
Microstructural analysis of Cast irons		

TECHNICAL PAPER PRESENTATION/PUBLICATION ASSESSMENT PROCESS

1. Course champion should conduct meetings with faculty members, students from all disciplines for the given semester regarding following points-Importance of paper publication at SY level for placements/research work, plagiarism, research ethics, technical paper formation and publication process, demonstration of experimental and review paper formation.
2. Each faculty member should form students' groups in practical session as per students' interest domain selected from any content form the syllabus or from content beyond syllabus.
3. Each student groups will download the research papers, discuss the various technical points and doubts with peers and faculty member during the time left after conduction of practical in laboratory session as a continuous process for all weeks during semester.
4. In case of doubts are unsolved within particular practical session, then doubts are discussed within course meeting held weekly and the information is conveyed back to students to complete the loop.
5. Faculty members should display the list of Scopus/web of science indexed journals with no article processing fee or SPPU UGC CARE included journals' list and list of conferences scheduled within the semester to students and motivate students to prepare drafts.
6. The drafts are prepared by students and reviewed by faculty member, team of materials Engineering and then DRC should be done to receive suggestions on the paper draft.
7. The evaluation of the assessment can be said as complete if students' groups are able to
   (a) Publish the paper in journal or conference proceedings which are Scopus indexed or web of science indexed
   (b) Students' group has received the acceptance for the publication of their paper.
8. In case any students' group is not able to publish or receive the acceptance then minimum criteria is to communicate the paper and receive at least review 1 from reviewers of the paper with no major corrections. Communication to the journal for the paper with no major corrections and possibility of publication is mandatory for all project groups.

PROJECT BASED LEARNING- CONTENT BEYOND SYLLABUS

A group of 3 students will be given following set of experiments which needs to be performed to prepare a review report based on the practical observations, literature review discussions among peers and faculty members:

1. Identification of failure mode (cup/cone/brittle/ductile) of the given failed component obtained from any manufacturing company or workshop
2. Selection of suitable destructive and non-destructive testing method for the given component which has defects obtained from any manufacturing company or workshop

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 SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Geotechnical Engineering
	COURSE CODE	CV204
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : Applied Mechanics

COURSE OBJECTIVES :

CV204.CEO.1: To describe the basics of soil and its importance in Civil Engineering.
CV204.CEO.2: To establish an understanding of the fundamental concepts of mechanics for soil.
CV204.CEO.3: To provide students with exposure to the systematic methods for solving geotechnical engineering related problems.
CV204.CEO.4: To give an experience in the implementation of Engineering concepts which are applied in field of Geotechnical Engineering

COURSE OUTCOME :

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

CV204.CO.1: grade engineering properties of soil based on index property by performing relevant experiments.
CV204.CO.2: explain seepage and flow net.
CV204.CO.3: choose suitable method for improvement in soil characteristics.
CV204.CO.4: apply basic soil mechanics principle to calculate various stresses induced in soil.
CV204.CO.5: calculate the stability of slope.
CV204.CO.6: evaluate bearing capacity of soils.

THEORY		
UNIT 1	**Introduction to Soil and Site Investigation**	**6 HOURS**
Introduction to Geotechnical Engineering, Introduction to soil. Properties of soil and their significance. Soil structure and classification systems. Weight volume relationship, (Study of working model on soil structure) Purpose and planning of subsurface exploration. Methods of Investigation, DCPT, SCPT and Demo- SPT. Case Study: Geotechnical investigation planning of subway projects in urban areas Self Study: Three phase soil system		
UNIT 2	**Permeability and Seepage**	**6 HOURS**
Darcy's Law, Validity of Darcy's Law, Laboratory and field tests for determination of permeability. Seepage and Seepage Pressure, hydraulic gradient, Laplace equation, Flow Net, Demonstration: Construction of model for flow net though earthen body. Case Study: A Case Study on Seepage Failure of Hauser Lake Dam Self Study: Introduction to permeability of soils.		
UNIT 3	**Compaction and Consolidation**	**6 HOURS**
Introduction to compaction, Field compaction methods (Site Visits). Introduction to consolidation, spring analogy, Terzaghi's consolidation theory, Lab methods of compaction and consolidation. Case Study: A case study on Soil Improvement with Heavy Dynamic Compaction Self Study: compaction equipment's		
UNIT 4	**Stresses In Soil and Shear Strength of Soil**	**12 HOURS**
Stresses in Soil Boussinesq's theory, Pressure bulb and Westergaard's theory, Contact Pressure distribution. Earth Pressure-, Rankine's theory, Coulomb's Wedge theory. Shear Strength of Soil Shear strength- an Engineering Property. Mohr-Coulomb failure theory. The effective stress principle-Total stress, effective stress and neutral stress / pore water pressure. Case Study: Hai Phong City, Viet Nam Shear Resistance and Stability Study of Embankments. Self Study: Introduction to stress and shear strength of soil		
UNIT 5	**Stability of Slope**	**4 HOURS**
Modes of slope failure, Stability analysis finite and Infinite slope, Taylor's stability Case Study: Soil nailing behaviour for slope stabilization Self Study: Introduction to slope		
UNIT 6	**Bearing Capacity of Soil and Foundation**	**6 HOURS**
Bearing capacity of soil, bearing capacity analysis: list of methods and field tests, types of shear failure, Settlement and its types, its causes and remedial measures. Case Study: Investigation of Foundation Failure of a Residential Building. Self Study: Types of Foundation		

PRACTICALS/PROJECT: Project should be perform in a group of 5 students		
PROJECT	**Preparation of Soil mass**	**14 HOURS**
Prepare a sub grade of 1m X 1m X 0.15m with well graded locally available soil having dry density of 1.85 gm/cc. Also find for atterberg's limits and coefficient of permeability. Objective: 1) Find water content, Sp. Gravity, and Bulk Density of Borrow soil 2) Calculate dry density and required quantity of borrow soil 3) Find and fix the gradation of soil 4) Find required W.C. to compact soil embankment at given dry density 5) Compact embankment at site Note: All tests must follow relevant I.S. codes OR Prepare trapezoidal shape hearting of an earthen dam of given dimension using well graded locally available soil having dry density of 1.85 gm/cc. Also check for atterberg's limits and coefficient of permeability. Objective: 1) Find water content, Sp. Gravity and Bulk Density of Borrow soil 2) Calculate dry density and required quantity of borrow soil 3) Find and fix the gradation of soil 4) Find required W.C. to compact hearting at given dry density 5) Compact embankment at site Note: All tests must follow relevant I.S. codes		
PRACTICAL NO.01	**Shear strength of the soil**	**2 HOURS**
To find the unconfined compressive strength of cohesive soil		
PRACTICAL NO.02	**Shear strength of the soil**	**2 HOURS**
To find the shear strength parameters of the soil by direct shear test		
PRACTICAL NO.03	**Shear strength of the soil**	**2 HOURS**
To find the Shear strength of cohesive soil using vane shear test		
PRACTICAL NO.04	**Shear strength of the soil**	**2 HOURS**
To find the Shear strength of cohesive soil using triaxial shear test		
PRACTICAL NO.05	**Consolidation of soil**	**2 HOURS**
To find the consolidation test on soil using oedometer		

TEXT BOOK

1. Gopal Ranjan and A. S. Rao, "Basic and Applied Soil Mechanics", G. K. Publications Pvt. Ltd, Dec. 2006, ISBN : 978-81-224-1223-9
2. V. N. S. Murthy, "Soil Mechanics and Foundation Engineering", B. S. Publications, Dec 2009, ISBN 0 – 324 – 06680 – 5.
3. B. C. Punmia, "Soil Mechanics and Foundation Engineering", Laxmi Publishing Co, Dec. 2005, ISBN: 81-7008-081-9.
4. Dr. K .R. Arora, "Soil Mechanics and Foundation Engineering", (8th Edition) 2015, Standard Publishers, ISBN:81-8014-112-8

REFERENCE BOOK

1. Joseph E Bowles, "Engineering Properties of Soils And Their Measurements", McGraw Hill Publications, 1992, ISBN: 0070067783, 9780070067783.
2. Palanikumar. M, "Soil Mechanics", PHI Learning Private Limited, 2013, ISBN: 978-81-203-4838-7
3. R. F. Craig "Craig's Soil Mechanics", E and FN Spon an imprint of Chapman and Hall, 2012, ISBN: 0-415-32702-4, 0-415-32703-2.
4. Venkatramaiah, C. Geotechnical Engineering, (3rd edn.) New Age International Publishers, New Delhi, 2006.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Building Design & Construction
	COURSE CODE	CV205
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	Nil	150

PRE-REQUISITE : Engineering Graphics

COURSE OBJECTIVES :

CV205.CEO.1: To implement the various building bye laws.
CV205.CEO.2: To know the different rules and regulation for development of any area
CV205.CEO.3: To identify the different types of building materials and components.
CV205.CEO.4: To understand the green building concept and terminologies.

COURSE OUTCOMES :

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

CV205.CO.1: design functionally a single/multi-storied building for various components of residential/commercial units.
CV205.CO.2: implement relevant bye laws in functional design of buildings in a prescribed locality in India.
CV205.CO.3: select suitable types of basic building material and masonry used for construction of various types of buildings
CV205.CO.4: explain various components of buildings namely forms of floors, roofs, doors, windows, arches, lintels, staircases.
CV205.CO.5: select suitable type of formwork and scaffolding.
CV205.CO.6: describe green building concept and Rating Systems.

THEORY		
UNIT 1	**Introduction to Building and Planning**	**7 HOURS**
Definition and different types of buildings. Components of buildings. Types of structure. Types of foundation, Principles of Planning and Design. Rules for ventilation, lighting .Types of drawings. Conventions as per IS 962. (Self-Study : DCPR: Provisions for high rise development and structural safety)		
UNIT 2	**Bye Laws and Legal Aspects**	**7 HOURS**
A. Necessity of bye laws. Different rules and regulation according to NBC and IS. Types of areas and area calculations. B. Different permissions and certifications required before, during and after building construction, permissions and procedure for land acquisitions. (Self-Study : Introduction RERA)		
UNIT 3	**Masonry Construction**	**6 HOURS**
Brick masonry: types of bonds, construction procedure and supervision, Block masonry: Hollow, Solid, CLC, ACC, cavity wall construction, Pointing and Painting Purpose, types and procedure, (Self-Study : Stones masonry: procedure for UCR and CR masonry)		
UNIT 4	**Building Components**	**6 HOURS**
A: Doors and Windows: Types, materials used, purposes. B: Floors and Roofs: Types, materials used, purposes. Lintels: Need and types of lintels,Staircase: types, design. (Self-Study : Arches: principle of arch action, types of arches, method of arch construction)		
UNIT 5	**Formwork and Scaffolding**	**6 HOURS**
Formwork: Timber, Aluminum, Mivan and Plastic, Slip form work: component parts, Procedure for erection and checking of formwork. Scaffolding: Purpose, types and suitability. (Self-Study : Introduction and types of basic building materials)		
UNIT 6	**Green Building**	**4 HOURS**
Concept of green building, Salient features, Materials, Planning, Rating Systems- LEED, GRIHA. (Self-study : BREEAMS, Green Building challenge Assessment Framework)		

PRACTICALS/PROJECT: Project should be perform individually		
PROJECT NO.01	**Residential building**	**18 HOURS**
Draw following plans of a G+1 residential multistoried building having minimum B/U area 125 square meter also minimum one cantilever projection and overhead water tank required by using computer software (AutoCAD) and prepare brochure containing following drawings Lay out plan Line Plan Development Elevation. Section. Foundation Plan		
PRACTICAL NO.01	**Commercial or Public building**	**6 HOURS**
Draw line plans of two different commercial or public building with scale 1:50 or 1:100 (hand sketch)		
PRACTICAL NO.02	**Site Visit**	**4 HOURS**
Site visit and technical report on the visit (Minimum Two). (Visit should contain Stage of visit, related sketches of components-C/S-Dimensions, Materials used, site plan sketch and detailed report etc.)		

TEXT BOOK

1. Punmia B.C., Building Construction, Laxmi Publications Delhi, sixth edition, 2009, ISBN: 81-7008-053-3
2. Shaha M.G., Kale C.M., Principles of Building Drawing, Macmillan Publishers India Limited, Fourth edition, 2010, ISBN-0333925467
3. Duggal S. K., "Building Materials", New Age International Limited, First Edition, 2003, ISBN -81222414354

REFERENCE BOOK

1. Shah, kale and Patki, " Building Drawings with an Integrated Approach to Build Environment", Tata McGraw Hill Publications, Fifth edition, 2015, ISBN- 0071077871
2. Rangwala, "Civil Engineering Drawing", Charotar Publications, First Edition, 2017, ISBN - 9789385039300
3. Rangwala, "Building Construction", Charotar Publications, 33rd Edition, 2017, ISBN - 978-93-85039-04-1

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Mechanics of Solids
	COURSE CODE	CV206
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : Applied Mechanics

COURSE OBJECTIVES :

CV206.CEO.1: To analyze axially loaded bars, beams, columns and shafts subjected to torsion.

CV206.CEO.2: Learner should be able to identify most critical locations, planes and critical direct and shear stresses for various loading scenarios on different types of structures.

COURSE OUTCOMES :

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

CV206.CO.1: enlist and explain different types of actions on a structural component[Understand].

CV206.CO.2: draw axial force diagrams for axially loaded members, shear force diagrams and bending moment diagrams for statically determinate beams and twisting moment diagram for statically determinate shafts[Apply].

CV206.CO.3: Draw bending stress distribution diagram for beams and shear stress distribution diagrams for beams and shafts. [Apply].

CV206.CO.4: Calculate load corresponding to elastic instability for columns with various end conditions[Apply].

CV206.CO.5: Calculate principal stresses and absolute maximum shear stresses at various locations of a structural component using analytical method and Mohr's circle whichever is suitable[Analyse].

CV206.CO.6: Select particular shape of cross section to economically carry calculated bending/shear stresses under flexure/shear[Evaluate]

THEORY		
UNIT 1	**Linear elasticity**	**6 HOURS**
Deformation and strain, concept of the stress, constitutive matrix for isotropic matrix, strain energy, composite sections subjected to axial/flexure/temperature loading Simulation/ Demonstration : compute change in stress strain and volume using excel or any suitable computational program.		
UNIT 2	**Axially loaded bars and torsion of shafts**	**6 HOURS**
Axial force diagram, deformation of axially loaded bars, axially composite bars, composite bars subjected to temperature change, twisting moment diagram, torsion formula, angle of twist, torsion of prismatic shafts, shear stress distribution.		
UNIT 3	**Shear force diagram and bending moment diagram**	**8 HOURS**
Introduction, relations between shear force diagram and bending moment at a section, forward and reverse problems. Case studies: Observe locations of flexure and flexure-shear failures in the beams and correlate them with shear force diagram and bending moment diagram. Field studies: Shapes of beams in steel structures/ RCC structures, amount of steel and its correlation with variation of bending moment.		
UNIT 4	**Stresses in beams**	**8 HOURS**
Bending formula, bending stress distribution and shear stress distribution in a beam, economic shape of cross section of beam to maximize moment of inertia. Programming: compute bending and shear stresses at all locations in the prismatic or non-prismatic beams with various support conditions and for complex loading pattern. Reading: Research papers related with bending and shear stress in prismatic cross sections. 'Suggested': Reflections on following research paper, 'Minamino R and Tateno M, 2014, Tree Branching: Leonardo da Vinci's Rule versus Biomechanical Models. PLoS ONE Volume 9, issue 4		
UNIT 5	**Principal planes and principal stresses**	**6 HOURS**
State of stress, state of pure shear, direct state of stress, analytical and graphical method of finding principal planes and principal stresses, maximum in-plane shear stress, absolute maximum shear stress. Simulation/ Demonstration : finding out critical planes and maximum shear and normal stresses in beams and shaft (under twisting) problems using any computational program.		
UNIT 6	**Columns**	**8 HOURS**
Stability of columns, Euler buckling of columns, Rankine's and Jhonson's interpretations of critical load on column, eccentric load, initially imperfect columns. Reading: Research papers related to 'inelastic stability of prismatic members'. Suggested: Reflections on 'how high the trees can grow? 'Karl J N, 2006, Maximum plant height and the biophysical factors that limit it, Tree Physiology, Vol. 27, pp 433-440 '		

PRACTICALS: Experimental study may be checked using MATLAB or Excel		
PRACTICAL NO.01	**Tension test on metals.**	**4 HOURS**
Tensile strength of steel (M.S And TOR Steel)		
PRACTICAL NO.02	**Bending test**	**6 HOURS**
Four point monotonic and half cyclic bending test on timber/concrete beam/steel beam.		
PRACTICAL NO.03	**Torsion test on metals.**	**2 HOURS**
Torsion test on metals like aluminum, Mild steel specimens		
PRACTICAL NO.04	**Buckling test of column.**	**4 HOURS**
Buckling tests on columns with different end conditions		
PRACTICAL NO.05	**Desk experiments**	**6 HOURS**
Stiffness of spring, and effect of various combination of springs.		
PRACTICAL NO.06	**Simulation using MATLAB/ Excel**	**2 HOURS**
Using MATLAB/ Excel make simulation for the specimen tested in experiment no. 1, 2 and 3.		

TEXT BOOK

1. Beer F P, J. E. Russell Johnston, John T. DeWolf, and David F. Mazurek, Mechanics of Materials, McGraw-Hill, 7th edition, 2014, ISBN : 9780073398235
2. Gere J. M. and Timoshenko S. P., Mechanics of Materials, Boston: PWS Kent Publishing, 5th edition, 1970, ISBN: 9788123908946
3. S. S. Bhavikatti, Strength of Materials, Vikas Publishing House, 4th Edition, 2013, ISBN : 978-93259- 7157-8
4. S. Ramamrutham, R. Narayanan, Strength of Materials, Dhanpat Rai Publishing Company,9th edition, 2017, ISBN - 13: 978-9352164387.

REFERENCE BOOK

1. Nash W. A., Strength of Materials, Schaum's Outline Series, McGraw-Hill, 1994, 3rd edition, ISBN: 9780070843660
2. R.C.Hibbeler, Mechanics of materials, Prentice Hall, 2011, 8th edition, ISBN: 9780134321233
3. Egor P. Popov, Engineering Mechanics Of Solids, Pearson , 2nd Edition, 2010, ISBN: 9788178085357

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	AY: 2020 - 2021 (R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Digital Prototyping
	COURSE CODE	ET224
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	REVISION NO	1.0

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

PRE-REQUISITE : ME104 - Engineering Graphics, EX102 - Electrical and Electronics Engineering, CV102 - Applied Mechanics

COURSE OBJECTIVES :

ET224.CEO.1: To learn about materiality and techniques.
ET224.CEO.2: To justify the product development cycle through prototype project.
ET224.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET224.CEO.4: To 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,

ET224.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET224.CO.2: Apply acquired skills to the construction of a prototype project.
ET224.CO.3: Develop a prototype project by performing tasks in team.
ET224.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. Hardware Prototyping (HP)
2. Software Prototyping(SP)

In the module hardware prototyping students will develop a prototype of electronic product. Student will be acquiring different skills in electronics like Soldering, Wiring and PCB Design using Electronic Design Automated tools, Assembly of electronic product, Testing and troubleshooting, requirement Analysis , Product concept development in electronic product design.

On the other hand in software prototyping students will learn Software development life cycle (SDLC) concepts, AEIOU framework, UML diagrams, Requirement analysis, data flow diagrams, creating high fidelity prototypes, Testing and Analysis etc.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Digital Prototyping, Semester - III

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Software Prototyping (SP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Software Prototyping (SP)	

MODULE: 1/2	Hardware Prototyping (HP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to design and construction of electronic prototyping	02 HOURS

1. Gain familiarity with basic product design stages; Conceptualization, Detailed Design and Implementation. Form a group of students. (04 max)
2. Acquire concepts of basic processes in electronic prototyping. Develop Concept Description Sheet (CDS) for product to be designed.
3. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span. Hence draw Physical and Mechanical Drawing.
4. Perform Customer Survey and Competitor Analysis
5. Develop Specifications and Make requirement analysis. Hence develop Bill of Material.
6. 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.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	06 HOURS

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

PRACTICAL NO. 04	PCB fabrication	06 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
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.
8. Develop Customer feedback sheet and Take feedback from Customers.
9. Make Customer feedback Analysis based on ratings.

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.
6. Present Customer feedback analysis.

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: 2/2	**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	**Requirement analysis**	**04 HOURS**
Find the requirement specification of given problem statement and formulate the feasible solution.		
PRACTICAL NO. 03	**Design UML Diagrams for given problem statement**	**06 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. 04	Design analysis	02 HOURS
Create High Fidelity Prototype		
PRACTICAL NO. 05	**Prototype Implementation**	**06 HOURS**
Use of prototype development tools such as Proto.io, Invision		
PRACTICAL NO. 06	**Presentation**	**04 HOURS**
Each group will be given 10 min to present their work.		

REFERENCE BOOK

1. Software Engineering A practitioners Approach, Roger S, Pressman, 7th Edition, ISBN: 9780073375977
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Minor Project- Design
	COURSE CODE	CV230
	COURSE CREDITS	1
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV230.CEO.1: To categorize and define a problem to be solved.
CV230.CEO.2: To realize the ethical principles in general and its importance.
CV230.CEO.3: To make the students aware of project requirement analysis, design and planning.
CV230.CEO.4: To appreciate the importance of documenting and ethics of writing.

COURSE OUTCOMES :

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

CV230.CO.1: Delineate the problem to be solved.
CV230.CO.2: Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession.
CV230.CO.3: Embark project planning and design.
CV230.CO.4: Inculcate problem solving skills and critically analyze the options available to solve the problem.
CV230.CO.5: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

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. This will help students to understand the process of product/project development, best practices and encourage their creativity to solve real life problems. The students will learn effective team building, designing, budgeting, planning, engineering skills and processes, safety norms and standards while developing the application/ product. The students will be able to understand importance of documentation and professional ethics.

Guidelines

1. Every student shall undertake the Minor Project in semester III and IV.
2. Every student shall work on an approved project, a group of 03/04 students (maximum) shall be allotted for each minor project.
3. The group members may be from different programme to support the interdisciplinary functioning.
4. The students have to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
5. Collect the sufficient data and survey to establish the criticality of the problem to be solved.
6. Apply various tools for project planning and design.
7. Critically analyze various solutions/techniques to solve real world problems.
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use.
9. Learn and apply standards of engineering ethics and professional behavior.
10. Adherence to the highest principles of ethics, conduct and practices.

TIMELINE

The four member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Formation of Project Group: 2 Weeks (1^{st} week and 2^{nd} week)
2. Finalizing title, feasibility study and approval: 3 Weeks (3^{th} week to 5^{th} week)
3. Engineering Ethics: 3^{rd} week
4. Project Review 1 Presentation: 6^{th} week
5. Analysis and Design of the Project: 3 Weeks (7^{th} week to 9^{th} week)
6. Project Review 2 Presentation: 10^{th} week
7. Report Writing, Documentation and Presentation: 2 Weeks (11^{th} week and 12^{th} week)
8. Project Review 3 Presentation: 13^{th} week (Assessment by Guide)
9. Final Evaluation/Examination Presentation: 14^{th} week

Project Demonstration (50 Marks)

1. **Review 1 (Problem Statement and Literature Survey) (10 marks)**
2. **Review 2 (Project Modeling and Designing) (10 marks)**
3. **Project Activities (10 Marks)**
    - Quiz on Ethics
    - Drafting of Literature Review and Synopsis
    - Project Planning and Design
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration & Presentation (10 marks)**

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 1	Introduction to different forefront areas available within the School. Discussion on innovative application in domain area and resources such as Books, Blog, Publication Houses	To search the domain area of interest	At least 4 subtopics in area of interest (Template I)
Week 2	To brief at least two Innovative products with complete details and their Evolution	To search the domain area/innovative products of interest	Search in area of interest (Template II)
Week 3	Ethics, Morals, Values and Integrity, Work Ethic, Civic Virtue, Senses of Engineering Ethics, Business Ethics, Media Ethics, Environmental Ethics, Bio Ethics, Computer Ethics, Research Ethics	Graded Activity Quiz on Engineering Ethics	Understand the Ethics of an Engineer (Template III)
Week 4	Introduction to Research publication, its type, science citation index, methods to search Journals. Introduction to Ethics of writing(Plagiarism)	Search domain related five papers (from Journal Paper, Conference paper, Technical report, Manual, Thesis)	Student will learn searching SCI journal and understand Ethics of writing
Week 5	Presentation on how to make Project Presentation. Title, problem statement, objective, Scope etc (Select suitable topic of domain and explain it as per the template-IV)	Graded Activity on background study (market survey, customer survey, literature Survey) of domain area of interest	Drafting literature review and Synopsis (Template IV)
Week 6	NIL	Project Review 1 Presentation	Problem Definition and Objectives

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 7	Guidelines and tools for Analysis and Design of the Project and problem solving sessions	Analysis and Design of the Project	Best practices for Analysis and Design
Week 8	Guidelines and tools for the Project Planning, Introduction to Block Diagram, System Architecture	Make use of Project Planning Tools and Design Tools	Best practices for Project Planning and Design
Week 9	Presentation, discussion and doubt clearing based on • Working on Algorithms • Working on Design/ System Architecture • Working on Analysis/ CAD modeling	Graded Activity on Project Design and Planning	Best practices of Project Planning and Design
Week 10	NIL	Project Review 2 Presentation	Project Planning, Design of a solution
Week 11	Guidelines and tools for report writing	Project Report Writing	Effective Report Writing Practices
Week 12	How to give effective presentation on project	Report Writing and Presentation	Effective Documentation of the Project
Week 13	NIL	Project Review 3 Presentation	Final Report and Presentation
Week 14	NIL	Examination: Final Demonstration and Presentation	Problem Statement, Objectives, Design and Planning

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Skill Development Course I - Excel
	COURSE CODE	CV231
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV231.CEO.1: To know the difference between a workbook and a worksheet
CV231.CEO.2: To use basic statistical functions
CV231.CEO.3: To understand basic chart functionality

COURSE OUTCOMES :

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

CV231.CO.1: examine spreadsheet concepts and explore the Microsoft Office Excel environment.
CV231.CO.2: understand basic operators and the order of operations
CV231.CO.3: learn what a function is, and the syntax of a function
CV231.CO.4: apply basic math functions and logical operation
CV231.CO.5: creating Scripts in Worksheet for Auto-cad sheet

PRACTICALS/PROJECT:		
PRACTICAL NO.01	**Introduction to Microsoft Excel**	**2 HOURS**
Worksheet and Workbook, Ribbon, Setting the colour theme, Settings for formulas, Proofing settings, Data Type, Formula, Built-In Function, Data Formatting, Making Charts.		
PRACTICAL NO.02	**Excel Functions**	**2 HOURS**
Common functions, Numeric Functions, String functions, Date Time Functions, VLOOKUP functionon tools		
PRACTICAL NO.03	**Sorting and Filtering**	**2 HOURS**
Hiding rows and columns, Basic sorting in Google Sheets, Sorting with multiple criteria, filtering		
PRACTICAL NO.04	**Creating Macro**	**4 HOURS**
Control Structures, Structure of Program, Chart Macro, Manipulation on Program Steps		
PRACTICAL NO.05	**Matrix Program**	**2 HOURS**
Types of Matrix, Matrix Operation, Program for Matrix Operations		
PRACTICAL NO.06	**Auto-cad Script File**	**2 HOURS**
Creating Scripts in Worksheet		
PRACTICAL NO.07	**What If Analysis**	**2 HOURS**
Goal Seek, Data Tables, Scenario Manager		
PRACTICAL NO.08	**Charts**	**2 HOURS**
Using Charts, Formatting Charts, Using 3D Graphs, Using Bar and Line Chart together, Using Secondary Axis in Graphs, Sharing Charts with PowerPoint / MS Word, Dynamically, (Data Modified in Excel, Chart would automatically get updated)		
PRACTICAL NO.09	**Working with Templates**	**2 HOURS**
Designing the structure of a template, Using templates for standardization of worksheets		

ACTIVITIES- 20 HOURS (1 Hour for each activity)

1. Determination of water content
2. Mechanical sieve analysis
3. Classification of fine grained soil
4. Data of Characteristic compressive strengths of concrete cubes
5. Determination of shear strength of soil
6. Draw SFD and BMD
7. Mohr circle
8. Calculating travel time based on GPS coordinates
9. Produce complex AutoCAD drawings
10. AutoCAD Excel Data
11. Creating Autocad script in worksheet
12. Designing the organisation chart of MITAOE
13. Creating Own Excel Templates
14. Monthly expense sheet
15. Daily / weekly / monthly activity planner
16. Gantt chart
17. EMI sheet
18. Future value of money
19. Student marks datta
20. Generating forms (Attendance letters)

TEXT BOOK

1. Gunthar Pangaribuan, Aplikasi Excel untuk Rekayasa Teknik Sipil, Penerbit PT. Elex Media Komputindo, Jakarta.
2. William Weaver, Jr., James M. Gere, Matrix Analysis of Framed Structures, Second Edition, Van Nostrand Reinhold Company, New York.

REFERENCE BOOK

1. Walkenbach, J. (2010). Excel 2010 formulas. Wiley Pub.
2. Jeschke, E., Reinke, H., Unverhau, S., and Pfeifer, E. (2011). Microsoft Excel 2010 Formulas and Functions Inside Out. Pearson Education.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Skill Development Course I - Revit
	COURSE CODE	CV232
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : Engineering Graphics

COURSE OBJECTIVES :

CV232.CEO.1: To Learn and get familiar with Autodesk Revit Architecture.
CV232.CEO.2: To Understand concept and technique in the 2D and 3D modeling.
CV232.CEO.3: To be able to provide complete rendering and animation

COURSE OUTCOMES :

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

CV232.CO.1: describe building information modeling methodology and its benefits.
CV232.CO.2: draw all Architectural components.
CV232.CO.3: design detail views, add 3D and 2D elements and detail components.
CV232.CO.4: create construction documentation.

PRACTICALS/PROJECT: Project should be performed individually		
PRACTICAL NO.01	**BUILDING INFORMATION MODELING**	**4 HOURS**
• Building Information Modeling for architectural		
PRACTICAL NO.02	**REVIT ARCHITECTURE BASICS**	**4 HOURS**
• Understanding Revit element hierarchy • Revit Architecture user interface • The ribbon framework • Guidelines for using the interface • Using Common modification tools Assignment 1 : Questionaries' on BIM		
PRACTICAL NO.03	**VIEWING THE MODEL**	**4 HOURS**
About Views • View Properties • Guidelines for Working with Views • About Controlling Object Visibility • View Templates • Using Filters • Guidelines for Controlling Object Visibility • About Elevation and Section Views • Guidelines for Working with Elevation and section views • About 3D Views • Perspective view • About Cameras • Creating and Modifying Camera Views • Axonometric view		
PRACTICAL NO.04	**STARTING A NEW PROJECT**	**4 HOURS**
• About Projects • Creating Project Templates • Guidelines for Creating Project Template Files • About Levels • Adding and Modifying Levels • Guidelines for Adding and Modifying Levels • About Grids • Methods of Creating and Modifying Grid Lines • Guidelines for Creating and Modifying Grids Assignment 2 : Questionaries' on REVIT architecture.		

PRACTICAL NO.05	WALLS AND CURTAIN WALLS	6 HOURS

- Creating generic walls
- Sketching walls
- Hosting element in walls
- Modifying walls
- Editing walls
- Creating curtain walls
- Adding curtain grids, mullions and panel
- Modifying curtain walls
- Editing curtain walls structure

Assignment 3 : Draft models of building with Walls.

PRACTICAL NO.06	FLOORS AND ROOFS	4 HOURS

- About floor elements
- Process of adding a floor element
- Sketching floors
- Editing Floors
- About roofs
- Process of sketching roofs
- Roof modification and example
- About Ceiling elements
- Creating ceiling
- Editing ceiling

Assignment 4 : Add floors, roofs and ceiling to drafted model.

PRACTICAL NO.07	STAIRS AND RAILINGS	4 HOURS

- About stairs and railing
- Process for creating a staircase by component
- Process for creating a staircase by sketch
- Creating the generic railing

Assignment 5 : Add Staircases and railings at different locations in model

PRACTICAL NO.08	ADDING FAMILIES and ROOMS AND COLOR FILL PLANS	4 HOURS

- Adding families
- Loading families
- Placing families
- Editing families in project
- Tagging spaces with room tags
- Room tags
- Room Boundaries
- Room separation line
- Generating color rooms plan

Assignment 6 : Add families in plan to create color floor plan, furniture plans, etc.

PRACTICAL NO.09	CREATING PLAN ANNOTATION AND SCHEDULES	4 HOURS

- About Temporary Dimensions
- About Permanent Dimensions
- About Spot Dimension Symbols
- Guidelines for Adding Dimensions
- Exercise: Add Dimensions and Spot Symbols
- About Text
- Setting Text Placement Parameters
- About Legends
- Guidelines for Creating Legends
- About Schedules
- Working with Schedules
- Guidelines for Working with Schedules

Assignment 7 : Add annotations in plans and create schedule documents for different components.

TUTORIAL NO.10	CREATING CONSTRUCTION DOCUMENTATION	4 HOURS

- About Sheets and Title blocks
- About Revision Tracking
- Process of Creating Sheets by using customized title blocks
- Creating Revision Clouds
- Print settings
- Print setup setting
- Guidelines for printing sheets
- Setting for exporting content
- Process of exporting views to CAD formats
- Guidelines for exporting content to CAD formats

Assignment 8 : Prepare all working and commercial plans along with walkthrough video.

PRACTICALS/PROJECT: Project should be performed individually		
PROJECT	**Draw, Design and Develop Residential building Model**	

Draw, Design and Develop G+1 residential multistoried building having minimum B/U area 125 square meter also minimum one cantilever projection and overhead water tank, by using computer software (REVIT). Also prepare commercials Brochure and a Walkthrough video showing internal and external details of building.

Objectives :

1. Prepare all types of submission plans for a building namely :

a. Lay out plan

b. Development Plan

c. Elevation Plans from all sides

d. Section plans

e. Foundation Plan

2. Compose a brochure containing all types of commercials plans for a building namely:

. Colored floor Plans

b. Axonometric Plans

c. 3D Views

d. Perspective Views

3. Prepare basic schedules for different materials used.
4. Compose a Walkthrough video showing internal and external details of building.
5. Present and demonstrate a building prepared in REVIT

TEXT BOOK

1. Autodesk Revit Architecture Essentials User Guide Manual.
2. Punmia B.C., Building Construction, Laxmi Publications Delhi, sixth edition, 2009, ISBN: 81-7008-053-3
3. Shaha M.G., Kale C.M., Principles of Building Drawing, Macmillan Publishers India Limited, Fourth edition, 2010, ISBN-0333925467
4. Building Services Handbook, Routledge Publication, 7 edition, 2013, ISBN-10: 0415631408
5. Duggal S. K., "Building Materials", New Age International Limited, First Edition, 2003, ISBN -81222414354

REFERENCE BOOK

1. Shah, kale and Patki, " Building Drawings with an Integrated Approach to Build Environment", Tata McGraw Hill Publications, Fifth edition, 2015, ISBN- 0071077871
2. Rangwala, "Civil Engineering Drawing", Charotar Publications, First Edition, 2017, ISBN – 9789385039300
3. Building Services Design Management , Wiley-Blackwell Publication, 1 edition, 2014, ISBN-10: 9781118528129
4. Rangwala, "Building Construction", Charotar Publications, 33rd Edition, 2017, ISBN - 978-93-85039-04-1
5. Additional learning from YouTube channel BIMscape The Complete Beginner's Guide to Autodesk Revit Architecture (https://www.youtube.com/watch?v=hyKGzX4lSg and list=PLbJykfQm9O8cArlgixHjUnHI4QLbTZpV3)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Environmental Science
	COURSE CODE	CV203
	COURSE AUDIT	1
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE :

COURSE OBJECTIVES :

CV203.CEO.1: Create awareness about environmental problems among future citizens.
CV203.CEO.2: Interpret basic knowledge about the environment and its allied problems.
CV203.CEO.3: Develop an attitude of responsibility for the environment and society.
CV203.CEO.4: Perceive the importance of sustainable development.

COURSE OUTCOMES :

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

CV203.CO.1: summarize the importance of ecosystem and biodiversity for maintaining ecological balance.
CV203.CO.2: identify environmental problems arising due to engineering and technological activities and the science behind those problems.
CV203.CO.3: categorize the major pollutants along with sources and abatement devices for the environmental management.
CV203.CO.4: perceive the social and professional responsibility towards the environment.

THEORY		
Module I	**Overview of Environment**	**2HOURS**
Multidisciplinary nature of environmental studies, Types of spheres, Natural Resources: Forest, Water, Mineral, Energy, Land, Ecosystems, Biodiversity and its conservation, Natural cycles: Hydrologic, Carbon, Nitrogen, Phosphorus and Sulphur cycle.		
Module II	**Environmental Pollution**	**2 HOURS**
Environmental Pollution: Air, Water, Soil, Solid and Hazardous Waste Management; Environment and human health, Overutilization of natural resources, Environmental Legislation, Environmental monitoring organizations in India, Environmental Protection Agency (EPA)		
Module III	**Global Environmental Issues**	**2 HOURS**
Introduction to: Climate change, Global warming, Acid rain, Ozone layer depletion, Plastic waste management, Municipal solid waste management, Food problem, E-waste management, Social Issues: Environmental ethics and economics.		
Module IV	**Sustainable Development**	**2 HOURS**
Concept of sustainable development, International Institute of Sustainable Development (IISD) : Introduction Sustainable goals, Environmental Audits, Rainwater harvesting Water management techniques		

Activity Based Learning and Evaluation:		
Activity No. 1	**Site Visit**	**02 HOURS**
Students have to visit any one nonhazardous polluted site for finding the various reasons of its pollution and suggest preventive measures for it. Prepare the detailed report on it along with the photos. This could be completed in a group.		
Activity No. 2A	**Students has to perform any one of the following activities : (2A or 2B)**	**02 HOURS**
Students have to organize any one of the following activities in the institute and prepare a detailed report on their experience of organizing conducting the activity, its possible benefits to the environment along with the photos. This could be completed in group of students: 1. No Car and Bike Day 2. Shutting down the fans and air conditioning systems of the campus for an hour. 3. Environmental awareness programs like organizing essay competition, poster competition, slogan making competition or any other related to it. 4. Celebrating various environmental days. 5. Any other similar activity related to the environment.		
Activity No. 2B	**Project Work**	**2 HOURS**
Students have to identify the real life environmental problems from their daily observations and try to find out the various feasible solutions for it as their project work. They are supposed to prepare the prototype, demonstration model, poster, detailed report and present it to the evaluators. The project should be related to the below mentioned heads: 1. Reuse, Recycle and Reduce 2.Environmental Pollution Monitoring and Control 3.Material Balance Concept 4.Sustainable Development 5.Environmental Innovations The evaluation is based on at least one number of project presentation reviews apart from the final project presentation.		

TEXT BOOK

1. R. J. Ranjit Daniels and Jagdish Krishnaswamy, "Environmental Studies", Wiley India Publications, ISBN: 9788126519439.
2. Rao C.S. "Environmental Pollution Control Engineering", Wiley Eastern Publications, ISBN: 9780470217634.
3. Cunningham W.P. and Cunningham M.A., "Principles of Environmental Science", Tata McGraw-Hill Publishing Company, New Delhi, 2002.
4. Miller T. G. Jr., "Environmental Science", Wadsworth Publishing Co., ISBN-10: 1111988935 ISBN: 9781111988937.

REFERENCE BOOK

1. H. S. Peavy, D. R. Rowe and G. Tchobanoglous, "Environmental Engineering", McGraw Hill, ISBN: 84-282-0447-0.
2. Helen Kavitha "Principles of Environmental Science", Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
3. Henry J.G. and Heinke G.W., "Environmental Science and Engineering", 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
4. Metcalf Eddy "Wastewater engineering: Treatment and reuse", McGraw Hill, ISBN: 007041878.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CHEM/CIVIL/MECH ENGINEERING	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS203
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS203.CEO.1: To evaluate the Laplace and inverse transform of functions.

AS203.CEO.2: To evaluate the Fourier series of periodic functions and Fourier transform of non-periodic functions.

AS203.CEO.3: To evaluate the derivative of vector-valued functions.

AS203.CEO.4: To evaluate the area and the surface integrals of the vector functions.

AS203.CEO.5: To apply numerical methods for solving the problems of general calculus and differential equations.

AS203.CEO.6: To execute the program on problems of numerical methods using MATLAB.

COURSE OUTCOMES :

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

AS203.CO.1: Evaluate the Laplace and Inverse Laplace transform and will solve the differential equations.

AS203.CO.2: Rewrite the periodic and non-periodic functions as a series of sines and cosines.

AS203.CO.3: Differentiate a vector valued function in plane or space.

AS203.CO.4: Solve and compute the area and volume of the objects.

AS203.CO.5: Apply the numerical methods to problems of calculus and differential equations.

AS203.CO.6: Execute the program codes using MATLAB.

THEORY		
UNIT 1	**Laplace Transform and its Applications to LDE**	**9 HOURS**
Introduction of Laplace Transform, Properties: First shifting, Change of scale, Linearity, Multiplication by t, Division by t. Laplace Transform of derivatives, Unit Step function, Impulse Function and Periodic Functions. Introduction of Inverse Laplace Transform, Properties: First shifting, Change of scale, Linearity, Multiplication by s, Division by s. Derivatives, Integration. Use of partial fractions to find Inverse Laplace Transform. Applications of Laplace Transfrom to find Solution of linear differential equations.		
UNIT 2	**Vector Differentiation**	**6 HOURS**
Vectors in 2-D and 3-D, Scalar Product, Vector Product, Vector/scalar functions and fields, Derivative of vectors, Velocity and Acceleration, Gradient of a Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field.		
UNIT 3	**Vector Integration**	**6 HOURS**
Line Integration, Line Integrals Independent of Path, Double Integrals Green's Theorem in the Plane, Surfaces for Surface Integrals. Surface Integrals, Volume Integrals, Divergence Theorem, Stoke's Theorem.		
UNIT 4	**Fourier Series and Fourier Transform**	**9 HOURS**
Periodic functions, Fourier series, Dirichlet's conditions, determination of Fourier constants, Half ranges series, arbitrary period functions series. Introduction of Fourier Transform, Fourier Integral Theorem (without proof), Fourier transform and its properties, Fourier Sine Transform, Fourier Cosine Transform, and Inverse Fourier transforms.		
UNIT 5	**Numerical Methods I**	**6 HOURS**
Numerical Differentiation and Integration, Interpolation: Finite Differences, Newton's and Lagrange's Interpolation. Numerical solution of System of linear equations by Gauss elimination method, LU-Decomposition method.		
UNIT 6	**Numerical Methods II**	**6 HOURS**
Solution of Ordinary differential equations by Euler's, Modified Euler's, Runge-Kutta 4th order methods, Adams-Bashforth Predictor and Corrector Method, Solution of Partial Differential equations by Numerical method: Crank Nicholson method .		

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

TEXT BOOK

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232.
2. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0.
3. Amos Gilat, "MATLAB: An Introduction with Applications", 4th edition, Wiley Publication, 2010, ISBN-13: 978-0-470-76785-6.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Ram N. Patel and Ankush Mittal, "Programming in MATLAB- A Problem solving approach", Pearson Education, 2014, ISBN-978-93-325-2481-1.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Mechanics of Fluids
	COURSE CODE	CV214
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : Applied Mechanics, Science of Nature

COURSE OBJECTIVES :

CV214.CEO.1: To relate the knowledge of fluid behavior at rest and in motion for problem solving.
CV214.CEO.2: To summarize the fundamentals of open channel flow.
CV214.CEO.3: To apply conservation equations to pipe flow and open channel flow problems.
CV214.CEO.4: To make use of the concepts related to dimensional analysis and model studies for design of hydraulic structures.

COURSE OUTCOMES :

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

CV214.CO.1: interpret the properties and behavior of the fluid at rest and in motion.
CV214.CO.2: apply the principles of hydrostatics and determine the forces.
CV214.CO.3: utilize equations of motion for various flow conditions and compute discharge of the flows.
CV214.CO.4: analyze laminar and turbulent flows through pipes.
CV214.CO.5: evaluate various parameters related to the flow around immersed bodies.
CV214.CO.6: analyze the different types of open channel flow using various governing equations.

THEORY		
UNIT 1	**Fundamental Concepts and Fluid Statics**	**6 HOURS**

Fundamental Concepts:
Continuum, Fundamental fluid properties, Viscosity and Newton's law of viscosity, Vapour pressure, Surface tension, Capillarity, Bulk Modulus and Compressibility.
Fluid Statics:
Introduction to fluid statics, Pressure and Pressure measuring devices, Pascal's law, Hydrostatic equation, Hydrostatic forces on submerged surfaces, Buoyancy, Stability of floating and submerged objects.

UNIT 2	**Fluid Flow and Equations of Motion**	**7 HOURS**

Fluid Flow:
Parameters of Fluid Flow, Types of Fluid Flow, Potential, Stream function, Rotationality, Vorticity and Circulation, Conservation of Mass and Equation of Continuity.
Equations of Motion:
Forces acting on fluid mass in motion, Euler's equation of motion along a streamline, Navier stokes equation, Bernoulli's Equation and conservation of Energy, Applications of Bernoulli Equation, Hydraulic Grade line and Total Energy line, Kinetic Energy Correction Factor, Linear Momentum Equation, Momentum Correction Factor.

UNIT 3	**Internal Flows**	**7 HOURS**

Reynold's Equation
Laminar Flow:
Characteristics of Laminar flow through circular pipes, Resistance to Flow in Smooth and Rough Pipes, Darcy's law, Energy losses in pipe flow, Flow through simple, compound, parallel, branched pipes and siphons.
Turbulent Flow:
Characteristics of Turbulent Flow through Pipes, Boussinesq's theory, Prandtl's mixing length theory, Velocity distribution in turbulent flow, Velocity distribution for smooth and rough boundaries, Average Velocity Concept.

UNIT 4	**External Flows and Dimensional Analysis**	**8 HOURS**

Flow Analysis:
Practical problems involving fluid flow around submerged objects, Definitions and expressions for drag, Lift, Drag coefficient, Lift coefficient, Types of drag, Stokes law, Drag on - Sphere, Cylinder, Flat plate and Aerofoil, Karman„s vortex street, Effects of free surface and compressibility on drag, Development of lifts, Lift on cylinder and aerofoil, Magnus effect, Polar diagram.
Dimensional Analysis:
Methods of Dimensional Analysis, Dimensionless Numbers. Self-Study: Boundary layer theory, Different types of thicknesses, Boundary layer separation

UNIT 5	Open Channel Flow	6 HOURS

Introduction to Open Channel Flow:
Classification of Channels and Channel Flows, Froude Number, Continuity and Energy Equations for Open Channel flows. Specific Force, Specific Energy, Critical flow computations based on specific force and energy criteria.
Uniform flow in Open channels:
Characteristics and establishment of uniform flow, Chezy's and Manning's formula, Normal Depth, Conveyance, Section factor, Hydraulic Exponent, Uniform flow computations, Most efficient channel sections.

UNIT 6	Gradually and Rapidly Varied Flows in Open Channels	6 HOURS

Gradually Varied Flow (GVF):
Assumptions and Differential equations of GVF, Classification of Bed slopes, GVF profiles, GVF computations.
Rapidly Varied Flow (RVF):
Phenomenon of Hydraulic Jump and energy dissipation, Conjugate depths, Types of hydraulic jump, Applications of Hydraulic jump. Introduction to Computational Fluid Dynamics.

PRACTICALS:		
PRACTICAL NO.01	**Designing the Pipe System**	**6 HOURS**
Design a pipe system for the assigned area by using the appropriate software. In order to complete this practical, students has to do following activities and refer its result as a input data to design the pipe system: 1. Determine viscosity of the fluid. 2. Identify the type of flow by using Reynolds experiment. 3. Calculate all the losses in the flow field (except losses in the pump).		
PRACTICAL NO.02	**Discharge Measurement**	**4 HOURS**
1. Pipe Flows: Using Venturimeter Orifice meter. 2.Open Channel Flow: Using Notches.		
PRACTICAL NO.03	**Analyzing the Internal and External Flows**	**4 HOURS**
In order to complete this practical, students have to do following activities: 1. Verify the Bernoullis Theorem for Internal Flow. 2. Plot the pressure distribution around aerofoil shape by using a wind tunnel.		
PRACTICAL NO.04	**Energy Dissipation in Hydraulic Jump**	**6 HOURS**
In order to complete this practical, students have to do following activities: 1. Determine the value of Mannings coefficient for the given channel and calculate the velocity. 2. Identify the type of hydraulic jump based on Froude number. 3. Determine the percentage energy dissipation (relative loss) due to hydraulic jump both experimentally and analytically.		
PRACTICAL NO.05	**Mini Project**	**4 HOURS**
Students have to identify real-world situation/problem related to applications of basic fluid mechanics concepts and prepare the working model or prototype for the selected project along with the detailed report.		

TEXT BOOK

1. Modi, P.N. and S.M. Seth, "Hydraulics and Fluid Mechanics including Fluid Machines", Standard Book House, Delhi, Nineteenth edition, 2009, ISBN 13: 978-8189401269
2. Frank M. White, "Fluid Mechanics in SI Units", McGraw Hill Publications, Eighth edition, 2017, ISBN 13: 978-9385965494.
3. Streeter and Wylie, "Fluid Mechanics", McGraw Hill Publications, ISBN 13: 978-0070622425
4. Subramanya K, "Flow in Open Channels", Tata McGraw-Hill Education, Fourth edition, 2015, ISBN 13: 978-9332901339.

REFERENCE BOOK

1. Yunus Cengel and John Cimbala, "Fluid Mechanics Fundamentals and Applications", McGraw Hill, Publications, ISBN 13:978-0070700345.
2. Fox, McDonald and Pritchard, "Fluid Mechanics", Wiley publication, 2015, ISBN: 978-8126541287.
3. R. C. Hibbeler, "Fluid Mechanics", Person Publication, 2018, ISBN: 978-9332547018
4. Ven te Chow, "Open Channel Hydraulics" Tata McGraw Hill, 2009, ISBN 13: 978-1932846188.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Surveying and Geospatial Engineering
	COURSE CODE	CV215
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	-	50	150

PRE-REQUISITE :

COURSE OBJECTIVES :

CV215.CEO.1: To introduce the students, to the theory and application of Surveying in Civil Engineering projects.

CV215.CEO.2: To facilitate understanding of the fundamentals of surveying knowledge and familiarizing them with latest surveying practices. To train the students to work in the field with the knowledge acquired in the classroom through mini field projects.

COURSE OUTCOMES :

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

CV215.CO.1: apply the techniques of levelling to solve engineering problems.

CV215.CO.2: interpret and implement the principles of trigonometry for surveying using standardized methods.

CV215.CO.3: perform traversing and triangulation by implementing the basic principles of surveying.

CV215.CO.4: construct different types of curves for alignment of roads and railways and lay out civil engineering structure on field.

CV215.CO.5: Record and interpret spatial data and perform analysis by using modern surveying tools

CV215.CO.6: analyze field data to minimize errors using mathematical models.

THEORY		
UNIT 1	**Introduction to Surveying and measurement of elevations**	**8 HOURS**
Introduction: Principle of surveying, classification of surveys. Introduction to coordinate systems. Applications of surveying. Equipment used in surveying. Concept of temporary and permanent adjustments. Errors in measurements- sources and types. Introduction to EDM: Study of Total Station Spirit Levelling- different types of levels and staffs; booking and reduction of data, methods of levelling, errors in levelling. Contours- characteristics, uses, and methods of contouring, contour maps-toposheets, drawing sections, measurements from cross section, earth work calculations, contouring using software. Self Study: Principle of plane table surveying, advantages and disadvantages		
UNIT 2	**Measurement of Linear Distances and Directions**	**8 HOURS**
Prismatic Compass- concept of bearings and angles; magnetic bearings, dip-declination, local attraction, errors and adjustments; Theodolites- different types, methods of observation and booking of data, Optical methods for linear measurement with theodolite. direction measurement with theodolite, horizontal angles by repetition and reiteration, vertical angles, measurement of Hz Distance and reduced levels of inaccessible locations. Total Station- Distance and Coordinate Measurement, Remote Elevation Measurement. Self-Study- Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite (assisted With demonstration and practical)		
UNIT 3	**Traversing and Triangulation**	**8 HOURS**
Traversing: Purpose and classification of traversing, traversing with a theodolite and Total Station. balancing of traverses, Computation of coordinates, computation of areas from plans, calculation of area of a closed traverse, omitted measurements, Triangulation- network, strength of figures, selection of stations, intervisibility, satellite stations, measurements and computations. Self Study: deflection angles using transit theodolite and magnetic bearing.		
UNIT 4	**Curves and Survey Projects**	**8 HOURS**
Curve Setting: Types of curves, elements of a curve, setting out a simple curve, types of vertical curves, setting out vertical curves. Engineering Project Surveys- requirements and specifications, various stages of survey work. Setting out of works- buildings Self-Study: Setting out of culverts		
UNIT 5	**Fundamentals of RS, GIS and Photogrammetry**	**8 HOURS**
Remote Sensing: Fundamentals of remote sensing- definition and overview of remote sensing, electromagnetic spectrum, concept of resolution, earth observation satellite and their characteristics. GIS: introduction to GIS definition, evolution, components of GIS, Input data, GIS data models, address geocoding, digital image processing Introduction to Aerial Photogrammetry: vertical and oblique photography, scale, image parallax, geodetic reference co-ordinate system, introduction digital elevation model		

UNIT 6	Adjustment computation	4 HOURS
Theory of errors, propagation of errors, variance and covariance; Least squares principle and adjustment of field survey data by parametric and condition equation methods		

PRACTICALS: The following practical are to be performed		
PROJECT NO.01	**ROAD PROJECT**	**8 HOURS**

Prepare a project report on road setting out a road having simple circular curve.
Data output- Post-requisite TRE and QSE Objective:
1. Fix the alignment of road with its magnetic bearings
2. Calculate deflection angle- with at least one change in direction
3. Setting out of simple circular curve
4. Calculate RLs of road profile by auto level- simple and differential levelling
5. Draw the contour map of the road either manually or using standard software.
6. Draw l/s to fix formation line and draw c/s at various chainage
7. Calculate the volume of earthwork in cutting and filling

PROJECT NO.02	Setting out of foundation	10 HOURS

Prepare a project report on setting out a designed foundation plan on ground As inputs from pre-requisite CV-205-BDC (plan of residential building)
Objective:
1. Prepare of the plan of a whole area/populated area/closed traverse (survey number such as the campus of a college) with total station using Auto-CAD
2. Calculate the co-ordinates of respective plot
3. For proposed building, find the position of required plot size on ground and mark the area
4. Perform preliminary survey of an area with a total station
5. Draw the contour map of the region either manually or using standard software such as QGIS or ArcGIS.
6. Calculate the co-ordinates of respective foundation on the same area using AutoCAD
7. Mark out a designed foundation plan on ground with total station

PRACTICAL NO.01	Closed traversing	2 HOURS
Comparison between the angular and linear adjustment necessary for a closed traverse performed with a prismatic compass and a total station or 1" micro-optic theodolite.		

PRACTICAL NO.02	Reduced level	4 HOURS
To determine the reduced level of inaccessible point using a 1" micro-optic theodolite (at least two cases)		

TEXT BOOK

1. Dr. B. C. Punmia, Ashok K. Jain, ArunK.Jain, "Surveying Vol. I and II", Laxmi Publication, ISBN : 81- 7008-054-1.
2. T.P.Kanetkar and S.V.Kulkarni , "Surveying and Levelling" Vol. I and Vol. II, PVG Publication , ISBN:10 8185825009, ISBN: 13 9788185825007.

REFERENCE BOOK

1. Charles D Ghilani, Paul R Wolf., "Elementary Surveying: An introduction to Geomatics", Prentice Hall, 14th Edition, ISBN-13: 978-0132554343/ ISBN-10: 0132554348.
2. A.M.Chandra, "Plane Surveying", New Age International Publishers, ISBN 13 : 9788122419023.
3. N. N. Basak, "Surveying and Levelling", Tata Mc-Graw Hill, ISBN 10: 007460399X / ISBN 13: 9780074603994.
4. Dr. K. R. Arora, "Surveying Vol. I and II", Standard Book House. ISBM-13: 9788189401238
5. Subramanian,"Surveying and Levelling", Oxford University Press, ISBN : 0195684249, 9780195684247.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Structural Analysis
	COURSE CODE	CV216
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : Mechanics of Solids

COURSE OBJECTIVES :

CV216.CEO.1: To understand the process of structural analysis.
CV216.CEO.2: To apply geometric and energy methods to determinate structures.
CV216.CEO.3: To apply force methods of analysis for indeterminate structures.
CV216.CEO.4: To apply displacement methods of analysis for indeterminate structures.
CV216.CEO.5: To draw influence line diagrams for determinate structures.
CV216.CEO.6: To introduce plastic analysis for steel structures.

COURSE OUTCOMES :

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

CV216.CO.1: determine internal forces in structure and sketch deflected shapes.
CV216.CO.2: determine displacements of determinate structures.
CV216.CO.3: analyse indeterminate structures by force methods.
CV216.CO.4: analyse indeterminate structures by displacements methods
CV216.CO.5: analyse determinate structures for moving loads.
CV216.CO.6: estimate the collapse load for indeterminate structures.

THEORY		
UNIT 1	**Introduction to structural analysis**	**6 HOURS**
Types of structures and loads. The process of analysis and design of structures. Stability of structures. Degree of static and kinematic indeterminacy. Symmetry of loads and supports. Review of Axial force, shear force, bending moment diagrams. Static analysis of beams frames and trusses.		
UNIT 2	**Geometrical and Energy methods**	**7 HOURS**
Displacements of Statically Determinate Structures by Macaulay's Method, moment area method and conjugate method. Principles of virtual work, Strain energy, Castigliano's theorems. Principle of superposition, Betti's theorem, Maxwell's reciprocal theorem.		
UNIT 3	**Force Methods**	**7 HOURS**
Basic Concepts of the Force Method. Formulation of compatibility equations, Method of consistent deformations, Unit load method for analysis of indeterminate beams, frames and trusses. Analysis for Temperature and lack of fit.		
UNIT 4	**Displacement Methods**	**7 HOURS**
Basic Concepts of the displacement method. Stiffness coefficients, Slope deflection equations. Formulation of equilibrium equations. Relative stiffness, Moment distribution method. Analysis of indeterminate beams, frames and trusses, effect of settlement of supports.		
UNIT 5	**Influence Lines**	**7 HOURS**
Concept of moving loads. Influence lines for cantilever, simply supported, overhanging beams and pin jointed truss. Criteria for maximum shear force and bending moment. Absolute maximum shear force and bending moment under moving point loads.		
UNIT 6	**Plastic Methods**	**6 HOURS**
Concept and assumptions in plastic analysis theory, shape factor, collapse load, load factor, plastic modulus of section and plastic moment of resistance. Upper bound and lower bound theorems. Computation of collapse load for fixed beam, continuous beam and plane frames.		

A) TUTORIAL: Tutorials based on following topics		
TUTORIAL NO.01	**Static analysis of determinate structures**	**2 HOURS**
Use of FBD and equilibrium equations for analysis of determinate beams, frames and truss.		
TUTORIAL NO.02	**Geometrical and energy methods**	**2 HOURS**
Determination of slope and deflections for determinate beams by geometric and energy methods.		
TUTORIAL NO.03	**Force methods**	**2 HOURS**
Analysis of indeterminate structures by force methods and plotting SFD and BMD.		
TUTORIAL NO.04	**Displacement Methods**	**2 HOURS**
Analysis of indeterminate structures by displacements methods and plotting SFD and BMD.		
TUTORIAL NO.05	**Influence Lines**	**2 HOURS**
Drawing ILD for determinate beams and trusses under moving point loads.		
TUTORIAL NO.06	**Plastics Methods**	**4 HOURS**
Plastic analysis of indeterminate beams and frames by static and kinematic methods.		

B) V Labs: Experiments on following topics using Virtual Labs.		
EXPERIMENT NO.01	**Single Span Beams Experiment**	**2 HOURS**
http://bsa-iiith.vlabs.ac.in/exp2/Objective.html?domain=Civil		
EXPERIMENT NO.02	**Continuous Beams Experiment**	**2 HOURS**
http://bsa-iiith.vlabs.ac.in/exp3/Objective.html?domain=Civil		
EXPERIMENT NO.03	**Portal Frames Experiment**	**2 HOURS**
http://bsa-iiith.vlabs.ac.in/exp5/Objective.html?domain=Civil		
EXPERIMENT NO.04	**Trusses Experiment**	**2 HOURS**
http://bsa-iiith.vlabs.ac.in/exp8/Objective.html?domain=Civil		
EXPERIMENT NO.05	**Plastic Hinge Experiment**	**2 HOURS**
http://bsa-iiith.vlabs.ac.in/exp10/Objective.html?domain=Civil		

TEXT BOOK

1. C S Reddy, "Basic Structural Analysis", Tata McGraw Hill, 2011, ISBN-13: 978-007-0702-769
2. R.C.Hibbeler, "Structural Analysis", Pearson Education; 9th Edition, 2017, ISBN-10: 9332586144
3. Devdas Menon, "Structural Analysis", Narosa Publishing House, 2008, ISBN: 978-81-7319-750-5

REFERENCE BOOK

1. Amin Ghali, Adam M Neville and Tom G Brown, "Structural Analysis: A Unified Classical and Matrix Approach", Sixth Edition, 2007, Chapman and Hall, ISBN: 978-04-1577-433-8
2. T.S. Thandavamoorthy, "Structural Analysis", Oxford Higher Education, 2011, ISBN-10: 0198069189

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	AY: 2020 - 2021 (R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Rapid Prototyping
	COURSE CODE	ET235
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	REVISION NO	1.0

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

PRE-REQUISITE : ME104 - Engineering Graphics, EX102 - Electrical and Electronics Engineering, CV102 - Applied Mechanics

COURSE OBJECTIVES :

ET235.CEO.1: To learn about materiality and techniques.
ET235.CEO.2: To justify the product development cycle through prototype project.
ET235.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET235.CEO.4: To 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,

ET235.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET235.CO.2: Apply acquired skills to the construction of a prototype project.
ET235.CO.3: Develop a prototype project by performing tasks in team.
ET235.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. Civil Prototyping (CP)

In Mechanical prototyping, students will learn rapid prototyping skills. Students will focus on basics of CAD modeling, hands on practice on CAD software, 3D Modeling , 3D Printing, Fabrication of prototype and testing etc.

On the contrary in civil prototyping students will learn developing bamboo structures by testing and analyzing bamboo, designing bamboo joinery, and testing of bamboo structures.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Rapid Prototyping, Semester - III

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Civil Prototyping (CP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Civil Prototyping (CP)	

MODULE: 1/2	Mechanical Prototyping (MP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to prototyping	04 HOURS

1. Introduction to different prototyping, traditional prototyping vs. advance rapid prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Different types of materials used in prototyping model.
3. Introduction of multi axis (4D and 5D) machines used in prototyping and machining.
4. Making of paper prototyping (virtual or physical).
5. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.

PRACTICAL NO. 2a	Basics of CAD modeling	04 HOURS

1. Introduction of CAD software.
2. Introduction of 2D, 3D Modeling using CAD software package.
3. Hands on practice of CATIA or any other CAD software.
4. Formation of students group per project team.

PRACTICAL NO. 2b	3D Modeling for prototyping	04 HOURS

1. Introduction of 3D modelling and its interaction with prototype machine
2. Identify physical constraints of prototyping.
3. Sketcher-workbench and its applications
4. Part design workbench.
5. Preparation of 3D prototyping model by CAD software for final project

PRACTICAL NO. 03	Preprocessing of 3D printing slicing	03 HOURS

1. Generating STL files of 3D models from CAD software & working on STL files.
2. Pre-Processing the 3D Model in Cuba software / kisslicer - repeater for slicing.
3. Selection of orientation of model, support generation, skin and wall thickness- depth setting.
4. Setting of printing speed, flow rate, volume, mass and time require for printing or manufacturing.
5. Practice of slicing on 3D Cad model and decide optimize parameters.

PRACTICAL NO. 04	Orientation and support generation, manufacturing planning	03 HOURS

1. Suitable filament material for 3D printing and selection and its properties.
2. Selection of material and process for making physical models by other tradition methods (machining, wood, clay, paper, polymer, etc).
3. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Manufacturing and fabrication of model	06 HOURS

1. Introduction 3D printer machines, and other machines used for prototyping.
2. Demonstration of 3D printing machine pre-setting and filament material loading.
3. Hands on experience of rapid prototype machine for part/object/model, manufacturing of conventional prototype model if any, assembly if required.
4. Calculation of cost of product, financial aspect, Bill of material (BOM), testing for prototyping, Plan to promote product/model in market, etc.

PRACTICAL NO. 06	Project presentation	02 HOURS

1. Final Presentation and demonstration of models.
2. 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: 2/2	Civil Prototyping (CP))	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**02 HOURS**
Introduction of bamboo, its physical, mechanical properties, selection, seasoning and treatment, case studies of bamboo structures.		
PRACTICAL NO. 02	**Testing & Analysis of Bamboo**	**04 HOURS**
Study of different test on Bamboo & Analysis of structures made by bamboo.		
PRACTICAL NO. 03	**Design of bamboo Joinery**	**04 HOURS**
Study of different bamboo structures, Hands on different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo structures**	**08 HOURS**
Making of bamboo structures		
PRACTICAL NO. 05	**Testing on bamboo structure (Post Testing)**	**04 HOURS**
Testing of different bamboo structures		
PRACTICAL NO. 06	**Final project presentation**	**04 HOURS**
Comparative study of analytical and test results of the bamboo Structure, 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.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Minor Project-Implementaion
	COURSE CODE	CV240
	COURSE CREDITS	1
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

COURSE OBJECTIVES :

CV240.CEO.1: To disseminate different methodical approaches to make solution.
CV240.CEO.2: To explain different conventional and modern engineering tools/techniques.
CV240.CEO.3: To engage them in creative thinking to improve the project performance using recent trends.
CV240.CEO.4: To educate about different types of prototyping.
CV240.CEO.5: To be more self efficient to solve problem in real time design environment.
CV240.CEO.6: To create awareness about Intellectual Property Rights(IPR).

COURSE OUTCOMES :

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

CV240.CO.1: Select appropriate method for making of solution.
CV240.CO.2: Compare various engineering tools/technique to develop solution.
CV240.CO.3: Justify the selected method/tools opted for making of solution.
CV240.CO.4: Develop tangible solution to defined problem.
CV240.CO.5: Test the developed solution.
CV240.CO.6: Document solution in the form of Project report / IPR drafts.

COURSE ABSTRACT

Project is an avenue to cater Societal and Industrial needs. Minor project is one of the platform which students will use to solve real time problems. This course focuses on Selection of Methods/Engineering tools/Analytical techniques for making of solution.Further it emphasizes on importance of testing of solution by various stake holders.Through this course student learns to comprehensively understand engineering fundamentals and concepts, gets practical experience, chance to showcase skills, learns about team work, communication skills and responsibilities. It also imparts knowledge of Intellectual Property Rights.

Guidelines

1. Group members should deliberate upon different methodical approaches and finalize the appropriate method.
2. Students group should explore different Engineering tools/techniques for making of solution.
3. Justify the selected method/Engineering tools/analytical techniques identified based on the feasibility, affordability and ease of use.
4. While making the solution ,its imperative to take inputs/suggestions from various stake holders.
5. Solution must be critically analyzed from aspects.
6. Completed solution must be tested by target user/stake holders.
7. Students must protect their innovation,proof of concept through IPR .
8. While working in team, individual student should contribute and communicate effectively to maintain team balance.

TIMELINE

1. IPR Activity on Earlier allocated Group : 2 Weeks (1^{st} ,2^{nd} week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (4^{th}, 5^{th} week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (9^{th}, 10^{th} week)
4. Preparation of Project Progress Report – I (week 11^{th} and 12^{th}) Project Phase-II
5. Project Review III (10 marks) (11^{th} week)
6. Evaluation by external examiner (End Semester by 12^{th}, 13^{th} week)

Demonstration and Presentation (50 Marks)

1. **Review 1 (Project Implementation) (10 marks)**
2. **Review 2 (Project Demostration) (10 marks)**
3. **Project Activities (10 Marks)**
   - Quiz on IPR (5 marks)
   - Patent Drafting (5 marks)
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration and Presentation (10 marks)**

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Introduction to IPR (Patent & Right) (30 min) Videos on Patent: (30 min)	Student will attempt Quiz-I IPR after the lecture (10 Questions) Graded Activity 5marks Template I	Student will learn the patents and how to search patent
Week 2	How to check patent through CDAC online portal.	Student will do prior art search for their project, and try to generate patent Abstract as per the (Template- II)	Submission of Patent Abstract as per the prescribed Template.
Week-3	Design, Architectural overview /feasibility analysis of the project, Recent trends available to improve the performance.	Discussion on system architecture/ design method/ feasibility of project idea.	Student will implement the best feasible method to generate prototype
Week-4	NIL	Review I (10 Marks) - Presentation	Student will present progress done in project prototype building.
Week-5	Searching of Patents, Drafting of Patents , Filing of Patents , types of patent Application, Patent Documents. Expert lecture on above topic.	Final Drafting of complete patent document (5 marks) Graded Activity	Student will understand the basics of drafting patents, important of filling patent Submission in LMS
Week-6	Presentation, discussion and doubt clearing based on • Working on Algorithms / Design • Working on Analysis • Developing Prototype / Programming/ Circuits etc	As per department / school	Student will learn to prevent design flaws.

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week-7	Presentation, discussion and doubt clearing based on • Working on Algorithms/Design • Working on Analysis • Testing of Prototype/ Code/ Circuits of project	As per department / school	Student will analyze for project outcome
Week-8	NIL	Review-II (10 Marks) - Presentation	Student will work for performance improvement if project not working satisfactorily.
Week-9	Regarding Final PPT For Project Faculty himself gives a presentation based on how to make effective presentation on research topics.	Student will submit the Draft PPT through LMS at the end of Week-10	Student will learn to generate PPT covering all final outcomes of the project.
Week-10	Regarding Final report Generation For Project Faculty himself gives a presentation based on how to make effective project report should explain all guidelines to be followed while preparing report	Student will submit the Draft Project report through LMS at the end of Week-10	Student report are expected to have design Analysis, and the project should be expected to one year with the same guide
Week-11	NIL	Review-III (10 Marks)-Presentation	Students are expected to prepare a detailed project report and Project PPT , they should also check for plagiarism.
Week-12	Final Project presentation and project report submission to the project coordinator. Faculty will review the student projects with external examiner	Presentation and demonstration of project.	Prototypes/Software and Final Project report

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	AY: 2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	COURSE NAME	Minor Project-Implementaion
	COURSE CODE	CV240
	COURSE CREDITS	1
RELEASED DATE : 01/07/2020	REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV240.CEO.1: To disseminate different methodical approaches to make solution.
CV240.CEO.2: To explain different conventional and modern engineering tools/techniques.
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COURSE OUTCOMES :

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CV240.CO.1: Select appropriate method for making of solution.
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CV240.CO.3: Justify the selected method/tools opted for making of solution.
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5. **Final Demonstration and Presentation (10 marks)**

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Week-11	NIL	Review-III (10 Marks)- Presentation	Students are expected to prepare a detailed project report and Project PPT , they should also check for plagiarism.
Week-12	Final Project presentation and project report submission to the project coordinator. Faculty will review the student projects with external examiner	Presentation and demonstration of project.	Prototypes/Software and Final Project report

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP 202
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP202.CEO.1: To increase students' confidence during everyday communication.

HP202.CEO.2: To increase impact of students' communication during presentations and public speaking.

HP202.CEO.3: To develop Leadership qualities among students.

COURSE OUTCOMES :

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

HP202.CO.1: Express themselves effectively in routine and real-world interactions through verbal and written communication.

HP202.CO.2: Show Confident Public Speaking skills.

HP202.CO.3: To showcase leadership qualities during tough tasks, make decisions and actions effectively within time.

TUTORIALS: (SECTION A)		
TUTORIAL NO.01	**Role Plays and Picture Description**	**4 HOURS**
It helps students to sharpen their extempore skills with effective articulation and logical sequencing of content.		
TUTORIAL NO.02	**Creative Writing Skills and Presentation Skills**	**8 HOURS**
It aims at evolving effective writing skills and presentation skills.		
TUTORIAL NO.03	**Voice Modulation and Audio - Video Listening and Debate**	**8 HOURS**
To enhance listening skills and to teach the students the basic components of voice modulations and helping them practice it. It helps overcome stage fear and learn audience engagement		
TUTORIAL NO.04	**Leadership**	**6 HOURS**
Leadership qualities helps person to lead a team in achieving the set vision. It helps in planning to execute it, utilizing resources and motivating people involved in it.		
TUTORIAL NO.05	**Decision Making**	**4 HOURS**
It helps to make necessary courageous and difficult decisions and carry them into action.		
TUTORIAL NO.06	**Time Management**	**6 HOURS**
It helps organizing and planning how to divide valuable time between specific activities and prioritizing activities.		
SECTION B:	**Verbal, Reasoning and Aptitude Training through BtechGuru**	**12 HOURS**

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Simon Wootton and Terry Horney, Strategic Thinking A Nine Step Approach to Strategy and Leadership for Managers and Marketer, ISBN13: 9780749460778.
5. Lorin Woolfe, The Bible on Leadership: From Moses to Matthew – Management Lessons for Contemporary Leaders, ISBN-10 : 0814439438; ISBN-13 : 978-0814439432.

REFERENCE BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Garr Reynolds, Presentation Zen: Simple Ideas on Presentation Design and Delivery (Voices That Matter) , New Riders; 2 edition (8 December 2011), ISBN-10: 0321811984.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Liberal Learning
	COURSE CODE	HP203
	COURSE CREDITS	AUDIT
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP203.CEO.1: To create awareness about joy of learning among students
HP203.CEO.2: To teach the skills necessary to be a lifelong learner
HP203.CEO.3: To provide students with broad knowledge of the wider worlds.
HP203.CEO.4: To develop a sense of social responsibility as well as strong and transferable intellectual and practical skills.
HP203.CEO.5: To inculcate intellectual, civic, and practical capacities in students.

COURSE OUTCOMES :

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

HP203.CO.1: Develop a skill in the domain of their interest.
HP203.CO.2: Demonstrate the skills learnt in the course.
HP203.CO.3: Apply the concepts learnt in real-life situations.

NOTE : Students may select any one of the following tracks

COURSE CONTENTS		
Track 1	**Introduction to photography**	**12 HOURS**
Types of camera, Basic camera controls. Light & Lenses, Understanding the Exposure Triangle. Aperture, Shutter Speed, and ISO. Auto and manual focus, Depth of field Landscape & nature photography, Creative aspects.		
Track 2	**Dance**	**12 HOURS**
Study and demonstration of various dance forms such as classical, Bollywood, street dance, ballroom dance and Contemporary.		
Track 3	**Creative Writing**	**12 HOURS**
Introduction to Creative Writing-How, literary aspects, different genres, forms of writing and script writing, Short Story Writing. Blog Writing.		
Track 4	**Guitar**	**12 HOURS**
Parts of guitar, Names of strings, Proper right hand techniques, Proper left hand techniques, Tuning Guitar, Tuning by Ear, Tuning to a keyboard Introduction to guitar fret board & The Chromatic Scale- The Chromatic Scale, Fret board, How to read Guitar Tablature, Finger exercises, how to read Chord Blocks.		
Track 5	**Art and Craft**	**12 HOURS**
Sketching & Drawing, Elements of Art, types of art forms, types of Painting, Craft, Wrap in scrap, Best out of waste, Paper craft, Cloth craft & Rangoli.		
Track 6	**Robotics**	**12 HOURS**
Introduction to Robotics, Robotics Links and joints, Selection & types of sensors, Actuators.		
Track 7	**Drama**	**12 HOURS**
Learning & practicing narrations, craft and art conceptualization as an effective presentation, Survey for identification of social and global issues as a concept in script writing, Sound and illumination measures. Understanding the audition for various sections like drama & film.		

Illustrating the dialog delivery, expressions, volume, pitch in the dialog, Expression through photography and editing skill with an expertise in handling cameras, microphone, effective management skill enabling the justification through foundation till representation.

Track 8	**Yoga and Meditation**	**12 HOURS**

Concept of mind, Consciousness. Concentration techniques, Breathing exercises, Visualizations, Walking meditations. Simple yoga, Meditation and prayer, Asana and its types , Pranayama, its types and principles.

Track 9	**Automotive Skills**	**12 HOURS**

Introduction to Automotive system, Brake system, Power train of automotive, Suspension system, Computer Aided Engineering, Manufacturing and safety, Assembly and finishing.

Track 10	**Empathy & Compassion**	**12 HOURS**

Importance of Empathy, Role of empathy and compassion for engineers, Empathy activities, Skepticism About the Self, Free Will and the Situation, Recognizing emotions reading body language, improving listening skills, mindful self compassion, Compassionate Leadership,Origins of Morality, joy of giving, social responsibility, exercising social services.

Track 11	**Singing**	**12 HOURS**

Vocal cords, Voice types, Female: Soprano or alto, Male: Tenor, baritone or bass, Breathing Techniques, Role of breathing in singing, types of scales and pitches, Musical notes foundation of any song, warm-up exercises: Humming exercise, tongue twisters, vowels, Tempo of song, Tempo Markings, Practicing all octaves, analysis of songs, practicing songs.

Track 12	**Chess**	**12 HOURS**

Introduction to game of Chess. Rules, movement of pieces, strengths and weaknesses of all pieces. Stalemate, touch move, etiquette, pawn promotion and zugzwang, square of the pawn. Fundamental checkmate patterns, basic rules, special moves and rules such as castling, promotion, EnPassant, good moves for the opening.

Track 13	**RC Plane**	**12 HOURS**

Introduction to RC planes, study with categorization of planes and study of control forces on RC plane. Study of control surfaces. Study of airfoil, Studying the concepts of take-off, cruising, landing and motions during flight. Study of graphs. Study on factors affecting the flight of plane. Control and propulsion system of RC aircraft. Introduction and making of Electrical glider.

Track 14	Drone Making	12 HOURS

Three thumb rules, Basic of FAA, Combination of electronics, Frame design , Motor stator reading and dimension, Basic of electronics, Introduction to Drones, Fundamental of Flight, Airframes and Electric Motors, ESC and flight controller, Receivers And Transmitter, Battery and chargers, Basic building Tutorial with working on software(Betaflight), FPV and LOS Simulations, Working on development of Betaflight.

NOTE : More tracks will be added as per demand of the students

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY IN CIVIL ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V

SUMMER INTERNSHIP (Audit: CV300**)**

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	CV305	Concrete Technology	3	2	-	35	35	30	50	0	150	4
DC08	CV306	Drinking Water & Sanitary Engineering	3	2	-	35	35	30	50	0	150	4
DC09	CV307	Design of Steel Structure	3	0	-	35	35	30	0	0	100	3
OE01	CV32#	Open Elective-01 (CPM / EE)	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP6	CV342	Skill Development Course – 2 (ETABS)	0	4	-	0	0	25	50	0	75	2
SDP7	CV350	Project Design	0	4	-	0	0	25	0	50	75	2
TO0TAL			**15**	**12**	**0**	**140**	**190**	**195**	**200**	**50**	**775**	**21**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	CV312	Design of Reinforced Concrete Structure	3	2	-	35	35	30	50	0	150	4
DC11	CV313	Transportation Engineering	3	2	-	35	35	30	50	0	150	4
DC12	CV314	Water Resources Engineering	3	0	-	35	35	30	0	0	100	3
OE02	CV33#	Open Elective-02 (CPM / EE)	3	2	-	35	35	30	50	0	150	4
SDP8	CV34#	Skill Development Course – 3 (OpenRoad Designer / WATERGEMS)	0	4	-	0	0	25	50	0	75	2
SDP9	CV360	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability and Career Development	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	2020 - 2021 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Student Internship Program (Soft Skill/Technical Skills)
	COURSE CODE	CV300
	COURSE CREDITS	Audit
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV300.CEO.1: To develop good bahavioural practices
CV300.CEO.2: To gain learning and living experience
CV300.CEO.3: To get acquainted with online learning platforms
CV300.CEO.4: To recognize the latest trend and understand the requirements for professional life
CV300.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CV300.CO.1: Manage emotions, health, finances, relationships, performance extracurricular activities
CV300.CO.2: Increase knowledge of emotional competency and emotional intelligence
CV300.CO.3: Develop interpersonal skills and adopt good leadership behavior
CV300.CO.4: Reduce negative stress while promoting eustress, or positive stress
CV300.CO.5: Inculcate a sense of sportsmanship, better physical health and competitive spirit

INTRODUCTION:

The main aim of this internship is to assist all Third Year B.Tech. students to acquire the skills required for personal stability and professional growth. The ultimate goal is to imbue students with professionalism and technical skills. Using this internship, MITAoE students will enhance their professional skills, making themselves more marketable in today's competitive world. The students can develop various extracuurricular skills for working on emotional intelligence and sportsman spirit.

SCOPE AND STRUCTURE OF SIP:

This internship is offered to entrants of Third Year B.Tech. (after semester IV) that meet the eligibility criteria stated below:
Third Year B.Tech. entrants should apply for 3 to 4 weeks duration training or certification courses during June-July of every academic year. This is an audit course.

The scope of this internship is limited to identifying soft skill/ technical skill development opportunities and assisting MITAoE students to apply for such courses.

STUDENT ELIGIBILITY CRITERIA:

Students applying for internship must meet the following criteria:
After completion of fourth academic semester, Second Year B.Tech. students (Third Year B.Tech. entrants) of all schools are eligible to apply for 3 to 4 weeks duration internships under student internship program.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Concrete Technology
	COURSE CODE	CV305
	COURSE CREDITS	4
RELEASE DATE : 01-07-2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : 1. Building Design & Construction

COURSE OBJECTIVES :

CV305.CEO.1: To understand fundamental knowledge of concrete, its properties and its behaviour under various conditions.

CV305.CEO.2: To design mix of regular and special types of concrete.

CV305.CEO.3: To understand special techniques of concreting and machineries used for concreting work.

COURSE OUTCOME :

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

CV305.CO.1: Describe different type's concrete ingredients with their properties. (L1)

CV305.CO.2: Illustrate properties of concrete using various IS tests. (L3)

CV305.CO.3: Produce a concrete with specific mix. (L4)

CV305.CO.4: Explain special types of concrete techniques.(L2)

CV305.CO.5: Describe different concrete related equipment. (L2)

CV305.CO.6: Analyze Methods of Concrete Repair. (L3)

THEORY		
UNIT 1	**Introduction and General Ingredient Of Concrete**	**6 HOURS**
History and Introduction of concrete. Cement: Different types of cement, Important properties and applications, Manufacturing of Portland cement, Chemical composition of Portland cement, Hydration of cement, Setting of cement. Aggregate: Classification- Fine aggregate, coarse aggregate, Mechanical and Physical properties, Deleterious Materials, Soundness, Alkali aggregate reaction, Grading of Aggregates, Artificial and Recycled aggregate. Water: Mixing Water, Curing water, Tests on water. Fly Ash: Classification of fly ash, properties of fly ash, tests on fly ash. Admixtures: functions, classification, types. (Self-study component : cements and cement replacement materials https://www.sciencedirect.com/science/article/pii/B9780081002759000188)		
UNIT 2	**Properties Of Fresh And Hardened Concrete**	**6 HOURS**
Fresh Concrete: Workability: Factors affecting workability, measurement of workability, cohesion and segregation, bleeding, Mixing, Transporting, Placing, and Compaction of concrete, Curing Methods of concrete, Influence of temperature, Maturity rule, Steam curing. Hardened concrete: strength of concrete, factors affecting strength, micro-cracking and stress-strain relationship, other strength properties, relation between tensile and compression strength, impact strength, abrasion resistance, elasticity and creep, shrinkage and swelling. (Self-study component : Conventional precast assembly : https://sci-hub.se/https://www.sciencedirect.com/science/article/pii/B9780081027219000017)		
UNIT 3	**Concrete Mix Design**	**6 HOURS**
Concrete mix design: Concepts of Mix Design, Laboratory trial mixes and guidelines to improve mix, methods of Mix Design, IS method of Mix Design as per IS 10262:2019. (Self-study component : Mix design from DOE method: https://web.iitd.ac.in/ bishwa /LEC$_P DF_7$74/LEC1.*pdf*)		
UNIT 4	**Special Concrete and Concreting Techniques**	**6 HOURS**
Roller compacted concrete, Light weight concrete, Polymer concrete, Fibre reinforced concrete, High performance concrete, Pumped concrete, self-compacting concrete, Ferrocrete. Under water concreting, Cold weather concreting, hot weather concreting (Site Visit : Visit to any R.M.C. plant and prepare a detailed report)		
UNIT 5	**Introduction to Concrete Related Equipment**	**6 HOURS**
Introduction, Significance and Types of: Batching plants, Hauling, Pumps, Concrete mixers, Concrete vibrators. (Self-study component : New equipment used in industry: Boom placer , Lifting cranes)		
UNIT 6	**Reclamation: Concrete Repair**	**6 HOURS**
Standard Methods of Concrete Repair : Thin Repairs, Thick Repairs , Crack and Water Leak Repairs, 1. Strengthening of concrete by Reinforced Concrete Jacketing, Steel Jacketing, FRP Confining or Jacketing. (Self-study component : Case study of Repair and rehabilitation of hardened concrete)		

PRACTICALS/PROJECT: Project should be perform in a group of maximum students		
PROJECT NO.1	**Design of Concrete Mix**	**16 HOURS**

Perform following tests on materials and use findings to prepare a concrete mix of M20/M25/M30/M35/M40 grade.

- Tests on Cement: Fineness, Standard Consistency and Setting time
- Tests on fine aggregate: Particle size distribution, Moisture content, Silt content, Specific gravity
- Tests on aggregate:, Gradation, Density test, Specific gravity.

PROJECT NO.02	**Perform Tests on Fresh and Hardened Concrete**	**4 HOURS**

- Tests on fresh concrete: Slump Cone, Compaction factor, Vee Bee
- Tests on hardened concrete: Compressive strength,
- Flexural strength test and Split tensile strength

PROJECT NO.03	**Evaluate strength of old concrete by NDT tests.**	**4 HOURS**

Evaluate strength of old concrete by using following NDT tests

- Rebound Hammer Test
- Ultrasonic Pulse Velocity Meter

TEXT BOOK

1. Shetty M. S., "Concrete Technology", S. Chand Publications, eleventh edition, 2015, ISBN-13: 978- 8121900034
2. Gambhir M.L., "Concrete technology", Tata McGraw hill Publication, sixth edition, 2009, ISBN: 978- 1259062551
3. S. S. Bhavikatti, "Concrete technology", I.K. International Publishing House Pvt. Limited, 2015, ISBN: 9384588679
4. Dr. S. Kandasamy, Advanced Concrete Technology, 2020, Notion Press, ISBN: 9781648690785

REFERENCE BOOK

1. Neville A. M., Brooks J.J., "Concrete Technology", Pearson Publications, fifth edition, 2012, ISBN:978-0273732198
2. Zongjin Li, Advanced Concrete Technology, John Wiley Sons, 2011, ISBN: 0470902434
3. John Newman, B S Choo, Advanced Concrete Technology 1: Constituent Materials, Elsevier, 2003, ISBN: 0080489982, 9780080489988
4. Santhakumar A.R., "Concrete technology", Oxford University Press, Fourth edition, 2010, ISBN: 978 0195671537

FURTHER LEARNING

1. NPTEL Videos Web notes of course Concrete Technology
2. IS Codes

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Drinking Water and Sanitary Engineering
	COURSE CODE	CV306
	COURSE CREDITS	4
RELEASE DATE : 01-07-2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE:

COURSE OBJECTIVES:

CV306.CEO.1: To study the various sources and properties of water and wastewater.

CV306.CEO.2: To acquire the knowledge of components design associated with water supply and sanitation systems.

CV306.CEO.3: To attain knowledge of various aspects related to supply of pure and safe drinking water to communities.

CV306.CEO.4: To comprehend methods of waste water collection, characterization, treatment, safe disposal practices and reuse of wastewater.

COURSE OUTCOME:

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

CV306.CO.1: Analyze the characteristics of water and wastewater.

CV306.CO.2: Estimate the quantity of drinking water and domestic wastewater generated

CV306.CO.3: Design the various units of water treatment plant.

CV306.CO.4: Summarize the advancement in water distribution system.

CV306.CO.5: Design the various units of sewerage treatment plant.

THEORY		
UNIT 1	**Water Demand , Quality and Quantity**	**6 HOURS**
Source of Water, Water quality and Characteristics of water (ISO 10500: 2012) 2ND Revision, Water Quantity Estimation and Water Demand (ISO 10500: 2012) 2ND Revision and (MWRRA Guideline), Water Intake Works. Self-Study: Pipe Appurtenances. Reference: Manual on Water supply and Treatment by CPHEEO.		
UNIT 2	**Water Treatment Units**	**7 HOURS**
Layout of Water Treatment Plant, Treatment for the removal of suspended, colloidal and dissolved solids, Design of Coagulation- Flocculation-Settling Plain Sedimentation, Filtration Methods of Disinfection (U-V method, ozone disinfection). Self-Study: Miscellaneous Treatments Reference: Manual on Water supply and Treatment by CPHEEO Site visit to Water Treatment Plant is recommended.		
UNIT 3	**Water Distribution Systems**	**6 HOURS**
Requirements of a good distribution system, Methods of Distribution, Layout and Components of distribution system, Systems of Supply of Water, Design of Distribution System, Distribution Reservoirs, Design of ESR, Analysis of pipe networks of distribution system, Hardy cross method for network analysis, Appurtenances in distribution system (fire hydrant). Self-Study: Maintenance of water distribution system Reference: Manual on Water supply and Treatment by CPHEEO		
UNIT 4	**Advancement in Water Distribution**	**6 HOURS**
Water loss detection control in water Supply Systems, Software's for Water Supply Systems EPANET and GEMS, Smart metering and Sensing devices, IoT and Automation in Water Supply, Pricing water, water audit. Site visit to Water Treatment Plant: Application of SCADA System in PCMC Water Distribution System.		
UNIT 5	**Characterization and Collection of Sewage**	**7 HOURS**
Quantification of sewage; Characterization of sewage; Types of sewerage systems; Design of Sewers and Storm Sewers, Variation in Sewage Flow Self-Study: Sewer appurtenances Reference: Manual of Sewerage Sewage Treatment by CPHEEO		
UNIT 6	**Design of Sewage Treatment Units**	**8 HOURS**
Layout plan and section of municipal wastewater treatment plant, Preliminary primary treatment of sewage, Secondary treatment of sewage: Activated Sludge Process, Sewage Filtration, Miscellaneous methods such as Oxidation Ponds, Aerated Lagoons, rotating biological reactors, Sewage treatment plant sludge handling facilities, Recycle Reuse treated waste water. Introduction to: MBBR, MBR, SBR, Up-flow Anaerobic Sludge Blanket (UASB) Reactor– Principle, advantages limitations, application Reference: Manual of Sewerage Sewage Treatment by CPHEEO Site visit to Sewage Treatment Plant is recommended.		

PRACTICALS/PROJECT:		
PROJECT NO.1		**10 HOURS**
Prepare a water testing report for domestic water as per guidelines of CPHEEO manual		
PROJECT NO.02		**10 HOURS**
Prepare a water testing report for sewage as per the guidelines of CPHEEO manual		
PROJECT NO. 3		**2 HOURS**
Designing the Water Distribution Network by using Appropriate Software		

TEXT BOOK

1. Water Supply Engineering: S. K. Garg, Khanna Publishers, ISBN-13: 978-8174091208
2. Water Supply and Sanitary Engineering: G. S. Birdie and J. S. Birdie, Dhanpat Rai Publishing Company, ISBN-13, 9788187433798
3. Environmental Engineering 1: Water Supply Engineering: B. C. Punmia, Ashok Jain and Arun Jain. Laxmi Publications (P) Ltd. ISBN 13: 9788174091208
4. Environmental studies by Rajgopalan- Oxford University Press. ISBN: 9780198072089
5. Waste Water Treatment – Rao Dutta. ISBN:9788120417120

REFERENCE BOOK

1. Environmental Engineering, Peavey, H.S, Rowe, D.R., and G. Tchobanoglous (1985), McGraw Hill Inc., ISBN-13: 978-0070491342
2. Water supply Engineering – Environmental Engineering (Vol. I) P.N. Modi (2006), – Standard Book House. ISBN-13: 978-8189401351
3. Sewage treatment Disposal and waste water Engineering – Environmental Engineering (Vol.II) P.N. Modi (2008),– Standard Book House. ISBN-10, 8190089324
4. Sewage Disposal and Air Pollution Engineering – Environmental Engineering (Vol.II) – S.K. Garg (1999), Khanna Publishers. ISBN-13: 978-8174092304
5. Wastewater Engineering Treatment and Reuse Metcalf Eddy, Inc. (2003), McGraw Hill Inc., ISBN-10: 0070418780

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Design of Steel Structures
	COURSE CODE	CV 307
	COURSE CREDITS	3
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EVALUATION SCHEME :					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	0	35	35	30	Nil	Nil	100

COURSE OBJECTIVES :

1.CV307.CEO.1: To design steel elements subjected to Axial force/Shear force/ Bending moment or any combination of these actions for Limit State of Collapse.

1.CV307.CEO.2: To design a structure using software to perform tasks mentioned in CEO.1

COURSE OUTCOMES :

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

CV307.CO.1: Explain the various design philosophies.[L2 Understanding].

CV307.CO.2: Design connections of structural elements for the actions they are subjected to, using limit state method. [L4 Analyzing]

CV307.CO.3: Design axially loaded steel elements using Limit state method.[L4 Analyzing]

CV307.CO.4: Design steel elements subjected to bending and shear using Limit state method. [L4 Analyzing]

THEORY		
UNIT 1	**Introduction and Design philosophies**	**3 HOURS**
Introduction to structural design, Structural systems, Properties of Structural Steel, I.S. Rolled Sections, I.S. Specifications ,Factor of Safety, Permissible and Working Stresses, Elastic Method, Introduction to Plastic theory, Introduction to Working stress method, Limit States of Design. Types of loads acting on structure, Introduction to IS Codes and specifications: IS 875, IS 800 **Self study:** Advantages of steel as a structural material, Types of structural steel, Mechanical properties of cold- formed sections, structural pipe (tubes)) sections and their properties. **Tasks:** Planning and drawing of Structural frame system (beam to beam, beam to column, bracings and splicing details sheet drawn using drafting software)..		
UNIT 2	**Connections**	**10 HOURS**
Bolted connections: Bolted including friction grip connections subjected to shear and/or bending. Beam to beam, Beam to Column and Moment resistant connections Welded connections: Fillet and Butt weld subjected to shear and/or bending. Self study: Mechanical properties of bearing bolts and High strength friction grip bolt, advantages and disadvantages of bolted and welded connections. Case study: https://www.sciencedirect.com/science/article/pii/S0143974X08001685		
UNIT 3	**Tension and compression Members**	**10 HOURS**
Design of Tension Member: Behavior, Modes of failure, permissible stress in tension and Design of single and double angle sections. Design of compression member: Modes of Failure of compression member, Buckling Failure: Euler's Theory, Effective Length, Slenderness Ratio, Design Formulae: I.S. Code Formulae. Designing of lacing and battening system for columns. Design of column base. Case study: https://www.sciencedirect.com/science/article/pii/S2352012416300248 torsional or buckling failure of column.		
UNIT 4	**Design of flexure member**	**6 HOURS**
Design of members subjected to flexure: Laterally restrained and unrestrained members. Design of compound beams.		
UNIT 5	**Industrial sheds**	**5 HOURS**
Roof trusses, roof side coverings, design loads, design of purlins, design of truss members, end bearings. Tasks : **Full imperial size sheets** Full imperial size sheets covering. 1. Provisions and details of purlins, trusses, rafter and tie level bracings. 2. Connections showing roof truss to the column cap plate. 3. Column, column bracings, gable end bracings, base plates, shear-keys, holding down bolts.		
UNIT 6	**Welded Plate Girder**	**6 HOURS**
Plate-girders including stiffeners, splices and curtailment of flange plates.		

TEXT BOOK

1. S.K.Duggal, "Design of Steel structures",McGraw Hill, ISBN: 978-0136077909
2. N Subramanian,"Limit state design of Steel Structures", Oxford university press, ISBN10: 9780199460915

REFERENCE BOOK

1. IS 800-2007, IS 875 (part I to IV), IS 808, SP-6(4).
2. Karuna Moy Ghosh,"Practical Design of Steel Structures", Whittles Publishing ISBN 97814398357
3. Luís Simões da Silva, Rui Simões, Helena Gervásio, "Design of steel structures, Part 1-1 - General rules and rules for buildings", First Edition Author(s): Print ISBN: 9783433029732

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Construction Planning and Management
	COURSE CODE	CV325
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EVALUATION SCHEME :					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	30	20	150

Basic knowledge of Building Design and Construction :

COURSE OBJECTIVES :

CV311.CEO.1: To understand basic concepts and novel technologies in project management and project planning.

CV311.CEO.2: To acquire skills for planning, scheduling, controlling, forecasting, and earned value management of various construction projects.

CV311.CEO.3: To take part in practical training in the planning and scheduling of construction projects.

COURSE OUTCOMES :

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

CV311.CO.1: Relate various project managerial and planning concepts with onsite work. L2

CV311.CO.2: Analyze the technique of project scheduling network analysis L4

CV311.CO.3: Utilize the methods of project controlling inventory management L3

CV311.CO.4: Contrast on earned value management with administrative incentive schemes L4

CV311.CO.5: Illustrate various concepts and methods for quality and safety management L2

CV311.CO.6: Functionally design a schedule for a residential building. L4

THEORY COURSE CONTENT		
UNIT 1	**Project Management and Planning**	**4 HOURS**
Basic concepts of project management, Management theories, SWOT Analysis in construction, Project Planning Methods, Work study, Method study, Construction Project Life-Cycle, construction site layout introduction. (Self-study component: Selection of construction enterprises management strategy based on the SWOT and multi-criteria analysis- https://www.sciencedirect.com/science/article/abs/pii/S164496651260096X)		
UNIT 2	**Project Scheduling**	**8 HOURS**
Basics of project scheduling, Work Breakdown Structure, Line of balance, Development of network, Network Analysis PERT CPM, Estimating, analyzing, and managing the schedule, Tool for optimizing project schedules, Graphical Evaluation and Review Technique. (Self-study component: Scheduling of Industrialized Construction Project using Graphical Evaluation and Review Technique (GERT)		
UNIT 3	**Project Controlling**	**8 HOURS**
Crashing,Network compression: Least Cost and Optimum Duration, Resource allocation, Smoothening and leveling. (Self-study component: Project Acceleration via Activity Crashing, Overlapping, and Substitution: - https://ieeexplore.ieee.org/document/4604760)		
UNIT 4	**Advance Techniques in Construction Management**	**6 HOURS**
Earned Value Management (EVM Techniques), Importance of EVM, Issues Involved and its solutions Administration of Incentive Schemes- Introduction to artificial intelligence technique, Introduction to BIM. (Self-study component: https://theirf.org/research/the-impact-and-potential-of-artificial-intelligence-in-incentives-rewards-and-recognition/2558/ Conceptual Framework and Roadmap Approach for Integrating BIM into Lifecycle Project Management)		
UNIT 5	**Quality and Safety Management**	**6 HOURS**
Quality and safety concerns,Total Quality Control,Quality Control by statistical methods,Causes of Accidents, safety measures and safety policies to be adopted Personal protective equipment, Occupational Safety and Health Administration (OSHA) guidelines, Hazard Identifications and Control Techniques (Self-study component: Case Studies on the Safety Management at Construction Site)		
UNIT 6	**Inventory Management**	**6 HOURS**
Application of ABC and Economic Order Quantity analysis in inventory control, Use of Indices in materials/inventory mode ls Inventory Management, Materials Management Systems. (Self-study component: Construction Material Management through Inventory Control Techniques: - https://www.sciencepubco.com/index.php/ijet/article/view/16558/7073)		

PRACTICAL		
PRACTICAL NO.01	**Project Planning using MS-Project**	**16 HOURS**
Developed a schedule for ten storied residential building using MS-Project.		
PRACTICAL NO.02	**Prepare Line of Balance for project no.1**	**4 HOURS**
Prepare LOB for above project.		
PRACTICAL NO.03	**Presentation on Safety Measures at site**	**4 HOURS**
Students must visit any ongoing high-rise construction site and identify various safety measures. Collect the information and give presentation.		

TEXT BOOK

1. S. Seetharaman, "Construction Engineering and Management", Umesh Publications Delhi, sixth edition, 2009, ISBN:9382533095
2. B. Sengupta and H Guha, "Construction Management and Planning", Tata Mc-GrawHill Publishing Company, New Delhi, ISBN:0074623982
3. K.K.Chitkara,"Construction Project Management",McGraw-Hill Education third edition, ISBN:9339205448

REFERENCE BOOK

1. Newman,"Engineering Economic Analysis,"tenth edition,Oxford University,ISBN:091055496X
2. Dennis Lock,"The Essentials of Project Management",2nd Revised edition,Gower Publishing Ltd, ISBN:0566082241
3. P S GahlotandBMDhir,"Construction Planning and management",First Edition NewAge International Limited Publishers
4. Construction Project planning Scheduling By Charles Patrick, Pearson, 2012
5. Project Management-Planning and Control—Rory Burkey 4th ed.—Wiley,India.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Solid Waste Management
	COURSE CODE	CV326
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ISE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	25	25	150

PRE-REQUISITE:

COURSE OBJECTIVES:

CS326.CEO.1: To understand the core concepts of solid waste management and the importance of this on economic development and environmental protection.

CS326.CEO.2: To impart knowledge and skills in the collection, storage, transport, treatment, disposal and recycling options for solid wastes management.

CS326.CEO.3: To characterize the solid waste.

CS326.CEO.4: To describe the components of solid waste management and laws governing it.

COURSE OUTCOMES:

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

CV326.CO.1: Describe the functional elements of a solid waste management system.

CV326.CO.2: Identify the methods of collection, storage and transportation of solid waste.

CV326.CO.3: Evaluate recovery, treatment and disposal alternatives according to properties of solid waste.

CV326.CO.4: Understand basic concepts in hazardous waste management and integrated waste management for urban areas.

CV326.CO.5: Recognize the relevant smart techniques for collection, transport disposal of waste.

CV326.CO.6: Acquire knowledge on waste to energy productions in the perspective of sustainable development.

THEORY :

UNIT 1	Fundamentals of Solid Waste	6 HOURS

Present scenario of Solid Waste Management (SWM), Need of SWM, Solid Waste: Sources and engineering classification, Generation and Quantification, Characterization, Functional elements of solid waste management (SWM) system, Importance of SWM for economic development and environmental protection, Linking SWM and climate change.

Case Study: Solid Waste Management issues in different urban sub-urban areas of India.

Reference: IS: 9234 -1979 (Reaffirmed 2003), Indian Standard for 'Method for Preparation of Solid Waste Sample for Chemical and Microbiological Analysis.

UNIT 2	Waste Collection and Transport	6 HOURS

Handling and segregation of wastes at source, Collection: Primary and Secondary, Storage of municipal solid wastes, Collection equipment, Transfer stations.

Case Study: Five way segregation system at source of city Panaji, Goa, India.

Reference: SOP on Segregation at Source by Ministry of Urban Development, Government of India.

UNIT 3	Treatment and Disposal Technologies	6 HOURS

Mechanical Biological treatment, Incineration, Pyrolysis, Gasification, Aerobic anaerobic decomposition, Composting Types of composting, Recycling of plastics, Biomethanation, Sanitary landfills, Leachate management.

Case Study: Dumpsite Management / Legacy Waste Management for different cities in India.

Reference: 'Clean It Right: Dumping Management in India', a research report by 'Centre for Science and Environment (CSE), New Delhi.

UNIT 4	Hazardous Waste Management	6 HOURS

Need for hazardous waste management, Sources of hazardous wastes, Effects on community, Terminology and Classification, Storage and Collection of hazardous wastes, Problems of hazardous waste management in developing countries, Pollution prevention and Waste minimization.

UNIT 5	Advancement in Solid Waste Management	8 HOURS

Smart waste segregation using Machine Learning (ML) techniques, Real time data monitoring, Geographically mapping of: collection points, Bin locations, Solid waste management garages, Dumping grounds, Transfer stations, Ward offices on GIS maps, Smart bins, Automation of transfer station disposal sites for daily garbage inward and outward movement, Minimize human intervention, Use of IoT in SWM : Route optimization, RFID tagging.

Case Study: Integrated Solid Waste Management of 'Navi Mumbai Municipal Corporation', Maharashtra, India by using smart tools.

UNIT 6	Sustainable Techniques in SWM	8 HOURS

Waste to Energy: Energy recovery, Power generation, Blending with construction materials and Best Management Practices (BMP), Community based waste management, Waste as a Resource concept, Public private partnership (PPP), 7R approach, Circular Economy in SWM, Extended producer responsibility (EPR).

Case Study: Co-processing of Segregated Plastic Waste: An Initiative of Jabalpur Municipal Corporation and ACC–Holcim, Crushing units at Burari CD waste recycling plant. **Reference:** Manual on 'Waste To Wealth' published by 'Ministry of Housing and Urban Affairs', Government of India.

PRACTICALS :

Important Instructions:

1. Practicals has to be performed in a group of maximum 4 numbers of students.
2. Students has to submit the detailed report on each practical.

PRACTICAL-1	Physical Characterization of Solid Waste	6 HOURS

Determine the physical characteristics of given solid waste sample and prepare a detailed report on it.

PRACTICAL-2	Chemical Characterization of Solid Waste	6 HOURS

Determine the chemical characteristics of given solid waste sample and prepare a detailed report on it.

PRACTICAL-3	Visit to Solid Waste Management Plant, Moshi, PCMC or Gasification Plant of Pune Municipal Corporation	2 HOURS

Visit to the mentioned site and prepare a detailed report on it including the information about site, photographs, site map, process flow diagram, different treatment / disposal methods etc.

PROJECTS :

Important Instructions:

1. Projects has to be performed in a group of maximum 4 numbers of students.
2. Students has to submit the detailed report on project work done.

PROJECT-1	Lab Scale Study on Household Kitchen Waste Management using IoT	4 HOURS

Prepare a lab scale model and carry out the project work at your individual house for mentioned waste. Maintain the weekly records of the observations and findings. Prepare a detailed report and short film on it.

PROJECT-2	Land Disputes for Treatment Sites and Legislation	2 HOURS

Go through the various clauses and provisions of 'Solid Waste Management Rules, 2016' and ' Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016'. Carry out the a case study related to land legal disputes related to solid waste treatment sites and draft a detailed report on it.

PROJECT-3	Awareness Programs	2 HOURS

Organize a social awareness program for societies on importance of functional elements of solid waste management. Prepare a short film of the activity.

REFERENCES

1. Tchobanoglous, G., Theisen, H. and Vigil, S.A., 'Integrated Solid Waste Management - Engineering Principles and Management Issues', McGraw Hill (1993).
2. Rowe, R. Kerry, Quigley, Robert M., Brachman, Richard W. I., and Booker, John R., 'Barrier Systems for Waste Disposal Facilities' , 2nd Edition 2004. Spon Press, Taylor Francis Group, London, ISBN 0-419-22630-3.
3. Vesilind, P.A. and Worrell, W. A., 'Solid Waste Engineering', 2nd Edition 2016, Cengage India.
4. Manual on 'Municipal Solid Waste Management, 2016' published by Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, Government of India.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Project Management
	COURSE CODE	CS361
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	NA	NA	50	25	NA	NA	75

PRE-REQUISITE:

COURSE OBJECTIVES:

CS361.CEO.1: To create awareness of organizational strategy for project implementation.
CS361.CEO.2: To understand the rules for creating a Work Breakdown Structure for a Project. .
CS361.CEO.3: To illustrate approaches for risk identification, analysis, and assessment.
CS361.CEO.4: To identify key characteristics of a high-performance project team.
CS361.CEO.5: understand the critical success factors in project management.

COURSE OUTCOMES:

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

CS361.CO.1: Identify the Project Management Knowledge Areas and Processes.
CS361.CO.2: Classify the responsibilities while designing the Project Master Plan.
CS361.CO.3: Outline the Cost Estimating and Cost Escalation Process.
CS361.CO.4: Demonstrate and highlight The Processes of Project Quality Management.
CS361.CO.5: Analyze Management of a Project and Maturity Models.

THEORY :		
UNIT 1	**Basics of Project Management**	**6 HOURS**
Contents: Introduction, Need for Project Management, SMART Project, Knowledge Areas and Processes, The Project Manager and Project Management Office, Phases of Project Management Life Cycle, Project environments, Impact of Delays in Project Completions **Case Study:**		
UNIT 2	**Systems and Procedures for Planning and Control**	**5 HOURS**
Contents: Type of Projects, The Project Master Plan, The Project Charter, Project Organization and Responsibilities, Work Breakdown Structure (WBS), Networks Diagrams, The Critical Path, Gantt Charts and Calendar Schedules, CPM, PERT (Project Management Tools: GanttProject, OpenProj) **Case Study:**		
UNIT 3	**Cost Estimating, Budgeting and Risk Management**	**5 HOURS**
Contents: Cost Estimating and Cost Escalation, Cost Estimating Process, Elements of Budgets and Estimates, Risk Management process, Project Risk by Phases, Risk Assessment, Risk Response Planning, Risk Tracking and Response **Case Study:**		
UNIT 4	**Project Quality Management and Organization Behavior**	**5 HOURS**
Contents: The Concept of Quality, The Processes of Project Quality Management, Techniques for Quality Assurance during System Development, Stakeholders, Managing Participation, Teamwork and Conflict. **Case Study:**		
UNIT 5	**The Corporate Context**	**5 HOURS**
Contents: Project Management Maturity and Maturity Models, Knowledge and Time Management, International Projects and associated problems, Entrepreneurs and Startup. **Case Study:**		

TEXT BOOK

1. Project Management for Business, Engineering, and Technology, 3rd Edition, John M. Nicholas and Herman Steyn ELSEVIER ISBN: 978-0-7506-8399-9.
2. Project Management Planning and Control, Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards, Seventh Edition, Eur Ing Albert Lester, B H Copyright © 2017 Elsevier Ltd, ISBN: 978-0-08-102020-3.
3. Project Management in Product Development, George Ellis, Copyright © 2016 Elsevier Inc, ISBN: 978-0-12-802322-8.
4. Project Management best Practices, 4th Edition, HAROLD KERZNER, Wiley Copyright © 2018, ISBN 978-111-9-46885-1.

REFERENCES

1. Project Management Toolbox, Second Edition, Russ J. Martinelli, Dragan Z. Milosevic, Wiley Copyright © 2018, ISBN 978-1-118-97312-7.
2. Project Management Essentials You Always Wanted To Know, Kalpesh Ashar, VIBRANT PUBLISHERS
3. The Practical guide to Project Management, 1st Edition, Christine Petersen, ISBN 978-87-403-0524-1
4. Beginning Project Management (e book), John M. Preston
5. Project Management from Simple to Complex, Russell W. Darnall, John M. Preston, The Open University of Hong Kong

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Skill development course II - (ETABS)
	COURSE CODE	CV 342
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EVALUATION SCHEME :					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
0	04	00	00	50	00	25	75

COURSE OBJECTIVES :

CV304.CEO.1: To Understand the basics methodologies of analyzing and designing structures using software.

CV304.CEO.2: To apply various tools and techniques in analysis and design.

CV304.CEO.3: To design the various structures using ETABS.

COURSE OUTCOMES :

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

CV304.CO.1: Prepare structural framing plan. [Applying]

CV304.CO.2: Assigning material properties, boundary conditions and loading to structural elements. [Applying]

CV304.CO.3: Analyze the R.C. and steel structures for various load combinations. [Analysis]

CV304.CO.4: Interpret the results of software. [Applying] [L4 Analyzing]

CV304.CO.5: Design the structural elements (reinforced or fabricated) for static and dynamic loading as per Indian standards.

CV304.CO.6: Articulate importance of software's in research and industry by simulation work.

THEORY		
UNIT 1	**Introduction to analysis and design software**	**8 HOURS**
Introduction to various analysis and design software, overview of ETABS, Unit system, knowing interface, generating grids for structural plan, Edit grid system and storey data, Master storey and similar stories.		
UNIT 2	**Modeling In ETABS**	**8 HOURS**
Defining materials and section properties, assigning material properties and boundary conditions to the structural elements.		
UNIT 3	**Gravity Loads and load combinations**	**6 HOURS**
Load calculation as per IS 875 part I II, defining and assigning primary load cases viz. Dead load, Live load and superdead load, Design load combinations as per IS 456 - 2000		
UNIT 4	**Analysis and result interpretation**	**4 HOURS**
Perform analysis for defined load cases, Interpretation of analysis results viz. deflection, shear force, bending moment, axial force and reactions.		
UNIT 5	**Design and optimization.**	**4 HOURS**
Design the structural elements as per codal provisions. Optimization for structural elements.		
UNIT 6	**Analysis of multi storied structures for lateral loading.**	**8 HOURS**
Conceptualization of lateral loading, Modeling, defining and assigning material properties, section properties, load cases and load combinations, base shear calculation and verification with manual calculations.		
UNIT 7	**Analysis and Design of Industrial shed.**	**8 HOURS**
Modeling, defining and assigning material properties. Selecting steel sections as per Indian standards, load cases and load combinations as per IS 875 –III, performing analysis, and verification of section, design and optimization.		
UNIT 8	**Generating the report.**	**2 HOURS**
Preparing customized final report as per requirement. Report reading and interpretation for execution.		

TEXT BOOK

1. Analysis Design of a Multistorey Building using STAAD.Pro E-TABS (with Manual Calculation) (First Edition,2016), by D. Rajendran.

REFERENCE BOOK

1. ETAB 2016, User's Guide, July 2016, by Computers Structures Inc.
2. IS 800- 2007,
3. IS-875 – Part I,II and III,
4. IS 1893 – 2016
5. IS 456- 2000

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Project Design
	COURSE CODE	CV350
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV350.CEO.1: To embrace innovation and creativity in project design while empathizing real world needs.

CV350.CEO.2: To acquaint with requirement analysis process and techniques.

CV350.CEO.3: To inculcate the agile project management tools for project design and planning.

CV350.CEO.4: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

CV350.CO.1: Delineate the problem to be solved.

CV350.CO.2: Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges.

CV350.CO.3: Carry out systematic literature review, planning and project design.

CV350.CO.4: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables student's to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation. To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation. The first phase of Project Design mainly focuses on formulating system's requirement, background/literature review, and defining scope, objective and apply project management/modeling tools to design proposed solution. This enables students to apply their technical acumen and innovativeness in proposing methodology, milestones, and expected outcome.

GUIDELINES

1. Every project group should consist of minimum 03 and maximum of 04 students.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Project group members and title of the project need to be approved by Project Guide and School.
4. Projects should preferably have a national/international industry/academic/research collaboration.
5. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
6. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
7. Define proposed solution and apply project management/modeling tools for project planning and design.
8. Critically analyze various solutions/techniques to solve real world problems and perform feasibility study to select and justify proposed solution.
9. Define outcome, milestones, definite roadmap for project design, implementation, evaluation and documentation.

Collaborative/Sponsored Project

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for final project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization, anytime before the commencement of the sixth semester.
3. Proposed Collaborative Project work need to reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of minimum 12 months to 18 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Exploration of fore front research/specialization areas and opportunities in the various fields.
2. Formation of Project Group. Finalization of area of work/title as per forefront areas.
3. Exploration of abridged courses, valid resources, challenges, relevance with current opportunities.
4. Background study Systematic literature review.
5. Literature review documentation for Project Report and Research Article.
6. Project Review I Presentation.
7. Define problem statement and objectives.
8. Define scope of the work and Outline of the work.
9. Project Design, Modelling, Simulation etc.
10. Proposed Methodology of the solution and its documentation.
11. Project Review II Presentation.
12. Project Documentation: Ethics in Writing
13. Project Documentation: Final Synopsis
14. Project Documentation: Project Report Writing

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Background Study and Literature Review (10 Marks)
2. Synopsis (5 Marks)
3. Project Review I: Problem Identification, Motivation, Relevance, Background Study, Literature Review (10 Marks)
4. Project Review II: Literature Review, Problem Definition, Project Planning, Analysis and Design (10 Marks)
5. Project Report (10 Marks)
6. Final Presentation and Demonstration (30 Marks)

REFERENCES

1. Nicholas John M.,"Project Management for Engineering, Business and Technology", Butterworth Heinemann, ISBN: 9780080967042
2. Michelle Reid, "Report Writing (Pocket Study Skills)"', Second Edition, Macmillan Eduation.
3. Sara Efrat Efron, Ruth David, "Writing the Literature Review : A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
4. Leslie Lamport,"LaTeX: A document preparation system, User's guide and reference manual", Second Edition 1994, Addison Wesley, ISBN: 978-0201529838.
5. Michel Goossens, Frank Mittelbach, Sebastian Rahtz, Denis Roegel and Herbert Voss,"The LaTeX Graphics Companion", Second Edition 2007, Addison-Wesley Professional, ISBN: 078-5342508925.

WEEK WISE ACTIVITIES : PROJECT DESIGN

SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	AY: 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	COURSE NAME	Project Design
	COURSE CODE	CV350
	COURSE CREDITS	2

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Exploration of fore front research/specialization areas and opportunities in the various fields.(School Level Awareness Session)	Students may introspect within themselves to think about their choice of domain areas	Students should be clear about subjects which would lead towards research or towards product related jobs
Week 2	Students are briefed about Specialization open electives tracks and interdisciplinary project available in the institute.(School Level Awareness Session)	Students start deliberating on project ideas by referring to various sources linked directly or indirectly to their minor track.	Open electives and project domain are chosen with close connectivity.
Week 3	Mentor guidelines for abridged courses, valid resources, challenges, relevance with current opportunities, Guideline to define roadmap of the project progress for three semester	Finalization of area of work/title as per fore front area of the project work, feasibility study, Define Roadmap of the Project.	Greater understanding of the project work and requirement. Synopsis of the Project
Week 4	Guide introduces relevant resources, recent papers / reports / manuals / books / moocs selective lectures / case study. Guideline to identify valid resources and properly read the contents of article. (School Level Awareness Session)	Valid resources are identified by group. Every student study these resources and articles in detail. Presentation by each student on their understanding about all referred resources.	Collection of state of the art work documents / research papers / research material / industry report / books / blogs / Websites / manuals etc. for the decided topic.

Week 5	Guideline to perform background study /Literature Review and various ways of documenting literature review.	Documentation of referred resources, publication details, contribution and identification of opportunities/gap in the field.	Systematic literature review, background study, and its documentation.
Week 6	Project Review Presentation I		
Week 7 and 8	Guidelines for defining problem statement, objectives, and scope of the work. (School Level Awareness Session)	Explore related work and define problem statement, objectives etc.	Refinement in proposed work /synopsis if any.
Week 9	Verification and Validation of Project Proposal created by students.	Refinement in the proposal as per suggestion by guide and review members.	Problem statement, Objectives and Project Outcome.
Week 10	Introduction of tools for Project Design, Modelling, Simulation and planning etc. Verification of the Proposed Methodology of the solution.	Use various tools for Project Management, Project Design, and Simulation. Description of methodology. Define Algorithm Steps, Process, Modules, milestones, System Architecture etc.	Design Documentation, Graphical Presentation of proposed solution and entire planning of project implementation and evaluation.
Week 11	Project Review Presentation II		
Week 12 and 13	Introduction to Project Report Writing tools and plagiarism checking. Guidelines for Project Documentation and Ethics in Writing. (School Level Awareness Session)	Prepare the Project Report as per format shared by Project Coordinator.	Project Documentation: Final Synopsis.
Week 14	Verification of Project Report, Final Synopsis prepared by Students.	Refinement in the project report as per suggestion by guide and review members.	Project Report.
Final End Semester Examination: Project Design, Report, Presentation and Demonstration.			

NOTE:

1. *School should organize awareness sessions on topics highlighted in RED.*
2. *Suggested to provide templates for project documents at the starting of the semester such as Synopsis, Literature Review, Project Report, Review Presentation I, II and Final Presentation*

WEEK WISE ACTIVITIES : PROJECT DESIGN

SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	AY: 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	COURSE NAME	Project Design
	COURSE CODE	CV350
	COURSE CREDITS	2

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Exploration of fore front research/specialization areas and opportunities in the various fields.(School Level Awareness Session)	Students may introspect within themselves to think about their choice of domain areas	Students should be clear about subjects which would lead towards research or towards product related jobs
Week 2	Students are briefed about Specialization open electives tracks and interdisciplinary project available in the institute.(School Level Awareness Session)	Students start deliberating on project ideas by referring to various sources linked directly or indirectly to their minor track.	Open electives and project domain are chosen with close connectivity.
Week 3	Mentor guidelines for abridged courses, valid resources, challenges, relevance with current opportunities, Guideline to define roadmap of the project progress for three semester	Finalization of area of work/title as per fore front area of the project work, feasibility study, Define Roadmap of the Project.	Greater understanding of the project work and requirement. Synopsis of the Project
Week 4	Guide introduces relevant resources, recent papers / reports / manuals / books / moocs selective lectures / case study. Guideline to identify valid resources and properly read the contents of article. (School Level Awareness Session)	Valid resources are identified by group. Every student study these resources and articles in detail. Presentation by each student on their understanding about all referred resources.	Collection of state of the art work documents / research papers / research material / industry report / books / blogs / Websites / manuals etc. for the decided topic.

Week 5	Guideline to perform background study /Literature Review and various ways of documenting literature review.	Documentation of referred resources, publication details, contribution and identification of opportunities/gap in the field.	Systematic literature review, background study, and its documentation.
Week 6	Project Review Presentation I		
Week 7 and 8	Guidelines for defining problem statement, objectives, and scope of the work. (School Level Awareness Session)	Explore related work and define problem statement, objectives etc.	Refinement in proposed work /synopsis if any.
Week 9	Verification and Validation of Project Proposal created by students.	Refinement in the proposal as per suggestion by guide and review members.	Problem statement, Objectives and Project Outcome.
Week 10	Introduction of tools for Project Design, Modelling, Simulation and planning etc. Verification of the Proposed Methodology of the solution.	Use various tools for Project Management, Project Design, and Simulation. Description of methodology. Define Algorithm Steps, Process, Modules, milestones, System Architecture etc.	Design Documentation, Graphical Presentation of proposed solution and entire planning of project implementation and evaluation.
Week 11	Project Review Presentation II		
Week 12 and 13	Introduction to Project Report Writing tools and plagiarism checking. Guidelines for Project Documentation and Ethics in Writing. (School Level Awareness Session)	Prepare the Project Report as per format shared by Project Coordinator.	Project Documentation: Final Synopsis.
Week 14	Verification of Project Report, Final Synopsis prepared by Students.	Refinement in the project report as per suggestion by guide and review members.	Project Report.
Final End Semester Examination: Project Design, Report, Presentation and Demonstration.			

NOTE:

1. *School should organize awareness sessions on topics highlighted in RED.*
2. *Suggested to provide templates for project documents at the starting of the semester such as Synopsis, Literature Review, Project Report, Review Presentation I, II and Final Presentation*

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Design of Reinforced Concrete Structures
	COURSE CODE	CV312
	COURSE CREDITS	4
RELEASE DATE : 01-06-2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : The basic knowledge of mechanics of solids and structural analysis

COURSE OBJECTIVES :

CV312.CEO.1: To know the various design philosophies for concrete structures.
CV312.CEO.2: To analyze RC members for bending, shear and torsion.
CV312.CEO.3: To understand the limit states for RC structural members
CV312.CEO.4: To design RC members using limit state method.

COURSE OUTCOME :

The students after completion of the course will be able to

CV312.CO.1: Describe the concept of elastic, ultimate, working stress and limit state method of design for reinforced concrete structures. [Understand].
CV312.CO.2: Design one way, two way, rectangular slab, singly and doubly reinforced Rectangular beam and flanged beam by Limit State Method. [Design]
CV312.CO.3: Design RC members for combined bending shear and torsion using Limit State Method. [Design].
CV312.CO.4: Design short columns for various conditions. [Design]
CV312.CO.5: Design axially and eccentrically loaded rectangular footing. [Design]

THEORY		
UNIT 1	**METHODS OF DESIGN OF CONCRETE STRUCTURES**	**6 HOURS**
Concept of elastic method ultimate load method and limit state method- -Introduction to working stress method-IS 456 - limit state philosophy as detailed in current IS code. Analysis for singly and double reinforced cross sections. Self-study: advantages of limit state method over other methods-design codes and specification		
UNIT 2	**LIMIT STATE DESIGN FOR SHEAR, TORSION, BOND AND ANCHORAGE**	**6 HOURS**
Behavior of RC beams in shear and torsion-shear and torsion reinforcement-limit state design of RC members for combined bending shear and torsion- use of design aids.		
UNIT 3	**DESIGN FOR BEAM**	**8 HOURS**
Singly and doubly reinforced rectangular and flanged beams - design aids for flexure deflection and crack width control. Self-study: Study of RCC drawings and bar bending schedule		
UNIT 4	**DESIGN FOR SLAB AND STAIRCASE**	**7 HOURS**
Design of one way and two way slabs - rectangular slab subjected to uniformly distributed and concentrated loads - boundary conditions and corner effects. Design of dog legged staircase. Self-study: design of cantilever slab FLAT SLAB		
UNIT 5	**DESIGN OF COLUMNS AND FOOTING**	**7 HOURS**
Types of columns-analysis and design of short columns for axial uniaxial and bi axial bending- use of design aids. Types of footing, selection criteria for footing, Design of isolated rectangular footing for axial, Uniaxial and biaxial column Self-study: Study on reinforcement detailing as per IS 13920-2016 and Failure of footing		
UNIT 6	**INTRODUCTION TO PRESTRESSES CONCRETE**	**6 HOURS**
Introduction, Basic Concepts, History of development of materials and prestressing, different methods of prestressing, Advantages and Limitations, IS provisions related to materials properties prestressing. Analysis of member for prestress and bending stresses at various stages; Pressure Line; Stress, strength and Load Balancing concepts; Losses in presstress; short term and long term deflections		

PROJECT(G+1,Storied RC building perform individually)		
Activity1	**Study on Various Codes Involved in Designs**	**2HOURS**
Study of IS 456-2000, IS 875 part 1,2,3,4 5, IS 1893-2016		
Activity 2	**Structural Framing**	**2HOURS**
To interpret the orientation and positions for column and beam		
Activity 3	**Beam Design**	**4HOURS**
Design and detailing of singly and doubly reinforced beams		
Activity 4	**Slab and Stair Case Design**	**4HOURS**
Design and detailing of One way and two way. Design of dog legged stair case		
Activity 5	**Column Design**	**4HOURS**
Design and detailing for short columns		
Activity 6	**Footing Design**	**4 HOURS**
Design and detailing of Isolated rectangular footing		
Activity 7	**Design and detailing of G+2 building on Software**	**4 HOURS**
Design of G+2 storied building on softwares like Staad-pro, Etabs or SAP2000.		

TEXT BOOKS

1. N. Krishnaraju, and R. N.Pranesh," Reinforced Concrete Design", New Age International Pvt. Ltd., 2009
2. . Varghese P C, Limit State Design of Reinforced Concrete, Prentice Hall of India, Private, Limited New Delhi,2008.
3. Gambhir.M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2006.
4. Krishna Raju N., "Prestressed concrete", 5th Edition, Tata McGraw Hill Company, New Delhi, 2012

REFERENCE BOOKS

1. . Prab Bhatt, T.J. MacGinley, Ban Seng Choo, "Reinforced Concrete Design: Design Theory and Examples", Third Edition, 2006, CRC Press, Taylor Francis Group, U.S.
2. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002
3. . Punmia B.C, Ashok Kumar Jain, ArunK.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
4. Mallick and Gupta, Reinforced Concrete Design, Oxford and IBH, Delhi, 1997 5 Unnikrishna Pillai,
5. Devdas Menon, "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., 2009
6. . Subramanian,N. ,"Design of Reinforced Concrete Structures", Oxford University Press, New Delhi, 2013.
7. IS 456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2000
8. SP16, IS 456:1978 "Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 1999
9. Pandit.G.S. and Gupta.S.P., "Prestressed Concrete", CBS Publishers and Distributers Pvt. Ltd, 2012.
10. IS1343:1980, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi, 2012 IS 456:2000 and SP 16 are permitted in the Examination

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Transportation Engineering
	COURSE CODE	CV313
	COURSE CREDITS	4
RELEASE DATE : 01-06-2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : Strength of Material , Geotechnical Engineering, Surveying Geospatial

COURSE OBJECTIVES :

CV313.CEO.1: To understand the basic principles and practices of transportation engineering and urban transportation planning.

CV313.CEO.2: To have the capability to identify and solve transportation problems within the context of data availability and limitations of analysis tools

CV313.CEO.3: To gain the facility of utilizing the state of the art techniques and models in the field.

COURSE OUTCOME :

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

CV313.CO.1: : explain basic transportation planning process (L2)

CV313.CO.2: design systems for traffic operations (L4)

CV313.CO.3: :design highway geometry (L4)

CV313.CO.4: : design bituminous mixes (L4)

CV313.CO.5: explain basics of bridge engineering (L2)

CV313.CO.6: demonstrate use of BIS, IRC MORTH codes (L3)

THEORY		
UNIT 1	**Introduction to Transportation Engineering**	**5 HOURS**
Content: Role of transportation in society, Different modes of transportation, Road classification, network patterns, planning surveys, 20-year road development plans, basic Transportation planning process,4 stage demand, trip generation, trip distribution, trip assignment modal split. Self-study component: Advancement in Transportation Case study: Evaluation of Development Plans towards Sustainable Urban Transportation: A Case Study of Pune Metropolitan Region (https://trid.trb.org/view.aspx?id=1250402) Further reading: Highway Economics		
UNIT 2	**Traffic Engineering**	**8 HOURS**
Content: Fundamental parameters of traffic stream, Fundamental relations of traffic flow, concept of EPCU, capacity and level of service. Introduction to grade separated intersections, cloverleaf, trumpet, flyovers. Design of isolated fixed time signal. Introduction to signal coordination Intelligent Transportation Systems. Self-study component: Traffic regulations, one-way streets, traffic signs, road markings, signals, warrants. Case study: Evaluation of Development Plans towards Sustainable Urban Transportation: A Case Study of Pune Metropolitan Region (https://trid.trb.org/view.aspx?id=1250402) Further reading: Indo-HCM, VISSIM demonstration.		
UNIT 3	**Geometric design of highway**	**8 HOURS**
Content: Principles of highway alignment, requirements, highway cross section elements, road furniture, arboriculture, pavement surface characteristics, sight distances, Design of horizontal alignment: horizontal curves, super elevation, transition curves. Design of vertical alignment: gradients, vertical curves, grade compensation as per IRC codes. Demonstration of OpenRoad software. Self-study component: Parking facility, Highway Lighting, IRC SP 048: Hill Road Manual Case study: Visit to study road cross section elements.		
UNIT 4	**Pavement materials and construction practices**	**6 HOURS**
Content: Bituminous materials Bituminous mixes WBM WMM and requirements as per MORTH codes. Types of pavement structures functions of pavement components. Construction practices as per MORTH guidelines and construction machinery Self-study component: Related MORTH Specifications Case study: Site visit to highway construction site		
UNIT 5	**Pavement Design and highway maintenance**	**8 HOURS**
Content: Design of flexible pavements by IRC method. Design of rigid pavement by IRC method. Highway Maintenance: Pavement distresses, causes. Classification of Maintenance: routine maintenance, periodic maintenance. Importance of highway drainage. Case study: Site visit to highway construction site Further reading: IIT PAVE software		
UNIT 6	**Introduction to Bridges**	**5 HOURS**
Content: Classification and types bridges, components of bridges, concept of economical span, afflux, HFL, scour depth. Loads on bridges, IRC load specifications.		

Practical/project		
Project.01	**Material conformity as per standards**	**20HOURS**

• Tests on bituminous mixes: Determination of flow stability, Bitumen extraction test • Marshall mix design Self-study: Related IS codes

TEXT BOOK

1. S.K. Khanna and C.E.G. Justo, "Highway engineering", 10th Edition, Nem Chand and Brothers, 8185240930, 2017.
2. Dr. L.R. Kadiyali, "Transportation Engineering", Khanna Book Publishing Co., 9788187325727, 2016
3. S.P. Bindra., "A Course in Highway Engineering", Dhanpat Rai and Sons, 8189929860, 2008.
4. S.P. Bindra, "Principles and practice of Bridge Engineering", Dhanpat Rai and Sons, 8189928848, 2012.
5. Principles of Transportation Engineering", Tata Mac-Graw Hill, , 007462363X , 2000

REFERENCE BOOK

1. Rangawala, "Highway Engineering", Charotar publishing House, 9385039091, 2015.
2. Dr. L.R. Kadiyali and N.B. Lal, "Principles and practices of Highway Engineering", Khanna Publishers, 8174091653, 2005
3. Partha Chakraborty ,Animesh Das, , "Principles of Transportation Engineering", , Prentice Hall of India Pvt. Ltd., , 978-81-203-2084-0.
4. D. Johnson and Victor, "Essentials of Bridge Engineering", Oxford and IBH publishing co. Pvt. Ltd., , 9788120417175 , 2008.
5. S.Ponnuswamy, "Bridge Engineering", , Tata Mc Graw–Hill publishing co. Ltd., , 9339221079 , 2017

FURTHER LEARNING

1. BIS codes, MORTH standards, IRC standards

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Water Resources Engineering
	COURSE CODE	CV314
	COURSE CREDITS	3
RELEASE DATE : 01-06-2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	NA	35	35	30	NIL	NIL	100

PRE-REQUISITE:

COURSE OBJECTIVES:

CV314.CEO.1: To estimate the hydrological parameters for a given catchment or a river basin.

CV314.CEO.2: : To analyze rainfall-runoff relationship using hydrograph methods and determine reservoir capacity as per the availability and demand of water

CV314.CEO.3: To study the design theories of canal systems and various irrigation practices and.

CV314.CEO.4: To estimate ground water availability using concepts of ground water hydrology.

CV314.CEO.5: To judge the applicability of any proposed process, strategy, or methodology for Water Resources systems engineering using the fundamental concepts

CV314.CEO.6: To analyse remote sensing data and geographic information system (GIS) data in hydrological modelling studies.

COURSE OUTCOME:

The students after completion of the course will be able to

CV314.CO.1: Analysis of hydro-meteorological data.

CV314.CO.2: : Estimation of reservoir capacity and yield.

CV314.CO.3: Design of irrigation canals and canal network

CV314.CO.4: Estimation of aquifer parameters.

CV314.CO.5: Apply system analysis techniques and solve complex problems in water resources engineering.

CV314.CO.6: Develop rainfall-runoff relationship hydrological models.

THEORY		
UNIT 1	**Introduction: Water Resources Engineering**	**7 HOURS**
Introduction to water resources engineering: Hydrologic Cycle, various components- precipitation, abstraction, Infiltration, Evaporation, runoff etc Stream gauging techniques. Self Study- Measurement of precipitation (Recommended Site Visit to IMD, Pune).		
UNIT 2	**Unit hydrograph theory, floods and Reservoir Planning**	**8 HOURS**
Runoff: Hydrograph Theory, Effective Rainfall, Derivation of unit hydrograph, S-curve hydrograph. Floods: what is flood, flood frequency analysis, probabilistic and statistical concepts in estimating peak discharge, various flood formulas, design flood for the reservoir, probable maximum flood, flood lines Reservoir Planning: Mass curve and demand curves, Fixation of reservoir capacity from annual inflow and outflow, Reservoir losses, Reservoir sedimentation, Trap Efficiency, Useful life of reservoir.		
UNIT 3	**Irrigation Water Distribution Systems**	**8 HOURS**
Irrigation Water Requirements of Crops, Soil moisture, field capacity, crops cycle, crop period, base period, various seasons, duty, delta and various irrigation efficiency. Diversion head works: Layout, Types of cross drainage works Canal Systems: Types of canals, design principles of irrigation canals, Canal design by manning's formula, various canal structures Silt theories, Introduction to Pipe Distribution Network (PDN) for increasing water use efficiency Self Study- Assessment of Canal Revenue		
UNIT 4	**Ground Water Hydrology**	**7 HOURS**
Occurrence of groundwater, types of aquifers, aquifer properties, Groundwater movement, Darcy's law, Conductivity and Transmissivity, yield from a well under steady state conditions, unsteady flow in unconfined aquifers, well losses and specific capacity. Self Study- Aquifer mapping and management in Groundwater Hydrology		
UNIT 5	**Water Resources Systems Engineering**	**7 HOURS**
Use of System analysis techniques in water resources: optimization by conventional techniques like linear programming, dynamic programming and simulation. Use of Soft computing tools like ANN, Genetic algorithm, PSO, ACO in water resources planning, design and management		
UNIT 6	**Remote Sensing and Computer Modelling in Hydrology**	**7 HOURS**
Principles of Remote Sensing, Integration of remote sensing with GIS, Remote Sensing of hydrologic elements, Remote-Sensing applications to hydrology, Introduction to computer models for hydrology, Rainfall-Runoff / Flood Flow Model. Assignment: Development of Rainfall Runoff model for catchment area.		

TEXT BOOK

1. Vedula S., and Majumdar P. P. "Water Resources Systems" – Modeling Techniques and Analysis Tata McGraw Hill, 5th reprint, New Delhi, 2010.
2. Punmia B. C., Irrigation and Water Power Engineering, Lakshmi Publications, 2016, ISBN-13: 978-8131807637.
3. Santosh Kumar Garg, Hydrology and Water Resources Engineering, Khanna Publishers, 2017, ISBN-13: 978-8174090614.
4. Santosh Kumar Garg, Irrigation Engineering and Hydraulic Structures, Khanna Publishers, 2017, ISBN-13: 978-8174090478.

REFERENCE BOOK

1. Hall Warren, A. and John A. Dracup, "Water Resources System Engineering", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1998.
2. Engineering Hydrology, Subrahmanya K., 2008, Tata Mc Graw Hill Pub. Co., New Delhi, ISBN 13: 9781259029974
3. Patra K.C., "Hydrology and Water Resources engineering", Narosa Publications, New Delhi, 2008, ISBN-13: 978-8173198465
4. Jeya Rami Reddy. P, "A text book of Hydrology", Laxmi Publications, New Delhi, third edition, 2016, ISBN-13: 978-9380856049.
5. Ram S. Gupta, "Hydrology and Hydraulic Systems", Waveland Press, INC., USA, Fourth edition, 2017, ISBN-10: 1-4786-3091-4.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Operations Research Techniques in Civil Engineering
	COURSE CODE	CV332
	COURSE CREDITS	4
RELEASE DATE : 01-01-2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE: Construction Planning Management

COURSE OBJECTIVES:

CV332.CEO.1: To calculate maximum profit or minimum cost using LPP
CV332.CEO.2: To execute Sensitivity Analysis/ Post Optimality Analysis
CV332.CEO.3: To predict optimum path for transportation and assigning jobs to people in an efficient way
CV332.CEO.4: To predict optimum period of replacement of equipment/machinery
CV332.CEO.5: : To execute sequencing techniques
CV332.CEO.6: To predict business strategies and analyzing queuing systems

COURSE OUTCOME:

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

CV332.CO.1: Understand different optimization tools and Solve the Linear Programming problems using graphical and simplex method
CV332.CO.2: Apply Linear Programming for Transportation problems solve assignment problems for optimal assignment of men/equipment.
CV332.CO.3: :Make decision of replacing equipment/machinery at optimal time.
CV332.CO.4: Organize an appropriate order of operations.
CV332.CO.5: :Decide strategy for business growth using game theory.
CV332.CO.6: : Decide optimum service level by applying queuing theory.

THEORY		
UNIT 1	**Introduction to Optimization Tools for Engineering**	**8 HOURS**
Introduction to different optimization tools, their merits and demerits. Linear and Non- linear programming, Soft computing Tools used for optimization, simulation. Introduction to Linear Programming Problems, Formulation and Solution using graphical method and simplex method, Types of Linear Programming Problems.		
UNIT 2	**Duality and Sensitivity Analysis**	**8 HOURS**
Duality: Definition, Relationship between primal and dual solutions, Economic Interpretation, Post optimal analysis/ sensitivity analysis, Dual Simplex Method. Two phase method		
UNIT 3	**Transportation and Assignment Problems**	**6 HOURS**
Transportation Problems: Finding an initial feasible solution, Checking optimality of transportation problem, improving the solution of transportation problem, Special cases in Transportation problems Assignment Problems: Hungarian method of Assignment problem, Maximization in Assignment problem, unbalanced problem, problems with restrictions, travelling salesman problems.		
UNIT 4	**Replacement Models**	**6 HOURS**
Replacement Models: Introduction, replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly - Individual replacement policy, Group replacement policy.		
UNIT 5	**Sequencing Models**	**6 HOURS**
Sequencing Models: Introduction, General assumptions, processing n jobs through 2 machines, processing 'n' jobs through m machines, Processing 2 jobs through m machines.		
UNIT 6	**Game Theory / Queuing Theory**	**6 HOURS**
Game Theory: Introduction, 2 person zero sum games, Maximin - Minimax principle, Principle of Dominance, Solution for mixed strategy problems Queuing Theory: Introduction, single channel - Poisson arrivals - exponential service times with infinite population finite population, Multi-channel Poisson arrivals - Exponential service times with infinite population.		

Assignment:		
Assignment.1		**02 HOURS**
Assignment on solution of linear programming problems using graphical method, simplex method manually and using MS Excel and other Software)		
Assignment.2		**02 HOURS**
Assignment on Dual and Primal LP Problems (manually and using MS Excel and other Software) .		
Assignment 3		**2 HOURS**
Assignment on Sensitivity Analysis (manually and using MS Excel and other Software)		
Assignment 4		**2 HOURS**
Assignment on Transportation Problems. (manually and using MS Excel and other Software)		
Assignment 5		**2 HOURS**
Assignment on Assignment Problems. (manually and using MS Excel and other Software)		
Assignment 6		**2 HOURS**
Assignment on replacement model		
Assignment 7		**2 HOURS**
Assignment on sequencing problem		
Assignment 8		**2 HOURS**
Assignment on Game Theory		
Assignment 9		**2 HOURS**
Assignment on Queuing theory		
Assignment 10		**2 HOURS**
Assignment on Simulation		
Assignment 11		**2 HOURS**
Assignment on Dynamic Programming		
Assignment 12		**2 HOURS**
Assignment on Non Linear Programming		
Assignment 13		**2 HOURS**
Assignment on Modern Optimization Techniques		
Project		**14 HOURS**
Project on Application of Operation Research techniques on real life construction industry/ project		

TEXT BOOK

1. S.D. Sharma, Operations Research, Kedarnath, Ramnathamp; Co., Meerut.
2. V.K. Kapoor, Operations Research , S. Chand Publishers,New Delhi.
3. R. Paneer Selvam, Operations Research , Second Edition, PHI Learning Pvt. Ltd., New Delhi.
4. Data Reconciliation by Prof. Shanker Narasimha.

REFERENCE BOOK

1. 1. Hamdy, A. Taha, Operations Research-An Introduction, Sixth Edition, Prentice Hall of India Pvt. Ltd.
2. 2. Hrvey M. Wagner, Principles of Operations Research, Second Edition, Prentice Hall of India Ltd.
3. 3. Operations Research: Principles and Practice-Ravindrav,Philip Solberg,Wiley,India
4. 4. Engineering Optimazation Theory Practice – S.S. Rao., Wiely.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	UNIT OPERATION PROCESSES EFFLUENTTREATMENT
	COURSE CODE	CV333
	COURSE CREDITS	4
RELEASE DATE : 01-01-2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE:

COURSE OBJECTIVES:

CV333.CEO.1: To impart the knowledge on the concept and applications of Industrial Pollution.

CV333.CEO.2: To understand principles of different unit operations and processes in Effluent treatment plants.

CV333.CEO.3: To educate the students on the working principles and design of various physical, biological and chemical treatment systems for Industrial Effluent

CV333.CEO.4: To identify best applicable technologies for effluent treatment.

COURSE OUTCOME:

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

CV333.CO.1: Identify and solve complex engineering problems related to industrial effluent.

CV333.CO.2: Suggest and apply the suitable treatment processes for Industrial Effluent same in the field application.

CV333.CO.3: : Design various unit processes for effluent treatment.

CV333.CO.4: Identify and assess the characteristics of effluent water along with their environmental impacts

THEORY		
UNIT 1	**Fundamental Physical Unit Operations**	**7 HOURS**
Factors in selection of unit operations and processes – Sequencing of unit operations and processes; Plant layout; Hydraulic considerations. Principal type of Reactors – Flow measurement – Screening – Flow Equalization – Mixing –static and Mechanical mixers – Coagulation and Flocculation – Perikinetic and Orthokinetic flocculation.		
UNIT 2	**Principles of Sedimentation and Floatation**	**7 HOURS**
Sedimentation – Type of setting – Removal ratio – Tray and Titles plate settlers Floatation - Dissolved air flotation.		
UNIT 3	**Filtration**	**7 HOURS**
Filtration – Type of filters – Head loss through filters – Carman- Kozeny equation – Two film Theory – Mass transfer – Oxygenation capacity.		
UNIT 4	**Biological Unit Processes**	**7 HOURS**
Kinetic principles of Biological growth – Suspended and attached growth processes – Aerobic and Anaerobic – Determination of kinetic coefficients.		
UNIT 5	**Chemical Unit Processes**	**7 HOURS**
Chemical precipitation – phosphate removal – Adsorption – Activated carbon – Isotherms – Disinfection – principles – types of chlorination – De-chlorination		
UNIT 6	**Miscellaneous Methods**	**7 HOURS**
Nitrification and Denitrification - Phosphorus removal -Heavy metal removal - Membrane Separation Process - Air Stripping and Absorption Processes, Introduction to: HRTS and Phytoremediation Method for industrial effluent treatment– Principle, advantages limitations. Site visit to Effluent Treatment Plant is recommended.		

Project		
Project.01	**Fundamental Physical Unit Operations**	**HOURS**

Checking the quality of Effluent being discharged to nearby water bodies and preparing a report on it Also, suggest the various treatment methods to dispose of it safely in the water body.

TEXT BOOK

1. Garg, S. K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2015.
2. Purkait M K, TAYLOR FRANCIS, "Treatment Of Industrial Effluents Case Studies", 1st Edition 2020.

REFERENCE BOOK

1. METCALF EDDY, INC. Wastewater Engineering, Treatment, Disposal and Reuse", Fourth Edition, Tata McGraw-Hill Publishing company Limited, New Delhi, 2002.
2. Eckenfelder, W.W., "Industrial Water Pollution Control", Mc Graw Hill, 2001.
3. Arceivala, S.J., "Wastewater Treatment for Pollution Control", Tata McGraw-Hill, 2008.
4. Frank Woodard, "Industrial waste treatment Handbook", Butterworth Heinemann, New Delhi, 2001.
5. CASEY. T. J. "Unit Treatment Processes in Water and Wastewater Engineering", John Wiley Sons, England, 1993.
6. ARUNDEL, John "Sewage and Industrial Effluent Treatment: A Practical Guide", Blackwell Science, 1995.
7. A.D. Patwardhan, PHI Learning, "Industrial Wastewater Treatment", 2009.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	OpenRoad Designer
	COURSE CODE	CV343
	COURSE CREDITS	2
RELEASE DATE : 01-06-2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
0	4	NA	NA	NA	NA	75	75

PRE-REQUISITE: Basic computer handling skills and Auto Cad

COURSE OBJECTIVES:

CV343.CEO.1: To learn basic commands of OpenRoad Designer
CV343.CEO.2: To design horizontal vertical road geometry of highway using OpenRoad Designer

COURSE OUTCOME:

The students after completion of the course will be able to

CV343.CO.1: demonstrate use of basic functions of OpenRoad Designer
CV343.CO.2: model terrain using total station data in OpenRoad Designer Environment
CV343.CO.3: create horizontal vertical alignment
CV343.CO.4: create 3D model of 2 / 4 lane rural corridor
CV343.CO.5: create and annotate cross section sheets and plan and profile sheets

PRACTICAL :		
PRACTICAL 1	**Introduction to Open Roads Designer**	**4HR**
Introduction to the capabilities of the OpenRoads Designer software for existing GEOPAK, InRoads, and MXROAD OpenRoads Technology users. Introduction to the concept of BIM. Overview of various IRC codes involved.		
PRACTICAL 2	**Terrain modelling**	**4HR**
Introduction to terrain model features including the boundary, triangles, and contours using feature definitions, and modifying the default display parameters. Labeling terrain contours, spot elevations and slopes. Creation of terrain by Graphical filter method. Creation of terrain from Ascii file.		
PRACTICAL 3	**Geometric Design**	**12HR**
Creating a horizontal and vertical alignment using the OpenRoads Designer Geometry tools. Ceate, edit, review and annotate geometric elements. Geometric design on existing ground terrain and aerial imagery as well as defining 2D/3D Views.		
PRACTICAL 4	**Corridor Modelling and Superelevation**	**8HR**
Creating a Corridor and 3D model for a 2 lane rural road: Creating Corridor, assigning template drops, creating dynamic cross sections and reviewing the Corridor and 3D model. Designing Superelevation: Creating and assigning superelevation to a Corridor		
PRACTICAL 5	**Corridor Modelling Quantities**	**6HR**
Understanding various tools and methods to extract and compute quantities from the corridor model.		
PRACTICAL 6	**Drawing production**	**6HR**
Creating and annotating cross section sheets and plan and profile sheets, adding individual annotations to label specific location coordinates, station-offset values, elevations etc.		
PRACTICAL 7	**Civil Cells**	**4HR**
Introduction to civil cells, civil cell references are its applications in a practical workflow. Use 4 civil cells delivered with the product, use civil cells from external sources and their incorporation with ready models.		
PROJECT 1	**Designing of 4-lane corridor**	

REFERENCES

1. S.K. Khanna and C.E.G. Justo, "Highway engineering", Nem Chand and Brothers, 8185240930, 2017.
2. IRC related to geometric design of highway
3. Additional learning from Bentley's Open Road, Youtube channel (https://www.youtube.com/watch?v=Y36GiK3BPOw)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Skill Development Course 3: WaterGEMS
	COURSE CODE	CV344
	COURSE CREDITS	2
RELEASE DATE : 01-01-2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
0	4	NA	NA	NA	50	25	75

PRE-REQUISITE : Mechanics of Fluids Drinking Water and Sanitary Engineering

COURSE OBJECTIVES :

CV344.CEO.1: To understand the importance and uses of hydraulic simulation models and comprehend the essential concepts of modelling.

COURSE OUTCOME :

The students after completion of the course will be able to

CV344.CO.1: Summarize the basic principles of water distribution modeling. (L2)
CV344.CO.2: Apply WaterGEMS models to solve common water distribution system problems. (L3
CV344.CO.3: Develop a deeper understanding of model creation and analysis using WaterGEMS. (L4)

PRACTICAL		
PRACTICAL 1	**Fundamentals of Hydraulics and Water Supply Engineering**	**6HRS**
Revise the fundamentals of hydraulics and water supply engineering, Need to optimize the water supply models, Different methods to solve the hydraulic problems, Water losses, Introduction to currently available software related to water distribution modeling.		
PRACTICAL 2	**Introduction to the User Interface of WaterGEMS**	**4HRS**
Introduction to the user interface and the different menus along with its applications.		
RACTICAL 3	**Assembling a Water Supply Model**	**6HRS**
Assemble a water supply model consisting of reservoirs, tanks, junctions, pipes, pumps and valves		
PRACTICAL 4	**Steady State Simulations**	**4HRS**
Run the steady state analysis for the prepared water supply network and interpret the results. Modify the given inputs or design constraints if needed.		
PRACTICAL 5	**Extended Period Simulation**	**6HRS**
Model a water distribution system over time using the extended period simulation (EPS) calculation engine and by adding demand patterns to junctions.		
PRACTICAL 6	**Alternatives and Scenarios Management**	**6HRS**
Design and detailing of Isolated rectangular footing		
PRACTICAL 7	**Reporting Results and Validation**	**4HRS**
Interpret the results prepared through flex tables, profiles, contouring, element annotation, colour coding reports.		
PRACTICAL 8	**Water Quality Analysis**	**6HRS**
Perform a water quality analysis to compute water age, constituent concentration or percentage of water from a given node (trace analysis).		
PROJECT 1	**Design a Water Distribution Model using WaterGEMS**	**4HRS**
Design a water distribution model for the community of 50,000 souls. It should consist of demand estimation, pipe network, reservoirs, pumps and different valves. Also perform the water quality analysis for this system		

REFERENCES

1. Prabhata K. Swamee AND Ashok K. Sharma, 'Design of Water Supply Pipe Networks', Wiley Interscience Publications, ISBN: 9780470178522.
2. Bentley Systems, Thomas M. Walski, Donald V. Chase, Dragan A. Savic, Walter Grayman, Stephen Beckwith, Edmundo Koelle, 'Advanced Water Distribution Modeling and Management, First Edition, Bentley Institute Press, ISBN: 9781934493014.
3. 3. Nemanja Trifunovic, 'Introduction to Urban Water Distribution: Theory', Volume I, Second Edition, CRC Press, Taylor Francis Group, ISBN: 9780367504458.
4. 4. Nemanja Trifunovic, 'Introduction to Urban Water Distribution: Problems Exercises', Volume II, Second Edition, CRC Press, Taylor Francis Group, ISBN: 9780367504489.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022(R2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Project Implementation
	COURSE CODE	CV360
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV360.CEO.1: To understand latest techniques, algorithms, models and design process in the field of project

CV360.CEO.2: To implement/develop/experiment/simulate techniques, algorithms and processes in software and real time

CV360.CEO.3: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

CV360.CO.1: Analyze techniques, algorithms and design process relate to the project

CV360.CO.2: Implement/develop/experiment/simulate/test techniques/process and infer conclusions from it.

CV360.CO.3: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project design phase in Sem V (project design), next step is project implementation (Sem VI). The goal of this phase of the project is to implement/develop/experiment/simulate/test the techniques/processes of the project and give a mature shape. The implementation can be a combination of algorithms, techniques, processes, testing etc. This will also include drawing inferences from the results and discussing them.

GUIDELINES

1. Preferably project group students of Sem V would be continued in this semester VI.
2. Every project group should consist of minimum 03 and maximum of 04 students.
3. The group members may be from different programs to support the interdisciplinary functioning.
4. Project group members and title of the project need to be approved by Project Guide and School.
5. Projects should preferably have a national/international, industry/academic/research collaboration.
6. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
7. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
8. Define proposed solution and apply project management/modeling tools for project planning and design.
9. Define outcome, milestones, definite roadmap for project design, implementation, tools, resources, performance evaluation and documentation.
10. Perform refinement of System architecture & methodology.
11. Students should give a mature shape to their idea in terms of implementation. This is expected in this semester. This may include one or many of these points. Implementation /development/experimentation/simulation/testing/building the techniques/processes

COLLABORATIVE/SPONSORED PROJECT

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization at the start of semester VI.
3. Proposed Collaborative Project work need to be reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of 12 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Freezing of project groups and titles. Refinement of title and objectives from Sem V should freezed by the time of first review.
2. Final Synopsis of the project. (To be done at guide level)
3. Methodology / System Design / Block Diagram should be properly explained by the student
4. Project Review I Presentation.
5. Project Implementation: Students should take the work in one and/more of the points. Like Implementation/development/experimentation/simulation/testing/experimental yield/building the techniques/processes etc. . .
6. Based on the points discussed in 5, student would be able to get results and discuss them. Students should be able to draw inferences from results.
7. Project Review II Presentation.
8. Quality of Publication and Researchers: Students would be educated on different technical papers and their importance (article types, journal metrics etc) along with author/researcher credentials.
9. Project Documentation: Project Report Writing

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I: Problem Statement and objectives, Implementation plan & action (algorithms/techniques/models/mathematical understanding/implementation) (10 Marks)
2. An activity on illustrating methodology. This may inlcude paper reading activity: Read and Summarize a paper in 1 page (Individual to every student of the group). Any other activity can also be taken take would illustrate methodology (10 marks)
3. Project Review II: Results and Implementation, Observations, Inferences, Discussion on algorithms / techniques /models / testing) (10 Marks)
4. Article Quality and Author Credentials: Information about Research Article types, paper quality metrics (SCI/SCOPUS/WOS) and Author Credentials (Citation count, h-index, I10 index etc) (5 marks)
5. Project Report (10 Marks)
6. Project: Documentation Final Presentation and Demonstration (30 Marks)

(Parameters of evaluation: Final implemented work, report, presentation and paper drafted based on work)

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Larsen Samuel Bruning, "Doing Projects And Reports In Engineering", Macmillan Education UK, Bloomsbury Publishing PLC, 2019, ISBN: 9781352005639, 1352005638.
3. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
4. Sara Efrat Efron and Ruth David, "Writing the Literature Review: A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
5. Helmut Kopka and Patrick Daly, "A Guide to Latex: Document preparation for beginners and advanced users", Addison Wesley, 1999.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Employability and Career Development
	COURSE CODE	HP305
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	60	15	75

PRE-REQUISITE : Professional Skills

COURSE OBJECTIVES :

HP305.CEO.1: To define the importance of Employability skills in students life.
HP305.CEO.2: To explain them necessary, specific Employability Career Development skills.
HP305.CEO.3: To appraise students for placements through acquisition of professional skills.
HP305.CEO.4: To support them detect their present level in respect of each Career Development skill and show direction for improvement..

COURSE OUTCOMES :

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

HP305.CO.1: Relate the importance of Employability Career Development.
HP305.CO.2: Build necessary, specific professional skills
HP305.CO.3: Analyze the environment of employability.
HP305.CO.4: Develop various techniques of effective team building in their professional life.

SECTION A: Personal Development with the help of Professionals (30 Marks)		
PRACTICAL NO.01	**Self Management**	**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 self-evaluation, self-development and Goal Setting, Stress management, Career anchor.		
PRACTICAL NO.02	**Personal Interviews**	**4 HOURS**
Preparing for Interviews, Typical expected questions suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions.		
PRACTICAL NO.03	**Group Discussion and Public Speaking**	**4 HOURS**
Parameters of assessment,Initiating the discussion,Effective listening,Own contribution,Paraphrasing,Arguing and counter-arguing, Giving direction to the discussion, Public Speaking skills.		
PRACTICAL NO.04	**Team Building and Motivation**	**2 HOURS**
Hallmark of effective teams, Barriers to teamwork, 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	**Profile Development**	**4 HOURS**
Resume Writing: Introduction to the Resume, Key Components of a Resume and Cover Letter, Enhancing tips for Resume and Cover Letter. Letter of recommendation (LOR) preparation: Details on types, samples, structure, content tips format for letters of recommendation for student. Statement of Purpose (SOP) preparation: SOP Formats, Templates, and Guidelines for SOP Writing. Job application and professional email writing.		

SECTION B:	Aptitude Training with the help of BtechGuru Platform (30 Marks)	18 HOURS

1. Number System
2. HCF LCM , Surds and Indices.
3. Percentages and Average.
4. Time and work.
5. Time, Speed and Distance.
6. Probability.
7. Quadratic Equations.
8. Profit and Loss.
9. Simple and Compound Interest.
10. Ratio and proportion.
11. Permutation and Combination.
12. Boats and Streams, Pipes and Cisterns.
13. Mixtures and Allegations, Mensuration.
14. Data Interpretation – Tables, Pie Charts, Bar Graphs, Line Graphs.

SECTION C:	Final Assessment with the help of career Assessment Test (15 marks)	2 HOURS

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. R S Agrawal, Quantitative Aptitude, S. Chand Publishing (2020), ISBN: 9789352534029, 9789352534029.
4. Shakuntala Devi, Puzzles to Puzzle You, Orient Paperbacks, ISBN: 9788122200140, 9788122200140.

REFERENCE BOOK

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

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: VII												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC13	CV405	Estimating and Costing	3	2	-	35	35	30	50	0	150	4
DE01	CV47#	Discipline Elective - 1	3	-	-	35	35	30	0	0	100	3
OE03	CV42#	Open Elective-03 (CPM / EE)	3	2	-	35	35	30	50	0	150	4
SDP10	CV43#	Skill Development Course – 4 (CFD / QGIS)	-	4	-	0	0	25	50	0	75	2
SDP11	CV470	Project Evaluation	-	8	-	0	0	50	0	100	150	4
SDP12	CV400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CV406	Design of Hydraulic Structures	3	2	-	35	35	30	50	-	150	4
DE02	CV47#	Discipline Elective - 2	3	-	-	35	35	30	-	-	100	3
SDP13	CV480	Capstone Portfolio	-	8	-	-	-	-	-	150	150	4
HSS7	HP405	Engineering Economics	2	-	-	-	50	25	-	-	75	2
HSS8	HP406	Psychology	2	-	-	-	50	25	-	-	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**110**	**50**	**150**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CV406	Design of Hydraulic Structures	3	2	-	35	35	30	50	-	150	4
DE02	CVSW#	Discipline Elective*	3	-	-	35	35	30	-	-	100	3
SDP14	CV467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP15	CV468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**35**	**35**	**30**	**-**	**300**	**550**	**15**

Discipline Elective (DE) : 2 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	CV471	Building Services
	CV472	Structural Dynamics & Earthquake Engineering
	CV473	Railway Engineering
	CV474	Numerical Methods in Civil Engineering
2.	CV475	Foundation Engineering
	CV476	Geospatial Tools and Techniques
	CV477	Air and Noise Pollution
	CV478	Finite Element Methods
Discipline Elective* (For SLIP)	CVSW01	Foundation Engineering
	CVSW02	Advanced Concrete Technology
	CVSW03	Wastewater Treatment and Recycling

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Estimating and Costing
	COURSE CODE	CV405
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : Building Design and Construction

COURSE OBJECTIVES :

CV405.CEO.1: To prepare detailed estimate for buildings, roads and industrial structures
CV405.CEO.2: To calculate rates of different items of work
CV405.CEO.3: To estimate valuation of any existing structure
CV405.CEO.4: To summarize types of contracts, tenders and E tendering.

COURSE OUTCOMES :

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

CV405.CO.1: Describe the importance of estimation and able to use approximate estimate for rough estimation.(L2)
CV405.CO.2: Write specification for construction materials and activities.(L6)
CV405.CO.3: Prepare detailed estimate for building, road and industrial structure (L6)
CV405.CO.4: Calculate rates for various items of construction. (L4)
CV405.CO.5: Valuation report for residential building. (L6)
CV405.CO.6: Describe types of contracts and to draft tender notices.(L2)

THEORY		
UNIT 1	**Introduction to Estimate**	**4 HOURS**
Introduction, Purpose, Types of estimates – Approximate estimates, detailed estimate. Approximate Estimates: Meaning, purpose, methods of approximate estimation of building and other civil engineering projects like roads, irrigation/ water supply, sanitary engineering, and electrical works. Self-Study: Identifying components of interior furnishings with their types and market rates		
UNIT 2	**Specifications**	**6 HOURS**
Specifications: Meaning, purpose, types. Drafting detailed specifications for major items like excavation, stone/ brick masonry, plastering, flooring, R.C.C. work. Self-Study: Drafting detailed specifications for any two items of work condition.		
UNIT 3	**Taking out quantities**	**8 HOURS**
Methods of estimating- center-line methods of working out quantities. Calculation of quantities for R.C.C framed structures and steel structures including, Bar Bending Schedule Self-Study: P.W.D method, Calculation of quantities for Load-bearing structures		
UNIT 4	**Rate Analysis**	**6 HOURS**
Standard Data, Observed Data, Schedule of Rates, Market rates, Assessment of Man Hours and Machinery for common civil works, Rate Analysis, and Cost Estimates using Computer software Self-Study: Collection of market rates and comparison with DSR rates		
UNIT 5	**Valuation**	**6 HOURS**
Valuation: Purpose of valuation. Meaning of price, cost and value. Factors affecting 'value'. Types of value: only Fair Market Value, Book Value, Salvage/ Scrap Value, Distressed Value and Sentimental Value. Concept of free hold and lease hold property. Estimation versus valuation. Meanings of depreciation obsolescence. methods of valuation for different structures. Valuation of any building Self-Study: Preparation of valuation report of any existing structure.		
UNIT 6	**Contracts and Tenders**	**6 HOURS**
Contract – Types of contracts – Formation of contract – Contract conditions. Tender notices – types – tender procedures – Drafting model tenders, E-tendering Self-Study : Tender models, draft a detailed tender notice.		

PRACTICALS/PROJECT: All assignments/projects to be submitted.		
PRACTICAL.1	**Working out approximate estimate for civil structures**	**2 HOURS**
Working out approximate estimate for different Civil engineering projects like roads, irrigation/ water supply, sanitary engineering, and electrical works.		
PROJECT .1	**Working out quantities of RCC structure**	**10 HOURS**
Working out Detailed Quantities /BOQ of single storied R.C.C. building including i) Architectural structural drawings ii) A detailed specification for all item of works iii) Bar bending schedule of reinforcement .		
PROJECT .2	**Working out quantities of Industrial Shed**	**4 HOURS**
Working out detailed quantities/ BOQ of an industrial shed		
PROJECT .3	**Working out quantities of Road (WBM/Concrete)**	**4 HOURS**
Working out quantities of WBM or Concrete road.		
PROJECT .4	**Working out quantities of interior Furnishing**	**4 HOURS**
Analysis of Rates for any two Items of Works based on the prevailing market rates of various items and labor involved.		

TEXT BOOK

1. Estimation and Costing in Civil Engineering by B.N. Dutta, 28th edition, UBS Publishers Pvt Ltd, ISBN 978-81-7476-770-7
2. Estimation, Costing, Specification and Valuation by M. Chakroborti, 28th edition, Chakroborti Publication, ISBN-13: 978-8185304366

REFERENCE BOOK

1. Estimating, Costing and Valuation by R C Rangwala, Charotar Books Distributors, ISBN: 978-8185594859
2. Indian Practical Civil Engineers Handbook by P. N. Khanna UBS Publishers Pvt Ltd
3. IS 1200
4. Standard Bidding procedures/documents of MoRTH
5. Common schedule of rates

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Building Services
	COURSE CODE	CV471
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : Building Design and Construction

COURSE OBJECTIVES :

CV471.CEO.1: To develop proficiency in building service industry.
CV471.CEO.2: To know the practices of building services
CV471.CEO.3: To develop proficiency in calculating estimates of services
CV471.CEO.4: To encourage students for entrepreneurship in service industry.

COURSE OUTCOMES :

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

CV471.CO.1: Analyze plumbing and drainage plan.
CV471.CO.2: Explain the concepts and techniques of water proofing and rain water harvesting
CV471.CO.3: Prepare reflected ceiling plan
CV471.CO.4: Define principles of air conditioning and thermal insulation
CV471.CO.5: : Illustrate firefighting system
CV471.CO.6: Identify materials of acoustics and sound insulation.

THEORY		
UNIT 1	**Plumbing and Sanitation**	**6 HOURS**
Plumbing Systems, Various Materials for system like PVC, GI, AC, CI, HDPE, PPR (Pex Pipes), and Stoneware, Various types of traps, Fittings, Chambers, Concept of Plumbing Drainage plan. Self-Study : National Standard Plumbing Code, preparation of plumbing and drainage plan		
UNIT 2	**Rain water harvesting and water proofing**	**6 HOURS**
Introduction to rainwater harvesting, concept of rain water Gutters, rainwater outlet Down Tank systems, Specifications as per IS Code 15797. Waterproofing of New and Existing Structures Materials used, Non Destructive Water Proofing, Water proofing of terraces, Damp Proofing. Self-Study : New Materials of waterproofing		
UNIT 3	**Electrification and Illumination**	**6 HOURS**
Concealed and Open Wiring, Requirements and Location of various points, Concept of earthling, electrical layout plans Natural and artificial lighting-principles and factors, arrangement of luminaries, Distribution of illumination, Utilization factors, illumination layout plans, types of switches and sockets Self-Study: Reflected ceiling plan		
UNIT 4	**Air conditioning and Thermal Insulation**	**6 HOURS**
Air conditioning: Purpose, Classification, Principles, Various Systems. Thermal Insulation: General concept, Principles, Materials, Methods, Computation of Heat loss and heat gain in Buildings Self-Study: Overview of high performance of glass with respect to heat transfer		
UNIT 5	**Fire Safety**	**6 HOURS**
Fire resistance in building, Fire protection precautions, confining of fire, fire hazards, Characteristics of fire resisting materials, fire load, firefighting system layout Self-Study: Building materials and their resistance to fire		
UNIT 6	**Acoustics and Sound Insulation**	**6 HOURS**
Acoustics: Absorption of sound, various materials, Sabine's formula, optimum reverberation time, conditions for good acoustics. Sound Insulation: Acceptable noise levels, Noise prevention at its source, Transmission of noise. Noise control. Practical Applications. Self-Study: Visit to cinema hall/ auditorium/ sound recording studios and identifications of acoustics and sound insulation techniques and materials.		

TEXT BOOK

1. Building Energy Management Systems by G. Levermore Taylor and Francis. 2nd edition.. ISBN 978-04- 1926140-7
2. Building Services Engineering by David V. Chadderton , Taylor and Francis. 5th edition ISBN-10: 0415413559
3. Building Construction by Dr. B.C.Punmia , Ashok Kumar jain , jain Book Depot , ISBN-13: 978- 8131804285

REFERENCE BOOK

1. Building Drawing with an Integrated Approach to Built Environment by M G Shah, C M Kale, S. Y. Patki; 5th Edition ISBN: 9780071077873
2. Building Services Engineers, 2015, by Peter, Trenter, N. A., Earthworks : a guide / London : ICE Publishing, 2015 ISBN: 9780849374920
3. SP 35, IS 3067, IS 3646

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABUS**	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Structural Dynamics and Earthquake Engineering
	COURSE CODE	CV472
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : Structural Analysis and Design

COURSE OBJECTIVES :

CV472.CEO.1: To introduce the relevant principles and prevalent practices in Engineering Seismology from Earthquake Engineering viewpoint.

CV472.CEO.2: To know the different concepts of Structural Dynamics and Earthquake Engineering

CV472.CEO.3: To understand the special provisions and requirements of structures for their safety against earthquake forces.

COURSE OUTCOMES :

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

CV472.CO.1: Apply fundamentals of structural dynamics and earthquake engineering to different structures

CV472.CO.2: Analyse and design of structural components from seismic considerations

CV472.CO.3: Analyse and implement protective measures and strengthening techniques.

THEORY		
UNIT 1	**Introduction to geology and earthquakes**	**6 HOURS**
Introduction to Geology, configuration of tectonic plates in a globe, influence of Geology on earthquake, behavior of plates, their motion and effects, causes of earthquake and their Characteristics, Earthquake parameters, magnitudes, intensity, scales, classification of earthquake seismic zoning of India, seismic coefficients for different zones. Self-Study - Study of damages caused due to past, earthquakes in/ outside India and remedial measures.		
UNIT 2	**Vibrations Systems**	**6 HOURS**
Vibrations - definition, causes, classifications. Single Degree of Freedom systems (SDOF) - Free, forced, damped, un-damped vibrations with basic examples. Introduction to Multi-degrees of Freedom systems (MDOF) - derivations of related equations and solutions to two degree and three degree of freedom systems. Self-Study – Lumped and distributed parameters of vibrations systems		
UNIT 3	**Seismic design of RC structure**	**8 HOURS**
Introduction to IS1893 (Part-I): 2002, Seismic design Philosophy, provision, Seismic coefficient method. Response Spectra, Basic requirement, estimation of story shear, effect of unsymmetrical geometry and masses, mass center and stiffness center, estimation of story shear for symmetrical and torsion for unsymmetrical buildings. IS code provision to response spectrum. Self-Study - Concept of ductile detailing, IS 13920 (1993) provisions for RC frame.		
UNIT 4	**Seismic foundation design**	**6 HOURS**
Type of forces generated due to earthquake, effects on different types of foundation, design of RCC isolated footing for earthquake loading, liquefaction, causes and its remedial measure. Case Study-Bhuj Earthquake: Preliminary Report 2001		
UNIT 5	**Control systems and Disaster Management**	**7 HOURS**
Introduction of different control systems: Passive control: base isolation and active control: bracing system, TMD etc and some latest invention. Introduction to Disaster Management: Types of Disaster, Phases of disaster management, Disaster rescue, psychology and plan of rescue operations. Case Study-Disaster Management: Kedarnath, Uttarakhand 2013		
UNIT 6	**Strengthening and Retrofitting of Structures**	**7 HOURS**
Strengthening and Retrofitting: Need of retrofitting, Evaluation of existing structures, aging, weathering, development of cracks, improper load Path, asymmetry. Materials and equipment's for restoring and retrofitting, methodology of retrofitting for walls, slabs, roofs, columns, foundations. Case Study-Seismic Retrofitting of Reinforced Concrete Buildings		

TEXT BOOK

1. S K Duggal, "Earthquake Resistant Design of Structures", Oxford University Press, 2013.
2. Dr. Vinod Hosur , "Earthquake Resistant Design of Building Structures" Wiley India , 2012
3. B Chandra, Jai Krishna, Ar Chandrasekaran , "Elements of Earthquake Engineering" Standard Publishers Distributors, 2000
4. Anil K. Chopra, "Dynamics of Structures – Theory and Applications to Earthquake Engineering", Pearson, 3rdEdition, 2011
5. Gary Hart and Kevin Wong, "Structural Dynamics for Structural Engineers", John Wiley and Sons, 2000
6. J. W. Smith, "Vibration of Structures. Application in Civil Engineering Design", Chapman and Hall, 1988

REFERENCE BOOK

1. . Mario Paz and William Leigh, "Structural Dynamics - Theory and Computation, Updated With Sap 2000", 5thEdition, Kluwer Academic Publishers
2. Clough and J. Penzien, "Dynamics of Structures", Computers Structures, Inc., University Ave, Berkeley, USA, 1995
3. Leonard Meirovitch, "Fundamentals of Vibrations", Tata Mc Graw Hill, 2001
4. IS 1893(2016) Criteria for Earthquake Resistant design of buildings (Part I): General Provisions and Building – Code of Practice (Sixth Revision), Bureau of Indian Standards, New Delhi
5. IS 13301(1997) Vibration isolation of machine foundations - Guidelines
6. IS 2974 (2008) Code of practice for design construction of machine foundation for reciprocating type machines.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Railway Engineering
	COURSE CODE	CV473
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : Basic knowledge Transportation Engineering

COURSE OBJECTIVES :

CV473.CEO.1: Comprehend different parts of the rail track, their functions and its operation system with respect to construction and engineering applications.

COURSE OUTCOMES :

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

CV473.CO.1: explain different components of railway track
CV473.CO.2: calculate different resistances to the traction
CV473.CO.3: design geometry of railway track
CV473.CO.4: explain traffic regulatory system for railway
CV473.CO.5: describe facilities at railway station yards
CV473.CO.6: explain essentials of track maintenance

THEORY		
UNIT 1	**INTRODUCTION TO RAILWAY ENGINEERING**	**10 HOURS**
History of Indian railways, importance of railways. Role of civil engineers in construction and maintenance. Basic requirements and selection of an ideal alignment. Cross section of permanent way as per IRS and Rail-wheel interaction. Coning of wheel and tilting of rail. Resistance to-friction, wave action, speed, track irregularity, wind, resistance to gradient, curvature, starting and accelerating. Self-study: Recent developments in the field of Railway Engineering		
UNIT 2	**COMPONENTS OF RAILWAY TRACK**	**10 HOURS**
Different components of railway track:Subgrade and formation, Ballast,Sleepers, Rail and related specifications,Track fittings and fastenings, concept ofSEJ,LWR, SWR. Necessity of Points and Crossing.Track Layouts and Sketches of Turn Out,Types of Crossing,Types of Track Turnouts Site visit to study track components		
UNIT 3	**GEOMETRIC DESIGN OF TRACK**	**8 HOURS**
Necessity and Details of geometric design of track, Curves and Superelevation, track gradients, Grade compensation on curves. Demonstration: OpenRail Designer software		
UNIT 4	**MAINTENANCE OF RAILWAY TRACK**	**4 HOURS**
TIntroduction of Maintenance Program: Monsoon, Pre-Monsoon Post- Monsoon Maintenance, Causes for Maintenance, Routine Maintenance, Tools for Railway Track Maintenance and Their Functions. Surface Defects and Their Remedial Measures		
UNIT 5	**RAILWAY STATIONS YARDS SIGNALING AND INTERLOCKING**	**8 HOURS**
Railway Stations Station Yard. Signaling Interlocking, Modern signal system. Visit to nearby railway crossing for signaling and locking system		

TEXT BOOK

1. Satish Chandra M.M. Agarwal, "Railway Engineering", (2nd Edition) 2013, Oxford Higher Edu., ISBN : 9780198083535
2. S.C. Saxena, S.P. Arora, "A Text Book of Railway Engineering", Dhanpat Rai Publications (p) Ltd, 2010, ISBN: 978-8189928834.

REFERENCE BOOK

1. Indian Railway Permanent way manual. 2020
2. J.S. Mundrey, "Railway Track Engineering", 5th Edition, 2017, Tata McGraw Hill Publications, ISBN: 9352606485.
3. Clifford F. Bonnett, "Practical Railway Engineering", 2nd Edition, 2005, Imperial College Press, ISBN: 1860945155.
4. FURTHER LEARNING : Railway Engineering: An Integral Approach – edX www.iricen.com

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Numerical Methods in Civil Engineering
	COURSE CODE	CV474
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE :

COURSE OBJECTIVES :

CV474.CEO.1: Understand Numerical Techniques for solving complex Civil Engineering Problems.
CV474.CEO.2: Develop logical sequencing for solution procedure.
CV474.CEO.3: Optimize the solution for different real life problems with available constraints

COURSE OUTCOMES :

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

CV474.CO.1: Describe various concepts of Numerical Methods and Mathematical Modelling
CV474.CO.2: Select appropriate Numerical Methods to Find the Roots of the Equations.
CV474.CO.3: Analyse simultaneous Equation to solve the problems.
CV474.CO.4: Discover relationship between experimental values in the form of Mathematical Equation.
CV474.CO.5: Illustrate Solutions for real life problem using Numerical Integration.
CV474.CO.6: Evaluate a solution of Differential Equation in given area for various boundary conditions

THEORY		
UNIT 1	**Introduction to Numerical Methods**	**6 HOURS**
Basic concepts of Numerical Methods, Mathematical modeling, errors analysis - Types of Errors: Absolute, Relative, Algorithmic, Truncation, Round off Error, Error Propagation, Concept of convergence-relevance to numerical methods. Self Study-Study at least 5 Research Papers on Applications of Numerical methods in Civil Engineering and prepare report of the same.		
UNIT 2	**Roots of Equations**	**7 HOURS**
Roots of Equations, Bisection Method, False position Method, Newton Raphson method and Successive approximation method. Self Study- Prepare a Template on suitable platform for finding the Roots of Linear/Non Linear Equations		
UNIT 3	**Simultaneous Equations**	**7 HOURS**
Numerical Solution of Linear and Nonlinear Simultaneous Equations: Gauss Elimination Method, Partial Pivoting, Gauss-Seidal Method, Gauss- Jordan Method. Self Study-Prepare a Template on suitable platform for solving Linear/Non Linear Simultaneous Equations		
UNIT 4	**Curve Fitting and Interpolation**	**7 HOURS**
Curve Fitting - Least square technique- Straight line, Exponential equation. Interpolation Lagrange's Interpolation, Newton's Forward interpolation. Self Study-Prepare a Template on suitable platform for Linear/Non Linear Curves and Interpolation		
UNIT 5	**Numerical Integration**	**7 HOURS**
Trapezoidal rule, Simpson's Rule, Gauss Quadrature 2 point and 3 point method. Double Integration: Simpson's 1/3rd Rule. Self Study-Prepare a Template on suitable platform for Numerical Integration		
UNIT 6	**Ordinary Differential Equations**	**6 HOURS**
Taylor's Series method; Euler's method; Modified Euler's method, Runge- Kutta method (Second and Fourth Order) Self Study- Prepare a Template on suitable platform for solving Linear/Non Linear Ordinary Differential Equations		

TEXT BOOK

1. Chapra, Cannale, "Numerical Methods for Engineers", 6th edition, Tata McGraw Hill Edition
2. Dr. B. S. Garewal, Numerical Methods in Engineering and Science, Khanna Publishers.

REFERENCE BOOK

1. Sastry S. S., "Introductory Methods of Numerical Analysis", 5th edition, Prentice Hall of India Delhi.
2. N Krishna Raju Ku Muthu, Numerical Methods For Engineering Problems, 2nd edition, Macmillan Children's Books
3. Amos Gilat, "Numerical Methods for Engineers and Scientists", 3rd Edition, Wiley International, 2014.
4. Ascher, U.M. and Greif, C., "A First Course in the Numerical Methods", SIAM Publication, 2011.
5. Khoury, Richard, Harder, Douglas Wilhelm, "Numerical Methods and Modelling for Engineering", Springer International Publishing, 2016.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2018 – 2022)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2019 - 2020
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Financial Management
	COURSE CODE	CV422
	COURSE CREDITS	4
RELEASED DATE : 01/06/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	30	40	30	-	50	150

PRE-REQUISITE : CV311: Project Management

COURSE OBJECTIVES :

CV421.CEO.1: To identify the Goals and Functions of Financial Management
CV421.CEO.2: To understand Financial Forecasting
CV421.CEO.3: To study working capital management

COURSE OUTCOMES :

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

CV42.CO.1: Understand the basic of economic and financial management
CV42.CO.2: Solve the issues of financial management in business operations
CV42.CO.3: Apply the principles of financial analysis, financial decisions, investment decisions to construction industry
CV42.CO.4: Employ working capital management in Indian construction industry with supply chain inventory management

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Financial Management**	**6 HOURS**
Review of engineering economics, elements of engineering economics, Time value of money, goals, objectives and principles of economic analysis,methods of economic analysis, necessity and importance of cash flows, ESCROW Account, Concept of project for major purchases.		
UNIT 2	**Financial Forecasting**	**6 HOURS**
Introduction, Basic tools: random variables, hypothesis tests, regression, time series. Smoothing and filtering: Simple exponential filters, trends and seasonality with filters.		
UNIT 3	**Financial Analysis**	**6 HOURS**
Introduction to financial analysis, Objectives and Limitations of Financial analysis. analysis of financial decisions, analysis of investment decision, Analysis of Operating Decision, Profitability Analysis, Returns and Liquidity .		
UNIT 4	**Working Capital Management**	**6 HOURS**
Nature and Scope of working capital, Factors determining working capital, estimating working capital, components of working capital. Inventory management, receivable management, working capital financing for Indian industry		
UNIT 5	**Supply Chain Management**	**6 HOURS**
Building blocks of a supply chain network. Business processes in supply chains. Types of supply chains. Strategic, tactical, and operational decisions in supply chains. Supply chain performance measures. Supply chain inventory management. Performance modeling of supply chains.		
UNIT 6	**Risk Management**	**6 HOURS**
Introduction, Types and Sources of Risk in Capital Budgeting, Risk Adjusted Discount Rate, Certainty Equivalent Approach, Probability Distribution Approach, Sensitivity Analysis, Simulation Analysis, Decision Tree Approach.		

PRACTICAL Project should be performed in group of 5 students		
PRACTICAL NO.01	Title	**14HOURS**
Consider a financial management of typical construction industry or construction project. For that starting from planning stage to end of project, prepare detail report comprising of cash ow management, sources of funding, working capital management, profit and loss accounts, balance sheets, Income tax, GST and other necessary factors etc.		

TEXT BOOKS:

1. Khan M. Y. , Jain P. K. Financial Management McGrawHill, ISBN-13: 978-9339213053 Laxmi Publications (P) Ltd. 2010. ISBN-13: 978-817491208
   C., Subramanian T. "Financial Management New Age International publishers, ISBN-13: 978-8122425734
2. Pandey I. M. "Financial Management", Vikas Publishing House, ISBN-13: 978-9325982291

REFERENCE BOOKS:

1. Goyal V. K. Financial Accounting2012,Prentice Hall Publications
2. Indian Institute of Banking and Finance (IIBF) Risk Management MacMillan Publishers India, ISBN-13: 978-9387914544
3. Chopra S., Meindl P. and Kalra D. V. Supply Chain Management2016, Pearson Education India, ISBN-13: 978-9332548237

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Environmental Impact Assessment and Climate Change
	COURSE CODE	CV423
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE:

COURSE OBJECTIVES:

CV423.CEO.1: To identify the need to appraise and estimate the impact on environment.
CV423.CEO.2: To understand the basic principles of environmental impact assessment.
CV423.CEO.3: To learn its different components and methods of documentation and monitoring.
CV423.CEO.4: To illustrate about climate system its changes and causes.
CV423.CEO.5: To impart knowledge about impacts, adaptation and mitigation of climate change.

COURSE OUTCOMES:

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

CV423.CO.1: Examine different environmental attributes and identify the environmental parameters
CV423.CO.2: Apply the different methodologies to predict and assess the impacts.
CV423.CO.3: Compile The Data and Formulate an ElA Report.
CV423.CO.4: : Understand The Climate System and Its Changes due to Human Activities.
CV423.CO.5: Identify The Effects of Climate Change and Adopt Probable Techniques to Deal with Climate Change.

THEORY		
UNIT 1	**Introduction**	**6 HOURS**
Concepts of Environment its components, Environmental Imbalances, Definitions and Concepts of EIA, Types and Principles of EIA, Rationale and Historical Development of EIA, Role of EIA- As an Integral Part of the Planning Process, Concepts of Environmental Impact Statement (EIS), Organizational Structure, Status of EIA in India, Environmental legislations in India, Rapid and Comprehensive EIA.		
UNIT 2	**EIA Legislation**	**6 HOURS**
Detailed Contents of EIA Introduction, Project Description, Anticipated Environmental Impacts and Mitigation Measures: Analysis of Alternatives; Environmental Monitoring Programme, Additional studies, Project Benefits; Environmental Cost Benefit Analysis, Legislative and environmental clearance procedures in India, siting criteria, coastal regulation zone (CRZ).		
UNIT 3	**EIA Process and Methods**	**6 HOURS**
Category of projects Form-1 and Form-1A for EIA clearance EIA Methodologies Screening Scoping checklist matrix network and overlay methodologies for impact identification, EIS format baseline description of affected environment Terms of reference (TOR) Evaluation and mitigation air noise water environment, assessment of socio-economic impacts assessment of ecological impact public participation and involvement techniques for conflict management and dispute resolution. Self-Study EIA case studies for selected projects.		
UNIT 4	**Environmental Audit, Management and Monitoring**	**6 HOURS**
Environmental audit- Definitions and Concepts, Partial Audit, Compliance Audit, Methodologies and Regulations, Qualities of Environmental Auditor, Content of EA Report, Introduction to ISO and ISO 14000, Environmental Management Techniques and Environmental Monitoring Plan.		
UNIT 5	**Earth's Climate System, Changes and Causes**	**7 HOURS**
Introduction to hydro-meteorological parameters, weather and climate, causes of climate change, climatic fluctuations and climate change The Earth's Climate Machine – Climate Classification - Global Wind Systems, The Hydrological Cycle – Global Ocean Circulation: El Nino and La Nina and its Effect - Solar Radiation: The Earth's Natural Green House Effect, Observation of Climate Change: Changes in patterns of temperature, precipitation and sea level rise, Observed effects of Climate Changes, Drivers of Climate Change, The Montreal Protocol, UNFCCC – IPCC – Evidences of Changes in Climate and Environment : on a Global Scale and in India : climate change modeling.		
UNIT 6	**Climate change Impact, Adaptation and Mitigation Measures**	**8 HOURS**
Impacts: Impacts of Climate Change on various sectors, Uncertainties in the Projected Impacts of Climate Change and Risk of Irreversible Changes. Adaptation: Adaptation Strategy/Options in various sectors including coastal zones, Key Mitigation Technologies and Practices, Energy Supply, Carbon sequestration, Carbon capture and storage (CCS). Clean Technology: Clean Development Mechanism: Carbon Trading - examples of future Clean Technology like Biodiesel, Natural Compost, Eco- Friendly Plastic Usage, Alternate Energy like Hydrogen, Bio-fuels, Solar Energy, Wind Energy, Hydroelectric Power, India's Climate Change Mitigation and Adaptive Funding.		

PRACTICALS/PROJECT:		
PRACTICAL.1	**EIA STUDY**	**6 HOURS**
To study the impacts of any two developmental projects (Mining/industries/Transport sector/Hydroelectric project) by: Checklist method Ad-hoc method Matrix method		
PRACTICAL .2	**EIA STUDY**	**8 HOURS**
To study baseline data collection for EIA. To study the EMP of any two developmental projects. (Mining/industries/Transport sector/Hydroelectric project). .		
PRACTICAL .3	**SITE VISIT (Any One)**	**4 HOURS**
Visit a nearby industry and submit a report on screening process conducted. Visit a construction site and submit a report on the possible constriction phase impacts on different attributes Visit to the mentioned site and prepare a detailed report on it including the information about site, photographs, site map, process flow diagram, different treatment / disposal methods etc.		
PROJECT		**4 HOURS**
Important Instructions:		
PROJECT 1	**Study of Environmental sensitive places of respective areas**	**4 HOURS**
Identify the environmental sensitive places, conduct a survey and suggest suitable mitigation measures for human impact on natural ecosystem. Prepare a detailed report and presentation on it.		
PROJECT 2	**Site Visit for Climate Change**	**2 HOURS**
Visit to IITM Centre and IMD for Climate Change Prepare Analysis of historical instrumental data from IMD and Explain importance of Extraction of climatic data from repositories like Earth Null, School, NOAA, IMD, etc. in climate change study. Prepare a draft a detailed report on it.		
PROJECT 3	**Awareness Programs: Mitigation measures of any area specific project (Any One)**	**4 HOURS**
Suggest suitable mitigation measures for urban / rural solid waste management problems. Conduct a survey to a nearby residential complex/apartment and submit a report on facility procedure followed (w.r.t. Air, Noise, Waste Management, Water Utilization attributes)		

TEXT BOOK

1. Environmental Impact Assessment Methodologies, authored by Y. Anjaneyulu and Valli Manickam,2nd Edition, B.S. Publications, 2007 (ISBN: 978-81-7800-144-9).
2. Barry R.G. and Chorley R.L. (1992)' "Atmosphere, Weather and climate"' 4th Edition, ELBS Publication.
3. Environmental Science and Engineering by J. Glynn and Garry W. Hein Ke, Prentice Hall Publishers

REFERENCE BOOK

1. Dash Sushil Kumar, "Climate (Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 20077.
2. Canter, L.W., Environmental Impact Assessment, McGraw Hill, New York, 1996.
3. Petts, J., Handbook of Environmental Impact Assessment Vol. I and II, Blackwell Science, London 1999.
4. Cauter R.L. Environmental Impact Assessment, Mc Graw Hill International Edition, 1997.
5. Environmental Impact Assessment: A Guide to Best Professional Practices' Edited by Charles H. Eccles ton, CRC Press, 2011 (ISBN 978-1-4398-2873-1).

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	SDC-4 Computational Fluid Dynamics
	COURSE CODE	CV433
	COURSE CREDITS	02
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
00	04	00	00	00	50	25	75

PRE-REQUISITE : Mechanics of Fluids

COURSE OBJECTIVES :

CV433..CEO.1: To introduce Computational Fluid Dynamics (CFD)
CV433..CEO.2: To explain CFD workflow or steps involved in CFD analysis
CV433..CEO.3: To prepare CAD model and mesh generation in CFD
CV433..CEO.4: To simulate and explain Post-processing aspects in CFD

COURSE OUTCOMES :

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

CV433.CO.1: prepare CFD-specific CAD models
CV433.CO.2: prepare quality CFD simulation meshes from imported CAD geometry
CV433.CO.3: select the appropriate boundary conditions for CFD simulation
CV433.CO.4: analyze the solution of a CFD simulation
CV433.CO.5: interpret the results by qualitative and quantitative post-processing

PRACTICALS/PROJECT:		
PRACTICAL.1	**Introduction to Computational fluid dynamics**	**04 HOURS**
Introduction of CFD analysis process flow, Introduction of various software, an overview of ICEM CFD, an overview of ANSYS CFX, Interfacing of different software of ANSYS Suite. Assignment 1: GUI operations of ICEM CFD and ANSYS CFX.		
PRACTICAL .2	**Geometry modeling in ICEM CFD**	**08 HOURS**
Introduction of ICEM CFD, Understanding GUI of ICEM CFD, Creation of geometry with defining points, curves, surfaces, and bodies, Repair of geometry, Restoring of dormant entities. Assignment 2 :Geometry creation of Close conduit and open channel.		
PRACTICAL .3	**Meshing in ICEM CFD**	**08 HOURS**
Mesh types, Mesh setups (global, part, surface, curve), Prism meshing parameters, Different volume mesh types, and methods, Mesh quality, Mesh quality improvement, Mesh output, Mesh independence study. Assignment:3 Mesh generation of Close conduit and open channel geometries.		
PRACTICAL .4	**CFD Analysis process in ANSYS CFX**	**06 HOURS**
Structure of ANSYS CFX, Preprocessing -The extent of domain, Geometry generation, Meshing, Boundary conditions, Steady-state, and transient analysis, Processing -Solver controls, Advection schemes, Timestep, Convergence criteria, Sources of error, transient simulation, Post-processing – interpretation of results (Qualitative as well as quantitative both). Assignment 4: CFD analysis of one sample problem showcasing the above learning.		
PRACTICAL .5	**CFD Analysis for pipe flow using ANSYS CFX**	**04 HOURS**
MImporting geometry in CFX Pre, assigning a type of flow, fluid materials, boundary conditions, solver controls, Running the solver, and interpretation of results. Assignment 5: CFD analysis of close conduit (Laminar and Turbulent) with interpretation of results including conclusion and report submission.		
PRACTICAL .6	**CFD Analysis for Open channel Flow (OCF) using CFX**	**06 HOURS**
Importing geometry in CFX Pre, assigning a type of flow, fluid materials, boundary conditions, solver controls, Running the solver, and Interpretation of results. Assignment 6: CFD analysis of Open channel flow (OCF) with Interpretation of results including conclusion and report submission.		
PRACTICAL .7	**Project Work**	**04 HOURS**
Students will be given the Project Topic / Case Study related to preferably Fluid Flow applications in Civil Engineering. The results from the simulation would be compared with literature or hand calculation values.		

TEXT BOOK

1. John D Anderson Jr. (1995), "Computational fluid dynamics – The basics with application", International edition, McGraw Hill Inc., ISBN 0-07-113210-4
2. H K Versteeg and W Malalasekera. (2008), "An Introduction to Computational Fluid Dynamics", 2nd Ed., Pearson Education, ISBN-13: 978-8131720486.
3. Joel H. Ferziger, Milovan Perić, Robert L. Street, "Computational Methods for Fluid Dynamics", Springer Publication, ISBN-13: 978-3319996912.

REFERENCE BOOK

1. ICEM CFD, User's Guide 2019, by ANSYS Ltd.
2. ANSYS CFX user's Guide 2019, by ANSYS Ltd.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Skill Development Course 4 - QGIS
	COURSE CODE	CV434
	COURSE CREDITS	02
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
00	04	00	00	00	50	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV434..CEO.1: To Learn and get familiar with QGIS Interface.
CV434..CEO.2: To describe concept and technique in GIS modeling.
CV434..CEO.3: To demonstrate competency with the QGIS software and enhance and interpret data

COURSE OUTCOMES :

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

CV434.CO.1: Use GIS to identify, explore, understand, and solve spatial problems
CV434.CO.2: Demonstrate GIS modeling skills
CV434.CO.3: Design and implement a GIS project
CV434.CO.4: Formulate applications of GIS technology.

PRACTICALS/PROJECT: Project should be performed individually		
PRACTICAL.1	**Introduction to QGIS / Basics of QGIS**	**04 HOURS**
Getting familiar with QGIS Interface QGIS Configuration General tools Working with projections QGIS Browser Data Sources Importing CAD Data		
PRACTICAL .2	**Vector Data Management**	**06 HOURS**
Introduction Vector and alphanumeric data visualization Editing data Working with Vector Data Working with tables Export Vector data in HECRAS, MIKE software Practical Exercise: Working with vector data and tables, operations with vector and alphanumeric data.		
PRACTICAL .3	**Working with Raster Data**	**06 HOURS**
Introduction Display Raster data Raster calculator Working with Images Practical Exercise: Working with raster data and operations with Images.		
PRACTICAL .4	**Working with Terrain Data**	**06 HOURS**
Introduction Projections and Coordinate Systems (Geographic and Projection Coordinate System) Georeferencing Toposheets and scanned maps Downloading Contour Data – Creation of Digital Elevation Model (DEM), Hillshade, Slope, and Aspect. Practical Exercise: Georeferencing of Toposheet – DEM data.		
PRACTICAL .5	**Create Maps and 3D Visualization**	**04 HOURS**
Creation tools Graphic elements Atlases generation Graphic output creations Convert 2D data to 3D data		
PRACTICAL .6	**Spatial Analysis using Raster Data Hydrological Study**	**06 HOURS**
Delineation of Watershed Area, Drainage Networks, Flow Direction, Watershed basins/Sub-basins Catchment Areas Practical exercise: To delineate watershed using Digital Elevation Model data and develop a stream network for the delineated watershed.		
PRACTICAL .7	**Calculation of Normalized Difference Vegetation Index(NDVI)**	**04 HOURS**
To perform Normalized Difference Vegetation Index (NDVI) analysis for the delineated watershed.		
PROJECT.1	**Calculating Areal Mean Rainfall**	**06 HOURS**
For the delineated watershed area for runoff forecasting the average depth of rainfall (Areal Precipitation or Areal Mean Rainfall (AMR)) in a hydrological basin is required as an input. Calculate Areal Mean Rainfall using the Thiessen Polygon method.		
PROJECT.2	**Calculating Street Intersection Density**	**04 HOURS**
With the availability of global street network dataset from Open Street Map and QGIS, calculate and visualize intersection density for any region of the world.		

TEXT BOOK

1. Kurt Menke, "Discover QGIS 3.x - A Workbook for Classroom or Independent Study", Locate Press, ISBN (Print) 978-0998547763, ISBN (PDF) 978-1734464337, Published 2019-04-29.
2. Hans van der Kwast and Kurt Menke, "QGIS for Hydrological Applications", Locate Press, ISBN (Print) 978-0998547787, ISBN (PDF) 978-1734464320, Published 2019-09-19.
3. M. Anji Reddy, "Remote Sensing and Geographical Information System", BS Publication, Fourth Edition, ISBN: 978-93-81075-97-5.

REFERENCE BOOK

1. QGIS Desktop 3.16 User Guide.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Project Evaluation
	COURSE CODE	CV470
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	8	NIL	NIL	NIL	NIL	150	150

COURSE OBJECTIVES :

CV470.CEO.1: To understand how to carry out performance evaluation and comparative analysis in appropriate form.

CV470.CEO.2: To know about standard industry practices.

CV470.CEO.3: To become familiar with the steps involved in identifying and selecting a good platform to present the work done.

COURSE OUTCOMES :

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

CV470.CO.1: Interpret findings, compare them with results in the literature, identify weaknesses and limitations, and propose improvements.

CV470.CO.2: Make use of standard industry practices.

CV470.CO.3: Decide appropriate platform for presenting the work done.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop an alytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project implementation (Sem VI), next step is project evaluation (Sem VII). The goal of this phase of the project is to draw Inferences and Detail Analysis/Final Testing/Re-development/etc. Showcasing the work - Technical documentation in Conferences/Journal/Patent/Product/Working model.

GUIDELINES

1. Project group students of Sem VI would be continued in this semester VII.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Projects should preferably have a national/international, industry/academic/research collaboration.
4. Students should do extended implementation of their project in consultation with their advisor.
5. For extended implementation, objectives of Sem V and Sem VI should have been already achieved.
6. Every project should follow at least one standard industry practice while implementing. For example, below are some of the standard industry practices followed by Electrical engineers:
   (a) If writing a Matlab code, follow **MathWorks Advisory Board (MAB)** Guidelines
   (b) For embedded c coding, **Motor Industry Software Reliability Association (MISRA)** standards can be used
   (c) If antenna is manufactured, then get **EMI/EMC** testing certificate from National Accreditation Board for Testing and Calibration Laboratories.
7. Performance evaluation and Comparative analysis of results should be carried out and presented in appropriate form.
8. Carry out detail analysis to improve performance w.r.t Final Testing/Re-development/etc.
9. Showcase the work in Conferences/Journal/Patent/Product/Working model.

Note: *For guideline 6, every school should identify standard industry practices and try to incorporate in the projects.*

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I (Internal): (20 Marks)
2. Activity (Standard industry practices): (20 Marks)
3. Project Review II (External): (20 Marks)
4. Project Report: (20 Marks)
5. Every project group should publish paper in National conference / International conference / Participate in technical project competition (with achievement) / File a patent/etc.: (20 Marks)
6. Project: Final Presentation and Demonstration (External) (50 Marks)

Note:

- Report should be prepared in LaTeX.
- External examiner for Review 2 and Final Demo should be allocated same group.
- Report will be jointly evaluated by External examiner and Internal examiner.

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
3. Leslie Lamport, "A Document Preparation System LaTeX: User's Guide and Reference Manual", Pearson, 2011.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	2021 - 2022 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Student Internship Program (Technical/ Research Skills)
	COURSE CODE	CV400
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV400.CEO.1: To get acquainted with the professional organization structure
CV400.CEO.2: To enable students to apply their knowledge for development of product/system/software
CV400.CEO.3: To work individually as well as in groups
CV400.CEO.4: To get Hands-on experience in the related field
CV400.CEO.5: To formulate the engineering problem statement

COURSE OUTCOMES :

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

CV400.CO.1: Analyze a given engineering problem
CV400.CO.2: Identify an appropriate problem solving methodology
CV400.CO.3: Cultivate hands-on professional work experience prior to their graduation
CV400.CO.4: Understand the real time technical, managerial and communication skills required at the job
CV400.CO.5: Develop appropriate workplace attitudes and understand the importance of ethics in professional life

INTRODUCTION:

The main aim of Student Internship Program (SIP) is to assist all Final Year B.Tech. students to obtain internships at various centers of excellence in the industry and the academia. The ultimate goal is to imbue students with professionalism and networking capabilities using internships as a tool for providing comprehensive practical experience. Using SIP, MITAoE students will enhance their academic and professional skills, making themselves more marketable in today's competitive world. The students can harness this lucrative opportunity to apply the knowledge they acquired all through the academic career in the professional realm.

SCOPE AND STRUCTURE OF SIP:

Summer Internship Program (SIP) is offered to entrants of Final Year B.Tech. (after semester VI) that meet the eligibility criteria stated below:

Final year B.TECH entrants should apply for 4 to 6 weeks duration internships during June-July of every academic year. For this internship, REGULAR credits will be awarded. (Credit Based Internship - 4 Credits). This internship is compulsory for all the entrants of final year B.TECH. Awarded credits will be considered for the calculation of final year CGPA and will be reflected in Regular Grade Card. Student has to work for 160 hours minimum as an Intern during the said period.

MITAoE will be responsible for identifying internship oppportunities and assisting students to apply for such positions. However, any financial liability, including but not limiteed to travel, accomodation, insurance etc. incurred as direct or indirect consequence of such a position is the sole responsibility of the student and his/her guardians.

STUDENT ELIGIBILITY CRITERIA:

Students applying for internships must meet the following criteria:

After completion of sixth academic semester, Third Year B. Tech. students (Final Year B. Tech. entrants) of all schools are eligible to apply for 4 to 6 weeks duration internships under SIP. All students have to complete the internship successfully as stated in the scope of Student Internship Program. However, students who fail to earn the 4 credits for any reason, shall be required to earn the same at a later instant of time to be eligible for the award of degree as per the internship policy.

RULES FOR APPLICATION TO SIP:

Students applying to the Student Internship Program are required to adhere the following rules and need to go through SIP policy document:

1. Students must complete an undertaking to abide by the rules and regulations of the institution / industry for which they are applying for SIP.

2. Students must obtain academic and school clearances to ensure completion of prerequisite courses or other requirements as a part of their application to SIP.

3. Students must submit a well formatted CV, requisite form, financial declaration, if any, along with the undertaking stated above to the Internship Coordinator through Faculty Mentor before April 30 of every year.

4. Last date for completing all relevant formalities pertaining to SIP is 15 days prior to the start of the internship.

5. Within the first week of the internship, students are required to submit their supervisor's contact information to the Faculty Mentor and Internship Coordinator.

6. **During the internship, students must submit brief fortnightly report duly signed by their supervisor to the Faculty Mentor.**

7. **Annexure IV is the final approval for the SIP and without which no internship is approved and no queries will be entertained at a later stage.**

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Design of Hydraulic Structures
	COURSE CODE	CV406
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV406..CEO.1: To get knowledge of various types of dam and its components
CV406..CEO.2: To describe advanced fluid mechanics principles.
CV406..CEO.3: To convey the knowledge on design criteria and stability analysis of different types of dams.
CV406..CEO.4: To apply the design concepts of hydraulic structures
CV406..CEO.5: To describe theories of structures on Pervious Foundations.
CV406..CEO.6: To design different Canal regulation works.

COURSE OUTCOMES :

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

CV406.CO.1: Perform the stability analysis of gravity dams.
CV406.CO.2: Explain the causes of failure of different types of dams and their design criteria
CV406.CO.3: : Design minor irrigation structures.
CV406.CO.4: Design minor irrigation structures.
CV406.CO.5: : Integrate relevant concept and methodologies in the area of hydraulics, water resources and geotechnical engineering.

THEORY		
UNIT 1	**Reservoir Planning and Components of Dam Engineering**	**6 HOURS**
Investigations, Capacities, Zones of storage, Mass Inflow and Mass Demand curves, Life of Reservoir, site assessment and selection of type of dam, Introductory perspectives, Embankment types and Characteristics- Gravity dams and characteristics- Spillways and ancillary works.		
UNIT 2	**Embankment Dam**	**8 HOURS**
Types, principles of design, Material and construction, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden drawdown, steady seepage condition.		
UNIT 3	**Gravity Dam**	**8 HOURS**
Concepts and design criteria, Loading, Gravity dam analysis, Stability, Elementary profile of gravity dam, Concrete for dams, Roller Compacted Concrete gravity dams, Foundation treatment, Construction joints, Galleries in gravity dams. (Dam site visit is recommended)		
UNIT 4	**Dam outlets works**	**6 HOURS**
Ogee spillway and its design, Cavitation on spillway, design feature, Design principles and Design of spillways, Chute spillways, Principles of Energy dissipators based on jump height curves, stilling basins, Spillway crest gates, vertical lift and radial gates, their design principles.		
UNIT 5	**Structures on Pervious Foundations**	**6 HOURS**
Diversion head works- layout and functions of components, Weir and Barrage- Causes of failure of weir on permeable soils, Bligh's theory, limitations, Design of vertical drop weir, Khosla's theory of independent variables, Khosla's corrections.		
UNIT 6	**Design of canal regulation structures**	**8 HOURS**
BDesign of Hydraulic Structures: Aqueduct (Type-III), siphon aqueduct (Type-III), Canal falls - notch type, Siphon well type, Sarda type (High Discharge only), Glacis fall and Cross regulator, Head regulator and functions. (Regulatory structures site visit is recommended)		

PRACTICALS/PROJECT:		
PRACTICAL.1	**Stability Analysis of Embankment Dam**	**12 HOURS**
Students are supposed to prepare a model, carry out the stability analysis and Submit the same.		
PRACTICAL .2	**Gravity Dam Analysis**	**12 HOURS**
Students will be given the case studies. They are supposed to carry out complete loading analysis and Submit the same.		
PRACTICAL .3	**Field Visit**	**6 HOURS**
Field visit to Gravity Dam / Embankment Dam.		

TEXT BOOK

1. Modi, P. N., "Introduction to Water Resources and Waterpower Engineering", Standard Publication, Delhi, ISBN-13: 978-8174092304.
2. Punmia B. C. Ashok K. Jain, Arun K. Jain, B. B. L. Pande, "Irrigation and Water Power Engineering", Laxmi Publications (P) Ltd. 2010. ISBN-13: 978-817491208
3. Garg, S.K., "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, ISBN-13: 978- 0070491342.
4. Arora, K.R., Irrigation, "Water Power and Water Resources Engineering", Standard Publishers Distributors, Delhi, ISBN-10: 007041870.

REFERENCE BOOK

1. Asawa, G, L "Irrigation and Water Resources Engineering", New Age Int. Ltd. ISBN-13: 978-8189401351.
2. Sathyanarayana M. C. "Water Resources Engineering-Principles and Practice", New Age International ISBN-13: 978-8189401351.
3. Varshney, R. S. Theory Design of Irrigation Structures - Vol III, Nem Chand Bros., Roorkee, ISBN-13: 978-8189401351.
4. P. Novak, A. I. B. Moffat, C. Nalluri and R. Narayanan, Taylor and Francis, U. K., "Hydraulic Structures", ISBN-13: 978-8189401351.
5. Manual on Barrages and Weirs on Permeable Foundation, Publication 179, (Volumes I and II), Central Board of Irrigation and Power, New Delhi.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	FOUNDATION ENGINEERING
	COURSE CODE	CV475
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : Geotechnical Engineering

COURSE OBJECTIVES :

CV475.CEO.1: To have knowledge about exploration of soil
CV475.CEO.2: To acquire the capacity to design both shallow and deep foundations.
CV475.CEO.3: To have adequate knowledge about foundation on problematic soil and applications of Geosynthetics

COURSE OUTCOMES :

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

CV475.CO.1: adopt suitable soil exploration technique and interpretation of related data.
CV475.CO.2: design both shallow and deep foundation
CV475.CO.3: solve the engineering behaviour of expansive soils and selection of suitable foundation.
CV475.CO.4: selection of geosynthetic materials and its application in foundation problems.

THEORY		
UNIT 1	**Soil Properties and Exploration**	**9 HOURS**
Soil properties and its applications, Soil exploration techniques comparisons, Sounding tests, Geophysical methods, Sampling, Interpretation of Laboratory and field Testing.		
UNIT 2	**Shallow Foundation**	**9 HOURS**
Bearing capacity of soil Basic definitions Bearing capacity theories Types of shear failure Effect of water table Bearing capacity from plate load test. Shallow foundation- Types and Applications, Floating foundation, IS-6403-1981 code method - Rectangular and Circular Footing, Settlement of Foundations. Case Study- Practices in foundation engineering in India		
UNIT 3	**Deep Foundations**	**9 HOURS**
Load transfer mechanism, types of piles and their function, factors influencing election of pile, their method of installation and their load carrying characteristics for cohesive and granular soils, piles subjected to vertical loads- pile load carrying capacity from static formula,dynamic formulae (ENR and Hiley), penetration test data Pile load test (IS 2911). Pile group: carrying capacity, efficiency and settlement. Negative skin friction. Well foundation: components, sand island method. Case Study- Failure of deep foundation due to unexpected subsurface structure		
UNIT 4	**Foundations on problematic soil and Introduction to Geosynthetics**	**9 HOURS**
Identification of expansive soils, Swell potential and swelling pressure, Active depth, Foundation Problems, Foundation practices in expansive soils, Soil Replacement and 'CNS' concepts. Geotextiles, various methods of foundations design, Technological consideration in Geotechnical Engineering. Case Study- Challenges due to problematic soils Case Study- Rectification of Damaged Structures on Expansive Soil Deposits		

TEXT BOOK

1. Donald P. Coduto, Foundation Design: Principles and Practices, Prentice Hall 2 edition (July 20, 2000) ISBN-10: 0135897068.
2. Dr. K .R. Arora, "Soil Mechanics and Foundation Engineering", (8th Edition) 2015, Standard Publishers, ISBN:81-8014-112-8
3. Gopal Ranjan and A. S. Rao, Basic and Applied Soil Mechanics, G. K. Publications Pvt. Ltd, Dec. 2006, ISBN : 978-81-224-1223-9 .
4. V. N. S. Murthy, Soil Mechanics and Foundation Engineering, B. S. Publications, Dec 2009, ISBN 0 324 06680 5.

REFERENCE BOOK

1. Braja M. Das, Principles of Foundation Engineering, Cengage India Private Limited, Eighth edition (1 August 2017), ISBN-10: 9386650959
2. Joseph E. Bowles, Foundation Analysis and Design, Fifth Edition ISBN 0-07-912247-7
3. Palanikumar. M, Soil Mechanics, PHI Learning Private Limited, 2013, ISBN: 978-81-203-4838-7.
4. R. F. Craig "Craigs Soil Mechanics", E and FN Spon an imprint of Chapman and Hall, 2012, ISBN: 0-415-32702-4, 0-415-32703-2

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Geospatial Tools and Techniques
	COURSE CODE	CV476
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : Surveying and Geospatial Engineering

COURSE OBJECTIVES :

CV476.CEO.1: To understand the basics of Geodetic Surveying
CV476.CEO.2: To learn how to perform Hydrographic Surveying using Nautical Sextant
CV476.CEO.3: To know relevance of Heavenly Bodies.
CV476.CEO.4: To prepare plans of an area by aerial Photogrammetry
CV476.CEO.5: To comprehend fundamentals and principles of techniques
CV476.CEO.6: To utilize the concept of SBPS in detail

COURSE OUTCOMES :

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

CV476.CO.1: Explain the concept of Geodetic Surveying for fixing the ground control points.
CV476.CO.2: Apply knowledge of Hydrographic Surveying to identify points solve problems
CV476.CO.3: Utilize the concepts of astronomical surveying
CV476.CO.4: Apply the concepts of hydrographic surveying
CV476.CO.5: Analyse the knowledge of remote sensing and sensor characteristics.
CV476.CO.6: Distinguish working of various spaces-based positioning systems

THEORY		
UNIT 1	**Geodetic Surveying**	**6 HOURS**
Introduction to Plane and Geodetic Surveying, Geodetic surveying- Objects, Methods of Geodetic Surveying, Trigonometric Levelling, Terrestrial refraction, Corrections for curvature and refraction, Axis signal correction, Determination of difference in elevation by single observation and reciprocal observations.		
UNIT 2	**Hydrographic Surveying**	**7 HOURS**
Objects, Applications, Establishing controls, Sounding, Sounding Equipments, Methods of locating soundings, Reduction of soundings, Nautical Sextant and its use, Three point problem and its use, solution of three point problem, Tides and tide gauges.		
UNIT 3	**Field Astronomy**	**7 HOURS**
Introduction. Definitions of Astronomical Terms, Coordinate Systems, Spherical Trigonometry and Spherical Triangle, Relationship between Coordinates, The Earth and The Sun, Various systems for measuring Time, Interconversion of Time- Relation between Degrees and Hours of Time, Conversion of Conversion of Local Time to Standard Time and vice versa.		
UNIT 4	**Aerial Photogrammetry**	**7 HOURS**
Objects, Classification, comparison of map and aerial photograph, Vertical, Tilted and Oblique photographs, Scale of and Relief displacement in vertical photograph, Ground control points (GCPs), Flight planning, Introduction to digital photogrammetry, different stereo viewing techniques in digital photogrammetry, Different products of digital photogrammetry, Drones in aerial surveying.		
UNIT 5	**Remote Sensing**	**6 HOURS**
Definition and scope, history and development of remote sensing technology, Types of Remote Sensing Satellites and their characteristics, types of sensors, orbital and sensor characteristics of major earth resource satellites, sensor classification, applications of sensor, Indian remote sensing satellite programs, introduction to various open-source satellite data portals, concept of Swath and Nadir, resolutions, digital image. Introduction to spatial resolution, spectral resolution, radiometric resolution and temporal resolution and image interpretation.		
UNIT 6	**Space Based Positioning System**	**7 HOURS**
Introduction to SBPS; SBPS systems - GPS, GLONASS, Galileo, GAGAN, BeiDou and their features, Segments of SBPS (Space, Control and User) Positioning with SBPS - Absolute and Differential methods, Use of SBPS in Surveying, SBPS Co-ordinates and heights, Factors governing accuracy in SBPS positioning, Different types of errors in SBPS positioning.		

TEXT BOOK

1. N. N. Basak, "Surveying and Levelling", Tata Mc-Graw Hill
2. R Subramanian, "Surveying Levelling", Oxford University Press, 2013 2nd Revised edition. Revised.
3. Dr. B. C. Punmia, Ashok Kumar Jain, A.K. Jain "Surveying Vol. I and II", Laxmi Publication 2005 Edition
4. T. P. Kanetkar and S. V. Kulkarni, "Surveying and Levelling Vol. II", Pune Vidyarthi Publication
5. Dr. K. R. Arora, "Surveying Vol. I and II", Standard Book House.

REFERENCE BOOK

1. M. Chandra and S. K. Ghosh, "Remote sensing and Geographical Information System", Narosa Publishing House, 2006 Edition
2. Alfred Leick, "GPS Satellite Surveying", Wiley Publishers, 2003 3rd Revised ed.
3. M.D. Saikia, "Surveying", PHI Learning Pvt . Ltd, 2010 Edition.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Air and Noise Pollution and Control Measure
	COURSE CODE	CV477
	COURSE CREDITS	02
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	-	35	35	30	-	-	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV477..CEO.1: To study various metrological parameters affecting air pollution.

CV477..CEO.2: To understand the plume behavior and study dispersion modeling for atmospheric stability conditions. on the environment.

CV477..CEO.3: To know about air pollution controlling device and understand the effects of pollutants

COURSE OUTCOMES :

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

CV477.CO.1: Explain the Details About Source, Types and Impacts of Air Pollution.

CV477.CO.2: Understand Meteorological Aspects of Air Pollution

CV477.CO.3: Identify Sampling and Analysis Techniques for Air Quality Assessment.

CV477.CO.4: Illustrate The Various Air Pollution Control Measures.

CV477.CO.5: Summarize Various Polices Related to Air Pollution Prevention and Control

CV477.CO.6: Understand Noise Pollution Control Methods.

THEORY		
UNIT 1	**Introduction**	**6 HOURS**
Definition, Types of pollution, Indoor and Outdoor Air Pollution, Sources and classification of Air Pollutants, Effects of air pollution on health, vegetation materials, Economic effects of air pollution, Units of measurements of pollutants, Air quality criteria, Emission Standards, National Ambient Air Quality Standards (NAAQS) 2009. Self-Study: Global Effects of Air Pollution: Greenhouse Effect, Acid Rain, Smog and Photochemical Smog, Ozone Depletion		
UNIT 2	**METEOROLOGICAL ASPECTS**	**8 HOURS**
Scales of metrology, Meteorological Aspects of Air Pollution Dispersion, Temperature Lapse Rate, Plume behavior, Wind and Pollution Rose Diagram, Maximum mixing depth (MMD), Dispersion Modeling: Introduction to Dispersion Modeling, Its Applications and Limitations. Introduction to Gaussian Plume Model, Stack Height and Dispersion. Self-Study: Zones of atmosphere. Site visit to Industry or Indian Institute of Tropical Meteorology (IITM) Pune is recommended.		
UNIT 3	**AMBIENT AIR SAMPLING AND MONITORING**	**6 HOURS**
Basis and statistical consideration of sampling sites, Devices and methods used for sampling gases and particulates, Isokinetic sampling, Ambient air quality monitoring as per the procedure laid down by CPCB, Ambient air sampling, stack sampling. Control devices for particulate contaminants: Gravitational Settling Chambers, Cyclone Separators, Wet Collectors, Fabric Filters (Bag-House Filter), Electrostatic Precipitators (ESP), Air Pollution Indices. Site visit to Industry is recommended.		
UNIT 4	**Gaseous Pollutant Control**	**6 HOURS**
Absorption: Principles, Description of Equipment-Packed and Plate Columns, Adsorption: Principal Adsorbents, Equipment Descriptions, Pressure Swing Adsorption, Adsorption Cycle-Solvent Recovery System-Continuous Rotary Bed-Fluidized Bed. Condensation: Contact Condensers-Shell and Tube Condensers. Incineration: Hydrocarbon Incineration Kinetics, Equipment Description, Design and Performance Equations		
UNIT 5	**Legislation And Regulation for Industrial and Automobiles Pollution**	**6 HOURS**
Air pollution due to automobiles, Standards and Control Methods, Indian specifications, Bharat Stage Emission Standards, Motor Vehicle Act 1988. Industry Application: Control methods- Processes Based Control Mechanisms – Mineral, Asphaltic Concrete, Cement Plants, Glass Manufacturing Plants, Fertilizers, Pharmaceuticals and Wood Processing Industry, Power Plants, Construction Site. Air prevention and control of pollution Act 1981, The Environment (Protection) Act, 1986. Self-Study: Carbon Credit, Green Bench, Carbon Sequestration, Carbon Footprints.		
UNIT 6	**NOISE POLLUTION AND CONTROL**	**8 HOURS**
Noise: Definition, Characteristics, Sources, Types of noise, Impact of noise, Permissible limits, Noise Acts. Noise measuring equipment: Sound Level Meter, Octave Band Analyzer, Statistical Analyzer and Noise Average Meter Enclosures and Barriers.		

TEXT BOOK

1. 'Air pollution and control', C.S. Rao, New age international publication, ISBN: 812241835X, 9788122418354
2. Air Pollution', Rao M.N. and Rao H.V.N., Tata McGraw Hill Publishing Company Ltd., ISBN 10: 0074518712
3. 'Advanced Air and Noise Pollution Control', Wang L.K., Pereira N.C., Hung Y.T., Volume I and II, Humana Press, ISBN 1-58829-359-9

REFERENCE BOOK

1. Environmental Engineering, Peavey, Rowe and Tchobanoglous: McGraw-Hill,
2. ISBN 13: 9780070491342
3. Air Pollution Control Theory, Martin Crawford: McGraw-Hill Inc., ISBN 13: 9780070134904
4. Air Pollution: Its Origin and Control, Wark and Warner: Prentice Hall, ISBN 13: 9780673994165
5. Noise pollution and control strategy, Singal S.P., Alpha Science International, ISBN 13: 9781842652374
6. Environmental Pollution Principles, Analysis and Control, Narayanan P., CBS Publishers, ISBN 13: 9788123914510

e – Resources:

1. https://urbanemissions.info/
2. https://doi.org/10.1007/s12647-022-00555-4
3. https://cpcb.nic.in/National-Air-Quality-Index/
4. https://cpcb.nic.in/about-namp/
5. https://cpcb.nic.in/noise-pollution-rules/
6. https://cpcb.nic.in/noise-limits-for-vehicles/
7. https://dst.gov.in/clean-air-research-initiative-cari

REFRENCE MANUAL:

1. AUTOMOTIVE INDUSTRY STANDARD (AIS-137) - (Part 4)
2. Indian Emission Regulation Book- ARAI
3. INDIA BHARAT STAGE VI EMISSION STANDARDS

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Finite Element Method
	COURSE CODE	CV478
	COURSE CREDITS	3
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : 1. The basic knowledge of mechanics of solids and structural analysis

COURSE OBJECTIVES :

CV478.CEO.1: To study mathematical models create finite element models.
CV478.CEO.2: To comprehend quantitative and analytical methods.
CV478.CEO.3: To write simple computer programs for finite element analysis.
CV478.CEO.4: To Implement finite element methods for 1d and 2d model problems, and to evaluate and to interpret the numerical results.
CV478.CEO.5: To Apply finite element solutions to problems in structural engineering.

COURSE OUTCOMES :

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

CV478.CO.1: Understanding Mathematical Techniques used in FEM analysis
CV478.CO.2: Study the concepts of Nodes and elements [Understand].
CV478.CO.3: Use of FEA in Structural problem [Understand].
CV478.CO.4: Development of various Finite element modeling techniques for frame or truss.
CV478.CO.5: Generate the formulation of one-dimensional elements (truss and beam) and two- dimensional elements (triangle and quadrilateral continuum and shell elements) [Analysis]
CV478.CO.6: Analysis of for plates and shells by using FE analysis [Analysis]

THEORY		
UNIT 1	**Introduction to Finite Element Analysis**	**6 HOURS**
Introduction, Basic Concepts of Finite Element Analysis, Introduction to Elasticity, Steps in Finite Element Analysis Self Study: Study of various softwares based on FE analysis		
UNIT 2	**Finite Element Formulation Techniques**	**6 HOURS**
Virtual Work and Variational Principle, Galerkin Method, Finite Element Method: Displacement Approach, Stiffness Matrix and Boundary Conditions Self Study: Software testing with various approaches		
UNIT 3	**Element Properties**	**8 HOURS**
Natural Coordinates, Triangular Elements, Rectangular Elements, Lagrange and Serendipity Elements, Solid Elements, Isoparametric Formulation, Stiffness Matrix of Isoparametric Elements, Numerical Integration: One Dimensional, Numerical Integration: Two and Three Dimensional, Worked out Examples Self Study: Software analysis for various elements		
UNIT 4	**Analysis of Frame Structure**	**7 HOURS**
Stiffness of Truss Members, Analysis of Truss, Stiffness of Beam Members, Finite Element Analysis of Continuous Beam, Plane Frame Analysis, Analysis of Grid and Space Frame Self Study: Calculation of Stiffenss matrix 6x6		
UNIT 5	**FEM for Two and Three Dimensional Solids**	**7 HOURS**
Constant Strain Triangle, Linear Strain Triangle, Rectangular Elements, Numerical Evaluation of Element Stiffness, Computation of Stresses, Geometric Nonlinearity and Static Condensation, Axisymmetric Element, Finite Element Formulation of Axisymmetric Element, Finite Element Formulation for 3 Dimensional Elements, Worked out Examples Self Study: Stress calculation for solid elements		
UNIT 6	**FEM for Plates and Shells**	**6 HOURS**
Introduction to Plate Bending Problems, Finite Element Analysis of Thin Plate, Finite Element Analysis of Thick Plate, Finite Element Analysis of Skew Plate, Introduction to Finite Strip Method, Finite Element Analysis of Shell. Self study: Numerical analysis for plates and shells		

TEXT BOOK

1. Felippa, C. A. (2004). Introduction to finite element methods. University of Colorado, 885.
2. Ern, A., Guermond, J. L. (2004). Theory and practice of finite elements (Vol. 159, pp. xiv-524). New York: Springer.
3. Bhavikatti, S. S. (2005). Finite element analysis. New Age International.
4. Nikishkov, G. P. (2004). Introduction to the finite element method. University of Aizu, 1-70.
5. Reddy, J. N. (2019). Introduction to the finite element method. McGraw-Hill Education.
6. Godbole, P. N. (2013). Introduction to Finite Element Method (p. 400). New Delhi: IK International Publishing House.

REFERENCE BOOK

1. The Finite Element Method: Linear Static and Dynamic Finite Element Analysis, Thomas JR Hughes.
2. First Course in Finite Element Method, Jacob Fish, Ted Belytschko.
3. Applied Finite Element Analysis, LJ Segerlind.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECH AND CIVIL ENGG.	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Capstone Portfolio
	COURSE CODE	CV480
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
-	8	-	-	-	-	150	150

PRE-REQUISITE : Students should understand to:

COURSE OBJECTIVES :

CV480.CEO.1: Improve and profuse individual perspectives on problems at different scales

CV480.CEO.2: Identify and select the capstone work, formulate the methodology along with a significant collection of artifacts and outcomes.

CV480.CEO.3: Synthesize a reflective report to effectively communicate and explore findings. s

CV480.CEO.4: Create a professional portfolio that technically, graphically and verbally describes pertinent achievements and the progressive growth during the program.

COURSE OUTCOMES :

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

CV480.CO.1: Portray individual skill for solving the problem. (L4)

CV480.CO.2: Showcase and exhibit the best techniques and suitable methodology. (L5)

CV480.CO.3: Cognize the significance of report and comprehend its reflections. (L4)

CV480.CO.4: Assimilate digital and visual literacies. (L5)

COURSE ABSTRACT :

Capstone work is an individual, self-identified project that focuses on technical/non-technical issues. Capstone work requires taking risks, high productivity, strong design research, quick turnaround times, creating an advanced design. A Digital portfolio is an integrative collection of work that draws together skills gained from across the taught phase of the program. It comprises a structured set of papers that enabled application and critical reflection. It is an amalgamation of both written and visual content that draws out the evolution of thinking around the ways in which design, social constructs, and emerging technologies intercept. It exposed process, critical thinking, as well as final artifacts, concepts, and its contents articulated in depth. The student enables to learn powerful new methods to promote his online self-design profile. It will help to established a professional voice by writing a personal design philosophy and a reflective article for the Linked In profile page. The opportunity to choose the project,formulate solution, negotiate deliverable, work individually, and present digitally is what makes the Capstone portfolio unique.

Capstone portfolio is divided into two section a) Capstone work b) Digital Portfolio

CAPSTONE WORK : :

Individual student can choose the topic from one of the below capstones to carry out the work during the entire semester 1. Technical Capstone • Industry identified problem • Institute identified problem • Urban city identified problems • Rural Development • Environmental related problems • Student Conceived problems • Satisfactory solution to Open ended problems • Innovative Design stemming from Student/Faculty • Product Development • App/ Software Development • Multidisciplinary approach to existing problem • Modeling/Optimization/Analysis study 2. Writing Intensive Capstone • Design • Literature Survey • Commercial Survey • Social media Survey • Idea/ Design Philosophy • Research Methodology • Consultancy Project work • Collaborative Project work • Laboratory/Digital classroom • Manage/lead any Event/activity 3. General Capstone • State of art • Creating YouTube channel • Design Blog/Forum • Challenges and Prospect of Technology (Engineering) Education in Primary and Secondary Schools • Market Statistics

DIGITAL PORTFOLIO:

Individual student should create there own digital portfolio by using the standard professional platforms/blogs based on the record during their entire Under Graduate program. Digital portfolio should be professional, amalgamation of technical, written, graphical/Visual content and Verbal culmination of the skills and knowledge that students have developed over their under graduate program. Process Portfolio Show case Portfolio Hybrid Portfolio

GUIDELINES :

1. Individual student will work for Capstone work for entire semester.
2. Individual student will create their own digital portfolio.
3. Individual student should choose the title of the capstone work with approval from the Supervisor and School Dean
4. Student should work on the topic approved with all necessary information, evidences and the measurable outcomes.
5. Student will have to write the report on the capstone work
6. Students have to follow the guidelines of plagiarism for capstone report.
7. Student can skip the report if they are attempting Exemplary Capstone i.e. any one of the following. This will ensure the competency of students which they have learn during their undergraduate program. • Published Article in Scopus Index Journal • Approved Research Proposal • Winner for Design Competitions/Tech fest/ Workshop • Winner for State/National/International Event (Technical/Non-technical) • Valid score in Competitive exams (GATE/CAT/GRE-TOEFL/IELTS)
8. Capstone work and Digital portfolio need to be reviewed by supervisor and one faculty of same department to ensure whether student have followed all the guideline and work is appropriate and worth for evaluation.
9. Capstone work and Digital portfolio need to be reviewed by supervisor and one faculty of same department to ensure whether student have followed all the guideline and work is appropriate and worth for evaluation.

ASSESSMENT and EVALUATION :

The two member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the Capstone work supervisor. Assessment shall be done jointly by the guide and jury members.

1 . Capstone work Review 1 (25 Marks)
2. Capstone work Review 2 (25 Marks)
3. Creating Digital Portfolio (50 Marks)
4. Report (25 Marks)
5. Final Demonstration (25 Marks)

REFERENCES :

1. https://design.berkeley.edu/ Berkeley M.Des. University of California, U.S. ://design.gatech.edu/ Georgia Institute of Technology, College of Design Atlanta, U.S.
2. https://www.apus.edu/ American Public University
3. https://msu.edu/ Michigan State University's US
4. https://www.cranfield.ac.uk Cranfield University, Shrivenham Swindon UK
5. https://my.bulbapp.com/personalized-learning/assessment-infographic-blog/
6. https://edtechjeffco.weebly.com 7. https://www.invisionapp.com/inside-design/10-portfolio-websites-to-show-off-your-design-work/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP405
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP405.CEO.1: To study the basic concepts of economics
HP405.CEO.2: To use the practical applications of economic feasibility
HP405.CEO.3: To understand the concept of banking and features
HP405.CEO.4: To illustrate the financial planning and saving options

COURSE OUTCOMES :

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

HP405.CO.1: Relate the basic concepts of engineering economics
HP405.CO.2: Apply the economic viability of firm/organization under different market conditions
HP405.CO.3: Explain the bank structures and its schemes
HP405.CO.4: Execute the effective way of financial budget and skills

THEORY		
UNIT 1	**Introduction to Economics**	**6 HOURS**
Economic issues and concepts; How economist work, Theory of demand and supply; meaning, Determinants, Equilibrium between demand and supply; Elasticity of demand; Price elasticity; Income elasticity; Cross elasticity, Characteristics of an Indian economy, Concepts of foreign trade, Goods and Services Tax (GST), Globalization, Liberalization, Privatization, Global market indices, Foreign Direct Investment (FDI). **Case studies:** Housing market, General raw products/fuel market, Electronic devices, Startups, etc. **Further readings:** Introduction to Crypto-currency, Impact and analysis in the foreign market.		
UNIT 2	**Micro Economics and Macro Economy**	**6 HOURS**
Revenue concepts, Cost concepts, Short run and long run cost concepts and curves, Opportunity cost. Markets; meaning, types of markets and their characteristics, National Income (NI); meaning, stock and flow concept, NI at current price, NI at constant price, Gross National Product (GNP), Gross Domestic Product (GDP), Net National Product (NNP), Net Domestic Product (NDP), Personal income, Disposal income, Inflation: meaning, types, causes, measures to control. **Case studies:** Economics network, Economic influences of COVID-19 pandemic, etc.		
UNIT 3	**Capital Cost Estimation and Economic Viability Study**	**5 HOURS**
Typical capital cost component, Cost Index (CI), Typical operating cost components, Classes of cost estimates, Cost estimation by applying factors, Detailed cost estimation method, Financial viability calculation (Payback period, Break-even point, Internal rate of return (IRR) and Net present value (NPV); numerical), Cash flow diagrams, Profitability criteria – Project evaluation and index. **Case studies:** Detailed spreadsheet of product cost, Determination of project cost, Net profit/loss, etc.		
UNIT 4	**Introduction to Banking & Money Market**	**5 HOURS**
Banking; meaning, types, functions, Commercial banks- Instruments in operation of an account, Central bank- Reserve Bank of India (RBI); its functions, Concepts and influences- Cash Reserve Ratio (CRR), Bank rate, Repo rate, Reverse repo rate, Statutory Liquidity Ratio (SLR), Introduction to money and capital market, Introduction to fiscal policy- meaning and tools. **Further readings:** Retail banking, Demonetization, Banking management, etc.		
UNIT 5	**Financial Literacy and Planning**	**6 HOURS**
Importance of financial planning, literacy and budgeting, Savings related products, Insurance related products, Pension, Retirement and estate planning, Borrowing related products, Basic and advanced investing, Government schemes for various savings and investment options, Tax savings options. **Case studies:** Shore Financial, Real life examples, Goal-Planning, etc. **Self studies:** Protect your family financial and retirement planning.		

REFERENCE BOOKS

1. N G. Mankiw: Economics: Principles of Economics, Cengage Learning (2003), ISBN: 1305585127.
2. J. Bradfield, Introduction to the Economics of Financial Markets, Oxford University Press, New York (2007), ISBN: 9780195310634.
3. F. Vega-Redondo, Economics and the theory of games, Cambridge University Press (2003), ISBN: 9780521775908.
4. C. S. Park, Fundamentals of Engineering Economics, Prentice Hall (2003), ISBN: 9780130307910.
5. D. E. O'Connor, The Basics of Economics, Greenwood Publisher (2004), ISBN: 9780313325205.
6. V. V. Mahajani, S. M. Mokashi, Chemical Project Economics, Macmillan India Ltd. (2005), ISBN: 1403928142.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Psychology
	COURSE CODE	HP406
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP406.CEO.1: To introduce the basic concept of Psychology.

HP406.CEO.2: To explain how learning and conditioning occurs in everyday life through both nature and nurture factors.

HP406.CEO.3: To know the main schools of thought and prime contributors to the theory of workplace motivation.

HP406.CEO.4: To develop insight into one's own and others behavior and underlying mental processes.

HP406.CEO.5: To develop Positive Psychology interventions to increase personal well-being.

COURSE OUTCOMES :

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

HP406.CO.1: Explain the basic concepts of Psychology.

HP406.CO.2: Apply the concept of conditioning in day to day life.

HP406.CO.3: Explain the main schools of thought and prime contributors to the theory of workplace motivation.

HP406.CO.4: Demonstrate effetely the personality traits in regular life.

HP406.CO.5: Employ Positive Psychology interventions to increase personal well-being.

THEORY

UNIT 1	Basics of Psychology	6 HOURS

Meaning, Nature, Objective of Psychology, Learning: meaning, classical conditioning, operant conditioning; Attention and Perception: definition, types of attention, determinants of attention.

UNIT 2	Social Interactions	6 HOURS

Conformity, Compliance, Obedience, Stereotypes, Attitudes: nature, characteristics, attitude formation and attitude change; Prejudice and Discrimination- characteristics and types of prejudice, development and maintenance of prejudice and discrimination, manifestation of prejudice, methods of reducing prejudice and discrimination.

UNIT 3	Need and Motivation	6 HOURS

Meaning; extrinsic and intrinsic motivation, Vroom's Expectancy Theory of Motivation, Herzberg's Motivators and Hygiene Factors, Maslow's Hierarchy of Needs.

UNIT 4	Self and Identity	6 HOURS

Meaning and Need, Erik Erikson's Stages of Psychosocial Development, Carl Rogers' Theory of Personality, Thomas Harris's Transactional Analysis, Johari Window, SWOT .

UNIT 5	Positive Psychology	4 HOURS

Introduction to Positive Psychology; From Learned Helplessness to Learned Optimism, 'Building the Skill of Gratitude, VIA Classification of Character Strengths and Virtues, Identifying and Using Your Signature Strengths, Resilience and Optimism, Cognitive Strategies to Increase Optimism and Resilient Thinking, Managing Anxiety and Increasing Positive Emotions .

TEXT BOOK

1. S. Cicearelli, J. Noland White, Psychology 4th Edition, Pearson Publisher, ISBN-13:9780208972241.
2. Robert A. Baron, Introduction to Psychology 3rd Edition, Pearson Education Company, ISBN-10:0536813906.
3. Stephen P. Robbins, Timothy. A. Judge, Organizational Behavior 15th Edition, Pearson Education Inc., ISBN-10:0-13-283487-1.
4. Robert. A. Baron, Nyla. R. Branscombe, Social Psychology 13th Edition, Pearson Education India, ISBN-13:978-9332569911.

REFERENCE BOOK

1. Kathleen M. Galotti, Cognitive Psychology 2nd Edition, SAGE Publications India Pvt. Ltd. ISBN:978-93-515-0277-7.
2. Robert S. Feldman, Understanding Psychology 10th Edition, McGraw Hill Education (India) ISBN:10: 1-25-900305-1.
3. Elliot Aronson, Timothy D. Wilson, Robin M. Akert, Social Psychology 8th Edition, Pearson Education, ISBN:9788131730898.
4. Calvin S. Hall, Gardner Lindzey, John B. Campbell, Theories of Personality 4th Edition Choudhary Press, Delhi, ISBN: 978-81-265-1092-4.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023 (R-2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Semester Long Internship Program (SLIP)-Design
	COURSE CODE	CV467
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

CV467.CEO.1: To get acquainted with the organization structure
CV467.CEO.2: To gain learning and living experience
CV467.CEO.3: To develop appropriate workplace attitudes
CV467.CEO.4: To get Hands-on experience in the related field to relate and reinforce what has been taught at the university
CV467.CEO.5: To formulate the problem statement

COURSE OUTCOMES:

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

CV467.CO.1: Analyze a given engineering problem
CV467.CO.2: Identify an appropriate problem solving methodology
CV467.CO.3: Prepare themselves to work in cross-cultural, multi-national environment
CV467.CO.4: Improve self-confidence and independency
CV467.CO.5: Develop ability to work individually as well as in groups

ELIGIBILITY:

I. No live backlogs

II. 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.

APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including the 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 corporatee relations (CR) coordinator. The application must be prescibed in the SLIP policy.

TIMELINE:

The Semester Long Internship Program (SLIP) is carried out in two phases viz. SLIP - Design and SLIP - Implementation. SLIP - Design is a mandatory phase.

ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

I. Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel. The Panel for the evaluation should be 3 members or 4 members. The composition of the team would be as follows:

a. Dean, Respective School
b. Project Guide
c. CR Coordinator / Project Coordinator
d. Project Guide (Industry)
e. The domain expert

II. Presentation I in the mid of the internship and Presentation II at the end of the internship combined to a total weightage of 4 credits. **In grade card it will be mentioned as SLIP - Design.**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Semester Long Internship Program (SLIP)-Implementation
	COURSE CODE	CV468
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV468.CEO.1: To get acquainted with the organization structure
CV468.CEO.2: To gain learning and living experience
CV468.CEO.3: To develop appropriate workplace attitudes
CV468.CEO.4: To get Hands-on experience in the related field to relate and reinforce what has been taught at the university
CV468.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CV468.CO.1: Analyze a given engineering problem
CV468.CO.2: Identify an appropriate problem solving methodology
CV468.CO.3: Prepare themselves to work in cross-cultural, multi-national environment
CV468.CO.4: Improve self-confidence and independency
CV468.CO.5: Develop ability to work individually as well as in groups

ELIGIBILITY:

I. No live backlogs

II. Semester Long Internship Program (SLIP) - Design must be completed.

III. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student).

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

ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

I. Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel. The Panel for the evaluation should be 3 members or 4 members. The composition of the team would be as follows:

a. Dean, Respective School

b. Project Guide

c. CR Coordinator / Project Coordinator

d. Project Guide (Industry)

e. The domain expert

II 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 4 credits and should be as per the template.

In grade card it will be mentioned as SLIP - Project Implementation.

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune Univeristy

Curriculum

For

Bachelor of Technology

In

Computer Engineering

(Choice Based Credit System)

2019-2023

BoS Chairman
(Dean, SCET)

Member Secretary
Academic Council
(Dean, Academics)

Chairman
Academic Council
(Director, MITAoE)

CHAIRMAN
BOS-Computer Engineering
MIT Academy of Engineering
(An Autonomous Institute)

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

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to SavitribaiPhule Pune University

CURRICULUM FRAMEWORK (2019 PATTERN)
COMPUTER ENGINEERING

The Bachelor of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION : SEMESTER WISE									
S.N.	TYPE OF COURSE	NO. OF COURSES/SEMESTER							TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science (NSC)	2	2	1						**5**
2.	Engineering Science (ESC)	3	2		1					**6**
3.	Discipline Core (DC)			4	3	3	3	1	1	**15**
4.	Discipline Elective (DE)							1	1	**2**
5.	Open Elective (OE)					1	1	1		**3**
6.	Humanities and Social Science (HSS)		1		1	1	1		2	**6**
7.	Skill Development and Project (SDP)	1	1	3	2	2	2	3	1	**15**
TOTAL		**6**	**6**	**8**	**7**	**7**	**7**	**6**	**5**	**52**
Audit Course			1	1	2		1			**5**

CREDIT DISTRIBUTION : SEMESTER WISE											
1 Lecture hour = 1 Credit		**2 Lab Hours = 1 Credit**					**1 Tutorial Hour = 1 Credit**				
S.N.	TYPE OF COURSE	NO. OF CREDITS/SEMESTER								TOTAL	%
		1	2	3	4	5	6	7	8		
1.	Natural Science (NSC)	8	8	4						**20**	**12.5**
2.	Engineering Science (ESC)	11	7		4					**22**	**13.75**
3.	Discipline Core (DC)			12	12	11	11	4	4	**54**	**33.75**
4.	Discipline Elective (DE)							3	3	**6**	**3.75**
5.	Open Elective (OE)					4	4	4		**12**	**7.5**
6.	Humanities and Social Science (HSS)	0	2		2	2	2		4	**12**	**7.5**
7.	Skill Development and Project (SDP)	2	2	5	3	4	4	10	4	**34**	**21.25**
TOTAL		**21**	**19**	**21**	**21**	**21**	**21**	**21**	**15**	**160**	**100**

CREDITS				
1Lecture Hour = 1 Credit, 2 Lab Hours = 1 Credit, 1 Tutorial Hour = 1 Credit				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	21	19	**40**
2.	Second Year	21	21	**42**
3.	Third Year	21	21	**42**
4.	Final Year	21	15	**36**
TOTAL				**160**

CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	29/27	28/30	**57**
2.	Second Year	31	31	**62**
3.	Third Year	27	30	**57**
4.	Final Year	25	20	**45**
TOTAL				**221**

ABBREVATIONS		
1.	MSE	Mid Semester Exam
2.	ESE	End Semester Exam
3.	IA	Internal Assessment
4.	T/P	Term Work / Practical
5.	DM	Demonstration
6.	L	Lecture
7.	P	Practical
8.	T	Tutorial
9.	Lab	Laboratory

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)

INDUCTION PROGRAM (Universal Human Values) : 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	CREDIT
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (Version I)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	CREDIT
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**11**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
PE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN COMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III

SUMMER INTERNSHIP (CS200)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
ESC8	IT221	Engineering Informatics										
DC01	CS221	Data Structures	3	0	-	35	35	30	0	0	100	3
DC02	CS222	Discrete Structure and Graph Theory	3	0	-	35	35	30	0	0	100	3
DC03	CS223	Computer Graphics	3	2	-	35	35	30	50	0	150	4
DC04	CS224	Programming Lab	0	4	-	-	-	25	50	-	75	2
SDP3	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP4	CS230	Minor Project- Design	0	2	-	0	0	0	0	50	50	1
SDP5	CS226/ CS227	Skill Development Course CPP/Core Java	0	4	-	0	0	25	0	50	75	2
ESC7	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**195**	**150**	**150**	**775**	**21**

SEMESTER: IV

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
ESC8	IT221	Engineering Informatics										
DC05	CS228	Advanced Data Structures	3	2	-	35	35	30	50	0	150	4
DC06	CS229	Computer organization & Architecture	3	2	-	35	35	30	50	0	150	4
DC07	CS231	Database Management System	3	2	-	35	35	30	50	0	150	4
SDP6	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP7	CS240	Minor Project -Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V

SUMMER INTERNSHIP (Audit: CS300)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC08	CS341	Operating System	3	2	-	35	35	30	50	0	150	4
DC09	CS342	Theory of Computation	3	0	-	35	35	30	0	0	100	3
DC10	CS343	Computer Networks	3	2	-	35	35	30	50	0	150	4
OE01	IT351/ CS351 /CS352,/CS353 HP 311	Open Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP8	CS344/ CS346	Skill Development Course Red Hat Linux/ Web Technology	0	4	-	0	0	25	50	0	75	2
SDP9	CS350	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			**14**	**16**	**0**	**140**	**190**	**195**	**200**	**50**	**775**	**21**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC11	CS347	Design Analysis and Algorithms	3	2	-	35	35	30	50	0	150	4
DC12	CS348	Compiler Design	3	0	-	35	35	30	0	0	100	3
DC13	CS349	Software Engineering	3	2	-	35	35	30	50	0	150	4
OE02	IT352/ CS353/CS354 /CS355/CS356 /HP 312/	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	CS357/CS358/CS359	Skill Development Course Adv.Java/ .Net core/Red Hat Linux	0	4	-	0	0	25	50	0	75	2
SDP11	CS360	Project- Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability and career development	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: VII

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CS481	Distributed Systems	3	2	-	35	35	30	50	0	150	4
DE01	CS471/CS472/CS	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	IT 461/ CS461/	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP12	CS 485/ CS486	Skill Development Course AWS cloud services/ Android Application Development	-	4	-	0	0	25	50	0	75	2
SDP13	CS470	Project Evaluation	-	8	-	0	0	50	0	100	150	4
SDP14	CS400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC15	CS482	Human Computer Interaction	3	2	-	35	35	30	50	0	150	4
DE02	CS474/CS475/	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP15	CS480	Capstone Work	-	8	-	0	0	75	0	75	150	4
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	-	-	0	50	25	0	0	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**185**	**50**	**75**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**						**CREDIT**
TYPE	**CODE**	**NAME**	**Hour/Week**			**THEORY**			**PRACT**		**TOTAL**	
			L	P	T	MSE	ESE	IA	T/P	DM		
DE02	CS474/ CS475	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP15	CS480	Capstone Work	-	8	-	0	0	0	0	150	150	4
SDP16	CS467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP17	CS468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**3**	**8**	**0**	**35**	**35**	**30**	**0**	**450**	**550**	**15**

Discipline Elective (DE): 2 Courses and 6 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	CS472	Wireless Mobile Network	3
	CS473	Information Retrieval	
	CS477	Computer Vision	
2.	CS474	Ubiquitous Systems	3
	CS475	AR/VR	
	CSSWAYAM01	Deep Learning for Computer Vision	
	CSSWAYAM02	Artificial Intelligence: Search method for problem solving	
	CSSWAYAM03	Cryptography & Network Security	
	CSSWAYAM04	Cloud Computing	
	CSSWAYAM05	Introduction to Machine Learning	
	CSSWAYAM06	Natural Language Processing	
	CSSWAYAM07	Introduction to industry 4.0 and Industrial Internet of Things	

Natural Science (NSC) : 5 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	AS105	Calculus and Differential Equations
2.	AS106	Engineering Physics
3.	CH101	Science of Nature
4.	AS107	Statistics and Integral Calculus
5.	AS203/04	Applied Mathematics

Engineering Science (ESC) : 6 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	EX102	Electrical and Electronics Engineering
2.	CV102	Applied Mechanics
3.	ME104	Engineering Graphics
4.	CS101	Logic Development - C Programming
5.	CS102	Application Programming – Python
6.	ME221	Material Engineering
	IT221	Engineering Informatics
Audit	CV203	Environmental Sciences

Discipline Core (DC) : 14 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	CS221	Data Structures
2.	CS222	Discrete Structure and Graph Theory
3.	CS223	Computer Graphics
4.	CS224	Programming Lab
5.	CS228	Advanced Data Structures
6.	CS229	Computer Organization& Architecture
7.	CS231	Database Management System
8.	CS341	Operating System
9.	CS342	Theory of Computation
10.	CS343	Computer Networks
11.	CS347	Design Analysis and Algorithms
12.	CS348	Compiler Design
13.	CS349	Software Engineering
14.	CS481	Distributed Systems
15.	CS482	Human Computer Interaction

Humanities and Social Science (HSS) : 6 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	HP103	English for Engineers
	HP104	German
	HP105	Japanese
Audit	HP106	Indian Constitution
2.	HP202	Professional Skills 1
Audit	HP203	Liberal Learning
3.	HP304	Project Management
4.	HP305	Professional Skills 2
5.	HP405	Engineering Economics
6.	HP406	Psychology

Skill Development and Project (SDP) : 15 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	ME105	Experimental Tools and Techniques
2.	ME106	Design Thinking
3.	ET224	Digital Prototyping
4.	CS230	Minor Project -Design
5.	CS226/ CS227	Skill Development Course : CPP/Core Java
6.	ET235	Rapid Prototyping
7.	CS240	Minor Project -Implementation
8.	CS344/ CS346	Skill Development Course :Red Hat Linux/ Web Technology
9.	CS350	Project- Design
10.	CS356/ CS357/	Skill Development Course:Adv. Java/ .Net core/Red Hat Linux
11.	CS360	Project- Implementation
12.	CS 485/ CS486	Skill Development Course :AWS cloud services/ Android Application Development
13.	CS470	Project Evaluation
14.	CS400	B.Tech Summer Internship
15.	CS480	Capstone Work
16.	CS467	Semester Long Internship Design
17.	CS468	Semester Long Internship Implementation
Audit	CS200	SY Summer Internship
Audit	CS300	TY Summer Internship

Programme Name	Skill Development Course 1	Skill Development Course 2	Skill Development Course 3	Skill Development Course4
Chemical Engineering	CFD	ASPEN ONE	Aspen EDR	Plant Design and Piping
Civil Engineering	REVIT/ EXCEL	ETABS	VISSIM / STADDPRO	WMS / QGIS
Computer Engineering (and IT)	CPP/Core Java	Red Hat Linux/ Web Technology	Adv. Java/ .Net Core/Red Hat Linux	AWS cloud services/ Android App Development
Mechanical Engineering	Industrial Measurements & Instrumentation	Piping Design/ Energy Audit/ Six Sigma	Computer Integrated Manufacturing	Multiphysics
Electronics Engineering (and ENTC)	Data Structures and Algorithms	OOP JAVA / C++	Networking	EMB Linux
Certification Courses	Java Certification	Red Hat Linux certification	Red Hat Linux certification	AWS Certification

Open Electives (OE): 03 Courses							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Chemical Engineering	Process Engineering	CH351	Process Engineering	CH371	Process Modeling and Simulation	CH471	Process Intensification and Integration
	Piping Design and engineering	CH352	Piping Engineering	CH372	Piping Layout	CH472	Piping Design & Engineering
Civil Engineering	Construction Project Management	CV325	Construction Planning and Management	CV332	Operation Research	CV422	Financial Management
	Environmental Engineering	CV326	Solid Waste Management	CV333	Unit Operations for Liquid Waste/Effluent Treatment	CV423	Environmental Impact assessment and Climate Change
	Structural Engineering	CV327	Advanced mechanics of Solids	CV334	Advanced Structural Analysis	CV424	Advanced RC structures
Computer Engineering	Data science	CS351	Descriptive Analytics	CS354	Predictive Analysis	CS461	Big Data Analytics
	Artificial Intelligence and Machine Learning	CS352	Artificial Intelligence	CS355	Machine Learning	CS462	Deep Learning
	Cloud Computing	CS353	Cloud Computing Foundation	CS356	Cloud Native Application Development	CS463	Cloud Native DevOps
Electronics Engineering	Robotics and Automation	EX351	Fundamentals of Robotics	EX371	Robot Dynamics and Control	EX471	Robotics Vision

Open Electives (OE)							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Electronics &Telecommuni-cation	Embedded Systems	ET351	Embedded System Programming (ESP)	ET371	Embedded Processor	ET471	RTOS
	Internet of Things	ET352	IoT Architecture and Sensors	ET372	IoT Network & Protocols	ET472	Data Management and Analytics
Information Technology	Computer Security	IT351	Cryptography and System Security	IT352	Cyber Security and Forensics	IT461	Ethical Hacking & Cyber Laws
Mechanical Engineering	Computer Aided Engineering	ME351	Finite Element Analysis	ME361	Computational Fluid Dynamics	ME491	Advanced Analysis
	Robotics and Automation	ME352	Fundamentals of Robotics	ME362	Kinematics & Dynamics of Robots	ME492	Electrical and Electronics Systems of Robots
	Industrial Engineering & Management	ME353	Industrial Engineering	ME363	Operations Management	ME493	Supply Chain Management
	Automobile Engineering	ME354	Automobile System Design	ME364	Vehicle Dynamics	ME494	Autotronics and e-Vehicles
Entrepreneur-ship Cell	Innovation, Entrepreneurship & Venture Development	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation

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 in

Computer Engineering

2019-2023

(With Effect from Academic Year: 2019-2020)

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE		
SCHOOL OF ENGINEERING SCIENCES AND HUMANITIES	W.E.F	:	2019 - 2020 (Rev.2019)20 (Rev.2019)
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
PE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
SS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Calculus and Differential Equations
	COURSE CODE	AS105
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS105.CEO.1: Classify and solve first order and first degree ordinary differential equations.
AS105.CEO.2: Categorize and inspect the applications of first order differential equations.
AS105.CEO.3: Inspect and solve linear differential equations of second and higher order.
AS105.CEO.4: Apply the concepts of partial differentiation.
AS105.CEO.5: Demonstrate an understanding towards the applications of partial differentiation.
AS105.CEO.6: Identify and classify first order linear and nonlinear partial differential equations.

COURSE OUTCOMES :

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

AS105.CO.1: Solve first order and first degree ordinary differential equations.
AS105.CO.2: Analyze and solve real world phenomenon governed by first order ordinary differential equations.
AS105.CO.3: Apply concepts of linear differential equations of second and higher order to solve different systems in engineering world.
AS105.CO.4: Infer the problems based on properties of partial differentiation.
AS105.CO.5: Examine the applications of partial differentiation.
AS105.CO.6: Solve and examine the solution of partial differential equations by theoretical methods.

THEORY COURSE CONTENT		
UNIT 1	**Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors, Linear differential equations, Differential equations reducible to linear form.		
UNIT 2	**Applications of Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Orthogonal Trajectories, Newtons law of cooling, Growth & Decay, Electric circuits, Chemical applications- Mixing problems.		
UNIT 3	**Linear Differential Equation of Second Order and Higher Order**	**7 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters, Equations reducible to linear differential equations with constant coefficients: Cauchy and Legendres linear differential equation, Simultaneous linear differential equations, Applications.		
UNIT 4	**Partial Differentiation**	**7 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 5	**Applications of Partial Differentiation**	**6 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function using Jacobians, Functional dependence, Maxima and Minima of functions of two variables.		
UNIT 6	**Partial Differential Equations**	**7 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration, Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors.		
TUTORIAL NO.02		**1 HOURS**
Linear differential equations, Differential equations reducible to linear form.		
TUTORIAL NO.03		**1 HOURS**
Orthogonal Trajectories, Newtons law of cooling, Growth & Decay		
TUTORIAL NO.04		**1 HOURS**
Electric circuits, Chemical applications- Mixing problems.		

TUTORIAL NO.05		**1 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		
TUTORIAL NO.06		**1 HOURS**
Cauchy and Legendres linear differential equation, Simultaneous linear differential equations, Applications.		
TUTORIAL NO.07		**1 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables.		
TUTORIAL NO.08		**1 HOURS**
Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
TUTORIAL NO.09		**1 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function.		
TUTORIAL NO.10		**1 HOURS**
Functional dependence, Maxima and Minima of functions of two variables.		
TUTORIAL NO.11		**1 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration.		
TUTORIAL NO.12		**1 HOURS**
Linear differential equations of first order, Non-linear differential equations of first order, Charpits method.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1

REFERENCE BOOK

1. G.B. Thomas, Maurice D. Weir, Joel R. Hass, Thomas Calculus, 12 th edition, Pearson Education, 2002, ISBN: 9789332519091
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house , 2010, ISBN: 8173194203.
4. Peter V. ONeil, Advanced Engineering Mathematics, 7 th edition, Cenage Learning, 2012, ISBN: 13: 9788131503102.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Engineering Physics
	COURSE CODE	AS106
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS106.CEO.1: Make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.

AS106.CEO.2: Analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.

AS106.CEO.3: Apply the concept of behavior of light and understand the polarization phenomena.

AS106.CEO.4: Classify and understand the difference of classical mechanics and quantum mechanics.

AS106.CEO.5: Derive the basic laws governing the motion of quantum particles.

AS106.CEO.6: Apply the concept of quantum mechanics to different applications and supplement the reasoning.

COURSE OUTCOMES :

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

AS106.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.

AS106.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.

AS106.CO.3: Apply that light is transverse in nature.

AS106.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.

AS106.CO.5: Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.
AS106.CO.6: Apply the concepts of Quantum Physics in different branches of engineering.

THEORY COURSE CONTENT		
UNIT 1	**Measurement and importance of span (order) of physical quantities**	**6 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. 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 Electromagnetic wave**	**6 HOURS**
Polarization of electromagnetic wave, Production and analysis of polarized electromagnetic wave, Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.		
UNIT 4	**Quantum Mechanics-I**	**7 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, 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	**LASER and Optical Fiber**	**5 HOURS**
Stimulated Absorption, 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 (Ruby Laser), Application of LASER in optical fiber communication.		

PRACTICAL		
PRACTICAL NO.01	**Signiftcant Figures**	**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02	**Interference of Light Waves**	**2 HOURS**
Calculate the refractive index of a given liquid using Newton Rings' Experiment.		
PRACTICAL NO.03	**Diffraction of Light Waves**	**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04	**Interference of Light Waves**	**2 HOURS**
Calculate the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05	**Phase and Phase Difference**	**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06	**Bohr's Atomic Model**	**2 HOURS**
Verification of Bohr's atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07	**Polarization**	**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08	**Stoke's Law**	**2 HOURS**
Calculation of wavelength of a laser beam using Lloyds mirror arrangement.		
PRACTICAL NO.09	**Division of Amplitude of Light Waves**	**2 HOURS**
Determination of Radius of Curvature of a given planoconvex lens using Newton's Rings apparatus.		
PRACTICAL NO.10	**Diffraction as a Particular Case of Interference**	**2 HOURS**
Calculation of wavelength of different colors present in a white light.		

TEXT BOOK

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

REFERENCE BOOK

1. Alan S Morris, Butterworth Heinemann, Measurement and Instrumentation Principles,3rd Edition, Butterworth-heinmann,2001, ISBN 0750650818
2. Ajoy Ghatak ,Optics, 6th Edition Tata Mc Graw Hill Publishing Company. Ltd., 2016, ISBN-10-9339220900

3. Jenkins & White, Fundamentals of Optics, 4th Edition,Mc Graw Hill Science,2016, ISBN-0070853460.

4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-,6th Edition, Mc Graw Hill Education (India) Pvt. Ltd., 2009, ISBN-10- 0070151555.

5. L I Schiff ,Quantum Mechanics,3rd Edition, Tata Mc Graw Hill Education (India) Pvt. Ltd.,ISBN-10- 0070856435, ISBN- 13- 9780070856431.

6. PAM Dirac,Principles of Quantum Mechanics,4th Edition, CBS publishers and Distributors,2004, ISBN-10- 0195671074, ISBN- 13- 978019567107

7. D J Griffiths, Introduction to Quantum Mechanics,2nd Edition,Cambridge India ,2016,ISBN-9781316646513.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Science of Nature
	COURSE CODE	CH101
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH101.CEO.1: Make students conversant with basic Biology regarding the life processes.

CH101.CEO.2: Study biology and engineering as biologically inspired technologies like designs in nature, bioenergetics, bioprocesses, biomaterials, biomechanics, bioinstrumentation.

CH101.CEO.3: Outline the technology involved in improving quality of water for its industrial use.

CH101.CEO.4: Illustrate the basic principles, instrumentation & applications of analytical techniques.

CH101.CEO.5: Get familiarize with the new concepts of Nano Science and Technology.

CH101.CEO.6: Define the basic aspects and applications of polymers, biomaterials & composites.

COURSE OUTCOMES :

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

CH101.CO.1: Explain natural biological processes and their technical aspects in view of optimizing Engineering solutions.

CH101.CO.2: Explain important biological inventions that changed the human life and their impact on engineering.

CH101.CO.3: Identify different methodologies for water quality analysis for industrial application.

CH101.CO.4: Apply basic concepts of analytical techniques for analysis of various chemical compounds.

CH101.CO.5: Apply the knowledge of nano science for betterment of the society.

CH101.CO.6: Categorize the different engineering materials and to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Science of Nature**	**7 HOURS**
The basics of science of nature. Exploring science in nature, specially symmetry, spiral, golden ratio, pattern and fractal. The phenomenon observed in nature viz., Physical, Chemical and Biological. Case studies and Applications. The diversity and commonality of cells, protein structure and function, basic molecular genetic mechanisms, bio membranes and cell architecture, transport of ions and small molecules across Cell membranes, cellular energetics, cell birth, lineage and death.		
UNIT 2	**Applications of Biology**	**6 HOURS**
Physiologic Systems - An Outline of Cardiovascular Structure and Function, Endocrine System, Nervous System, Vision System, Defense mechanisms in plants and animals. Introduction to Bio Sensors, Performance Factors, Factors Affecting the Performance of Sensors, Areas of Application. Biological Sensing Elements, Biological transducers. Discovery and Innovations in applications of Biology.		
UNIT 3	**The Role of Chemistry for Engineers**	**7 HOURS**
(A) **Introduction:** This section is an introduction to chemistry and chemical methods for engineering students. It describes how chemistry is used in engineering and how chemical principles aid engineers in the choice of materials for a particular application. Principles of Green chemistry are reviewed. The classification of separation methods used for mixtures. (B) **Periodic Table:** This section covers the names and symbols of the elements. The basic structure of the atom is reviewed including an explanation of isotopes. A discussion of the atomic structure describes electronic shells, subshells, their quantum numbers, orbital shapes, electron filling order, and the determination of the complete electron configuration of the elements. General description of the modern periodic table. Correlation between the valence electron configurations and the chemical properties of the elements. The periodic trends according to the position of the elements in the periodic table.		
UNIT 4	**Chemical Bonding - The Formation of Materials**	**8 HOURS**
(A) **The Formation of Materials:** This section covers chemical bonding and its effect on the chemical properties of the elements. Ionic bonding & covalent bonding are compared in terms of the octet rule and valence bond theory. Polar and non-polar covalent bonds. Molecular orbital theory is introduced to explain magnetism, bond order and hybridization helpful in Carbon chemistry. Intermolecular forces, including hydrogen bonding, are discussed with a special Case Study focusing on the special properties of water. (B) **Engineering Materials:** This section covers the Resources of Natural Materials, Introduction to Material Sciences viz. Polymers, Specialty polymers, Biomaterials, Nano materials and Smart materials with their examples and applications.		
UNIT 5	**Chemical Analysis and Instrumentation**	**6 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	Water Treatment and Effluent Management	5 HOURS
This chapter covers types of impurities in water & the conventional water treatment methods. Hardness, Alkalinity and Chloride content of water, its causes, types and volumetric methods for their determinations are reviewed along with numerical. Various water softening & treatment methods which includes filtration methods by Carbon adsorption, ion-exchange methods and membrane techniques are explained		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Distillation**	**2 HOURS**
Separation of two miscible liquids using distillation process		
PRACTICAL NO.02	**Polymerization**	**2 HOURS**
Synthesis by condensation polymerization reaction		
PRACTICAL NO.03	**Nano Particle**	**2 HOURS**
Synthesis of nano particles using reduction method		
PRACTICAL NO.04	**pH Metry**	**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.05	**Paper Chromatography**	**2 HOURS**
Separation of inorganic cations by paper chromatography		
PRACTICAL NO.06	**TLC**	**2 HOURS**
Separation of organic compounds by TLC		
PRACTICAL NO.07	**Conductometry**	**2 HOURS**
Conductometric titration for mixture of acids.		
PRACTICAL NO.08	**Colorimetry / Spectrophotometry**	**2 HOURS**
Absorption studies		
PRACTICAL NO.09	**Hardness of Water**	**2 HOURS**
Determination of Hardness of water by EDTA method		
PRACTICAL NO.10	**Alkalinity**	**2 HOURS**
Determination of alkalinity of water by neutralization titration		
PRACTICAL NO.11	**Adsorption Studies**	**2 HOURS**
Water purification by activated charcoal		

PRACTICAL NO.12	**Physical Phenomenon**	**2 HOURS**
Case Studies of Physical Phenomenon		
PRACTICAL NO.13	**Chemical Phenomenon**	**2 HOURS**
Case Studies of Chemical Phenomenon		
PRACTICAL NO.14	**Biological Phenomenon**	**2 HOURS**
Case Studies of Biological Phenomenon		

TEXT BOOK

1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai Publications company,2015, ISBN: 978-93-5216-000-6
2. S.M. Khopkar , Basic Concept of Analytical Chemistry,3rd edition, New Age International (P) Ltd., 2008, ISBN-10: 81-224-2092-3; ISBN-13: 978- 81-224-2092-0
3. Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, University Science Press (Laxmi Publications Pvt. Ltd).,2009, ISBN: 978-81-318-0579-4.
4. Lodish H, Berk A, Zipursky SL, et al., Molecular Cell Biology, 5th Ed., W. H. Freeman publications, 2000.
5. Palsson B.O. and Bhatia S.N., Tissue Engineering, Pearson, 2009,
6. Brian R. Eggins, "CHEMICAL SENSORS AND BIOSENSORS", JOHN WILEY & SONS, LTD, 2004.

REFERENCE BOOK

1. Jeffrey S. Gaffney and Nancy A. Marley General Chemistry for Engineers, Elsevier, 2018, ISBN: 978- 0-12-810425-5
2. Skoog, West, Holler, Crouch, Fundamentals of Analytical Chemistry, 8th Edition Cengage Learning, 2009, ISBN-13: 97881-315-0051-4, ISBN-10: 81-315-0051-9
3. Willard, Merritt, Dean and Settle, Instrumental Methods of analysis (Chemistry), 6th edition, Wadsworth Publishing Co., 1988, 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, ISBN: 0495668028.
5. O. G. Palanna, Engineering Chemistry, 1st Edition, Tata McGraw Hill education Pvt. Ltd., 2009, ISBN-13: 978-0-07-014610-5, ISBN (10): 0-07-014610-1.
6. Pradeep T., A Text Book of Nanoscience and Nanotechnology, Tata McGraw Hill, New Delhi, 2012.
7. Reece, J. B., Taylor, M. R., Simon, E. J. and Dickey, J. L. (2013) Campbell Biology: Concepts and Connections (Seventh Edition) (Pearson) ISBN 1292026359

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Electrical and Electronics Engineering
	COURSE CODE	EX102
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX102.CEO.1: Impart knowledge of single-phase AC circuit and use of renewable energy systems.
EX102.CEO.2: Explain relations in three-phase systems and study power measurement methods.
EX102.CEO.3: Explain power supply components, electronic devices.
EX102.CEO.4: Summarize various Digital systems and application.
EX102.CEO.5: Build the knowledge of measuring system and signal conditioning circuits.
EX102.CEO.6: Get acquainted with different electrical machines.

COURSE OUTCOMES :

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

EX102.CO.1: Develop Renewable energy system (PV) & power factor improvement circuits.
EX102.CO.2: Distinguish behavior of three phase circuits & power measurement methods.
EX102.CO.3: Analyze analog circuits.
EX102.CO.4: Design Digital circuits.
EX102.CO.5: Demonstrate the use of Instrumentation system in various fields.
EX102.CO.6: Identify electrical machines used in typical domestic and industrial sector Application.

THEORY COURSE CONTENT		
UNIT 1	**AC Circuits**	**7 HOURS**
Energy Scenario, General structure of electrical power systems, A.C. fundamentals, RMS and average value, R-L,R-C,RLC series and parallel circuits, phasor diagram, power triangle and power factor, measures to improve power factor and its effects on Power system and consumer. Work, Power & Energy, costing of electricity, Application of Renewable Energy Systems, Design of PV system (offgrid), Battery selection and its series parallel connections		
UNIT 2	**Three Phase Circuit and Power Measurement**	**7 HOURS**
Three phase voltage generation and its waveform, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, three phase 4 wire system, Difference between neutral and ground conductors, Safety measures in electrical system, types of wiring, Active and Reactive Power measurement in single and three phase balanced system.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply, Clipper, Clamper. BJT - Structure and operation, CE, CB, CC configurations, biasing methods, DC Load Line, Transistor as a switch and Amplifier. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Logic gates, Boolean algebra, KMap, SOP representation. Combinational circuit Design: Adder, Subtractor, MUX, DMUX, Comparator, Code converter Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor and Microcontroller based systems.		
UNIT 5	**Measuring System**	**7 HOURS**
Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, Level, 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, VA Rating, Efficiency and Voltage regulation, OC/SC Test on Transformer. Construction, principle of operation and types of DC motor, Speed Control, characteristics equation, PMDC, BLDC, Universal motor, Single phase Induction Motor, Stepper motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICAL:		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test both theorems.		
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 variations in X_L and X_C (3 cases) To justify the lagging and Leading nature for the three cases. To find power losses in total R, L and C and verify with total power consumed.		
PRACTICAL NO.04	**Veriftcation of relation between Line and Phase quantities in Star and Delta Circuits.**	**2 HOURS**
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation between Line and Phase Quantities. To connect Bulb load in Delta connection and verify the relation between Line and Phase Quantities.		
PRACTICAL NO.05	**Power Measurement in Three Phase Balanced Cir- cuit and Single Phase Circuit.**	**2 HOURS**
To measure active and reactive power by Two wattmeter method in three phase circuit. To measure reactive power by One wattmeter method in three phase circuit.		
PRACTICAL NO.06	**Open Circuit & Short Circuit Test on a Single Phase Transformer**	**2 HOURS**
To find iron losses and no load circuit parameters To find full load copper losses and Equivalent circuit parameters To determine efficiency and regulation of transformer at various different loading conditions.		
PRACTICAL NO.07	**Speed Control of D.C. Shunt Motor**	**2 HOURS**
To vary field current and measure speed To vary armature voltage and measure speed Draw conclusion from both the methods through graphs.		
PRACTICAL NO.08	**Step Angle Measurement of Stepper Motor.**	**2 HOURS**
To become familiar with the properties of Stepper Motor. To calculate the step angle of motor.		
PRACTICAL NO.09	**Electronics Components and Measuring Instruments**	**2 HOURS**
To study Passive components - Resistors, Capacitors & Inductor. To test semi-conducting components - Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		

PRACTICAL NO.10	**D.C. Regulated Power Supply**	**2 HOURS**
To design 12V/ 9V/ 5V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	**BJT as a Switch and Amplifter**	**2 HOURS**
To adapt BJT as a switch On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		
PRACTICAL NO.12	**Combinational Digital Circuits**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	**Sequential Digital Circuits**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	**OP-AMP Applications**	**2 HOURS**
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OP-AMP as summing and difference amplifier. To verify the application of OP-AMP 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 (Min.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.		

In addition to total 8 Experiments, two case study reports must be attached with Laboratory Course Record.

TEXT BOOK

1. Edward Hughes, Electrical and Electronic Technology 10th Edition, Pearson India, 2011, ISBN-13: 978-8131733660
2. Thomas L. Floyd, Electronics Devices & Circuits, 5th Edition, Pearson Education India, 1998, ISBN-13: 978-0136491385.
3. A. Anand Kumar, Fundamentals of Digital Circuits, 4th Edition, Prentice Hall of India, 2016, ISBN-13: 978-8120352681

REFERENCE BOOK

1. V. N. Mittle and Arvind Mittal, Basic Electrical Engineering, 2nd Edition, McGraw Hill Education, 2005, ISBN-13: 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, 4th Edition, McGraw Hill, 2010, 978-0070699670.
3. Paul Horowitz, Winfield Hill, The Art of Electronics, 3rd Edition, Cambridge University press, ISBN-13: 978-0521809269.
4. Thomas E. Kissell, Industrial Electronics, 3rd Edition, Prentice Hall of India, 2003, ISBN-13:9788120322608
5. B. H. Khan, Non-Conventional Energy Resources, 2nd Edition, Tata McGraw Hill, 2009, ISBN-13: 978-0070142763.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Applied Mechanics
	COURSE CODE	CV102
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV102.CEO.1: Classify force systems and explain the conditions of equilibrium.
CV102.CEO.2: Illustrate laws of friction.
CV102.CEO.3: Demonstrate the concepts of Centroid and moment of inertia.
CV102.CEO.4: Describe kinematic parameters of motion.
CV102.CEO.5: Make use of laws of motion for kinetics.
CV102.CEO.6: Explain energy and momentum methods.

COURSE OUTCOMES:

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

CV102.CO.1: Determine the resultant and support reactions.
CV102.CO.2: Equilibrium Analysis of bodies involving frictional forces.
CV102.CO.3: Evaluate Centroid of bodies and moment of inertia of sections.
CV102.CO.4: Identify the type of motion and its kinematic parameters.
CV102.CO.5: Analyze the motion under action of constant and variable forces.
CV102.CO.6: Apply energy and momentum methods for kinetics problems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Statics**	**8 HOURS**
Basic concepts in mechanics, Fundamental principles/laws of mechanics, Force, moment of a force and couple, Resolution and composition of forces, Resultant of coplanar forces, Free body diagrams, Equilibrium of coplanar forces, Applications to simple beams and cables. **Further Reading:** *Self study-Application to jib crane.		
UNIT 2	**Friction**	**6 HOURS**
Introduction to friction, Types of friction, Laws of friction- coefficient of friction, Theory of friction- angle of friction, angle of repose, cone of friction, Engineering applications - Block and wedge friction, ladder friction, Belt Friction. **Further Reading:** *Self study-Screw friction.		
UNIT 3	**Properties of Surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity. Centroid of standard objects, Centroid of composite 1D and 2D objects, Concept of area moment of inertia, Radius of gyration and its significance, Parallel and perpendicular axis theorems, Moment of inertia of standard and composite 2D figures. **Further Reading:** *Self study- Mass moment of Inertia.		
UNIT 4	**Kinematics of Planar Motions**	**7 HOURS**
Basic concepts in kinematics, Rectilinear motion with uniform and variable acceleration, Motion under Gravity, Motion curves, Curvilinear Motion in Rectangular and path coordinates, Projectile motion. **Further Reading:** *Self study- Curvilinear motion in polar coordinates.		
UNIT 5	**Kinetics- Force and Acceleration**	**6 HOURS**
Newton's second laws of Motion, Free body diagram equation- Rectilinear motion, Concept of dynamic equilibrium. Motion of connected bodies, Equations of motion in rectangular and path coordinates for curvilinear motion. **Further Reading:** *Self study- Free Vibrations.		
UNIT 6	**Kinetics Energy and Momentum**	**6 HOURS**
Concepts of Work, power and energy, Work done by gravity, spring and frictional forces, Principle of work and Energy, Conservation of mechanical energy, Concept of Impulse and linear momentum, Impulse-momentum theorem, Conservation of linear momentum, Collisions- Types of collisions, Coef-ficient of restitution, Applications to vehicles and sports. **Further Reading:** *Self study- Space mechanics.		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Basic Principles/Laws**	**2 HOURS**
To verify basic laws of mechanics.		
ACTIVITY NO.01	**Exploring Scientiftc Calculator**	**2 HOURS**
To complete the given task of calculations in a stipulated time with desired accuracy using a scientific calculator.		
PRACTICAL NO.02	**Friction**	**2 HOURS**
To determine coefficient of friction for a given surfaces		
ACTIVITY NO.02	**Presentations**	**2 HOURS**
To prepare and deliver a PPT presentation on engineering application of friction.		
PRACTICAL NO.03	**Centroid**	**2 HOURS**
To determine Centroid of a given 1D object		
ACTIVITY NO.03	**Act of Balancing**	**2 HOURS**
To cut a 2D figure precisely and locate a balancing point on it.		
PRACTICAL NO.04	**Motions**	**2 HOURS**
To study and analyze a given set of motion.		
ACTIVITY NO.04	**Graphing the Motion**	**2 HOURS**
To draw x-t, v-t, a-t graphs for given description of motion in stipulated time.		
PROJECT		**10 HOURS**
To fabricate a model of simple structure or mechanism from low cost materials.		

TEXT BOOK

1. A. Nelson ”Engineering Mechanics: Statics and Dynamics”, 1st edition ,Tata McGraw-Hill Education, 2009, ISBN: 978-0-07-014614-3
2. R.C Hibbeler ”Engineering Mechanics: Statics and Dynamics ”,12th edition, Pearson Education, 2010, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston ”Vector Mechanics for Engineers Vol.I and II”,10th edition, Tata McGraw-Hill Education, 2012, ISBN: 978-0077402327
2. Ferdinand Singer, ”Engineering Mechanics Statics and Dynamics”, 3rd edition Harper and Row, 1994 ISBN:0063506610
3. Manoj K Harbola ”Engineering Mechanics”,1st edition, Cengage Learning, 2009, ISBN:8131509907

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Engineering Graphics
	COURSE CODE	ME104
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	NIL	60	40	60	40	200

PRE-REQUISITE : NIL

COURSE OBJECTIVES:

ME104.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.

ME104.CEO.2: To develop & apply visualization skills to simple Objects.

ME104.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES:

The students after completion of the course will be able,

ME104.CO.1: Develop and/or comprehend a simple engineering drawing in both First and Third angle orthographic projections.

ME104.CO.2: Interpret engineering drawings.

ME104.CO.3: Apply visualization skills to development of surfaces.

ME104.CO.4: Analyze engineering drawings.

ME104.CO.5: Decide annotations for two dimensional drawings.

ME104.CO.6: Create manual drawing & CAD data using SP46 standards.

THEORY COURSE CONTENT		
UNIT 1	**Visual Thinking and Solid Geometry**	**12 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections and Sectional Views**	**4 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views, Missing views.		
UNIT 3	**Isometric Projections**	**4 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	**Development of Surfaces**	**2 HOURS**
Development of lateral surfaces of simple and sectioned solids Prisms, pyramids cylinders and cones.		
UNIT 5	**Auxiliary Projections**	**2 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View		
UNIT 6	**Freehand Sketching and 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.		

PRACTICAL: **Each Assignment carries 2 questions to be draws on A2 Size Drawing Sheet**		
ASSIGNMENT NO.1	Projection of Lines	**4 HOURS**
Two Questions on line inclined to both planes		
ASSIGNMENT NO.2	Projection of Planes	**2 HOURS**
Two Questions on plane inclined to both planes		
ASSIGNMENT NO.3	Projection of Solids	**2 HOURS**
Two Questions on solid inclined to both planes		
ASSIGNMENT NO.4	Orthographic Projections	**4 HOURS**
Two Questions on Orthographic Projection of Simple Mechanical Element		
ASSIGNMENT NO.5	Development of surface	**4 HOURS**
Two Questions on Development of regular Solids		
ASSIGNMENT NO.6	Isometric View	**6 HOURS**
Two Questions on Isometric view of Mechanical Element		

ASSIGNMENT NO.7	Auxiliary View	**4 HOURS**
Two Questions on auxiliary view of Mechanical Element		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 2D CAD software package**		
PRACTICAL NO. 1	Absolute & incremental drafting	**4 HOURS**
Drawing of two sketches using absolute and incremental commands		
PRACTICAL NO. 2	Draw commands, Modify commands, Array, fillet, offset commands	**6 HOURS**
Drawing of four sketches using draw & modify commands		
PRACTICAL NO. 3	Project Drafting	**2 HOURS**
Drafting of a small project using all drafting standards		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 3D CAD software package**		
PRACTICAL NO. 4	Sketching, Solid Modeling, Assembly	**12 HOURS**
Modeling of five Mechanical models using 3D Software package		
PRACTICAL NO. 5	Project Modeling	**4 HOURS**
Modeling of small Mechanical Project of Minimum three components		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to AutoCAD, 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 TextBook of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	English for Engineers
	COURSE CODE	HP103
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	CA	
NIL	4	NIL	NIL	NIL	NIL	60	40	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP103.CEO.1: Introduce a variety of English texts to the students.
HP103.CEO.2: Teach basic English grammar.
HP103.CEO.3: Enrich the vocabulary of the students with AWL and NAWL
HP103.CEO.4: Guide the students to write in English coherently and formally.
HP103.CEO.5: Improve the students overall communicative competence in English through activities like group discussions and debates.
HP103.CEO.6: 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,

HP103.CO.1: Interpret texts written in English.
HP103.CO.2: Apply English grammar rules correctly.
HP103.CO.3: Choose and employ appropriate words from AWL and NAWL in communication.
HP103.CO.4: Develop sentence and text in English coherently and formally.
HP103.CO.5: Demonstrate overall improvement in communication skills.
HP103.CO.6: Analyze and infer from written, audio and video texts.

PRACTICAL:		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**4 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Parts of Speech**	**3 HOURS**
Use of parts of speech in a sentence composition		
PRACTICAL NO.03	**Tenses**	**5 HOURS**
Use of tenses in day to day communication and academic writing		
PRACTICAL NO.04	**Vocabulary Enrichment and Common Errors**	**8 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills and Common errors in grammar while speaking and writing English		
PRACTICAL NO.05	**Letter and Email Writing**	**4 HOURS**
How to write an email, characteristics and essentials of a good email, formal letter writing and layout of business letters		
PRACTICAL NO.06	**Essay Writing**	**4 HOURS**
What is an essay? Tips to write a good essay, Types of essays		
PRACTICAL NO.07	**Report Writing and Summarizing**	**4 HOURS**
Types of reports, format and writing a report, what is summarizing? Rules of summarizing		
PRACTICAL NO.08	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos and Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.09	**Presentation Skills**	**4 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.10	**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.11	**Debate**	**4 HOURS**
Concept, Dos and Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.12	**Listening Skills**	**4 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		

PRACTICAL NO.13	Reading Comprehension	4 HOURS
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Ashok Thorat and Munira Lokhandwala: Enriching Oral and Written Communication in English, ISBN 9788125037446
2. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
3. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
4. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
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 SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	German Language
	COURSE CODE	HP104
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	REVISION NO	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP104.CEO.1: To introduce German as a foreign language and enhance knowledge, communication and intellectual capabilities which helps to improve cognitive skills and creativity vital for problem solving and innovation.

HP104.CEO.2: To develop an awareness of German culture along with providing better career opportunities later in life.

COURSE OUTCOMES:

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

HP104.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics

HP104.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively

HP104.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Germany

HP104.CO.4: Enhance their knowledge of German culture and society

THEORY COURSE CONTENT		
UNIT 1		**2 HOURS**
Introduction- Alphabets, Numbers 0-20, Self Introduction and Introducing third person. Grammar- wh Questions(w-frage), pronouns.		
UNIT 2		**4 HOURS**
Greetings, Speaking about different Languages and Countries, numbers above 20, seasons Grammar- Yes or no Questions, Sentence Construction verbs and conjugations of regular verbs		
UNIT 3		**4 HOURS**
Speaking about hobbies and interests, different professions, weekdays, months Grammar- Nouns, Articles, conjugations of irregular verbs		
UNIT 4		**6 HOURS**
Vocabulary related to food, different places in the city, transport Grammar- Imperative sentence		
UNIT 5		**4 HOURS**
Relations, understanding clock timings Grammar- Cases, Nominative case, nominative verbs pronouns and articles		
UNIT 6		**6 HOURS**
Body parts, directions, asking for the address email address and telephone number Grammar- Accusative case, accusative verbs pronouns and articles		

TEXT BOOK

1. Netzwerk Deutsch als Fremdsprache- Kursbuch A1(Stefanie Dengler), Goyal Publications.

REFERENCE BOOK

1. https://www.klett-sprachen.de , https://www.duolingo.com/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Japanese Language
	COURSE CODE	HP105
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	REVISION NO	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP105.CEO.1: To perform daily basic activities including below mentioned.
HP105.CEO.2: Self Introduction, Greetings in Japanese.
HP105.CEO.3: Introduction to Japanese scripts- Hiragana, Katakana, Kanji.
HP105.CEO.4: Develop basic vocabulary throughgroup activities, videos.
HP105.CEO.5: Develop an understanding business etiquette.
HP105.CEO.6: Introduce topics related daily conversation, listening skills, cultural awareness.

COURSE OUTCOMES:

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

HP105.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics.
HP105.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively.
HP105.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Japan.
HP105.CO.4: Enhance their knowledge of Japanese culture and society.

THEORY COURSE CONTENT		
UNIT 1		**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 2	**Hiragana, vocabulary and listening.**	**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 3		**4 HOURS**
Hiragana and Katakana, and Japanese games.		
UNIT 4		**4 HOURS**
Family Members understanding in Japanese. and Vocab.		
UNIT 5		**5 HOURS**
Japanese cultures study, and business etiquette.		
UNIT 6		**5 HOURS**
Daily conversation and cultural study.		

TEXT BOOK

1. Minna Na Nihongo, Goyal Publications.

REFERENCE BOOK

1. Nil

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Logic Development-C Programming
	COURSE CODE	CS101
	COURSE CREDITS	3
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS101.CEO.1: Develop programming skills using the fundamentals and basics of C Language.

CS101.CEO.2: Enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

CS101.CEO.3: Teach the issues in file organization and the usage of file systems.

COURSE OUTCOMES:

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

CS101.CO.1: List the various data types, control structures and looping structures supported by C language.

CS101.CO.2: Differentiate between various data types supported by C language.

CS101.CO.3: Implement the solutions for various algorithms in C language.

CS101.CO.4: Analyze various parameter passing methods to functions in C language.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of C Language**	**2 HOURS**
Overview of C, Character set, Constants, Variables and Keywords, Data types (Primitive and Derived), Operators (arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators) and Expressions (Type Conversion, precedence and order of evaluation), C Storage Classes, Managing Input and Output Operations, A structure of C Program, C Preprocessor, C Macro, Compilation, Execution, Debugging and Testing of C program.		
UNIT 2	**Control Structures**	**2 HOURS**
Decision Control Structure-If statement, if-else statement, Nested if-else statement, Ternary operator, Case Control structure- Switch Case Statements, GOTO statement, Loop Control Structure- while statement, do while statement, for statement, odd loop, nesting of loops, break and continue statement, finite & infinite Loop.		
UNIT 3	**Arrays and Functions**	**3 HOURS**
Arrays: Array Declaration and Initialization, Bounds Checking, Array arithmetic, One dimensional arrays and multi-dimensional Arrays, Strings - Standard Library String Functions, Array of strings. **Functions:** Function definition and prototype, Scope Rule of Functions, Calling Conventions, Passing Values between Functions - Call by Values and Call by References, Recursive functions, Passing Array Elements to a Function.		
UNIT 4	**Pointers**	**3 HOURS**
Pointers and Addresses, Pointer Notation & Arithmetic, Pointer to array, Array of pointers, Pointer to a function, Passing pointers as function arguments, Strings and Pointers, Structures and Pointers.		
UNIT 5	**User Deftned Data Types**	**1 HOURS**
Structures & Union: Declaration of Structure and Union, Difference between Structure and Union, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures.		
UNIT 6	**File Handling**	**2 HOURS**
File Operations-open, read, write, append, delete, Error Handling, File Opening Modes Using command line argument(argc and argv), line input and output operations, Miscellaneous Functions.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
• Write a program in C to display "Hello World" • Write a menu driven program in C to display addition, subtraction, multiplication, division of two numbers		
PRACTICAL NO.02		**2 HOURS**
• Write a program in C to display the quotient and remainder after the division of two numbers • Write a menu driven program in C to demonstrate the use of left shift, right shift, and, or, xor operators		
PRACTICAL NO.03		**2 HOURS**
• Write a menu driven program in C to demonstrate the use of mathematical functions supported by math.h library • Write a program in C to display the grade obtained by the student in a course. The input will be the marks obtained and the output will be the grade obtained		
PRACTICAL NO.04		**2 HOURS**
• Write a program in C to display first N numbers on the screen using while, do while and for loop • Write a program in C to display first N number in reverse order on the screen using while, do while and for loop		
PRACTICAL NO.05		**2 HOURS**
Write a program in C display various patterns using *		
PRACTICAL NO.06		**2 HOURS**
• Write a program in C to display the addition of N numbers stored in an array • Write a program in C to copy the array of N numbers into another array in reverse order • Write a program in C to display the minimum and maximum element in an array		
PRACTICAL NO.07		**2 HOURS**
• Write a program in C to display the prime numbers within a given range • Write a program in C to display the fibonacci series within a given range		
PRACTICAL NO.08		**2 HOURS**
Write a menu driven program in C to perform addition, subtraction, division and transpose of matrices		

PRACTICAL NO.09		2 HOURS
• Write a program in C to convert every lowercase letter to uppercase letter and vice versa in a given string • Write a program in C to implement the string functions using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, sub string		
PRACTICAL NO.10		**2 HOURS**
• Write a program in C using functions to display addition, subtraction, multiplication, division of two numbers • Write a program in C using functions to display the minimum and maximum element in an array		
PRACTICAL NO.11		**2 HOURS**
Write a program in C using functions to implement the string functions without using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, string palindrome		
PRACTICAL NO.12		**2 HOURS**
• Write a program in C using functions and pointers to display addition, subtraction, multiplication, division of two numbers • Write a program in C using function and pointers to swap two numbers		
PRACTICAL NO.13		**2 HOURS**
Write a program in C using function and pointers to demonstrate the use of pointer arithmetic by taking input in an array		
PRACTICAL NO.14		**2 HOURS**
• Write a program in C using recursion to display the factorial of a number • Write a program in C using recursion to display fibonacci series within a given range		
PRACTICAL NO.15		**2 HOURS**
• Write a program in C to accept the information of single student and store it in structure and display the same • Write a program in C to accept the information of students and store it in array of structure and display the same		

PRACTICAL NO.16		2 HOURS
• Write a program in C to display Semester Grade Point Average (SGPA). Input will be stored in array of structure • Write a program in C to demonstrate the concept of union		
PRACTICAL NO.17		**2 HOURS**
Write a program in C to read a single line from the file using functions like fgetc, fgets, fscanf, and fread		
PRACTICAL NO.18		**2 HOURS**
Write a program in C to write a single string in a file using functions like fputc, fputs, fprintf and fwrite		
PRACTICAL NO.19		**2 HOURS**
Write a program in C to display contents of whole file on the screen		
PRACTICAL NO.20		**2 HOURS**
Write a program in C to read and write the record stored in structure from file		
PRACTICAL NO.21		**2 HOURS**
Write a program in C to implement student information system using array of structures		
PRACTICAL NO.22		**2 HOURS**
Write a program in C to implement Linear Search and Binary Search		
PRACTICAL NO.23		**2 HOURS**
Write a program in C to check whether a given matrix contains a saddle point		
PRACTICAL NO.24		**2 HOURS**
Write a program in C to implement union and intersection of two sets		

TEXT BOOK

1. E. Balguruswamy , "Programming in ANSI C" , Tata Mc-Graw Hill
2. Yashvant Kanitkar, "Let Us C" BPB Publication
3. "Programming With C", Schaum Series

REFERENCE BOOK

1. Kernighan and Ritchie , "The 'C' programming language" , Prentice Hall
2. V. Rajaraman , "Computer Programming in 'C' " , Prentice Hall
3. R.G. Dromey , "How to solve it by Computer", Pearson Education

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Experimental Tools and Techniques
	COURSE CODE	ME105
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	60	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME105.CEO.1: Introduce different tools and study various measurement techniques.
ME105.CEO.2: Study different parts of the system along with its functions and applications.
ME105.CEO.3: List various tools used for the said application.
ME105.CEO.4: Identify the function of various parts of the system.
ME105.CEO.5: Impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME105.CEO.6: Apply the knowledge to find the solution for basic engineering problems.

COURSE OUTCOMES :

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

ME105.CO.1: Recall the tools required for the measurements.
ME105.CO.2: Summarize the application of various engineering tools used.
ME105.CO.3: Identify the right tools for selected purpose.
ME105.CO.4: Inspect various parts of the system.
ME105.CO.5: Justify the most appropriate technique which can be compatible with the existing environment.
ME105.CO.6: Develop the system which will give appropriate solution to the identified problem.

PRACTICAL:

PRACTICAL NO.01	**Information Technology/Computer Engineering (Any 6 Practicals from the following list)**	**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
16. Creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Any 06 practicals from the following list)**	**12 HOURS**

1. Study of basic electronics component and Switches.
2. PCB and Soldering Tools and Technique.
3. Relay and application.
4. Domestic wiring for Extension Board and Inverter.*
5. Load test of D.C. series motor.*
6. Brake test on D.C. Shunt motor.*
7. Load test on 3-phase induction motor.
8. V-I Characteristics of Thyristor & measurement of holding & latching current
9. V-I Characteristics of MOSFET.
10. V-I Characteristics of IGBT.
11. V-I Characteristics of TRIAC.
12. Solar cell and application (Generation of Energy).
13. Speed control of DC Motor (Toy Motor)
14. Actuators and application (Electrical and Mechanical).

15 Study of Virtual Instrumentation.

16 Open IT : Optical Mouse, Cathode Ray Oscilloscope, Study of Power Supply PA System, CD Player, TV, Microwave oven (Any Two)

PRACTICAL NO.03	Mechanical Engineering (Any 6 practicals from the following list)	12 HOURS

1. Linear and angular measurements.
2. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
3. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
4. Types of mechanism and making any one mechanism containing four links using cardboard.
5. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
6. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
7. Measurement of Relative humidity of air in the lab.
8. Measurement of hardness of Steel and Aluminum.
9. Measurement of stiffness of helical spring (compression or tension)
10. Servicing of 2 wheeler and 4 wheeler system.
11. Study of various components of automobile system.
12. Open IT: Mixer or kitchen machine, Refrigerator, Boiler and accessories thermal power plant (Mini), Two stroke and four stroke engine, Introduction to threaded fasteners and joints using threaded fasteners. Bearing and its lubrication, Bicycle /Two wheeler/ 4 wheeler(Any Two)

PRACTICAL NO.04	Chemical Engineering (Any 3 practicals from the fol- lowing)	6 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. Plate type heat exchanger
9. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Any 3 Practicals from the follow- ing)	6 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 parcel of land 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 life saving do s and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

Assessment	Common to all branches	4 HOURS

TEXT BOOK

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

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Design Thinking
	COURSE CODE	ME106
	COURSE CREDITS	2
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	NIL	60	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME106.CEO.1: Disseminate the philosophy of design thinking.
ME106.CEO.2: Impart the information regarding User centric approach.
ME106.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME106.CEO.4: Enhance thinking in order to inspect diverse solutions.
ME106.CEO.5: Sensitize about the feasibility, desirability and viability criterias for selection of Appropriate solution.
ME106.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES:

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

ME106.CO.1: Recall fundamental principles of design thinking.
ME106.CO.2: Explain all the dimensions of user and his needs using design thinking approach.
ME106.CO.3: Outline user centric problem by using information gathering techniques.
ME106.CO.4: Compare multiple solutions through ideation process.
ME106.CO.5: Interpret most appropriate solution for defined user centric problem.
ME106.CO.6: Develop the most optimum solution.

PRACTICAL:		
PRACTICAL NO.01	**Human Centred Design**	**2 HOURS**
Introduction to Human Centred Design, Human Centred Design Phases, Human Centred Design Process, Human Centred Design case study		
PRACTICAL NO.02	**Research Methodology (Problem Deftnition, Infor- mation Gathering)**	**4 HOURS**
Design thinking Models & Methodology - General Problem Statement, Random check list, mind mapping Categorization of random check list. Brainstorming of problem areas, Research Methodology - Information gathering - Primary, Secondary Sources, data presentation, Preparation of survey forms, Survey Analysis, Drawing Inference.		
PRACTICAL NO.03	**Ideation**	**4 HOURS**
SWOT analysis, Vein Diagram (User Desirability, Feasibility, Viability check) Drawing inferences, Translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of simple form of products (Isometric views, layout, circuit diagram, Ideation sketches), Ergonomic and aesthetic consideration in design.		
PRACTICAL NO.04	**Prototyping**	**2 HOURS**
Concept validation, evaluation and detailing, Different methods of Prototyping, selection of right method of prototyping.		
PROJECT		**40 HOURS**
PRACTICAL NO.05	**Phase 1 : General Problem Statement and problem background**	**4 HOURS**
PRACTICAL NO.06	**Phase 2 : Research methodology**	**4 HOURS**
PRACTICAL NO.07	**Phase 3 : Product Speciftcation**	**4 HOURS**
PRACTICAL NO.08	**Phase 4 : Ideation**	**6 HOURS**
PRACTICAL NO.09	**Phase 5 : Concept Evaluation, Validation and Con- cept detailing**	**8 HOURS**
PRACTICAL NO.10	**Phase 6 : Prototyping**	**10 HOURS**
PRACTICAL NO.11	**Phase 7 : Documentation**	**4 HOURS**

TEXT BOOK

1. Emrah Yayici, Design Thinking Methodology Book, Amazon Digital Services LLC - Kdp Print Us, 2016, ISBN: 6058603757, 9786058603752
2. Idris Mootee, Design Thinking for Strategic Innovation, Wiley (2017), ISBN-13: 978-8126572694
3. Thomas Lockwood, Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Allworth Press; Original edition (10 November 2009), ISBN-13: 978-1581156683

REFERENCE BOOK

1. Harper Perennial, Lateral Thinking: Creativity Step by Step; Reissue edition, 2015 (Perennial Library).
2. John Chris Jones, Design Methods, John Wiley & Sons, David Fulton Publishers, London, 1980, ISBN 0-471-28496-3.
3. Nigel Cross, Design Thinking: Understanding How Designers Think and Work, Berg Publishers (May 15, 2011), ISBN-13: 978-1847886361
4. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Published September 29th 2009 by Harper Business, ISBN 0061766089

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Statistics and Integral Calculus
	COURSE CODE	AS107
	COURSE CREDITS	4
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS107.CEO.1: Study different statistical methods for solving problems.
AS107.CEO.2: Analyze different probability distribution functions.
AS107.CEO.3: Extend the basic concepts of integration for evaluation of complex integration problems.
AS107.CEO.4: Categorize and use equation of curves to trace the given curve.
AS107.CEO.5: Demonstrate an understanding towards evaluating multiple integrals.
AS107.CEO.6: Relate and examine the applications of multiple integrals.

COURSE OUTCOMES:

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

AS107.CO.1: Assess statistical problems.
AS107.CO.2: Solve the probability distribution problems.
AS107.CO.3: Evaluate complex integrals.
AS107.CO.4: Sketch curves by analyzing the given equation of curves.
AS107.CO.5: Evaluate the multiple integrals.
AS107.CO.6: Apply the knowledge of multiple integrals to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Statistics**	**6 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression		
UNIT 2	**Probability**	**6 HOURS**
Probability, probability density function, probability distribution: Binomial, Poisson, Normal		
UNIT 3	**Integral Calculus**	**7 HOURS**
Reduction formulae, Gamma function, Beta function, Differentiation under integral sign.		
UNIT 4	**Curve Tracing and Rectiftcation**	**7 HOURS**
Tracing of Curves: Cartesian curves, Parametric curves, Polar curves. Rectification: Rectification of Cartesian, Parametric and Polar curves		
UNIT 5	**Multiple Integrals**	**7 HOURS**
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 6	**Applications of Multiple Integrals**	**6 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		

TUTORIAL: Problem solving session		
TUTORIAL NO.01		**1 HOURS**
Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.02		**1 HOURS**
Moments, skewness and kurtosis		
TUTORIAL NO.03		**1 HOURS**
Correlation and regression		
TUTORIAL NO.04		**1 HOURS**
Probability, probability density function, Probability distribution: Binomial		
TUTORIAL NO.05		**1 HOURS**
Probability distribution: Poisson, Normal. Reduction formulae, Gamma function		
TUTORIAL NO.06		**1 HOURS**
Beta function, DUIS Rule1 & 2.		

TUTORIAL NO.07		**1 HOURS**
Tracing of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.08		**1 HOURS**
Rectification of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.09		**1 HOURS**
Double Integration, Evaluation of Double Integration, Change the order of integration, Integration by transforming Cartesian to Polar Coordinate system		
TUTORIAL NO.10		**1 HOURS**
Triple integration, Integration by transforming to spherical and cylindrical polar coordinates. Applications of multiple integrals: To find Area, Volume		
TUTORIAL NO.11		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.12		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		

TEXT BOOK

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd, 2015, ISBN: 9788126554232, 8126554231,
2. B.S. Grewal ,Higher Engineering Mathematics ,39th edition, Khanna Publications,2005 , ISBN: 81-7409- 195-5

REFERENCE BOOK

1. G.B. Thomas & R.L.Finney, Calculus, 9th edition, Pearson Education, 2002, ISBN: 81-7758-325-5.
2. Dr. B.V. Ramana ,Higher Engineering Mathematics,4 th edition, Tata McGraw Hill,2016, ISBN: 978-0-07-063419-
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house,2002,ISBN No.0849324173
4. Peter V. ONeil , Advanced Engineering Mathematics,7th Edition , Cenage Learning ,2012, ISBN-13: 9788131503102.
5. Dennis G. Zill & Warren S. Wright ,Advanced Engineering Mathematics ,4th edition ,Jones and Bartlett Publishers, 2011, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.
6. Douglas C. montgomery , George C runger ,Applied statistics and probability for engineers, 5 th edition, wiley ,2012, ISBN No: 9788126537198, 8126537191 .
7. Richard A Johnson, Irwin Miller,John freund ,Miller & Freunds Probability and statistics for engineers 8th edition, Pearson, 2011,ISBN no:978-93325-5041-4.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Applications Programming-Python
	COURSE CODE	CS102
	COURSE CREDITS	3
RELEASE DATE : 01/07/2019	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS102.CEO.1: Get familiar with basics of Python programming.
CS102.CEO.2: Understand usage of conditional and looping statements in Python.
CS102.CEO.3: Learn different simple data structure supported in Python.
CS102.CEO.4: Acquire knowledge and skills of strings and dictionary.
CS102.CEO.5: Implement Object Oriented Programming concepts using Python.
CS102.CEO.6: Introduce the concepts of Pandas & NumPy.

COURSE OUTCOMES :

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

CS102.CO.1: Debug syntax and semantics in Python programs.
CS102.CO.2: Demonstrate proficiency in handling strings and file system.
CS102.CO.3: Implement the programs using core data structures like Lists and Dictionaries.
CS102.CO.4: Interpret the concepts of Object Oriented Programming in Python
CS102.CO.5: Develop solution for real life problems using Python.

THEORY COURSE CONTENT		
UNIT 1	**Python Fundamentals and Data Handling**	**2 HOURS**
Introduction, Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types ,Mutable and immutable types, Input output operation , Comments, Reserved words, Indentation, Operators and expressions.		
UNIT 2	**Decision and Iterative Statements**	**2 HOURS**
Introduction to Decision Statements: Decision control statements, Selection/conditional branch- ing Statements: if, if-else, nested if, if-elif-else statements. **Introduction to Iterative Statements:** Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, break, continue, pass, else statement used with loops.		
UNIT 3	**List manipulation, Tuples and Python Function**	**2 HOURS**
List: Introduction, creating & accessing lists, list operations, working with lists, list functions & methods. **Tuples:** Introduction, creating & accessing tuples, tuples operations, tuples functions & methods. **Functions:** Need for functions, definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.		
UNIT 4	**Strings and Dictionary**	**3 HOURS**
Strings: Introduction, string operations- concatenation, appending, multiplication and slicing. Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, Iterating strings, the string module. **Dictionary:** Introduction, working with dictionaries, dictionary functions and methods		
UNIT 5	**Object Oriented Programming**	**2 HOURS**
Programming Paradigms-monolithic, procedural, structured and object oriented, Features of Object oriented programming-classes, objects, methods and message passing, inheritance, polymorphism, containership, reusability, delegation, data abstraction and encapsulation. Classes and Objects: classes and objects, class method and self-object, class variables and object variables, public and private members, class methods		
UNIT 6	**Data Structure and Libraries in Python**	**2 HOURS**
Introduction to data structure, pandas, NumPy.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mc2 where m is the mass of the object and c is its velocity.		
PRACTICAL NO.02		**2 HOURS**
Write a Python program for following conditions. • If n is single digit print square of it. • If n is two digit print square root of it. • If n is three digit print cube root of it.		
PRACTICAL NO.03		**4 HOURS**
Solve the Fibonacci sequence using recursive function in Python.		
PRACTICAL NO.04		**4 HOURS**
Write a Python program to print different patterns.		
PRACTICAL NO.05		**2 HOURS**
To accept students five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade if first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division.		
PRACTICAL NO.06		**4 HOURS**
To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.		
PRACTICAL NO.07		**2 HOURS**
Write a program in Python to enter two unequal nos. if first no. is greater than display square of the smaller no. and cube of the greater no. otherwise vice-versa. If no. are equal display the message both no. are equal find square, square root and cube root of a number.		
PRACTICAL NO.08		**4 HOURS**
Write a Python program to perform following string operations. a) String concatenation b) String Reverse c) String compare d) String length e) Palindrome f) Case change.		
PRACTICAL NO.09		**2 HOURS**
Select the number from the entered list and find its position in Python (use Linear Search).		
PRACTICAL NO.10		**4 HOURS**
Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain) using dictionary.		

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABUS		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCE			W.E.F	:	2019 - 2020 (Rev.2019)
FIRST YEAR BACHELOR OF TECHNOLOGY			COURSE NAME	:	Indian Constitution
			COURSE CODE	:	HP 106
			COURSE CREDIT	:	Audit
RELEASE DATE	:	1/07/2019	REVISION NO.	:	1.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		MSE	ESE	IA			
1	--	--	--	--	--	--	--

COURSE OBJECTIVES:

1. HP106.CEO.1: To realize the significance of constitution of India to students formal walks of life and help them to understand the basic concepts of Indian constitution.
2. HP106.CEO.2: To identify the importance of fundamental rights as well as fundamental duties.
3. HP106.CEO.3: To understand the functioning of Union, State and Local Governments in Indian federal system.
4. HP106.CEO.4: To learn procedure and effects of emergency, composition and activities of election and amendment procedure.

COURSE OUTCOMES:

Students successfully completing the course will be able to

1. HP106.CO.1: Understand and explain the significance of Indian Constitution as the fundamental law of the land.
2. HP106.CO.2: Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.
3. HP106.CO.3: Analyze the Indian political system, the powers and functions of the Union, State and Local Governments in detail
4. HP106.CO.4: Understand Electoral Process, Emergency provisions and Amendment procedure.

THEORY:

Unit I		**4 Hours**

Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India, Salient features and characteristics of the Constitution of India, Scheme of the fundamental rights, The scheme of the Fundamental Duties and its legal status, The Directive Principles of State Policy – Its importance and implementation

Unit II		**6 Hours**

Federal structure and distribution of legislative and financial powers, between the Union and the States, Parliamentary Form of Government in India – The constitution powers andstatus of the President of India, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India

Unit III		**8 Hours**

Emergency Provisions: National Emergency, President Rule, Financial Emergency

Unit IV		**6 Hours**

Local Self Government – Constitutional Scheme in India, 13. Scheme of the Fundamental Right to Equality, Scheme of the Fundamental Right to certain Freedom under Article 19, Scope of the Right to Life and Personal Liberty under Article 21

TEXT BOOKS:

a) D. D. Basu, Introduction to the Constitution of India, LexisNexis
b) Granville Austin, The Constitution of India: Cornerstone of a Nation,
c) Oxford University Press
d) SubhashKashyap, Our Constitution, National Book Trust
e) M.P. Jain, Indian Constitutional Law, LexisNexis
f) c) V .N.Slmkla, Constitution of lndia, Eastern Book Co mpany
g) t) P.M. Bakshi,The Constitution of India , Universal Law Publishing
h) g) M.V.Pylee, Constitutional Government in India , S. Chand
i) h) V. S. Khare, Dr. B.R. Ambedkarand India ' s National Security

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Second Year

Bachelor of Technology in

Computer Engineering

2019-2023

(With Effect from Academic Year: 2020-2021)

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE		
SCHOOL OF COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2020-2021 (Rev.2019)
SECOND YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III												
SUMMER INTERNSHIP												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOT	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
ESC8	IT221	Engineering Informatics										
DC01	CS221	Data Structures	3	0	-	35	35	30	0	0	100	3
DC02	CS222	Discrete Structure and Graph Theory	3	0	-	35	35	30	0	0	100	3
DC03	CS223	Computer Graphics	3	2	-	35	35	30	50	0	150	4
DC04	CS224	Programming Lab	0	4	-	-	-	25	50	-	75	2
SDP3	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP4	CS230	Minor Project- Design	0	2	-	0	0	0	0	50	50	1
SDP5	CS226/ 27	Skill Development Course CPP/Core Java	0	4	-	0	0	25	0	50	75	2
ESC7	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**195**	**150**	**150**	**775**	**21**

SEMESTER: IV												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOT	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
ESC8	IT221	Engineering Informatics										
DC05	CS228	Advanced Data Structures	3	2	-	35	35	30	50	0	150	4
DC06	CS229	Computer organization & Architecture	3	2	-	35	35	30	50	0	150	4
DC07	CS231	Database Management System	3	2	-	35	35	30	50	0	150	4
SDP6	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP7	CS240	Minor Project -Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**2020 - 2021 (Rev.2019)**
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT221
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME & MARKS**						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	2	35	35	30	NIL	25	25	150

PRE-REQUISITE : 1.CS102 – Application Programming - Python
2.ME105 – Engineering Tools and Techniques

COURSE OBJECTIVES :

IT221.CEO.1: To introduce facts, concept and theory of an information system for decision making.
IT221.CEO.2: To understand information evolution using data processing cycle.
IT221.CEO.3: To explain information transmission for its visualization and interpretation.
IT221.CEO.4: To design digital data acquisition system for information generation.

COURSE OUTCOMES :

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

IT221.CO.1: Interpret Data, Information and Knowledge.
IT221.CO.2: Make use of data acquisition techniques for an information system.
IT221.CO.3: Categories different storage techniques.
IT221.CO.4: Develop dashboard for effective communication of information.
IT221.CO.5: Determine components of Human computer interface interaction.
IT221.CO.6: Design digital information acquisition system.

THEORY :		
UNIT 1	**Fundamentals of Informatics**	**6 HOURS**
Data, Types of Data: Primary data, Secondary data, Operational data, Derived data, Structured, Semi-Structured, Unstructured Meta data : Administrative and Descriptive Data forms: Analog and Digital (Telephone and Stenography) ADC and DAC. Information, Information Life Cycle Knowledge, Types of Knowledge: Procedural, Declarative, Tacit and Explicit etc. Self-Study: Grade Sheet Generation system **Further Reading:** Customer Relationship Management (CRM)		
UNIT 2	**Data Acquisition and Information generation**	**6 HOURS**
Data Collection Methods: Human Interface – Interview, Interrogation, Survey and Observation Hardware and Software Interface – Digital Data Acquisition System: Introduction to Microprocessor and Micro-controller Web Interface: Web scrapper Data Processing Cycle, Data Processing Stages – Activities, Business Pyramid Model, Information System. Self-Study: Weather forecasting System **Further Reading:** Trivago, Spot Code, QR Code		
UNIT 3	**Information Storage and Transmission**	**6 HOURS**
Need of data storage, Types of storage: stand alone, centralized, distributed Cloud: Deployment Model, Services, Advantages and Disadvantages Transmission Modes : Simplex, Half Duplex and Full Duplex Transmission Types :- Serial (Synchronous and Asynchronous) and Parallel, Satellite Transmission : Features and Types (GEO,MEO and LEO) Wireless Communication : Bluetooth, Zigbee and RFID Encryption and Decryption. Self-Study: Evolution of Storage **Further Reading:** LoRa and Sigfox		
UNIT 4	**Information Visualization**	**6 HOURS**
Dashboard: Definition, Components: Pivot Table, Pivot Chart, Slicer and General Charts Types: Operational, Strategic and Tactical, Advantages KPI / Grains: Definition, Design Rules, Assessing Quality of Dashboard Dashboard Vs Scoreboard. Self-Study: Dashboard Vs. Scoreboard **Further Reading:** Information Dashboard Design		
UNIT 5	**Interactive Interface attributes**	**6 HOURS**

Human interaction interface User specific goals, Interface design life cycle, Neilsons Attributes Interaction Evaluation and Guidelines: Normans Principles, Shneidermans Rules Compliance of interaction goals : Neilsons and Normans 10 Heuristics. Self-Study: Web based systems interactivity **Further Reading:**GUI Design		
UNIT 6	**Acquisition system and IoT**	**6 HOURS**
Machine to Machine interaction, IoT: Overview, Characteristics and Architecture Componants: Sensors, Actuators, Controller and Processor Basic elements / building blocks of IOT 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, “Human–Computer Interaction: Fundamentals and Practice”, CRC Press, Auerbach Publications, 1 edition, 2015 ISBN 9781482233896
2. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2013 ISBN-13: 978-1118430620

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING ANDTECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Data Structures
	COURSE CODE	CS221
	COURSE CREDITS	3
RELEASE DATE : 01/07/2020	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	NIL	35	35	30	NIL	NIL	NIL	100

PRE-REQUISITE : CS101 Logic Development- C Programming

COURSE OBJECTIVES :

CS221.CEO.1: To illustrate fundamental data structures and their applications in programming and problem solving.
CS221.CEO.2: To understand abstract data representation methods.
CS221.CEO.3: To build the ability to synthesize and analyze algorithms.
CS221.CEO.4: To identify appropriate data structure for the specified problem.
CS221.CEO.5: To understand the various techniques of searching and sorting.
CS221.CEO.6: To analyze different sorting and searching algorithms.

COURSE OUTCOMES:

Students successfully completing the course will be able to,

CS221.CO.1: Explain the concept of data structure.
CS221.CO.2: Develop efficient algorithm for a given problem.
CS221.CO.3: Analyze appropriate algorithm for solving the real world problem.
CS221.CO.4: Demonstrate advantages and disadvantages of data structures for variety of problems.
CS221.CO.5: Choose effective data structures in approaching a problem solution.
CS221.CO.6: Make use of appropriate sorting and searching algorithm for a given application.

THEORY COURSE CONTENT		
UNIT 1	**INTRODUCTION TO DATA STRUCTURES**	**5 HOURS**

App/System/Case Study: Social networking, Recommendation system , Map applications

Contents:

Introduction to Data Structures, Data object, Abstract Data Types (ADT), Classification of data structure, time and space complexity (iterative and recursive algorithms), Classification of algorithmic complexities(constant time to exponential/factorial time), Asymptotic notation(big O, theta and omega) and its significance, efficiency of algorithms, Performance measures for data structures.

Self-study: Analysis of algorithms for time complexity

Further reading: Case study of time complexity.

UNIT 2	**ARRAY**	**6 HOURS**

App/System/Case Study: Election Voting System, Slide puzzle game

Contents:

Array as data structure, Representation and address calculation of array, two dimensional and multidimensional arrays, operations on arrays: Insertion, deletion, searching, sorting, and traversing, Polynomial and its operations using arrays, sparse matrix and its operations(addition,multiplication,transpose and fast transpose) using array

Self-study: Conversion functions of sparse matrix

Further reading: Array and database

UNIT 3	**Linked List**	**10HOURS**

App/System/Case Study: Process management in Linux, Account Management System, Shuffle merging system for set of two integer sets

Contents:

Linked lists, Representation of linked list, comparison of sequential and linked list organizations, Types of linked list (Singly linked list, Doubly Linked list, Singular and doubly Circular linked list), operations on linked list: insertion, deletion, traversing, searching, concatenation, merging and sorting, Polynomials using linked list

Self-study: Garbage collection and linked list

Further reading: Web indexing using linked list

UNIT 4	**STACK**	**7 HOURS**

App/System/Case Study:Josephus problem, CPU Scheduling

Contents:

Stack, Stack as ADT, representation and implementation of stack using sequential linked organization, operations on stack, Expression conversion (infix, prefix, postfix), Expression evaluation, recursion,types of recursion(direct,indirect,tail and tree recursion), Use of stack in recursion and backtracking

Self-study: Role of stack in memory management

Further reading: Use of stack in Language processing

UNIT 5	Queue	6 HOURS

App/System/Case Study:Syntax checker system for matching braces, Maze solving system
Contents:
Queue, Queue as ADT, representation and implementation of linear queue and circular queue using sequential linked organization, double ended queue and Priority queue and its operations(insertion ,removal, empty and peek).
Self-study: Concurrent priority queues
Further reading: Bandwidth management using priority queue

UNIT 6	SEARCHING AND SORTING	6 HOURS

App/System/Case Study: Employee leave management system for an organization
Contents:
Searching and different techniques of searching (sequential, binary, Fibonacci, sentinel), Comparison of Searching techniques, Sorting and different sorting techniques (selection sort, insertion sort, radix sort, and quick sort), Comparison of sorting techniques
Self-study:Merge sort
Further reading: Organisation of books in library management system

TEXT BOOK

1. E. Horowitz S. Sahani, D. Mehta, Fundamentals of Data Structures in C++ , Seventh Edition, Universities Press ,2008, IS BN-13: 978-8173716065.
2. T. Cormen, C Leiserson, R. Rivest, C Stein, Introduction to Algorithms, MIT press,2009, ISBN-13: 978-0262533058
3. 'Michael T. Goodrich, Roberto Tamassia, David M. Mount, Data Structures and Algorithms in C++, John Wiley Sons, ISBN-13: 978-0470383278

REFERENCE BOOK

1. Richard F. Gilberg, Behrouz A Forouzan, Data structures- A pseudocode Approach with C++ Second edition , Cengage l earning, 2004, 9780534390808.
2. E.Horowitzs S. Sahani, S. Rajashekharan, Fundametals of Computer Algorithm s, Universities Press, 2008,ISBN-13: 978-8 173716126
3. Debasis Samanta, Classic Data Structures, Second Edition, TMH, 2009, ISBN-13: 978-8120337312

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Discrete Structure and Graph Theory
	COURSE CODE	CS222
	COURSE CREDITS	3
RELEASE DATE : 01/07/2020	REVISION NO	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE :

1. AS107 Statistics and Integral Calculus
2. AS105 Calculus and Differential Equations

COURSE OBJECTIVES :

CS222.CEO.1: To learn logic and proof techniques to explore mathematical reasoning.
CS222.CEO.2: To formulate the problems precisely and solve the problems.
CS222.CEO.3: To use appropriate set, function, or relation models to analyze practical examples.
CS222.CEO.4: Model and analyze computational processes using combinatorial methods.
CS222.CEO.5: To explore number of logical possibilities and algebraic structures.
CS222.CEO.6: To use graph theory and associated terminology in practical example.

COURSE OUTCOMES:

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

CS222.CO.1: Develop the notion of mathematical thinking, mathematical proofs in problem-solving.
CS222.CO.2: Evaluate elementary mathematical arguments and identify fallacious reasoning
CS222.CO.3: Make use of set, function, relation models, associated operations and terminology.
CS222.CO.4: Calculate numbers of possible outcomes of elementary combinatorial processes.
CS222.CO.5: Demonstrate the use of algebraic structure, logical possibilities for algorithmic design.
CS222.CO.6: Model problems of computing using graphs.

THEORY COURSE CONTENT		
UNIT 1	**Sets**	**6 HOURS**
Application/System/Case Study: Bank Management System, Online Shopping System: Specialization and Generalization **Sets :** Sets, Basic operations of sets, Finite and Infinite sets, Principle of Inclusion and exclusion, power sets, countable and uncountable sets.Cantor's diagonal argument and The Power Set theorem,Proof by Mathematical Induction and Strong Mathematical Induction. **Self-Study:** Multi-Sets, Use of Multi Sets **Further Reading:** Applications of Mathematical Induction		
UNIT 2	**Propositional Logic**	**5 HOURS**
APP/System/Case Study: Applications of Propositional logic in AI, Logic Puzzles **Propositional Logic:** logic, Propositions, Conditional Propositions, Logical Connectivity, Prepositional calculus, Universal and Existential Quantifiers, Rules of inference, Propositional Equivalences, Application of Propositional Logic-Translating English Sentence. **Self-Study:** Normal Forms **Further Reading:** Application of propositional logic in Boolean Algebra, Logic Circuits .		
UNIT 3	**Relations and Functions**	**7 HOURS**
App/System/Case Study: Employee Management, Time-Table Scheduling, Job scheduling Problem, Relation between sets and associated functions **Relations and Functions:** Properties of Binary Relations, Closure of relations, Warshalls algorithm, Equivalence relations and partitions, Partial ordering relations ,Hasse Diagram, and lattices, Chains and Antichains. Functions, Surjective, Injective and Bijective functions, Composition of functions, Invertible functions,Schroeder-Bernstein theorem, Recurrence relations. **Self-Study:** Application Recurrence Relation for Analysis of Algorithm **Further Reading:** Linear Recurrence Relations With constant Coefficients.		
UNIT 4	**Counting Methods and The Pigeonhole Principle**	**6 HOURS**
App/System/Case Study: Library Management System, Diet Planning System **Counting :** The Basics of Counting, rule of Sum and Product, Permutations and Combinations, Binomial Coefficients and Combinatorial Identities, Generalized Permutations and Combinations, The Pigeonhole principle **Self-Study:**Algorithms for generating Permutations and Combinations. **Further Reading:** Discrete Probability Theory		

UNIT 5	Algebraic Structures and Coding Theory	6 HOURS

App/System/Case Study: Cryptography, Error Correction Systems

Groups theory: Algebraic Systems, Groups, Semi-Groups, Monoids, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Auto-morphisms, Homomorphism, special types of groups: Abelian and cyclic groups, order of subgroups of a group, Lagrange's theorem. Number Theory, Modular Arithmetic and Euclidean algorithm,

Self-Study: Rings, and Cyclic Codes

Further Reading: Cyclic Groups

UNIT 6	Graphs	8 HOURS

App/System/Case Study: Traveling salesman problem, Map Coloring Problem

Graph Theory: Basic terminology, representation of a graph in computer memory, multigraphs and weighted graphs, Subgraphs, Complete, regular and bipartite graphs, Graph Isomorphism, operations on graph, Hamiltonian and Euler paths and circuits, shortest path in weighted graphs (Dijkstras algorithm), and Graph Coloring.

Self-Study: Planer Graph

Further Reading: Instant Insanity

TEXT BOOK

1. R. Johnsonbaugh, Discrete Mathematics, 5th Edition, Pearson Education, 2009, ISBN 817808279-9 C.
2. Liu and D. P. Mohapatra, Elements of Discrete Mathematics, SiE Edition, TataMcGraw-Hill, 2008, ISBN 10:0-07-066913-9
3. Kenneth H. Rosen, Discrete Mathematics and its Applications, 6th edition, McGraw-Hill, 2007. ISBN 978-0-07-288008-3

REFERENCE BOOK

1. N. Biggs, Discrete Mathematics, 3rd Edition, Oxford University Press, ISBN 0 19 850717 8
2. E. Goodaire and M. Parmenter, Discrete Mathematics with Graph Theory, 2nd edition, Pearson Education, 2003 ISBN 81 7808 827 4
3. Semyour Lipschutz Marc Lipson, Discrete Mathematics, McGraw-Hill, 3rd Special Indian Edition, ISBN-13 : 978-0-07-060174-1
4. B. Kolman, R. Busby and S. Ross, Discrete Mathematical Structures, 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**2020 - 2021 (Rev.2019)**
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Computer Graphics - and Gaming
	COURSE CODE	CS223
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE :

1.AS204 Applied Mathematics
2.CS221 Data Structures

COURSE OBJECTIVES :

CS223.CEO.1: : To study various algorithms for generating and rendering graphical figures
CS223.CEO.2: To get familiar with mathematics behind graphical transformations
CS223.CEO.3: To understand various geometric transformations
CS223.CEO.4: To get acquainted with different techniques applied for projections
CS223.CEO.5: To understand various methods of clipping.
CS223.CEO.6: To study different techniques of animation

COURSE OUTCOMES:

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

CS223.CO.1: To understand different graphics primitives
CS223.CO.2: To apply mathematics to develop Computer graphics operations
CS223.CO.3: To develop programs on 2D and 3D transformation
CS223.CO.4: To apply various methods for projection.
CS223.CO.5: To develop programs on clipping algorithms.
CS223.CO.6: To develop animation and gaming application.

THEORY COURSE CONTENT		
UNIT 1	**Graphics primitives**	**6 HOURS**
App/System/Case study: Display devices- OLEDs, Micro LEDs, Radar displays Contents: Introduction, Pixel, Frame buffer, Resolution, Aspect ratio, Primitives: Lines, Line segments, Vectors Display file Structure, Display file Interpreter, Character generating methods, Antialising techniques, Self-study: Graphics files: TIFF, GIF, JPEG, GTK+ Further reading: Raster scan displays, CRT basics, Flat panel displays		
UNIT 2	**Scan Conversion**	**6 HOURS**
App/System/Case study: Design of different 2D objects and 3D objects Contents: Line Drawing algorithms: DDA, Bresenham, Circle drawing algorithms: Bresenham, Mid-point Self-study: Line styles: Thin, Thick, Dotted Further reading: DDA Circle drawing algorithm		
UNIT 3	**Clipping and Windowing**	**6 HOURS**
App/System/Case study: Games, Animation Contents: Polygon: Introduction, Types of polygon, Representation of Polygon, Inside test, Polygon filling algorithms, Windowing: Introduction, Viewport, Viewing transformation, Clipping: 2D clipping, Polygon clipping Self-study: Self Intersecting polygon Further reading: Cyrus – Beck Clipping		
UNIT 4	**Geometric transformation**	**6 HOURS**
App/System/Case study: Animation, Augmented Reality Contents: 2D Transformations: Introduction, Matrices, Translation, Scaling, Rotation, Homogeneous coordinates and matrix representation, rotation about an origin, rotation about an arbitrary point, Inverse transformation, Shear transformation, Reflection, 3D Transformations: Introduction, Matrices, Rotation about an arbitrary axis, Projections: Parallel and Perspective projections Self-study: Classification of Projection Further reading: 3D Viewing, 3D Clipping.		
UNIT 5	**Segment, Light and Color models**	**6 HOURS**
App/System/Case study: Image Segmentation, 3D effects Contents: Segment: Segment table, Segment creation, Segment closing, deleting segment, Visibility Light and Color: Introduction, Diffused illumination, Point source illumination, Shading algorithms, Color models: RGB Self-study: Morphing Further reading: HSV, CMY		

UNIT 6	Curves, Fractals, Animation	6 HOURS

App/System /Case study: Fractals in Biology/ Chemistry, Animation in Medical

Contents: Introduction to curve generation, Interpolation, B-Splines, Bezier curve, Blending function Fractals, Fractal lines and surfaces, Irregular curves: Joints and Knots, Connectivity, Animation: Introduction to animation, Animation Languages, Guidelines

Self-study: Approximation Algorithms

Further reading: Triadic curve

PRACTICAL:

PRACTICAL NO.01		2 HOURS

- Develop program to draw a line with line style (Thin, Thick, Dotted)

PRACTICAL NO.02		2 HOURS

- Develop a program to draw a Circle of desired radius (Midpoint, Bresenham)

PRACTICAL NO.03		4 HOURS

- Develop a program for 2D transformation(Translation, Rotation, Scaling, Shear, Reflection)

PRACTICAL NO.04		4 HOURS

- Develop program for polygon filling

PRACTICAL NO.05		2 HOURS

Write program to simulate any one of or similar scene- 1.Clock with pendulum 2. National Flag hoisting 3.Vehicle/boat locomotion 4.Water drop falling into the water and generated waves after impact

PRACTICAL NO.06		2 HOURS

- Develop a program for bouncing ball using animation tool like 3D Blender, Seamless 3D,cartoona etc.

TEXT BOOK

1. D. Hearn and M. Baker "Computer Graphics",2nd Edition, Pearson Education,2002,ISBN-7808-794-4
2. S. Harrington, Computer Graphics", 2nd Edition, McGraw-Hill Publications,1987,ISBN 0-07-100472-6
3. D.Rogers, J.Adams, "Mathematical Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill publication, 2002, ISBN 0-07-048677-8.

REFERENCE BOOK

1. D. Rogers,"Procedural Elements for Computer Graphics",2nd Edition, Tata McGraw-Hill publication,2001,ISBN 0-07-047371-4.
2. James D.Foley,Andries Van Dam, "Fundamentals of Interactive Computer Graphics", Addison-Wesley

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Programming Lab
	COURSE CODE	CS224
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	T/P	DM	IA	
NIL	4	NIL	NIL	NIL	50	NIL	25	75

PRE-REQUISITE : 1. CS101 Logic Development-C Programming

COURSE OBJECTIVES :

CS221.CEO.1: To illustrate fundamental data structures and their applications in programming and problem solving.
CS221.CEO.2: To understand abstract data representation methods.
CS221.CEO.3: To build the ability to synthesize and analyze algorithms.
CS221.CEO.4: To identify appropriate data structure for the specified problem.
CS221.CEO.5: To understand the various techniques of searching and sorting.
CS221.CEO.6: To analyze different sorting and searching algorithms.

COURSE OUTCOMES:

Students successfully completing the course will be able to,

CS221.CO.1: Explain the concept of data structure.
CS221.CO.2: Develop efficient algorithm for a given problem.
CS221.CO.3: Analyze appropriate algorithm for solving the real world problem.
CS221.CO.4: Demonstrate advantages and disadvantages of data structures for variety of problems.
CS221.CO.5: Choose effective data structures in approaching a problem solution.
CS221.CO.6: Make use of appropriate sorting and searching algorithm for a given application.

PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
Design and implement a program to read, display, insert, update and delete operations on data objects for customer information supply chain management system using array.		
PRACTICAL NO.02		**4 HOURS**
Design and implement a program for sparse matrix operations of addition, multiplication and transpose of sparse matrix for climate prediction data stored in 2D array.		
PRACTICAL NO.03		**4 HOURS**
Design and develop program for insertion, up-dating, searching, sorting, listing and deletion operations using singly linked list for placement information system.		
PRACTICAL NO.04		**4 HOURS**
Design and develop program for polynomial addition, multiplication operations for disease information using circular linked list.		
PRACTICAL NO.05		**4 HOURS**
Design and implement a program for sorting two given lists and merging these two sorted lists of marks scored for technical skill examination of recruitment cell using doubly linked list.		
PRACTICAL NO.06		**4 HOURS**
Design and implement a menu driven program for expression conversion from infix to postfix, postfix to prefix expression and evaluation of postfix expression using stack.		
PRACTICAL NO.07		**2 HOURS**
Design and implement a program for poker hand royal flush game using recursion.		
PRACTICAL NO.08		**4 HOURS**
Design and implement a menu driven program for linear and circular queue for food ordering using array and linked list.		

PRACTICAL NO.09		**4 HOURS**
Design and implement a program for double ended queue and its operations for a shopping mall.		
PRACTICAL NO.10		**4 HOURS**
Design and implement a menu driven program for implementing insertion sort and quick sort for population of a town.		
PRACTICAL NO.11		**4 HOURS**
Design and implement a menu driven program for implementing Fibonacci, binary and sentinel searching for students marks scored in an examination.		
PRACTICAL NO.12		**2 HOURS**
Design and implement a program for survey information of sports using principle of inclusion and exclusion.		
PRACTICAL NO.13		**2 HOURS**
Design and implement a program for generating all possible combinations of given string using recursion.		
PRACTICAL NO.14		**2 HOURS**
Design and develop a program using linear recurrence relations for various loan schemes of a bank.		
PRACTICAL NO.15		**2 HOURS**
Design and implement program for parity checker of ASCII equivalence of given word.		

TEXT BOOK

1. E. Horowitz S. Sahani, D. Mehta, "Fundamentals of Data Structures in C++" , Seventh Edition, Universities Press ,2008, IS BN-13: 978-8173716065.
2. T. Cormen, C Leiserson, R. Rivest, C Stein, "Introduction to Algorithms", MIT press,2009, ISBN-13: 978-0262533058
3. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structures and Algorithms in C++", John Wiley Sons, ISBN-13: 978-0470383278

REFERENCE BOOK

1. Richard F. Gilberg, Behrouz A Forouzan, " Data structures- A pseudocode Approach with C++" Second edition , Cengage l earning, 2004, 9780534390808.
2. E. Horowitzs S. Sahani, S. Rajashekharan, "Fundametals of Computer Algorithm s", Universities Press, 2008,ISBN-13: 978-8 173716126
3. Debasis Samanta, " Classic Data Structures", Second Edition, TMH, 2009, ISBN-13: 978-8120337312

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Digital Prototyping
	COURSE CODE	ET224
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	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	25	NIL	50	75

PRE-REQUISITE : ME104 - Engineering Graphics, EX102 - Electrical and Electronics Engineering, CV102 - Applied Mechanics

COURSE OBJECTIVES :

ET224.CEO.1: To learn about materiality and techniques.
ET224.CEO.2: To justify the product development cycle through prototype project.
ET224.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET224.CEO.4: To 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,

ET224.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET224.CO.2: Apply acquired skills to the construction of a prototype project.
ET224.CO.3: Develop a prototype project by performing tasks in team.
ET224.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. Hardware Prototyping (HP)
2. Software Prototyping(SP)

In the module hardware prototyping students will develop a prototype of electronic product. Student will be acquiring different skills in electronics like Soldering, Wiring and PCB Design using Electronic Design Automated tools, Assembly of electronic product, Testing and troubleshooting, requirement Analysis , Product concept development in electronic product design.

On the other hand in software prototyping students will learn Software development life cycle (SDLC) concepts, AEIOU framework, UML diagrams, Requirement analysis, data flow diagrams, creating high fidelity prototypes, Testing and Analysis etc.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Digital Prototyping, Semester - III

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Software Prototyping (SP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Software Prototyping (SP)	

MODULE: 1/2	Hardware Prototyping (HP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to design and construction of electronic prototyping	02 HOURS

1. Gain familiarity with basic product design stages; Conceptualization, Detailed Design and Implementation. Form a group of students. (04 max)
2. Acquire concepts of basic processes in electronic prototyping. Develop Concept Description Sheet (CDS) for product to be designed.
3. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span. Hence draw Physical and Mechanical Drawing.
4. Perform Customer Survey and Competitor Analysis
5. Develop Specifications and Make requirement analysis. Hence develop Bill of Material.
6. 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.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	06 HOURS

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

PRACTICAL NO. 04	PCB fabrication	06 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
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.
8. Develop Customer feedback sheet and Take feedback from Customers.
9. Make Customer feedback Analysis based on ratings.

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.
6. Present Customer feedback analysis.

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: 2/2	**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	**Requirement analysis**	**04 HOURS**
Find the requirement specification of given problem statement and formulate the feasible solution.		
PRACTICAL NO. 03	**Design UML Diagrams for given problem statement**	**06 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. 04	Design analysis	02 HOURS
Create High Fidelity Prototype		
PRACTICAL NO. 05	**Prototype Implementation**	**06 HOURS**
Use of prototype development tools such as Proto.io, Invision		
PRACTICAL NO. 06	**Presentation**	**04 HOURS**
Each group will be given 10 min to present their work.		

REFERENCE BOOK

1. Software Engineering A practitioners Approach, Roger S, Pressman, 7th Edition, ISBN: 9780073375977
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**2020 - 2021 (Rev.2019)**
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Minor Project- Design
	COURSE CODE	CS230
	COURSE CREDITS	1
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME230.CEO.1: To categorize and define a problem to be solved.
ME230.CEO.2: To realize the ethical principles in general and its importance.
ME230.CEO.3: To make the students aware of project requirement analysis, design and planning.
ME230.CEO.4: To appreciate the importance of documenting and ethics of writing.

COURSE OUTCOMES :

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

ME230.CO.1: Delineate the problem to be solved.
ME230.CO.2: Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession.
ME230.CO.3: Embark project planning and design.
ME230.CO.4: Inculcate problem solving skills and critically analyze the options available to solve the problem.
ME230.CO.5: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

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. This will help students to understand the process of product/project development, best practices and encourage their creativity to solve real life problems. The students will learn effective team building, designing, budgeting, planning, engineering skills and processes, safety norms and standards while developing the application/ product. The students will be able to understand importance of documentation and professional ethics.

Guidelines

1. Every student shall undertake the Minor Project in semester III and IV.
2. Every student shall work on an approved project, a group of 03/04 students (maximum) shall be allotted for each minor project.
3. The group members may be from different programme to support the interdisciplinary functioning.
4. The students have to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
5. Collect the sufficient data and survey to establish the criticality of the problem to be solved.
6. Apply various tools for project planning and design.
7. Critically analyze various solutions/techniques to solve real world problems.
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use.
9. Learn and apply standards of engineering ethics and professional behavior.
10. Adherence to the highest principles of ethics, conduct and practices.

TIMELINE

The four member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Formation of Project Group: 2 Weeks (1^{st} week and 2^{nd} week)
2. Finalizing title, feasibility study and approval: 3 Weeks (3^{th} week to 5^{th} week)
3. Engineering Ethics: 3^{rd} week
4. Project Review 1 Presentation: 6^{th} week
5. Analysis and Design of the Project: 3 Weeks (7^{th} week to 9^{th} week)
6. Project Review 2 Presentation: 10^{th} week
7. Report Writing, Documentation and Presentation: 2 Weeks (11^{th} week and 12^{th} week)
8. Project Review 3 Presentation: 13^{th} week (Assessment by Guide)
9. Final Evaluation/Examination Presentation: 14^{th} week

Project Demonstration (50 Marks)

1. **Review 1 (Problem Statement and Literature Survey) (10 marks)**
2. **Review 2 (Project Modeling and Designing) (10 marks)**
3. **Project Activities (10 Marks)**
   - Quiz on Ethics
   - Drafting of Literature Review and Synopsis
   - Project Planning and Design
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration & Presentation (10 marks)**

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 1	Introduction to different forefront areas available within the School. Discussion on innovative application in domain area and resources such as Books, Blog, Publication Houses	To search the domain area of interest	At least 4 subtopics in area of interest (Template I)
Week 2	To brief at least two Innovative products with complete details and their Evolution	To search the domain area/innovative products of interest	Search in area of interest (Template II)
Week 3	Ethics, Morals, Values and Integrity, Work Ethic, Civic Virtue, Senses of Engineering Ethics, Business Ethics, Media Ethics, Environmental Ethics, Bio Ethics, Computer Ethics, Research Ethics	Graded Activity Quiz on Engineering Ethics	Understand the Ethics of an Engineer (Template III)
Week 4	Introduction to Research publication, its type, science citation index, methods to search Journals. Introduction to Ethics of writing(Plagiarism)	Search domain related five papers (from Journal Paper, Conference paper, Technical report, Manual, Thesis)	Student will learn searching SCI journal and understand Ethics of writing
Week 5	Presentation on how to make Project Presentation. Title, problem statement, objective, Scope etc (Select suitable topic of domain and explain it as per the template-IV)	Graded Activity on background study (market survey, customer survey, literature Survey) of domain area of interest	Drafting literature review and Synopsis (Template IV)
Week 6	NIL	Project Review 1 Presentation	Problem Definition and Objectives

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 7	Guidelines and tools for Analysis and Design of the Project and problem solving sessions	Analysis and Design of the Project	Best practices for Analysis and Design
Week 8	Guidelines and tools for the Project Planning, Introduction to Block Diagram, System Architecture	Make use of Project Planning Tools and Design Tools	Best practices for Project Planning and Design
Week 9	Presentation, discussion and doubt clearing based on • Working on Algorithms • Working on Design/ System Architecture • Working on Analysis/ CAD modeling	Graded Activity on Project Design and Planning	Best practices of Project Planning and Design
Week 10	NIL	Project Review 2 Presentation	Project Planning, Design of a solution
Week 11	Guidelines and tools for report writing	Project Report Writing	Effective Report Writing Practices
Week 12	How to give effective presentation on project	Report Writing and Presentation	Effective Documentation of the Project
Week 13	NIL	Project Review 3 Presentation	Final Report and Presentation
Week 14	NIL	Examination: Final Demonstration and Presentation	Problem Statement, Objectives, Design and Planning

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Skill Development Course - CPP
	COURSE CODE	CS226
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	REVISION NO	1.0

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

PRE-REQUISITE : CS101 Logic Development

COURSE OBJECTIVES :

CS226.CEO.1: To implement Object Oriented Programming concepts.
CS226.CEO.2: To understand usage of conditional and looping statements in C++.
CS226.CEO.3: To evaluate benefits of static and dynamic data structures.
CS226.CEO.4: To illustrate inheritance and polymorphism.
CS226.CEO.5: To make use of standard template library.
CS226.CEO.6: To analyze file handling, exception handling.

COURSE OUTCOMES:

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

CS226.CO.1: Make use of class and objects using C++.
CS226.CO.2: Demonstrate control structures using C++.
CS226.CO.3: Implement the programs using data structures in C++.
CS226.CO.4: Develop solution for real world problems using inheritance and polymorphism.
CS226.CO.5: Apply standard template library to solve real world instances.
CS226.CO.6: Make use of various file handling and exception handling operations in C++.

CONTENTS :

Introduction to C++, Tokens, Data types, Operators, Structure of C++ Program, Arrays, Pointers, Expressions and Control Structures. Functions in C++: Argument passing in function, Inline Functions, Default Arguments, Const. Arguments, Friend function, Classes and Objects, Constructors Destructors, Overloading, Virtual Functions, Inheritance, Polymorphism, Templates, Exception Handling, Standard Template Library, Managing Console I/O Operations, Files.

PRACTICAL: All assignments should be performed considering real world applications.		
PRACTICAL NO.01		**4 HOURS**
Assignment based on Class, constructor and user defined functions.		
PRACTICAL NO.02		**4 HOURS**
Assignment based on types of constructors and member functions.		
PRACTICAL NO.03		**4 HOURS**
Assignment based on operator overloading using default and parameterized constructor.		
PRACTICAL NO.04		**4 HOURS**
Assignment based on different string operations using operator overloading.		
PRACTICAL NO.05		**4 HOURS**
Assignment based on class, objects, this pointer, inline function, static member function and friend class.		
PRACTICAL NO.06		**4 HOURS**
Assignment based on different types of Inheritance.		
PRACTICAL NO.07		**4 HOURS**
Assignment based on Polymorphism.		
PRACTICAL NO.08		**4 HOURS**
Assignment based on Exception Handling.		

PRACTICAL NO.09		**4 HOURS**
Assignment based on Pointers to objects.		
PRACTICAL NO.10		**4 HOURS**
Assignment based on Class template, Function template.		
PRACTICAL NO.11		**4 HOURS**
Assignment based on List class as container of standard template library.		
PRACTICAL NO.12		**4 HOURS**
Assignment based on File Handling.		

TEXT BOOK

1. E. Balgurusawmy, "Object Oriented Programming with C++", (TMH).
2. Paul Deitel, Harvey Deitel, "C++: How to Program", Prentice Hall.

REFERENCE BOOK

1. Bjarne Stroustroup, "Programming - Principles and Practice using C++", Addison Wesley.
2. Herbtz Schildt, "C++: The Complete reference", MGH.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Skill Development Lab Core Java
	COURSE CODE	CS227
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	REVISION NO	1.0

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

PRE-REQUISITE :

CS101 - Logic Development

COURSE OBJECTIVES :

CS226.CEO.1: To design and program stand-alone Java applications.
CS226.CEO.2: To extend Java classes with inheritance and dynamic binding.
CS226.CEO.3: To use exception handling and file handling in Java applications.
CS226.CEO.4: To design a graphical user interface (GUI) with Java Swing.
CS226.CEO.5: To implement database applications.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

CS226.CO.1: Implement Object Oriented Programming Concepts in java.
CS226.CO.2: Use and create packages and interfaces in Java.
CS226.CO.3: Use graphical user interface in Java programs.
CS226.CO.4: Perform file handling operations.
CS226.CO.5: Implement exception handling in Java.
CS226.CO.6: Implement applications using JDBC .

GUIDELINES FOR CONDUCTION OF LAB

1. Course instructor has to frame practical assignments based on the contents mentioned in syllabus.
2. According to assigned number of hours, course instructor has to decide minimum number of practical assignments
3. Use notepad for at least first 4-6 Hours sessions after that use edit plus or net beans as per availability.

CONTENTS

1. Fundamentals of java, Object and class,Java Collections,Interfaces, Abstract class and inheritance, Exception handling,File Handling,Packages,Graphical user interfaces using swing,Database management

ASSIGNMENTS:		
PRACTICAL NO.01	**Fundamentals of Java**	**6 HOURS**
a) Simple program based on Input and Output in java b) Simple program based on Looping, Control Statement ,String, Array.		
PRACTICAL NO.02	**Object and Class**	**6 HOURS**
a) Program to create Class,declare Member Variables, Define Methods b) Program to define Constructor, Passing Information to a Method or a Constructor.		
PRACTICAL NO.03	**Java Collections,Interface, Abstract Class and Inheritance**	**8 HOURS**
a) Program based on Java collections b) Program based on Interfaces c) Program based on Inheritance		
PRACTICAL NO.04	**Exception Handling and File Handling**	**8 HOURS**
a) Program to handle different exceptions b) Program to create own exception class c) Program to perform file handling operations		
PRACTICAL NO.05	**Packages**	**6 HOURS**
a) Program to create own package b) Program to develop and deploy (executable) Jar File.		
PRACTICAL NO.06	**Graphical User Interfaces using Swing**	**6 HOURS**
a) Program to create Frame and make use of Layout Management, User Interface Components		
PRACTICAL NO.07	**Database Management**	**6 HOURS**
Program to make use of JDBC for performing different database transactions		

TEXT BOOK

1. The Complete Reference Java seventh edition, Herbert Schidlt.

REFERENCE BOOK

1. K. Arnold and J. Gosling, "The JAVA programming language", Third edition, Pearson Education, 2000.
2. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.
3. C. Thomas Wu, "An introduction to Object-oriented programming with Java", Fourth Edition, Tata McGraw-Hill Publishing company Ltd., 2006.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021(R2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IN COMPUTER ENGINEERING	**COURSE NAME**	Environmental Science
	COURSE CODE	CV203
	COURSE AUDIT	1
RELEASE DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE :

COURSE OBJECTIVES :

CV203.CEO.1: Create awareness about environmental problems among future citizens.
CV203.CEO.2: Interpret basic knowledge about the environment and its allied problems.
CV203.CEO.3: Develop an attitude of responsibility for the environment and society.
CV203.CEO.4: Perceive the importance of sustainable development.

COURSE OUTCOMES :

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

CV203.CO.1: summarize the importance of ecosystem and biodiversity for maintaining ecological balance.
CV203.CO.2: identify environmental problems arising due to engineering and technological activities and the science behind those problems.
CV203.CO.3: categorize the major pollutants along with sources and abatement devices for the environmental management.
CV203.CO.4: perceive the social and professional responsibility towards the environment.

THEORY		
Module I	**Overview of Environment**	**2HOURS**
Multidisciplinary nature of environmental studies, Types of spheres, Natural Resources: Forest, Water, Mineral, Energy, Land, Ecosystems, Biodiversity and its conservation, Natural cycles: Hydrologic, Carbon, Nitrogen, Phosphorus and Sulphur cycle.		
Module II	**Environmental Pollution**	**2 HOURS**
Environmental Pollution: Air, Water, Soil, Solid and Hazardous Waste Management; Environment and human health, Overutilization of natural resources, Environmental Legislation, Environmental monitoring organizations in India, Environmental Protection Agency (EPA)		
Module III	**Global Environmental Issues**	**2 HOURS**
Introduction to: Climate change, Global warming, Acid rain, Ozone layer depletion, Plastic waste management, Municipal solid waste management, Food problem, E-waste management, Social Issues: Environmental ethics and economics.		
Module IV	**Sustainable Development**	**2 HOURS**
Concept of sustainable development, International Institute of Sustainable Development (IISD) : Introduction Sustainable goals, Environmental Audits, Rainwater harvesting Water management techniques		

Activity Based Learning and Evaluation:		
Activity No. 1	**Site Visit**	**02 HOURS**
Students have to visit any one nonhazardous polluted site for finding the various reasons of its pollution and suggest preventive measures for it. Prepare the detailed report on it along with the photos. This could be completed in a group.		
Activity No. 2A	**Students has to perform any one of the following activities : (2A or 2B)**	**02 HOURS**
Students have to organize any one of the following activities in the institute and prepare a detailed report on their experience of organizing conducting the activity, its possible benefits to the environment along with the photos. This could be completed in group of students: 1. No Car and Bike Day 2. Shutting down the fans and air conditioning systems of the campus for an hour. 3. Environmental awareness programs like organizing essay competition, poster competition, slogan making competition or any other related to it. 4. Celebrating various environmental days. 5. Any other similar activity related to the environment.		
Activity No. 2B	**Project Work**	**2 HOURS**
Students have to identify the real life environmental problems from their daily observations and try to find out the various feasible solutions for it as their project work. They are supposed to prepare the prototype, demonstration model, poster, detailed report and present it to the evaluators. The project should be related to the below mentioned heads: 1. Reuse, Recycle and Reduce 2.Environmental Pollution Monitoring and Control 3.Material Balance Concept 4.Sustainable Development 5.Environmental Innovations The evaluation is based on at least one number of project presentation reviews apart from the final project presentation.		

TEXT BOOK

1. R. J. Ranjit Daniels and Jagdish Krishnaswamy, "Environmental Studies", Wiley India Publications, ISBN: 9788126519439.
2. Rao C.S. "Environmental Pollution Control Engineering", Wiley Eastern Publications, ISBN: 9780470217634.
3. Cunningham W.P. and Cunningham M.A., "Principles of Environmental Science", Tata McGraw-Hill Publishing Company, New Delhi, 2002.
4. Miller T. G. Jr., "Environmental Science", Wadsworth Publishing Co., ISBN-10: 1111988935 ISBN: 9781111988937.

REFERENCE BOOK

1. H. S. Peavy, D. R. Rowe and G. Tchobanoglous, "Environmental Engineering", McGraw Hill, ISBN: 84-282-0447-0.
2. Helen Kavitha "Principles of Environmental Science", Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
3. Henry J.G. and Heinke G.W., "Environmental Science and Engineering", 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
4. Metcalf Eddy "Wastewater engineering: Treatment and reuse", McGraw Hill, ISBN: 007041878.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2019 - 2020 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Student Internship Program (Life/Soft Skills)
	COURSE CODE	CS200
	COURSE CREDITS	Audit
RELEASE DATE : 01/07/2019	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS200.CEO.1: To develop good bahavioural practices
CS200.CEO.2: To gain learning and living experience
CS200.CEO.3: To get acquainted with online learning platforms
CS200.CEO.4: To recognize the latest trend and understand the requirements for professional life
CS200.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CS200.CO.1: Manage emotions, health, finances, relationships, performance extracurricular activities
CS200.CO.2: Increase knowledge of emotional competency and emotional intelligence
CS200.CO.3: Develop interpersonal skills and adopt good leadership behavior
CS200.CO.4: Reduce negative stress while promoting energy or positive stress
CS200.CO.5: Inculcate a sense of sportsmanship, better physical health and competitive spirit

INTRODUCTION:

The main aim of this internship is to assist all Second Year B.Tech. students to acquire the skills required for personal stability and professional growth. The ultimate goal is to imbue students with professionalism and life skills. Using this internship, MITAoE students will enhance their professional skills, making themselves more marketable in today's competitive world. The students can develop various extracuurricular skills for working on emotional intelligence and sportsman spirit.

SCOPE AND STRUCTURE OF SIP:

Student Internship Program (Life/Soft Skills) is offered to entrants of Second Year B.Tech. (after semester II) that meet the eligibility criteria stated below:
Second Year B.Tech. entrants should apply for 3 to 4 weeks duration life skill courses during June-July of every academic year.This is an audit course.

The scope of this internship is limited to identifying life skill development opportunities and assisting MITAoE students to apply for such courses.

STUDENT ELIGIBILITY CRITERIA:

Students applying for internship must meet the following criteria:
After completion of second academic semester, First Year B.Tech. students (Second Year B.Tech. entrants) of all schools are eligible to apply for 3 to 4 weeks duration internships under Student Internship Program.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IT/COMP/ETX AND E&TC ENGINEERING	COURSE NAME	Applied Mathematics
	COURSE CODE	AS204
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : First Year Engineering Mathematics OR Diploma Engineering Mathematics

COURSE OBJECTIVES :

AS204.CEO.1: To evaluate the rank of a matrix and solve the system of equations.
AS204.CEO.2: To compute the eigenvalues and eigenvectors of a matrix and diagonalize a matrix.
AS204.CEO.3: To evaluate the derivative of vector-valued functions.
AS204.CEO.4: To evaluate the area and the surface integrals of the vector functions.
AS204.CEO.5: To evaluate the derivative and line integral of complex valued functions.
AS204.CEO.6: To execute the program on problems of numerical methods using MATLAB.

COURSE OUTCOMES :

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

AS204.CO.1: Evaluate the rank of a matrix and solve the system of equations.
AS204.CO.2: Determine the eigenvalues and eigenvectors of a matrix.
AS204.CO.3: Differentiate a vector valued function in plane or space.
AS204.CO.4: Compute the area and volume of the objects.
AS204.CO.5: Apply the Cauchy's Integral Theorem and evaluate the integrations.
AS204.CO.6: Execute the program codes using MATLAB.

THEORY		
UNIT 1	**Linear Algebra I**	**9 HOURS**
Basic Concepts, Matrix Addition, Scalar Multiplication, Matrix Multiplication, Linear Systems of Equations, Gauss Elimination Method, Rank of a Matrix, Linear Independence, Vector Spaces, Inner Product Spaces.		
UNIT 2	**Linear Algebra II**	**9 HOURS**
Eigenvalues, Eigenvectors, Symmetric Matrices, Skew-Symmetric Matrices, Orthogonal Matrices, Similarity of Matrices, Basis of Eigenvectors, Digonalization.		
UNIT 3	**Functions of Complex Variables**	**6 HOURS**
Complex Numbers, Complex Plane, Polar Form, Powers, Derivative, Analytic Functions, Cauchy-Riemann Equations, Line Integrals in the Complex Plane, Cauchy's Integral Theorem, Cauchy's Integral Formula.		
UNIT 4	**Vector Differentiation**	**6 HOURS**
Vectors in 2-D and 3-D, Scalar Product, Vector Product, Vector/scalar functions and fields, Derivative of vectors, Velocity and Acceleration, Gradient of a Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field.		
UNIT 5	**Vector Integration**	**6 HOURS**
Line Integration, Line Integrals Independent of Path, Double Integrals Green's Theorem in the Plane, Surfaces for Surface Integrals. Surface Integrals, Volume Integrals, Divergence Theorem, Stoke's Theorem.		
UNIT 6	**Numerical Methods**	**6 HOURS**
Numerical Differentiation and Integration, Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method, LU-Decomposition method.		

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/ Row Spaces.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms/ Null Spaces.		
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. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232.
2. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0.
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2010, ISBN-13: 978-0-470-76785-6.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Advanced Data Structures
	COURSE CODE	CS228
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS					
		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	T/P	PR/DM	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE :

1: Data Structures
2: Discrete Structures and Graph Theory

COURSE OBJECTIVES :

CS228.CEO.1: Introduce various advanced data structures like trees, graphs, heaps, hash tables, disjoint sets etc.
CS228.CEO.2: Learn how to select appropriate data structure based on requirement of application
CS228.CEO.3: Learn how to implement various applications using data structures
CS228.CEO.4: Learn how to measure the performance of data structure in terms of time and memory complexity
CS228.CEO.5: Learn how to design own data structure using standard data structure

COURSE OUTCOMES:

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

CS228.CO.1: Explain the working of basic and advanced data structures like trees, graphs, heaps, disjoint sets, hash tables, bloom filters
CS228.CO.2: Demonstrate the advantages and disadvantages of various data structures
CS228.CO.3: Choose appropriate data structures while building the applications
CS228.CO.4: Implement various applications using data structures like trees, graphs, hash tables, heaps
CS228.CO.5: Evaluate the performance of various data structures in terms of time and memory complexity
CS228.CO.6: Design own data structures using the build in data structures

THEORY COURSE CONTENT		
UNIT 1	**Trees**	**8 HOURS**
App/System/Case study: Parse trees and expression trees in Compiler **Contents:** General tree and its representation using sequential and linked organization, converting tree to binary tree, binary tree traversals – inorder, preorder and postorder traversals, breadth first search traversal, binary tree operations. Binary Search Tree (BST), operations on BST. Threaded Binary Tree – concept, threading, insertion and deletion of nodes in threaded binary tree, inorder, preorder and postorder traversals of threaded binary tree. **Self study:** Game trees **Further Reading:** Optimal Binary Search Tree		
UNIT 2	**Height Balanced and Multiway Trees**	**9 HOURS**
App/System/Case study: BTRFS File System **Contents:** AVL Trees, B Trees, B+ Trees, Trie Trees, Splay Trees, Red Black Trees **Self study:** AA Trees **Further Reading:** Range queries		
UNIT 3	**Graphs**	**6 HOURS**
App/System/Case study: Packet routing in networks **Contents:** Basic Concepts, Storage representation, Adjacency matrix, adjacency list, adjacency multi list, inverse adjacency list. Traversals - depth first and breadth first, Minimum spanning Tree, Prims and Kruskal Algorithms, Dikjtra's Single source shortest path, Topological ordering **Self Study:** Warshall's algorithm **Further Reading:** Algorithms for connected components		
UNIT 4	**Heaps and Disjoint Sets**	**6 HOURS**
App/System/Case study: Priority queue **Contents:** Concept of Min and Max Heap, Operations on Heap – insert, delete, up-heapify and down-heapify, use of heap in heap-sort. Concept of Disjoint Sets, Disjoint Sets as ADT, Up Trees, Smart Union and Path Compression **Self Study:** Fibonacci heaps **Further Reading:** Min - Max heaps, Multidimensional Heaps		
UNIT 5	**Hashing**	**6 HOURS**
App/System/Case study: Cryptographic hash functions **Contents:** Concepts - hash table, hash function, bucket, collision, probe, overflow, open hashing, closed hashing, perfect hash function, load density, full table, load factor, rehashing. hash functions - properties of good hash function, division, multiplication, extraction, mid - square, folding and universal hash function, Collision resolution strategies - open addressing and chaining **Self Study:** Extendable hashing **Further Reading:** Locality sensitive hashing		

UNIT 6	Probablisitc Data Structures	6 HOURS
App/System/Case study: Recommendation System **Contents:** Bloom Filters, Cuckoo Filters, Quotient Filters, Count-Min Sketch, HyperLogLog, Min-hash, Simhash **Self Study:** Counting Bloom Filter **Further Reading:** q-digest and t-digest data structures for ranking		

PRACTICAL:		
PRACTICAL NO.01	**Binary Search Tree**	**4 HOURS**
Write a program in C++ to implement the following operations on Binary Search Tree: create, recursive inorder traversal, recursive preorder traversal, recursive postorder traversal, non recursive inorder traversal, non recursive preorder traversal, non recursive postorder traversal, delete a node, insert a node, level wise printing		
PRACTICAL NO.02	**Threaded Binary Tree**	**4 HOURS**
Write a program in C++ to implement the following operations on Threaded Binary Tree : create, recursive inorder traversal, recursive preorder traversal, recursive postorder traversal, non recursive inorder traversal, non recursive preorder traversal, non recursive postorder traversal		
PRACTICAL NO.03	**AVL Tree**	**4 HOURS**
Write a program in C++ to implement the following operations on AVL Trees: create, recursive inorder traversal, recursive preorder traversal, recursive postorder traversal, non recursive inorder traversal, non recursive preorder traversal, non recursive postorder traversal		
PRACTICAL NO.04	**Minimum Spanning Tree**	**4 HOURS**
Write a program in C++ to find the minimum spanning tree of a given graph using Prim's and Kruskal's algorithm		
PRACTICAL NO.05	**Hashing**	**4 HOURS**
Write a program in C++ to implement hash tables with collision handling strategies		
PRACTICAL NO.06	**Heaps**	**4 HOURS**
Write a program in C++ to implement heap sort algorithm to sort the given numbers in ascending and descending order		
PRACTICAL NO.07	**Probabilistic Data Structures**	**4 HOURS**
Write a program in C++ to implement the following probabilistic data structures: Bloom's Filter, Cuckoo Filter		

TEXT BOOK

1. Horowitz, Ellis, Sartaj Sahni, and Susan Anderson-Freed. Fundamentals of data structures. Vol. 1982. Potomac, MD: Computer science press, 1976
2. Samanta, Debasis. Classic data structures. Vol. 2. Prentice Hall India, 2001.
3. Brass, Peter. Advanced data structures. Vol. 193. Cambridge: Cambridge University Press, 2008

REFERENCE BOOK

1. Cormen, Thomas H., et al. Introduction to algorithms. MIT press, 2009
2. Gakhov, Andrii. Probabilistic Data Structures and Algorithms for Big Data Applications.
3. Mehta, Dinesh P., and Sartaj Sahni. Handbook of data structures and applications. Chapman and Hall/CRC, 2004.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Computer Organization and Architecture
	COURSE CODE	CS229
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	REVISION NO	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : EX102 - Electrical and Electronic Engineering

COURSE OBJECTIVES :

CS229 CEO.1: To understand the Architecture of 80386.
CS229 CEO.2: To get familiar with Assembly language programming.
CS229 CEO.3: To understand the Input Output organization And control unit of computer system.
CS229 CEO.4: To get familiar with the memory organization of the computer system.
CS229 CEO.5: To learn working of arithmetic unit of the computer system.
CS229 CEO.6: To differentiate various organizations for high performance computing

COURSE OUTCOMES:

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

CS229.CO.1: Explain the architecture of the microprocessor 80386.
CS229.CO.2: Develop assembly language programs using 32/64 bit registers
CS229.CO.3: Illustrate Control unit and IO organizations
CS229.CO.4: Explain the memory organization and Segmentation Paging in the computer system
CS229.CO.5: Illustrate arithmetic operations.
CS229.CO.6: Explain various parallel processing environment.

THEORY COURSE CONTENT		
UNIT 1	**Basic Architecture of 80386 Processor**	**6 HOURS**
App/System/Case study: Computer types **Contents:** 80386 Architecture, Features of 80386, Registers, Global Descriptor Table, Local Descriptor Table, Interrupt Descriptor Table, Data Types, 80386 addressing modes,RISC. **Self study:** CISC **Further Reading:** Intel core i9 processor		
UNIT 2	**Input/output organization and Control Unit**	**6 HOURS**
App/System/Case study: Input/output Devices **Contents:** Input-Output Organization: Accessing I/O devices, Interrupts, processor examples, direct memory access. Buses, PCI, SCSI, USB. Control Unit- Basic concepts, Microprogrammed control, Pipeline control. **Self Study:** Interface Circuits. **Further reading:** Exceptions		
UNIT 3	**The Memory System**	**5 HOURS**
App/System/Case study: Computer memory **Contents:** Basic concepts, semiconductor RAM memories, read-only memories, speed, size and cost, cache memories, DRAM , SRAM,RAID, virtual memory, SSD. **Self Study:** Secondary storage **Further reading:** Flash memory		
UNIT 4	**Segmentation Paging and Multitasking**	**9 HOURS**
App/System/Case study: Memory management **Contents:** Segmentation : Introduction, support registers, related instructions, descriptors, memory management through segmentation, logical to linear address translations, protection by segmentation, privilege-level, protection, related instructions, inter-privilege level, transfer control, Paging-support registers, related data structures, linear to physical address translation ,TLB, page level protection. Multitasking - Support registers, related data structures, Task switching, Nested task. **Self Study:** Protected mode instructions **Further reading:** Segmentation and Paging in Pentium Processor		
UNIT 5	**Arithmetic Operations**	**6 HOURS**
App/System/Case study: Number system **Contents:** Design of Fast Adders, Addition and Subtraction of Signed Numbers, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Floating-point Numbers and Operations, Integer division. **Self Study:** Addition of positive numbers **Further reading:** Implementing floating point operations.		

UNIT 6	Pipelining	6 HOURS
App/System/Case study: Ultra SPARC II Architecture **Contents:** Basic Concepts, Data Hazards, Instruction hazards, influence on instruction sets, data path and control considerations, Superscalar, Performance considerations, SIMD GPU architecture. **Self Study:** SMP Architecture **Further reading:** CC-NUMA Architecture		
PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
• Write an ALP to accept and display any ten 32/64 bit numbers.		
PRACTICAL NO.02		**4 HOURS**
• Write an ALP for 32/64 bit Arithmetic operations and display the result. Accept the numbers from the user.		
PRACTICAL NO.03		**4 HOURS**
• Write X86/64 ALP to count number of positive and negative numbers from the array.		
PRACTICAL NO.04		**4 HOURS**
• Write X86/64 ALP to perform multiplication of two 8-bit hexadecimal numbers. Use successive addition and add and shift method. (use of 64-bit registers is expected)		
PRACTICAL NO.05		**4 HOURS**
Write X86 program to sort the list of integers in ascending/descending order. Read the input from the text file and write the sorted data back to the same text file using bubble sort.		
PRACTICAL NO.06		**4 HOURS**
• Write an ALP to convert 64 bit Hex number into its equivalent BCD number and 64 bit BCD number into its equivalent HEX number.		
PRACTICAL NO.07		**4 HOURS**
• Write X86 menu driven Assembly Language Program (ALP) to implement OS (DOS) commands TYPE, COPY and DELETE using file operations. User is supposed to provide command line arguments in all cases.		
PRACTICAL NO.08		**2 HOURS**
• Write ALP to find the roots of the quadratic equation. All the possible cases must be considered in calculating the roots.		

TEXT BOOK

1. W. Stallings, "Computer Organization and Architecture: Designing for performance", Pearson Education/ Prentice Hall of India, 2003, ISBN 978-93-325-1870-4, 7th Edition.
2. Zaky S, Hamacher, "Computer Organization", 5th Edition, McGraw-Hill Publications, 2001, ISBN- 978-1-25-900537-5, 5th Edition.
3. Douglas V. Hall, "Microprocessors and Interfacing Programming and Hardware", 8086.80286.80386.80486, Second Edition, Tata McGraw Hill
4. Intel 386™ ox Microprocessor Programmer's Reference Manual 1990.
5. Barry B. Brey, "The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 - Architecture, Programming, and Interfacing".

REFERENCE BOOK

1. M Morris Mano "Digital Logic and Computer Design" 1/e Pearson, June 2016.
2. Kauffmann, Computer System Architecture by M. Mano, 2001, Prentice-Hall ISBN 72157661505664197
3. John P Hays, "Computer Architecture and Organization", McGraw-Hill Publication, 1998, ISBN:9781259028564, 3rd Edition.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Database Management Systems
	COURSE CODE	CS231
	COURSE CREDITS	4
RELEASE DATE : 01/07/2020	REVISION NO	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	30	20	150

PRE-REQUISITE :

1. CS221 – Data Structures
2. CS222 - Discrete Structure and Graph Theory

COURSE OBJECTIVES :

CS231.CEO.1: To learn basic concepts and operations of database management system.
CS231.CEO.2: To develop database design using ER diagram and normalization.
CS231.CEO.3: To understand validation of framework like integrity constraints and trigger.
CS231.CEO.4: To understand ACID properties of transaction and their implementation.
CS231.CEO.5: To understand the concurrency control mechanism using lock based and timestamp based protocol
CS231.CEO.6: To understand NoSQL for for processing all types of data

COURSE OUTCOMES :

Students successfully completing the course will be able to,

CS231.CO.1: Perform basic operation with DBMS.
CS231.CO.2: Design and develop database application using ER diagram and normalization.
CS231.CO.3: Implement validation framework like integrity constraints and trigger.
CS231.CO.4: Implement ACID properties of transaction.
CS231.CO.5: Explain concurrency control mechanism using lock based and timestamp based protocol
CS231.CO.6: Execute the basic operation on NoSQL database

THEORY		
UNIT 1	**Introduction**	**6 HOURS**
App/System/Case study: Banking system, Student Information system using traditional file processing system **Contents:** Database system – concept – System structure. Data models, Entity- relationships model. Mapping ER model to relational model. Case study ERD and Table design, Database architectures :Centralized, Client Server, Parallel and Distributed Systems. **Self-study:** Database users and DBA **Further reading:** Modeling concept for object oriented and object relational database.		
UNIT 2	**Relational Model**	**6 HOURS**
App/System/Case study: Relational model for Banking system, University database **Contents:** Basic concept, Integrity concept. Relational Query Languages – Relational algebra,Tuple relational calculus. **Self-study:** Equivalence of relational calculus and relational algebra. **Further reading** Domain relational calculus		
UNIT 3	**SQL**	**8 HOURS**
App/System/Case study: SQL queries for Banking system, shop management system, Tiwtter data analysis **Contents:** SQL Queries – Nested queries – Aggregate operators – Null values, Views, Index, PL/ SQL block, exceptions, packages, looping, Concept of stored procedures, cursor, Triggers. **Self-study:** Transaction control language – commit, Rollback, save points. **Further Reading:** Recursive Queries		
UNIT 4	**Database design.**	**6 HOURS**
App/System/Case study: Student Information system, Employee database system **Contents:** Concept of Normalization, Functional dependencies. Decomposition – Armstrong's axioms, 1NF, 2NF, 3NF, BCNF. **Self-study:** Multi valued dependency, 4NF **Further Reading:** XML and web databases.		

UNIT 5	Transaction Management	6 HOURS

App/System/Case study:
ATM system, Banking system

Contents:
Basic concept, ACID properties, Concept of schedule, Serializability: conflict and view, Recovery, Concurrency control.

Self-study: Buffer management and remote backup

Further Reading: ARIES Recovery

UNIT 6	NOSQL databases	6 HOURS

App/System/Case study:
Aadhar UIDAI system

Contents:
Introduction to NOSQL database, Types of No SQL Databases, ACID vs BASE, SQL vs No-SQL, MongoDB: Data Types, Documents, Collections, Database, CRUD Operations, Aggregation Pipeline and Indexing.

Self-study: Pipeline and Indexing.

Further Reading: Multimedia Databases.

PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
Design and draw an ER/EER diagram using standard notations for given problem definition and convert this diagram into Database Tables. Be sure to underline all primary keys, include all necessary foreign keys and indicate referential integrity constraints.		
PRACTICAL NO.02		**8 HOURS**
For above example use SQL DML statement such as INSERT, UPDATE and DELETE to insert the data into tables and to update/delete the data inserted into/from tables. Write and execute SQL queries to extract information from the table.		
PRACTICAL NO.03		**4 HOURS**
Create and perform Database Operations using Oracle as Back End and Java as Front End. Use JDBC connectivity.		
PRACTICAL NO.04		**6 HOURS**
Implement following different types of PL/SQL blocks 1. Anonymous PL/SQL block 2. Anonymous PL/SQL with cursor concept and Exception handling 3. Anonymous PL/SQL with For loop cursor concept 4. Stored Procedure and Function 5. Trigger		
PRACTICAL NO.05		**6 HOURS**
Design unstructured database and perform different operations on it		
PRACTICAL NO.06		**8 HOURS**
Mini Project: Database Project Life Cycle Students have to complete a mini project in a group of minimum 3 and maximum 4 students. The problem statement for the project will be given to each group by the instructor in the first week of semester. Students can use either of the database systems (structured or unstructured) for completing their project .		

TEXT BOOK

1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", 6th Edition, McGraw Hill Publishers, 2006, ISBN 978-0-07-352332-3
2. Elmasri R., Navathe S., "Fundamentals of Database Systems", 4th Edition, Pearson, Education, 2003, ISBN 8129702282
3. Pramod J Sadalage, Martin Fowler, "NoSQL- A brief guide to the Emerging World of Polyglot Persistence Distilled", Addison-Wesley, ISBN 978-0-321-82662-6

REFERENCE BOOK

1. Rab P. Coronel C. "Database Systems Design, Implementation and Management", 5thEdition, Thomson Course Technology, 2002, ISBN 981-243-135-7
2. Connally T., Begg C., "Database Systems", 3rd Edition, Pearson Education, 2002, ISBN 81-7808-861-4
3. Date C., "An Introduction to Database Systems", 7th Edition, Pearson Education, 2002,ISBN 81 -7808-23
4. H Garcia-Molina, JD Ullman and Widom, Database Systems: The Complete Book,2nd Ed., Prentice-Hall, 2008.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Rapid Prototyping
	COURSE CODE	ET235
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	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	25	NIL	50	75

PRE-REQUISITE : ME104 - Engineering Graphics, EX102 - Electrical and Electronics Engineering, CV102 - Applied Mechanics

COURSE OBJECTIVES :

ET235.CEO.1: To learn about materiality and techniques.
ET235.CEO.2: To justify the product development cycle through prototype project.
ET235.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET235.CEO.4: To 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,

ET235.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET235.CO.2: Apply acquired skills to the construction of a prototype project.
ET235.CO.3: Develop a prototype project by performing tasks in team.
ET235.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. Civil Prototyping (CP)

In Mechanical prototyping, students will learn rapid prototyping skills. Students will focus on basics of CAD modeling, hands on practice on CAD software, 3D Modeling , 3D Printing, Fabrication of prototype and testing etc.

On the contrary in civil prototyping students will learn developing bamboo structures by testing and analyzing bamboo, designing bamboo joinery, and testing of bamboo structures.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Rapid Prototyping, Semester - III

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Civil Prototyping (CP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Civil Prototyping (CP)	

MODULE: 1/2	Mechanical Prototyping (MP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to prototyping	04 HOURS

1. Introduction to different prototyping, traditional prototyping vs. advance rapid prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Different types of materials used in prototyping model.
3. Introduction of multi axis (4D and 5D) machines used in prototyping and machining.
4. Making of paper prototyping (virtual or physical).
5. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.

PRACTICAL NO. 2a	Basics of CAD modeling	04 HOURS

1. Introduction of CAD software.
2. Introduction of 2D, 3D Modeling using CAD software package.
3. Hands on practice of CATIA or any other CAD software.
4. Formation of students group per project team.

PRACTICAL NO. 2b	3D Modeling for prototyping	04 HOURS

1. Introduction of 3D modelling and its interaction with prototype machine
2. Identify physical constraints of prototyping.
3. Sketcher-workbench and its applications
4. Part design workbench.
5. Preparation of 3D prototyping model by CAD software for final project

PRACTICAL NO. 03	Preprocessing of 3D printing slicing	03 HOURS

1. Generating STL files of 3D models from CAD software & working on STL files.
2. Pre-Processing the 3D Model in Cuba software / kisslicer - repeater for slicing.
3. Selection of orientation of model, support generation, skin and wall thickness- depth setting.
4. Setting of printing speed, flow rate, volume, mass and time require for printing or manufacturing.
5. Practice of slicing on 3D Cad model and decide optimize parameters.

PRACTICAL NO. 04	Orientation and support generation, manufacturing planning	03 HOURS

1. Suitable filament material for 3D printing and selection and its properties.
2. Selection of material and process for making physical models by other tradition methods (machining, wood, clay, paper, polymer, etc).
3. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Manufacturing and fabrication of model	06 HOURS

1. Introduction 3D printer machines, and other machines used for prototyping.
2. Demonstration of 3D printing machine pre-setting and filament material loading.
3. Hands on experience of rapid prototype machine for part/object/model, manufacturing of conventional prototype model if any, assembly if required.
4. Calculation of cost of product, financial aspect, Bill of material (BOM), testing for prototyping, Plan to promote product/model in market, etc.

PRACTICAL NO. 06	Project presentation	02 HOURS

1. Final Presentation and demonstration of models.
2. 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: 2/2	Civil Prototyping (CP))	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**02 HOURS**
Introduction of bamboo, its physical, mechanical properties, selection, seasoning and treatment, case studies of bamboo structures.		
PRACTICAL NO. 02	**Testing & Analysis of Bamboo**	**04 HOURS**
Study of different test on Bamboo & Analysis of structures made by bamboo.		
PRACTICAL NO. 03	**Design of bamboo Joinery**	**04 HOURS**
Study of different bamboo structures, Hands on different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo structures**	**08 HOURS**
Making of bamboo structures		
PRACTICAL NO. 05	**Testing on bamboo structure (Post Testing)**	**04 HOURS**
Testing of different bamboo structures		
PRACTICAL NO. 06	**Final project presentation**	**04 HOURS**
Comparative study of analytical and test results of the bamboo Structure, 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.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Minor Project-Implementation
	COURSE CODE	CS240
	COURSE CREDITS	1
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME240.CEO.1: To understand the Intellectual property rights, trademarks, copyrights etc

ME240.CEO.2: To make the students more effective problem solvers with broader perspective of thinking.

ME240.CEO.3: To engage them in creative thinking to improve the project performance using recent trends.

ME240.CEO.4: To design working model for the solution of the problem.

ME240.CEO.5: To Evaluate the model built for its correctness, reliability and sustainability.

ME240.CEO.6: To be more self efficient to solve problem in real time design environment.

COURSE OUTCOMES :

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

ME240.CO.1: Select appropriate method for making of solution.

ME240.CO.2: Compare various engineering tools/technique to develop solution.

ME240.CO.3: Justify the selected method/tools opted for making of solution.

ME240.CO.4: Develop tangible solution to defined problem.

ME240.CO.5: Test the developed solution.

ME240.CO.6: Document solution in the form of Project report / IPR drafts.

COURSE ABSTRACT

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. This will help students to understand the process of product/project development, best practices and encourage their creativity to solve real life problems. The students will learn effective team building, designing, budgeting, planning, engineering skills and processes, safety norms and standards while developing the application/ product. The students will be able to understand importance of documentation and professional ethics.

Guidelines

1. Every student shall undertake the Minor Project in semester III and IV.
2. Every student shall work on an approved project, a group of 03/04 students (maximum) shall be allotted for each minor project.
3. The group members may be from different programme to support the interdisciplinary functioning.
4. The students have to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
5. Collect the sufficient data and survey to establish the criticality of the problem to be solved.
6. Apply various tools for project planning and design.
7. Critically analyze various solutions/techniques to solve real world problems.
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use.
9. Learn and apply standards of engineering ethics and professional behavior.
10. Adherence to the highest principles of ethics, conduct and practices.

TIMELINE

1. IPR Activity on Earlier allocated Group : 2 Weeks (1^{st} ,2^{nd} week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (4^{th}, 5^{th} week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (9^{th}, 10^{th} week)
4. Preparation of Project Progress Report – I (week 11^{th} and 12^{th}) Project Phase-II
5. Project Review III (10 marks) (week 11^{th})
6. Evaluation by external examiner (End Semester by 12^{th}, 13^{th} week)

Demonstration and Presentation (50 Marks)

1. **Review 1 (Project Implementation) (10 marks)**
2. **Review 2 (Project Demostration) (10 marks)**
3. **Project Activities (10 Marks)**
    - Quiz on IPR (5 marks)
    - Patent Drafting (5 marks)
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration and Presentation (10 marks)**

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Introduction to IPR (Patent & Right) (30 min) Videos on Patent: (30 min)	Student will attempt Quiz-I IPR after the lecture Graded Activity 5marks Template I	Student will learn the patents and how to search patent
Week 2	How to check patent through CDAC online portal.	Student will do prior art search for their project, and try to generate patent Abstract as per the (Template- II)	Submission of Patent Abstract as per the prescribed Template.
Week-3	Design, Architectural overview /feasibility analysis of the project, Recent trends available to improve the performance.	Discussion on system architecture/ design method/ feasibility of project idea.	Student will implement the best feasible method to generate prototype
Week-4	NIL	Review I -Presentation	Student will present progress done in project prototype building.
Week-5	Searching of Patents, Drafting of Patents , Filing of Patents , types of patent Application, Patent Documents. Expert lecture on above topic.	Final Drafting of complete patent document (05 marks) Graded Activity	Student will understand the basics of drafting patents, important of filling patent Submission in LMS
Week-6	Presentation, discussion and doubt clearing based on • Working on Algorithms / Design • Working on Analysis • Developing Prototype / Programming/ Circuits etc	As per department / school	Student will learn to prevent design flaws.

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week-7	Presentation, discussion and doubt clearing based on • Working on Algorithms/Design • Working on Analysis • Testing of Prototype/ Code/ Circuits of project	As per department / school	Student will analyze for project outcome
Week-8	NIL	Review-II (10 Marks)	Student will work for performance improvement if project not working satisfactorily.
Week-9	Regarding Final PPT For Project Faculty himself gives a presentation based on how to make effective presentation on research topics.	(GRADED ACTIVITY) (5 marks) Student will submit the Draft PPT through LMS at the end of Week-10	Student will learn to generate PPT covering all final outcomes of the project.
Week-10	Regarding Final report Generation For Project Faculty himself gives a presentation based on how to make effective project report should explain all guidelines to be followed while preparing report	(GRADED ACTIVITY)(5 marks) Student will submit the Draft Project report through LMS at the end of Week-10	Student report are expected to have design Analysis, and the project should be expected to one year with the same guide
Week-11	NIL	Review-III (10 Marks)	Students are expected to prepare a detailed project report and Project PPT , they should also check for plagiarism.
Week-12	Final Project presentation and project report submission to the project coordinator. Faculty will review the student projects with external examiner	Presentation and demonstration of project.	Prototypes/Software and Final Project report

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Professional Skills
	COURSE CODE	HP 202
	COURSE CREDITS	2
RELEASE DATE : 01/07/2020	REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP202.CEO.1: To increase students confidence during everyday communication.

HP202.CEO.2: To increase impact of students communication during presentations and public speaking.

HP202.CEO.3: To develop Leadership qualities among students.

COURSE OUTCOMES :

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

HP202.CO.1: Express themselves effectively in routine and real-world interactions through verbal and written communication.

HP202.CO.2: Show Confident Public Speaking skills.

HP202.CO.3: To showcase leadership qualities during tough tasks, make decisions and actions effectively within time.

TUTORIALS: (SECTION A)		
TUTORIAL NO.01	**Role Plays and Picture Description**	**4 HOURS**
It helps students to sharpen their extempore skills with effective articulation and logical sequencing of content.		
TUTORIAL NO.02	**Creative Writing Skills and Presentation Skills**	**8 HOURS**
It aims at evolving effective writing skills and presentation skills.		
TUTORIAL NO.03	**Voice Modulation and Audio - Video Listening and Debate**	**8 HOURS**
To enhance listening skills and to teach the students the basic components of voice modulations and helping them practice it. It helps overcome stage fear and learn audience engagement		
TUTORIAL NO.04	**Leadership**	**6 HOURS**
Leadership qualities helps person to lead a team in achieving the set vision. It helps in planning to execute it, utilizing resources and motivating people involved in it.		
TUTORIAL NO.05	**Decision Making**	**4 HOURS**
It helps to make necessary courageous and difficult decisions and carry them into action.		
TUTORIAL NO.06	**Time Management**	**6 HOURS**
It helps organizing and planning how to divide valuable time between specific activities and prioritizing activities.		
SECTION B:	**Verbal, Reasoning and Aptitude Training through BtechGuru**	**12 HOURS**

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Simon Wootton and Terry Horney, Strategic Thinking A Nine Step Approach to Strategy and Leadership for Managers and Marketer, ISBN13: 9780749460778.
5. Lorin Woolfe, The Bible on Leadership: From Moses to Matthew – Management Lessons for Contemporary Leaders, ISBN-10 : 0814439438; ISBN-13 : 978-0814439432.

REFERENCE BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Garr Reynolds, Presentation Zen: Simple Ideas on Presentation Design and Delivery (Voices That Matter) , New Riders; 2 edition (8 December 2011), ISBN-10: 0321811984.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2020 - 2021 (Rev.2019)
SECOND YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Liberal Learning
	COURSE CODE	HP203
	COURSE CREDITS	AUDIT
RELEASE DATE : 01/07/2020	REVISION NO	1.0

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

PRE-REQUISITE:
If required else Nil

COURSE OBJECTIVES
HP203.CEO.1: To create awareness about joy of learning among students HP203.CEO.2: To teach the skills necessary to be a lifelong learner HP203.CEO.3: To provide students with broad knowledge of the wider worlds. HP203.CEO.4: To develop a sense of social responsibility as well as strong and transferable intellectual and practical skills. HP203.CEO.5: To inculcate intellectual, civic, and practical capacities in students.

COURSE OUTCOMES
HP203.CO.1: Develop a skill in the domain of their interest. HP203.CO.2: Demonstrate the skills learnt in the course. HP203.CO.3: Apply the concepts learnt in real-life situations
NOTE : Students may select any one of the following tracks

Track 1	**Introduction to photography**	**12 HRs**
Types of camera, Basic camera controls. Light & Lenses Understanding the Exposure Triangle Aperture,		

aspects.		
Track 2	**Dance**	**12**
Study and demonstration of various dance forms such as classical, Bollywood, street dance, ballroom dance and Contemporary.		
Track 3	**Creative Writing**	**12**
Introduction to Creative Writing-How, literary aspects, different genres, forms of writing and script writing, Short Story Writing. Blog Writing.		
Track 4	**Guitar**	**12**
Parts of guitar, Names of strings, Proper right hand techniques, Proper left hand techniques, Tuning Guitar, Tuning by Ear, Tuning to a keyboard, – Introduction to guitar fret board & The Chromatic Scale- The Chromatic Scale, Fret board, How to Read Guitar Tablature, Finger Exercises, How to Read Chord Blocks		
Track 5	**Art and Craft**	**12**
Sketching & Drawing, Elements of Art, types of art forms, types of Painting, Craft, Wrap in scrap, Best out of waste, Paper craft, Cloth craft & Rangoli .		
Track 6	**Robotics**	**12**
Introduction to Robotics: Robotics Links and joints: Selection& types of sensors: Actuators, Actuators		
Track 7	**Discovery of Problem & Ideations**	**12**
What is a problem, types of problem, How to record the problem. Idea generations and its assessment. Understanding the various facets that influence successful set-up & operations. How to convert an Idea into a Business Model. Stages or steps of idea generation. Analysis of user environment, type of segmentations and customer survey. Layout of business plan and allocation of resources. Process to be followed for business development. Why would the customer switch to our service? Types of market segments, availability of different channels. Steps to turn your business idea into Startups. Registration process and types of registration. Sources of raising funds and capital budgeting etc. Submission of Problem-Solution and Pitch Deck		
Track 8	**Yoga and Meditation**	**12**
Concept of mind, consciousness. Concentration techniques, Breathing exercises, visualizations, walking meditations. Simple yoga, Meditation and prayer, Asana, its types, Pranayama its types and principles.		
Track 9	**Automotive Skills**	**12**
Introduction to Automotive system, Brake system, Powertrain of automotive, Suspension system, Computer Aided Engineering, Manufacturing and safety, Assembly and finishing		
Track 10	**Empathy & Compassion**	**12**
Importance of Empathy, Role of empathy and compassion for engineers, Empathy activities, Skepticism About the Self, Free Will and the Situation, Recognizing emotions reading body		

language, improving listening skills, mindful self-compassion, Compassionate Leadership, Origins of Morality, joy of giving, social responsibility, exercising social services.		
Track 11	**Singing**	**12**
Vocal cords, Voice types, Female: Soprano or alto, Male: Tenor, baritone or bass, Breathing Techniques, Role of breathing in singing, types of scales and pitches, Musical notes foundation of any song, Humming exercise, tongue twisters, vowels, Tempo of song, Tempo Markings, Practicing all octaves, analysis of songs, practicing songs.		
Track 12	**Chess**	**12**
Introduction to game of Chess. Rules, movement of pieces, strengths and weaknesses of all pieces. Stalemate, touch move, etiquette, pawn promotion and zugzwang, square of the pawn. Fundamental checkmate patterns, basic rules, special moves and rules such as castling, promotion, EnPassant, good moves for the opening. .		
Track 13	**RC Plane**	**12**
Introduction to RC planes, study with categorization of planes and study of control forces on RC plane. Study of control surfaces. Study of airfoil, Studying the concepts of take-off, cruising, landing and motions during flight. Study of graphs. Study on factors affecting the flight of plane. Control and propulsion system of RC aircraft. Introduction and making of Electrical glider.		
Track 14	**Drone Making**	**12**
Three thumb rules, Basic of FAA, Combination of electronics, Frame design , Motor stator reading and dimension, Basic of electronics, Introduction to Drones, Fundamental of Flight, Airframes and Electric Motors, ESC and flight controller, Receivers And Transmitter, Battery and chargers, Basic building Tutorial with working on software(Betaflight), FPV and LOS Simulations, Working on development of Betaflight.		

NOTE: More tracks will be added as per demand of the students.

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Third Year

Bachelor of Technology in

Computer Engineering

2019-2023

(With Effect from Academic Year: 2021-2022)

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE		
SCHOOL OF COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2021-2022 (Rev.2019) (Rev.2019)
THIRD YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V

SUMMER INTERNSHIP (Audit)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC08	CS341	Operating System	3	2	-	35	35	30	50	0	150	4
DC09	CS342	Theory of Computation	3	0	-	35	35	30	0	0	100	3
DC10	CS343	Computer Networks	3	2	-	35	35	30	50	0	150	4
OE01	IT351/ CS351 /CS352,/CS 353 HP 311	Open/Minor Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP8	CS344 /CS34	Skill Development Course Red Hat Linux/ Web Technology	0	4	-	0	0	25	50	0	75	2
SDP9	CS350	Project Design	1	2	-	0	0	25	0	50	75	2
TOTAL			**15**	**12**	**0**	**140**	**190**	**195**	**200**	**50**	**775**	**21**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC11	CS347	Design Analysis and Algorithms	3	2	-	35	35	30	50	0	150	4
DC12	CS348	Compiler Design	3	0	-	35	35	30	0	0	100	3
DC13	CS349	Software Engineering	3	2	-	35	35	30	50	0	150	4
OE02	IT352/ CS353/CS	Open/Minor Elective	3	2	-	35	35	30	50	0	150	4
SDP10	CS356/CS 357/CS35	Skill Development Course Adv.Java/ .Net core/Red Hat	0	4	-	0	0	25	50	0	75	2
SDP11	CS360	Project- Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Professional Communication	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT Academy of Engineering (An autonomous Institute Affilated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2021 – 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Operating System
	COURSE CODE	CS341
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : CS 221-Data Structures

COURSE OBJECTIVES :

CS341.CEO.1: To provide an understanding of major Operating system components.

CS341.CEO.2: To impart comprehensive understanding of the concepts related to process,IPC,scheduling and deadlock

CS341.CEO.3: To understand memory management in operating system

CS341.CEO.4: To understand file management,protection and security aspects of OS.

COURSE OUTCOMES :

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

CS341.CO.1: Illustrate the role of OS in the management of system resources.(L2).

CS341.CO.2: Organize process and threads execution in operating system effectively (L3)

CS341.CO.3: Identify deadlock to resolve the related issues.(L3)

CS341.CO.4: Analyze the memory management and its allocation policies.(L4)

CS341.CO.5: Make use of the file system, protection and security aspects of OS effectively (L3)

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Operating System**	**6 HOURS**
App/System/Case study: Open Source Operating Systems-Fedora **Contents:** Introduction to Operating System, Functions, Types of OS- Batch, timesharing, multiprogramming,multi tasking ,distributed,network os and real time os , Functions of OS , OS Structure, System Calls and its types. Unix: Architecture and System concepts **Self -Study:** Unix Booting and Login Process **Further Reading:** Boot Loaders		
UNIT 2	**Process Management**	**6 HOURS**
App/System/Case study: Multitasking In Mobile Systems. **Contents:** Process Concept, Process Scheduling-Scheduling Queues, Schedulers, Context Switch, Operations on processes, Inter process Communication-Shared Memory, Message Passing Systems, Pipes. Unix: Process States and Transitions ,System Calls for Process management **Self-Study:** Communication in Client-Server Systems. **Further Reading:** Operating System Debugging		
UNIT 3	**Multithread Programming and CPU Scheduling**	**6 HOURS**
App/System/Case study: Multi process-Any Web Browser **Contents:** Thread Overview, Multicore Programming, Multithreading Models, Thread Libraries Threading issues. Basic Concepts of CPU scheduling, Scheduling criteria, Scheduling Algorithms-FCFS, SJF, Priority and Round Robin Unix: System Calls for process scheduling in Unix. **Self-study:** Real Time Scheduling **Further Reading:** Examples of IPC Systems.		
UNIT 4	**Process Synchronization and Deadlock**	**8 HOURS**
App/System/Case study: Distributed Deadlocks. **Contents:** Process Synchronization overview, The critical Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problem of synchronization, Deadlock, Methods for Handling Deadlocks **Self- Study:** Synchronization examples **Further Reading:** Scheduling and Synchronization in xv6.		
UNIT 5	**Memory Management**	**8 HOURS**
App/System/Case study: ARM architecture. **Contents:** Main memory-Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of page table, Virtual Memory-Demand Paging, Page Replacement Policies: FIFO, LRU, Optimal. Memory management policies in Unix: Swapping: Allocation of swap space,Swapping processes in,Swapping processes out, Demand Paging : Data structures for Demand paging in unix **Self- Study:** Linux memory management schemes. **Further Reading:** Memory Management in xV6		

UNIT 6	File Management and Access Control	8 HOURS
App/System/Case study: Fedora linux operating system's Access Control. **Contents:**: File-System structure, File-System Implementation, Directory Implementation File System Access Control, Role based Access Control, Real world Access Control , Root user Access Control, Pseudo user other than root. UNIX: An overview of the File subsystem(File descriptors, File Table and Inode Table, File System Layout of Unix) **Self -Study:** Access Control Lists **Further reading:** Active Directory		
PRACTICAL: Perform following experiments using Open source tools		
PRACTICAL NO.01		**4 HOURS**
Write shell scripts to a. Rename all files in the current directory that end in ".jpg" to begin with today's date in the following format: YYYY-MM-DD. For example, if a picture of my cat was in the current directory and today was December 31,2020 it would change name from "mycat.jpg" to "2020–12–31-mycat.jpg". b. Delete the zero sized file c. Take an input file and remove identical lines (or duplicate lines from the file) d. Simulate the two level directory organization		
PRACTICAL NO.02		**2 HOURS**
Implement the Unix file commands using shell scripting.		
PRACTICAL NO.03		**2 HOURS**
Implement Interprocess Communication using PIPE/Shared Memory/Message Passing		
PRACTICAL NO.04		**4 HOURS**
Write a menu driven program for implementing CPU Scheduling Algorithms-FCFS,SJF,Priority & Round Robin		
PRACTICAL NO.05		**4 HOURS**
In a real computer system, neither the resources available nor the demands of processes for resources are consistent over long periods (months). Resources break or are replaced, new processes come and go, and new resources are bought and added to the system. If deadlock is controlled by the banker's algorithm, which of the following changes can be made safely (without introducing the possibility of deadlock), and under what circumstances? a.Increase Available (new resources added). b.Decrease Available (resource permanently removed from system).		
PRACTICAL NO.06		**4 HOURS**

Sleeping Barber: The analogy is based upon a hypothetical barber shop with one barber. There is a barber shop which has one barber, one barber chair, and n chairs for waiting for customers if there are any to sit on the chair.

If there is no customer, then the barber sleeps in his own chair.

When a customer arrives, he has to wake up the barber.

If there are many customers and the barber is cutting a customer's hair, then the remaining customers either wait if there are empty chairs in the waiting room or they leave if no chairs are empty.

Design and implement the given scenario in such a way that the barber and customers will not get into race condition

PRACTICAL NO.07		**4 HOURS**

Implement Page Replacement Policies using FIFO,LRU and Optimal

TEXT BOOK

1. Silberschatz, Galvin, Gagne, Operating System Concepts: International Student Version, 9th Edition, Paperback: 992 pages Publisher: Wiley; Eighth edition (20 April 2009) Paperback – 20 Apr 2009, Language: English, ISBN-10: 8126520515, ISBN-13: 978-8126520510.
2. Maurice J. Bach, "The Design of the Unix Operating System", Fourth Edition, Pearson Education, ISBN: 9789332549579, 9789332549579
3. Evi Nemeth, Garth Snyder, Trent R. Hein - UNIX and Linux System Administration Handbook, 4th Edition, Prentice Hall, ISBN-13: 978-0-13-148005-6

REFERENCE BOOK

1. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau: Operating Systems: Three Easy Pieces, https://www.overleaf.com/project/60508e799f7fac226457bf7c Arpaci-Dusseau Books, August, 2018
2. Evi Nemeth, Garth Snyder, Trent R. Hein - UNIX and Linux System Administration Handbook, 4th Edition – 2010,Prentice Hall, ISBN-13: 978-0-13-148005-6
3. Tanenbaum, Operating Systems Design and Implementation, Paperback: 1080 pages, Publisher: Pearson Education India; 3 edition (2015), Language: English, ISBN-10: 9332550514,ISBN-13: 978-9332550513.
4. Deitel, Operating System, 3rd Edition, Paperback: 1270 pages, Publisher: Pearson Education India; edition (2007), Language: English, ISBN-10: 8131712893, ISBN-13: 978-8131712894.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2021 – 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Theory of Computation
	COURSE CODE	CS342
	COURSE CODE	CS351
	COURSE CREDITS	3
RELEASE DATE : 01/07/2021	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	NA	NA	100

PRE-REQUISITE : CS101-Logic Development

COURSE OBJECTIVES :

CS342.CEO.1: To introduce students to the mathematical foundations of computation including automata theory and the theory of formal languages and grammars.

CS342.CEO.2: To develop an ability to conduct mathematical proofs for computation and algorithms.

CS342.CEO.3: To exhibit the relation between problem solving and theory of formal languages and automata.

COURSE OUTCOMES :

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

CS342.CO.1: Differentiate between types of languages and respective recognition automata..

CS342.CO.2: Construct various types of automata and grammar from language and vice versa..

CS342.CO.3: Make use of the properties of languages and automata to design complex automata prove equivalence of automata.

CS342.CO.4: Decide the type of automata to be used to recognize the particular language.

CS342.CO.5: Identify decidability of languages

THEORY :		
UNIT 1	**Finite Automata**	**6 HOURS**
App/System/Case study: Working of Vending Machines, Automatic Door Controller. **Contents:** Introduction to Complexity Theory, Computability Theory Automata Theory, String, Alphabet Languages, Regular Languages, Finite state Machines, Deterministic Non-Deterministic Finite State Machines, Union, Intersection Complement of Finite Automata, Epsilon NFA, Equivalence of the three Models, Minimization of Finite Automata, Finite Automata with output (Moore and Mealy Machines- Definitions, Models Inter Conversion). **Self Study:** Myhill-Nerode theorem. **Further reading:** Timed Automata, Hidden Markov Model, Transducers in NLP.		
UNIT 2	**Regular Expression**	**7 HOURS**
App/System/Case study: Grep utility of Linux. **Contents:** Operators of Regular Expression, Precedence of Operators, Building Regular Expression, Algebraic Laws for Regular expression, conversion of Regular Expression to DFA and vice versa, Use of Regular Expression in practical programming, Regular expression equivalence, Closure Properties of Regular languages, pumping lemma for Regular Languages. **Self Study:** Decision properties of RE. **Further reading:** Application of regular expressions in Lexical Analysis, Web scrapping, Regular expression in information retrieval.		
UNIT 3	**Context Free Grammar**	**6 HOURS**
App/System/Case study: Design of Parser for Compilers or Interpreters/ Web crawler. **Contents:** Context Free Language Models, context free grammars, simplification of CFG, Chomsky normal form(CNF), Greibach normal form(GNF), Ambiguous Grammar, Removing ambiguity, Closure Properties, Application of CFG:- Mark up languages, XML Document Type Definition, Chomsky Hierarchy, Regular Grammar. **Self Study:** Decision properties of Context Free Languages . **Further reading:** Chart parsing, CYK parsing, Early parsing.		
UNIT 4	**Pushdown Automata**	**6 HOURS**
App/System/Case study: Parser design for Compilers or Interpreters. **Contents:** Introduction to Pushdown Automata, Pushdown Automata Design, Deterministic Pushdown Automata, Non – Deterministic Pushdown Automata Design, Pushdown Automata to Context free grammar and Vice Versa, Closure properties, Pumping Lemma for Context Free Languages. **Self Study:** Multi – Stack Push Down Automata . **Further Reading:** Post Machines.		

UNIT 5	Turing Machines	7 HOURS

App/System/Case study: Memcomputing, Von Neuman Architecture

Contents: Turing Machines Introduction, Comparison of Turing Machine with other machines, Designing Turing Machine for different set of problems, Universal Turing Machine, Recursive Sets, Churches Turing Machine, Halting Problem

Self Study: Multi Tape Turing Machines.

Further Reading: Non Deterministic Turing Machine.

UNIT 6	Decidability and Complexity Theory	7 HOURS

App/System/Case study: Travelling Salesman Problem.

Contents: Not Recursively Innumerable Problems, Decidable Languages ,Decidable problems concerning regular languages ,Un-decidability,post correspondence problem, The diagonalization method, An undecidable language, A Turing-unrecognizable language, Introduction to Complexity Theory, P, NP Complete and NP Hard Problems, Polynomial-Time Reductions NP Complete Problems, Tractable and Intractable, Representing Satisfiability, Instances.

Self Study: 3 SAT Problem.

Further Reading: Simple Reducibility Problem.

TEXT BOOK

1. ”Introduction to Automata Theory Languages And Computation” by John E. Hopcroft, Rajeev Motwani, Jeffrey D-Ullman, Third Edition,Pearson,2008,ISBN 978-8131720479.
2. “Introduction to Theory of Computation” By Michael Sipcer, Third Edition, Cengage Learning, 2014,ISBN-13: 978-8131525296.
3. ”Automata and Computability” by Dexter Kozen, Springer Publishers, 2013 ISBN 978-3642857065.

REFERENCES

1. “Theory of Computation”, Vivek Kulkarni, Oxford University Press,2013,ISBN: 978-0198084587.
2. “Theory of Computation”, George Tourlakis, Willey, 2014,ISBN:978-1118315354.

(An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Computer Networks
	COURSE CODE	CS343
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	30	20	150

PRE-REQUISITE: :

1. CS201 Data and File Structure
2. CS211 Discrete Structure and Graph Theory

COURSE OBJECTIVES :

CS343.CEO.1: To comprehend the fundamental concepts of data communication and networking.
CS343.CEO.2: To differentiate between network topologies.
CS343.CEO.3: To understand routing algorithms.
CS343.CEO.4: To classify connection oriented and connectionless services.
CS343.CEO.5: To explore current trends in networking technologies.

COURSE OUTCOMES:

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

CS343.CO.1: Comprehend signals and communications types.
CS343.CO.2: Build different types of network topologies and protocols.
CS343.CO.3: Evaluate routing protocols for different real time systems.
CS343.CO.4: Analyze connection oriented and connectionless services.
CS343.CO.5: Demonstrate different application/systems related to networking.

THEORY COURSE CONTENTS		
UNIT 1	**Physical Layer**	**8 HOURS**
App/System/Case study:: E-Mail System, Real time video conferencing **Contents:** Data Communications, Networks, Network Types, Protocol Layering, The OSI Model, TCP/IP Protocol Suite, Data and Signals, Periodic analog signals, Digital Signals,Transmission Impairments, Data rate limits, Performance, Line Coding , Line Coding Schemes : Unipolar, Polar, Bipolar **Self-study:** Standards And Administration **Further Reading:** Transmission Modes		
UNIT 2	**Data Link Layer**	**8 HOURS**
App/System/Case study: WinRAR, WinZip **Contents:** Introduction: Nodes and Links, Services, Two categories of links, Two sublayers , Link Layer addressing: Three types of addresses, Address Resolution Protocol(ARP), Error detection and correction: Types of errors, redundancy, Detection Vs Correction, Coding, Block Coding: Hamming codes ,Cyclic Redundancy Check, Data Link Control and Services: Framing, Flow Control, Connectionless and Connection-Oriented, Data Link Layer Protocols : Simplest Protocol, Stop and Wait Protocol , Piggybacking , Stop-and-Wait ARQ ,Sliding Window Protocols: GO-Back-N ARQ, Selective-Repeat ARQ, Random Access: CSMA,CSMA/CD,CSMA/CA **Self-study:** Standard Ethernet **Further Reading:** Wi-Max(IEEE Project 802.16)		
UNIT 3	**Network Layer**	**8 HOURS**
App/System/Case study: Team viewer, Windows Remote Desktop Connection **Contents:** Introduction, Network Layer Services: Packetizing, Routing and Forwarding, Other Services, Packet Switching: Datagram Approach: Connectionless Service, Virtual-Circuit Approach: Connection-Oriented Service, Network-layer Performance: Delay, Throughput, Packet loss, Congestion Control, IPv4 Addresses: Address Space, Classful addressing, Classless Addressing, Dynamic Host Configuration Protocol(DHCP), Network Address Translation(NAT), Internet Protocol(IP) , Internet Control Message Protocol(ICMPv4), Routing Algorithms: Distance-Vector Routing, Link-State Routing, Path-Vector Routing, Unicast Routing Protocols : Routing Information Protocol(RIP) ,Open Shortest Path First(OSPF), Border Gateway Protocol(BGP) **Self-study:** Multicast Routing(Unicasting, Multicasting, Broadcasting) **Further Reading:** Internet Group Message Protocol(IGMP)		

UNIT 4	Transport Layer	6 HOURS
App/System/Case study: Microsoft Team, Cisco Webex, Google Hangout **Contents:** Introduction: Transport Layer Services, Connectionless and Connection-Oriented Protocols, Transport-Layer Protocols: Services, Port Numbers, User Datagram Protocol(UDP): Datagram, Services, Applications, Transmission Control Protocol(TCP): Services, Features, Segment, Connection, Applications, Socket Programming **Self Study:** Stream Control Transmission Protocol(SCTP) **Further reading:** Real Time Transport Protocol (RTP)		
UNIT 5	**Application Layer**	**6 HOURS**
App/System/Case study: Moodle Server, FileZilla, IP messenger, WhatsApp **Contents:** Introduction: Providing Services, Application-Layer Paradigms, Domain Name System (DNS), Hypertext Transfer Protocol (HTTP), Simple Mail Transfer Protocol (SMTP), File Transfer Protocol (FTP) **Self Study:** Simple Network Management Protocol (SNMP) **Further reading:** TErminaL NETwork(TELNET),Secure Shell(SSH)		
UNIT 6	**Networking Trends**	**6 HOURS**
App/System/Case study: VOIP, IoT **Contents:** Introduction, Software Defined Networking(SDN): Concept, Architecture, Communication, Application, Network Security: Policy - Integrity , Confidentiality, Availability , Privacy, Data Centric Networks **Self Study:** SD-WAN **Further reading:** Platform for Privacy Preferences(P3P)		

PRACTICAL:		
PRACTICAL NO.1		**2 HOURS**
Setup a wired LAN using Layer 2 Switch and then IP switch of minimum four computers. It includes preparation of cable, testing of cable using line tester, configuration machine using IP addresses, testing using PING utility and demonstrate the PING packets captured traces using Wireshark Packet Analyzer Tool.		
PRACTICAL NO.2		**4 HOURS**
Using cisco packet tracer design different network topologies and Subnet.		
PRACTICAL NO.3		**4 HOURS**
Write a program to detect and correct single bit error using 1. Parity Check 2. Hamming Code 3. Cyclic Redundancy Check		
PRACTICAL NO.4		**4 HOURS**
Write a program to implement sliding window mechanisms using 1. Stop and Wait ARQ 2. Go Back N ARQ 3. Selective Repeat ARQ		
PRACTICAL NO.5		**2 HOURS**
Write a program to implement subnet calculator.		
PRACTICAL NO.6		**2 HOURS**
Write a program to implement Distance Vector Routing /Link State Routing.		
PRACTICAL NO.7		**4 HOURS**
Write a program to implement simple communication between Client-Server using sockets utility(TCP and UDP) and demonstrate the packets captured traces using Wireshark Packet Analyzer Tool.		
PRACTICAL NO.8	**Mini Project**	**12 HOURS**
Guide Lines 1. Maximum 3 students allowed in each group. 2. Each group will work on design and Implementation. 3. Students should submit the report in soft copy and hard copy.		

TEXT BOOK

1. Behrouz A. Forouzan, ”Data Communications and Networking”, 5th edition, Tata McGraw-Hill Publications, 2013, ISBN 978-0073376226
2. Doulas E. Comer, ”Computer Networks and Internets, 6th edition, Pearson Education Limited, 2016, ISBN 978-1292061177

REFERENCE BOOK

1. Andrew S. Tanenbaum, David J.Wetherall, ”Computer Networks”, 5thedition, Pearson Education India, 2013, ISBN 978-9332518742
2. Larry L. Peterson Bruce S. Davie, “Computer Networks”, 5thedition, Morgan Kaufmann Publisher, 2011, ISBN 978-0123850591.
3. William Stallings, ”Data and Computer Communications”, 9thedition, Pearson Education India, 2013, ISBN 978-9332518865.
4. Behrouz A. Forouzan, ”Data Communications and Networking”, 4thedition, Tata McGraw-Hill Publications, 2006, ISBN 978-0-07-296775-3
5. Alberto Leon-Garcia , Indra Widjaja, ”Communication Networks” ,2nd edition, McGraw-Hill Education,2003, 978-0072463521.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**2021 - 2022 (Rev.2019)**
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Cryptography and Network Security
	COURSE CODE	IT351
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	2	35	35	30	50	NA	150

PRE-REQUISITE : CS343-Computer Networks

COURSE OBJECTIVES :

CS352.CEO.1: To understand Cryptography Theories, Algorithms and Systems.
CS352.CEO.2: To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.
CS352.CEO.3: To understand the basic categories of threats to computers and networks.
CS352.CEO.4: To understand the fundamental ideas of public-key cryptography and symmetric key cryptography.
CS352.CEO.5: Discuss IP Security , Web security and Firewalls

COURSE OUTCOMES :

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

CS352.CO.1: Identify the security threats, and the security services and mechanisms to counter them.
CS352.CO.2: Apply security principles to protect the data.
CS352.CO.3: Analyze symmetric key and asymmetric key algorithm.
CS352.CO.4: Identify the different Authentication method in digital signature
CS352.CO.5: Analyze network security protocols.
CS352.CO.6: Identify and investigate network security threat and provide solution to protect the network.

THEORY :		
UNIT 1	**Security in Computing Environment**	**8 HOURS**
App/System/Case study: Threats, Vulnerabilities, and Controls. **Contents:** Need for Security; Security Attack – Threats, Vulnerabilities, and Controls, Types of Threats (Attacks); Security Services – Confidentiality, Integrity, Availability; Information Security; Methods of Protection Terminologies used in Cryptography; Substitution Techniques – The Caesar Cipher, One-Time Pads, The Vernam Cipher, Book Cipher; Transposition Techniques – Encipher-ment/Decipherment Complexity, and Other Patterns **Further reading:** steganography- Foundations of modern cryptography		
UNIT 2	**Symmetric Key Encryption or Block Cipher**	**8 HOURS**
App/System/Case study: Properties of Trustworthy Encryption Systems. **Contents:** Modular Arithmetic, Euclidean and Extended Euclidean algorithm, Prime numbers , Data Encryption Standard (DES) Algorithm – Overview of the DES Algorithm; Double and Triple DES – Double DES, Triple DES; Security of the DES; Advanced Encryption Standard (AES) IDEA, Blowfish ,RC4 , Strength of the Algorithm; . **Further reading:** DES and AES Comparison.		
UNIT 3	**Public Key Encryption**	**6 HOURS**
App/System/Case study: Case study on Public key cryptography. **Contents:** Characteristics of Public Key System; RSA Technique – Encryption-Method; Key Ex-change; Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography. **Further reading:** Knapsack Algorithm.		
UNIT 4	**Hash Functions and Digital Signature**	**6 HOURS**
App/System/Case study: Demonstration Digital Certificate Creation. **Contents:** Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – EI Gamal – Schnorr, private key management, the PKIX model, Public key cryptographic standards (PKCS). **Further reading:** Different version of PKIX		
UNIT 5	**IP Security and Web Security**	**6 HOURS**
App/System/Case study: case study on security policy. **Contents:** Overview of IP Security (IPSec); IP Security Architecture; Modes of Operation; Security Associations (SA) – Security Parameter Index (SPI), SA Management, Security Policy; Authentication Header (AH); Encapsulating Security Payload (ESP); Internet Key Exchange. Web Security Requirements; Secure Socket Layer (SSL) – SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) – Features, Components, Dual Signature, Purchase Request. Self-Study: Applications of SET . **Further Reading:** Secure E-Mail System – PGP (Pretty Good Privacy).		
UNIT 6	**Security Practice ad System Security**	**6 HOURS**

App/System/Case study: Demonstration of Windows firewall or Sonic firewall. **Contents:** Authentication applications – Kerberos – X.509 Authentication services, Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles Self-Study: Single KDC **Further Reading:** Firewall configuration.		
PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Write a program to encrypt and decrypt the message using encryption decryption techniques a) Substitute Method b) Transposition Method		
PRACTICAL NO.02		**4 HOURS**
Develop a program in C++/Java/Python on Advanced Extended Euclidean Algorithm		
PRACTICAL NO.03		**4 HOURS**
Write a program to implement one of Symmetric Key Cryptography (AES, /DES/ RC4 etc.)		
PRACTICAL NO.04		**4 HOURS**
Write a program to implement public key cryptography algorithm RSA		
PRACTICAL NO.05	**Minimum Two**	**4 HOURS**
Implement Diffie Hellman key exchange algorithm in client server architecture		
PRACTICAL NO.06		**4 HOURS**
Calculate the message digest of a text using the SHA-1 or MD5 algorithm in JAVA/Python/C++		
PRACTICAL NO.07		**2 HOURS**
Create your own digital certificate using java key tool		
PRACTICAL NO.08		**4 HOURS**
Security Tools : 1. Configure and demonstrate firewall 2. Configure and demonstrate use of traffic monitoring tool such as wireshark with security perspective		

TEXT BOOK

1. Atul Kahate, "Cryptography and Network Security",The McGraw Hill Publication Second Edition, ISBN – 13: 978-0-07-064823-4.
2. 2. Eric Maiwald , "Network Security: A Beginners' Guide" , ISBN: 978-0-07-179571-5.

REFERENCES

1. William Stallings , "Cryptography and Network Security", Prentice Hall, Fourth Edition ISBN-13: 978-0-13-187316-2.
2. Peter Harrington, "Machine Learning in Action", Dreamtech Press, 2012, ISBN 978-1-617-29018-3
3. Bernard Menezes ," Network Security and Cryptography: Bernard Menezes", CENGAGE Learning.
4. Charlie Kaufman, Radia Perlman and Mike Speciner , "Network Security - Private Communication in a Public World", Pearson/PHI.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Descriptive Analytics
	COURSE CODE	CS351
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	CONTINUOUS ASSESSMENT	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	30	20	150

PRE-REQUISITE :

1. CS203: Applications Programming - Python
2. CS229: Database Management System
3. AS203: Applied Mathematics

COURSE OBJECTIVES :

CS351.CEO.1: To understand the data warehouse architecture.
CS351.CEO.2: To elaborate schema modelling.
CS351.CEO.3: To apply the various operations on OLAP cubes.
CS351.CEO.4: To outline the various preprocessing operations on data warehouse.
CS351.CEO.5: To explain the different hypothetical Tests.
CS351.CEO.6: To apply regression methods for a given dataset.

COURSE OUTCOMES :

The students after completion of the course will be able to

CS351.CO.1: Outline the data warehouse architecture.
CS351.CO.2: Build data marts using different modeling techniques for given application.
CS351.CO.3: Create OLAP cubes and Visualize data using visualizing tools.
CS351.CO.4: Recognize trends, detect outliers, and summarize data sets on real life dataset.
CS351.CO.5: Validate hypothesis using various testing methods for a real-life problem statement.
CS351.CO.6: Predict output by applying correct regression model.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Data Warehouse**	**6 HOURS**
App/System/Case study: Retail-Industry Case Study **Content:** Introduction to Data Science and Data Mining, Descriptive, Predictive and Prescriptive Data Analysis Techniques. Introduction to Data Warehouse, DW Architecture, DW Characteristics, ETL, Introduction to Business Intelligence. Applications of BI. Distributed Data Warehouse, Real Time Data Warehouse Architecture. **Self-Study:** Data Warehouse Security Measures : User access, Data load, Data movement, Query generation **Further Reading:** Advancement Data Collection Security.		
UNIT 2	**Dimensional Modeling**	**6 HOURS**
App/System/Case study: Retail-Industry Case Study **Content:** Data Modeling, Types of Dimensions and Facts, Granularity of Facts, Measures and Categorization of Measures, Making of Data Mart, Scheme Modeling (Star, Snowflake, Star Constellation Schema), Case Studies on Dimensional Modeling. **Self-Study:** Advanced Dimensional Modelling **Further Reading:** Data Design		
UNIT 3	**Online Analytical Processing**	**6 HOURS**
App/System/Case study: Retail-Industry Case Study **Content:** OLAP versus OLTP, MOLAP, ROLAP, HOLAP. OLAP cubes, Cube operations- Roll up, Drill down, slice, dice and pivot, OLAP Queries, Data Cube Computations, Key Performance Indicators, BI Dash-boards, BI Scorecards **Self-Study:** Analyze OLAP cube with Microsoft Excel, Cross Table Cube **Further Reading:** Cubing Service Security, Multidimensional Data Analysis		
UNIT 4	**Data Pre-processing**	**7 HOURS**
App/System/Case study: Retail-Industry Case Study **Content:** Handling Methods-Missing Values, Noisy Values, Inconsistent Values, Data Preprocessing Techniques-Data Cleansing, Data Integration, Data Reduction, Data Transformation and Discretization, Concept Hierarchy Generation, Data Quality, Descriptive Data Summarization and Representation **Self -Study:** Outlier Analysis **Further Reading:** Real Time ETL		

UNIT 5	Hypothesis Testing	9 HOURS

App/System/Case study:
Real Estate Case Study
Content:
Descriptive Statistics. Probability Distributions, Null Hypothesis, Alternative Hypothesis, Type-I and Type-II Error, Inferential Statistics through Hypothesis Tests, Z-Test, T-Test, Chi Square Test, ANOVA, F Test.
Self-Study: Permutation Test
Further Reading: Randomization Test

UNIT 6	Regression and Correlation	5 HOURS

App/System/Case study:
Retail-Industry Case Study
Content:
Simple Regression, Multiple Regression, Linear-Logistic Regression, Poisson Regression, Non-Linear Regression. Correlation Coefficient, Measuring Performance of a Model, Accuracy, ROC Curves, Precision-Recall Curves.
Self-Study: Regression Models using Excel 2013
Further Reading: Correlation Mining for Massive data

PRACTICAL : Perform following experiments using programming language (R/Python)		
PRACTICAL NO.01		**2 HOURS**
Getting Started Analyzing Data, Importing and Exporting Data, Packages for Data Science, Understanding the Data, Plotting Different Graphs		
PRACTICAL NO.02		**4 HOURS**
Dimensional Modeling, Data Mart, Cube Analysis, making a Dimensional model for given case study given, Identification of dimensions, measures and fact tables		
PRACTICAL NO.03		**4 HOURS**
Writing OLAP queries for the case study from Assignment no.2 Making of Cubes using Palo cube.		
PRACTICAL NO.04		**4 HOURS**
Data Preprocessing, Data wrangling, Binning, Finding Central tendency, Five-point summary using box plot. Data curation project (http://cs.iit.edu/Or Tableau-Prep (source system, mapping, meta data, cleansing, transformation, reduction, target system)		

PRACTICAL NO.05		4 HOURS
Data visualization using tableau/ Power BI/ Talend and making of Dashboards and Story boards.		
PRACTICAL NO.06		**4 HOURS**
Implementation of Regression Analysis (Simple, multiple, polynomial).		
PRACTICAL NO.07		**4 HOURS**
Implementation of hypothesis testing (Z-test, Chi test, F test, T-test).		

TEXT BOOK

1. Jiawei Han, Micheline Kamber, Jian Pei Professor, "Data Mining: Concepts and Techniques", The Morgan Kaufmann Series in Data Management Systems, ISBN 978-9380931913.
2. Rick Sherman, "Business Intelligence Guidebook: From Data Integration to Analytics", The Morgan Kaufmann Series in Data Management Systems, ISBN 012411461X.
3. Sheldon Ross, "Introductory Statistics", Academic Press; 4th edition, Hardcover ISBN: 9780128043172 eBook ISBN: 9780128043615.

REFERENCE BOOK

1. Paulraj Ponniah,"Data Warehousing: Fundamentals for IT Professionals", 2nd Edition, Paperback, McGraw Hill Publishers, ISBN 978-0-07-352332-3.
2. Ralph Kimball, "Data Warehouse Lifecycle Toolkit", Willey, ISBN 0471200247
3. Maria Sueli Almeida, Missao Ishikawa, Joerg Reinschmidt, Torsten Roeber, "Getting Started with Data Warehouse and Business Intelligence", IBM.
4. Ramesh Sharda, DursunDelen, Efraim Turban, "Business Intelligence, Analytics, and Data Science: A Managerial Perspective", Pearson Publication, 4th Edition, ISBN 0134633288
5. Grolemund, Garrett "R for Data Science", O'Reilly
6. Murrey R Spiegal, Larry Stifens, "Statistics" , 5th edition ,Schaum's Series, McGraw-Hill Education; 5 edition, ISBN-10: 0071822526 , ISBN-13: 978-0071822527

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Artificial Intelligence
	COURSE CODE	CS352
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	NA	50	150

PRE-REQUISITE : CS102-Application Programming

COURSE OBJECTIVES :

CS352.CEO.1: To provide strong foundation of fundamental Artificial Intelligence concepts of perception, knowledge, inference, reasoning and learning.

CS352.CEO.2: To provide a basic exposition to the goals and problem solving techniques of Artificial intelligence.

CS352.CEO.3: To provide knowledge about the key algorithms and concepts that form the foundation of machine learning and computational intelligence.

CS352.CEO.4: To introduce best practices of machine learning and performance analysis of statistical models.

COURSE OUTCOMES :

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

CS352.CO.1: Apply basic principles of knowledge representation, inference and reasoning in Artificial Intelligence[L3].

CS352.CO.2: Apply problem solving and searching techniques of Artificial Intelligence to reach desired goals [L3].

CS352.CO.3: Analyze appropriate methods of Machine Learning based on the particular characteristics of the domains and applications under consideration[L4].

CS352.CO.4: Accurately formulate, test and evaluate hypothesis and performance of machine learning algorithms[L4].

THEORY :		
UNIT 1	**Introduction**	**8 HOURS**
App/System/Case study: Medical Diagnosis System, Self Driving Vehicle. **Contents:** Introduction: Foundation and history of AI, AI applications and types, Impact and ethical concerns of AI, Intelligent Agents, PEAS Representation. Introduction to Reasoning and Knowledge Representation, First order Logic, Rules based reasoning, Architecture of expert systems, Knowledge Acquisition, Chatbots. **Further reading:** Applications of AI: Robotics, Natural Language Processing, Computer Vision.		
UNIT 2	**Search Strategies**	**7 HOURS**
App/System/Case study: GPS Navigation systems, Robot navigation. **Contents:** Search Strategies: State Space Search, Uninformed search (breadth-first, depth-first, depth limited, iterative deepening, Bidirectional). Heuristic search (Greedy best first search, A* Algorithm, Admissibility of A*). Hill-climbing, Genetic Algorithm. **Further reading:** Searching with Partial Observations.		
UNIT 3	**Constraint Satisfaction Problem and Adversarial Search**	**6 HOURS**
App/System/Case study: Map Coloring, IBM Deep Blue. **Contents:** Constraint Satisfaction Problem(CSP), Constrain Propagation and Inference in CSP, Local Search and Backtracking search in CSP. Adversarial Search, Minimax Search, Alpha-Beta Pruning. **Further reading:** Stochastic Games.		
UNIT 4	**Introduction to Machine Learning**	**9 HOURS**
App/System/Case study: Real Estate Price Prediction. **Contents:** Introduction to Machine Learning and Applications, Types of Learning, Regression Model (univariate, multivariate, polynomial regression), Cross Validation, Bias-Variance tradeoff, Cost Function, Optimization of Cost Function, Gradient Descent, Convergence. **Self Study:** Locally Weighted Linear Regression, Regularization.		
UNIT 5	**Classiftcation**	**6 HOURS**
App/System/Case study: Disease Detection. **Contents:** Classification, Logistic Regression, Cost Function for Classification, Multi class classification. K-Nearest Neighbour, Naive Bayes, Bayesian Network, Assessing Classification Performance. **Further Reading:** Nonlinear Classifiers.		
UNIT 6	**Mining, Clustering and Reinforcement Learning**	**6 HOURS**
App/System/Case study: Market Basket Analysis. **Contents:** Association rule, Support, Confidence, Apriori Algorithm. Introduction to Clustering, Partitional Clustering, Hierarchical Clustering, Density Based Clustering. Reinforcement Learning: Markov Decision Process, Exploration, Exploitation, Rewards, Penalties. **Further Reading:** Applications of Reinforcement Learning.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
a) Develop Vacuum Cleaner Agent Application. b) Develop an knowledge base system consisting of facts and rules about some specialized knowledge domain of your choice.		
PRACTICAL NO.02	**Minimum Two**	**6 HOURS**
a) Implement uninformed search algorithm for any suitable real time application. b) Find the shortest path for any particular source and destination using A* Algorithm. c) Implement hill climbing algorithm for real time application. d) Implement Traveling Salesman Problem using Genetic Algorithm. e) Develop 8-puzzle problem using appropriate search method.		
PRACTICAL NO.03		**4 HOURS**
a) Design and implement map coloring problem using backtracking. b) Develop and implement game of tic-tac-toe using minimax algorithm.		
PRACTICAL NO.04		**4 HOURS**
a) To implement techniques of Feature Engineering. b) To implement Multiple Linear Regression model with parameter estimation.		
PRACTICAL NO.05	**Minimum Two**	**4 HOURS**
a) Write a program to implement k-Nearest Neighbour algorithm to classify the selected data set. b) Write a program to design an email spam filtering using Naive Bayes Classifier. Compute the accuracy of the classifier, for selected data set. c) Write a program for weather forecasting using Naive Bayes Classifier. Compute the accuracy of the classifier, for selected data set.		
PRACTICAL NO.06		**2 HOURS**
Develop apriori algorithm for finding frequent itemsets and suggest association rules for selected application domain.		
PRACTICAL NO.07		**4 HOURS**
Implement K-means clustering and Hierarchical clustering for selected dataset. Compute the following, 1. K-Means: Compute the squared error for k=3 and k=4 clusters 2. K-Means: Find optimum number of clusters 3. Compute (and store) the squared errors of all possible clustering in hierarchical clustering 4. Compare k-means and hierarchical clustering with respect to error and optimum number of clusters.		

TEXT BOOK

1. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", Forth Edition 2020, Pearson, ISBN: 0-13-461099-7.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw Hill, ISBN-13: 978-0-07-008770-5.
3. Ethem Alpaydin, "Introduction to Machine Learning", Forth Edition, The MIT Press,2020, ISBN: 978-0-262-04379-3
4. Tom Mitchell, "Machine Learning" , McGraw Hill, 1997, ISBN 007-0-42807-7

REFERENCES

1. Deepak Khemani, "A First course in Artificial Intelligence", First Edition 2013, McGraw Hill Education, ISBN: 9781259029981.
2. Peter Harrington, "Machine Learning in Action", Dreamtech Press, 2012, ISBN 978-1-617-29018-3
3. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Second Edition, Springer, 2009, ISBN: 978-0-387-84857-0
4. Introduction to Machine Learning with Python: A Guide for Data Scientists, by Andreas Muller,Paperback: 392 pages,Publisher: Shroff/O'Reilly; First edition (2016), ISBN-10: 9352134575, ISBN-13: 978-9352134571
5. Python Machine Learning Cookbook, Prateek Joshi,Paperback: 304 pages, Publisher: Packt Publishing Limited (23 June 2016), ISBN-10: 1786464470 ISBN-13: 978-TMH, 2009, ISBN-13: 978-8120337312

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Cloud Computing Foundations
	COURSE CODE	CS353
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	REVISION NO	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	2	35	35	30	NIL	40	10	150

PRE-REQUISITE :

1: Data Structures
2: Database Management Systems
3: Discrete Structures and Graph Theory

COURSE OBJECTIVES :

CS228.CEO.1: To introduce various cloud computing services and models
CS228.CEO.2: To learn how to select appropriate configuration for compute node
CS228.CEO.3: To configure appropriate storage service for the specific application
CS228.CEO.4: To understand networking and security settings in cloud environment
CS228.CEO.5: To design the application using high scalability and reliability considerations

COURSE OUTCOMES:

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

CS228.CO.1: To classify various cloud computing services and models
CS228.CO.2: To build various compute services in cloud
CS228.CO.3: To distinguish between various storage related services used during application development
CS228.CO.4: To select appropriate database service during application development
CS228.CO.5: To choose various networking and security options during application development
CS228.CO.6: To estimate the resource requirements for the application with high availability and reliability features

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Cloud Computing**	**6 HOURS**
App/System/Case study: Amazon AWS, Microsoft Azure, Salesforce **Contents:** Distinguishing Cloud Types, Deployment Models, Service Models, Scalability, Virtualization, Software as a service (SaaS): understanding multitenant nature, service oriented architecture, Platform as a service (PaaS): Benefits and disadvantages, Infrastructure as a service (IaaS): Improving Performance Through Load Balancing, System and Storage Redundancy. Web as a portal to cloud : Overview of web protocols like HTTP, SOAP, REST and XML. Virtualization : types, hypervisors. Cloud economics and billing **Self study:** Hybrid cloud service providers **Further Reading:** REST implementation		
UNIT 2	**Compute Services in Cloud Computing**	**6 HOURS**
App/System/Case study: Amazon EC2, Virtualbox, Docker **Contents:** Compute node architecture, parameters to consider while configuring compute node, Machine images, instances, instance types, tags, key pairs, security groups, regions and zones – types Types of compute nodes – virtual machines and containers **Self study:** Kubernetes **Further Reading:** Virtual Machine Internal XML file		
UNIT 3	**Storage Services in Cloud Computing**	**6 HOURS**
App/System/Case study: Amazon S3, Amazon EBS, Amazon EFS, Amazon Glacier **Contents:** Examining the Evolution of Network Storage, Understanding Cloud-Based Data Storage, Advantages and Disadvantages of Cloud-Based Data Storage. Cloud- Based Backup Systems, Understanding File Systems Types of cloud storage – File Storage, Block Storage – Elastic Block Storage, File Systems, Storage for Backups, Storage for Databases Storage gateway for hybrid cloud storage systems **Self Study:** Google File System **Further Reading:** CEPH File System		
UNIT 4	**Database Services in Cloud Computing**	**6 HOURS**
App/System/Case study: Amazon RDS, Amazon DynamoDB, Amazon ElastiCache, Amazon Neptune **Contents:** Need for cloud databases, considerations for cloud databases, architecture and common characteristics, Data Models Relational database, Key – value based database, In-memory database, Document based database, Graph based database, Time series database, Ledger based database. High availability and load balancing in databases **Self Study:** Real time graph databases **Further Reading:** Blockchain		

UNIT 5	Networking and Security Services in Cloud Computing	8 HOURS

App/System/Case study: Amazon VPC, Amazon Route S3, Amazon Elastic Load Balancing, Amazon Cloud Front

Contents: Building cloud network : defining and provisioning isolated networks, gateways in cloud, providing private connectivity in hybrid cloud environments

Scaling cloud network : automatic traffic distribution across pool of servers, direct traffic routing for achieving performance

Securing network traffic : Configuring and managing firewall rules, access permissions

Content delivery networks: to deliver data, images and videos with low latency and high transfer speeds

Self Study: Advanced Firewall Settings

Further Reading: VPN Connectivity in AWS

UNIT 6	High Availability and Scalability Services in Cloud Computing	6 HOURS

App/System/Case study: Amazon EC2, Amazon EBS, AWS Autoscaling

Contents: Definition, elements of high availability. High availability for compute resources, high availability for databases and high availability for storage services.

Regions and availability zones, Auto scaling, Elastic Load Balancing, Reserved instance, Elastic Block Store, EBS snapshots.

Scalability issues, vertical scaling vs. horizontal scaling vs. diagonal scaling, difference between scalability and elasticity

Self Study: Autoscalling algorithms

Further Reading: Highly available and salable file system features

PRACTICAL:		
PRACTICAL NO.01	**First Virtual Machine on AWS**	**4 HOURS**
Launching the virtual machine on Amazon AWS and doing basic settings		
PRACTICAL NO.02	**Storage Conftguration**	**4 HOURS**
Configuring various storages available on AWS and storing, retrieving, deleting the data from those storage applications		
PRACTICAL NO.03	**Database Conftguration**	**4 HOURS**
Configuring and using various databases available on Amzon AWS		
PRACTICAL NO.04	**Networking and Security Services Conftguration**	**4 HOURS**
Configuring various networking and security options		
PRACTICAL NO.05	**High availability and scalability services**	**4 HOURS**
Configuration of high availability and scalability services		
PRACTICAL NO.06	**Project**	**4 HOURS**
Implement a project based on all the services studied for a given application on Amazon AWS		

TEXT BOOK

1. Wittig, Michael, Andreas Wittig, and Ben Whaley. Amazon web services in action. Manning,, 2018.
2. Murty, James. Programming amazon web services: S3, EC2, SQS, FPS, and SimpleDB. " O'Reilly Media, Inc.", 2008.
3. Piper, Ben, and David Clinton. AWS Certified Solutions Architect Study Guide: Associate SAA-C02 Exam. John Wiley Sons, 2020.
4. Anthony, Albert. Mastering AWS Security: Create and maintain a secure cloud ecosystem. Packt Publishing Ltd, 2017.
5. van Vliet, Jurg, Flavia Paganelli, and Jasper Geurtsen. Resilience and Reliability on AWS: Engineering at Cloud Scale. " O'Reilly Media, Inc.", 2013.
6. Sarkar, Aurobindo, and Amit Shah. Learning AWS: Design, build, and deploy responsive applications using AWS Cloud components. Packt Publishing Ltd, 2018.

REFERENCE BOOK

1. Kavis, Michael J. Architecting the cloud: design decisions for cloud computing service models (SaaS, PaaS, and IaaS). John Wiley Sons, 2014.
2. Vacca, John R., ed. Cloud computing security: foundations and challenges. CRC Press, 2016.
3. Furht, Borivoje, and Armando Escalante. Handbook of cloud computing. Vol. 3. New York: springer, 2010.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Skill Development Lab - RHA I
	COURSE CODE	CS344
	COURSE CREDITS	2
RELEASED DATE : 01-07-2021	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	20	45	10	75

AIM : To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS344.CEO.1: To learn configuring, installing, and upgrading Linux systems using established standards and procedures.
CS344.CEO.2: To understand Redhat Linux operational support.
CS344.CEO.3: To monitor system performance and availability.
CS344.CEO.4: To develop scripts for task automation and system administration.

COURSE OUTCOMES :

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

CS344.CO.1: Illustrate essential Linux administration tasks.
CS344.CO.2: Experiment with installation, networking and user profiles.
CS344.CO.3: Examine physical storage, file systems and log files.
CS344.CO.4: Inspect the Linux processes, control services, daemons and basic security administration.
CS344.CO.5: Analyze Redhat Linux System with a comprehensive and systematic approach.

Red Hat Administration - I	40 HOURS

Access the command line: Log in to a Linux system and run simple commands using the shell.
Manage files from the command line: Copy, move, create, delete, and organize files from the bash shell prompt.
Get help in Red Hat Enterprise Linux: Resolve problems by using online help systems and Red Hat support utilities.
Create, view, and edit text files: Create, view, and edit text files from command output or in an editor.
Manage local Linux users and groups: Manage local Linux users and groups, and administer local password policies.
Control access to files with Linux file system permissions: Set Linux file system permissions on files and interpret the security effects of different permission settings.
Monitor and manage Linux processes: Obtain information about the system, and control processes running on it.
Control services and daemons: Control and monitor network services and system daemons using Systemd
Configure and secure OpenSSH service: Access and provide access to the command line on remote systems securely using OpenSSH
Analyse and store logs: Locate and accurately interpret relevant system log files for troubleshooting purposes.
Manage Red Hat Enterprise Linux networking: Configure basic IPv4 networking on Red Hat Enterprise Linux systems.
Archive and copy files between systems: Archive files and copy them from one system to another.
Install and update software packages: Download, install, update, and manage software packages from Red Hat and yum package repositories.
Access Linux file systems: Access and inspect existing file systems on a Red Hat Enterprise Linux system.
Use virtualized systems: Create and use Red Hat Enterprise Linux virtual machines with KVM and Libvirt.

REFERENCE BOOK

1. Red Hat Enterprise Linux 8.0, "RH124: RED HAT SYSTEM ADMINISTRATION I", Student Guide.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Web Technology
	COURSE CODE	CS346
	COURSE CREDITS	2
RELEASE DATE : 01/01/2020	REVISION NO	1.0

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

PRE-REQUISITE : CS321: Database Management System

COURSE OBJECTIVES :

CS346.CEO.1: To understand the concepts and principles of web applications and development.
CS346.CEO.2: To apply current web technologies and web business models.
CS346.CEO.3: To understand the client-side web UI frameworks and world wide web client-server request and response.
CS346.CEO.4: To build mobile apps for multiple platforms with a single codebase.

COURSE OUTCOMES :

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

CS346.CO.1: Build a responsive website using HTML, CSS, JavaScript and Web UI Frameworks.
CS346.CO.2: Construct a functional front-end web application using AngularJS
CS346.CO.3: Build and configure a backend server using NodeJS and ExpressJS framework
CS346.CO.4: Build a RESTful API for the front-end to access backend services.

Course Project

Student will work in the group of 4, every group member has to contribute for project work.

Following reviews will be conducted during the course, date's will be provided in the planning.

Review - I: Presentation on topic (ungraded)
Review - II: Progress review (graded)
Review - III: Progress review (graded)

PRACTICAL NO. 1	**HTML, CSS and Frameworks**	**8 HOURS**

- Installation and Configuration of Web Application Servers- Tomcat.
- Design and develop any suitable web application using HTML, CSS and Framework in consultation of course instructor.

PRACTICAL NO. 2	**JavaScript**	**8 HOURS**

- Apply JavaScript on PRACTICAL NO.1 for validation. Use JSON and Array for storing the data, before saving the data validate it and show proper error message. This website will act as a single page application.

PRACTICAL NO. 3	**Front-End JavaScript Frameworks: AngularJS**	**8 HOURS**

- Re-Design, develop and deploy PRACTICAL NO. 2 using Angular JS

PRACTICAL NO. 4	**Server-side Development: NodeJS**	**8 HOURS**

- Re-Design, develop and deploy PRACTICAL NO. 2 using NodeJS

PRACTICAL NO. 5	**Web Application Framework: ExpressJS**	**6 HOURS**

- Re-Design, develop and deploy PRACTICAL NO. 4 using ExpressJS

PRACTICAL NO. 6	**RESTful API**	**8 HOURS**

- Create an API to perform CRUD operation in database and deploy the application on any web hosting provider and test the API's using Postman.

PRACTICAL NO. 7	**NoSQL Database**	**6 HOURS**

- Re-Design, develop and deploy PRACTICAL NO. 5 using NoSQL. Interact with NoSQL database from a Node application.

TEXT BOOK

1. Ralph Moseley, M.T. Savaliya, "Developing Web Applications ", Willy India, Second Edition, 2016,ISBN:9788126538676

REFERENCE BOOK

1. Aleksa Vukotic and James Goodwill, "Apache Tomcat 7", Apress, 2011.
2. Kogent Learning Solutions Inc , "Web Technology Black Book", Wiley, 2009.
3. Bryan Basham, Kathy Sierra, Bert Bates, "JSP: Passing the Sun Certified Web Component Developer Exam", O'Reilly Media, Second Edition, 2010.
4. B. M. Harwani, "Developing Web Applications in PHP and AJAX", Tata McGraw-Hill, 2010.
5. Michael Morrison, Lynn Beighley, "Head First PHP MySQL: A Brain-Friendly Guide", O'relly Media, Second Edition 2008.
6. Chuck Cavaness, "Programming Jakarta Struts", O'relly Media, Second Edition 2004.
7. Richard Monson-Haefel, "J2EE Web Services", Addison-Wesley Professional, First Edition, 2004.
8. Chirag Rathod, Jonathan Wetherbee, Peter Zadrozny, and Raghu R. Kodali, "Beginning EJB 3: Java EE 7 Edition", Apress, 2013.
9. Dan Rahmel, "Advanced Joomla!", Apress, First Edition, 2013.
10. Iwein Fuld, Marius Bogoevici, Mark Fisher, Jonas Partner", Spring Integration in Action", Manning, 2012.

REFERENCE WEBSITE

1. https://www.w3schools.com/
2. https://www.coursera.org/
3. https://getbootstrap.com/

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY IN COMPUTER ENGINEERING	COURSE NAME	Project Management
	COURSE CODE	CS361
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
2	NA	NA	50	25	NA	NA	75

PRE-REQUISITE :

COURSE OBJECTIVES :

CS361.CEO.1: To create awareness of organizational strategy for project implementation.
CS361.CEO.2: To understand the rules for creating a Work Breakdown Structure for a Project. .
CS361.CEO.3: To illustrate approaches for risk identification, analysis, and assessment.
CS361.CEO.4: To identify key characteristics of a high-performance project team.
CS361.CEO.5: understand the critical success factors in project management.

COURSE OUTCOMES :

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

CS361.CO.1: Identify the Project Management Knowledge Areas and Processes.
CS361.CO.2: Classify the responsibilities while designing the Project Master Plan.
CS361.CO.3: Outline the Cost Estimating and Cost Escalation Process.
CS361.CO.4: Demonstrate and highlight The Processes of Project Quality Management.
CS361.CO.5: Analyze Management of a Project and Maturity Models.

THEORY :		
UNIT 1	**Basics of Project Management**	**6 HOURS**
Contents: Introduction, Need for Project Management, SMART Project, Knowledge Areas and Processes, The Project Manager and Project Management Office, Phases of Project Management Life Cycle, Project environments, Impact of Delays in Project Completions **Case Study:**		
UNIT 2	**Systems and Procedures for Planning and Control**	**5 HOURS**
Contents: Type of Projects, The Project Master Plan, The Project Charter, Project Organization and Responsibilities, Work Breakdown Structure (WBS), Networks Diagrams, The Critical Path, Gantt Charts and Calendar Schedules, CPM, PERT (Project Management Tools: GanttProject, OpenProj) **Case Study:**		
UNIT 3	**Cost Estimating, Budgeting and Risk Management**	**5 HOURS**
Contents: Cost Estimating and Cost Escalation, Cost Estimating Process, Elements of Budgets and Estimates, Risk Management process, Project Risk by Phases, Risk Assessment, Risk Response Planning, Risk Tracking and Response **Case Study:**		
UNIT 4	**Project Quality Management and Organization Behavior**	**5 HOURS**
Contents: The Concept of Quality, The Processes of Project Quality Management, Techniques for Quality Assurance during System Development, Stakeholders, Managing Participation, Teamwork and Conflict. **Case Study:**		
UNIT 5	**The Corporate Context**	**5 HOURS**
Contents: Project Management Maturity and Maturity Models, Knowledge and Time Management, International Projects and associated problems, Entrepreneurs and Startup. **Case Study:**		

TEXT BOOK

1. Project Management for Business, Engineering, and Technology, 3rd Edition, John M. Nicholas and Herman Steyn ELSEVIER ISBN: 978-0-7506-8399-9.
2. Project Management Planning and Control, Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards, Seventh Edition, Eur Ing Albert Lester, B H Copyright © 2017 Elsevier Ltd, ISBN: 978-0-08-102020-3.
3. Project Management in Product Development, George Ellis, Copyright © 2016 Elsevier Inc, ISBN: 978-0-12-802322-8.
4. Project Management best Practices, 4th Edition, HAROLD KERZNER, Wiley Copyright © 2018, ISBN 978-111-9-46885-1.

REFERENCES

1. Project Management Toolbox, Second Edition, Russ J. Martinelli, Dragan Z. Milosevic, Wiley Copyright © 2018, ISBN 978-1-118-97312-7.
2. Project Management Essentials You Always Wanted To Know, Kalpesh Ashar, VIBRANT PUBLISHERS
3. The Practical guide to Project Management, 1st Edition, Christine Petersen, ISBN 978-87-403-0524-1
4. Beginning Project Management (e book), John M. Preston
5. Project Management from Simple to Complex, Russell W. Darnall, John M. Preston, The Open University of Hong Kong

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABUS**	
SCHOOL OF COMPUTER ENGINEERING & TECHNOLOGY	**W.E.F**	**2021 - 2022 (Rev.2019)**
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Design
	COURSE CODE	CS350
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS350.CEO.1: To embrace innovation and creativity in project design while empathizing real world needs.

CS350.CEO.2: To acquaint with requirement analysis process and techniques.

CS350.CEO.3: To inculcate the agile project management tools for project design and planning.

CS350.CEO.4: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

CS350.CO.1: Delineate the problem to be solved.

CS350.CO.2: Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges.

CS350.CO.3: Carry out systematic literature review, planning and project design.

CS350.CO.4: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation. To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation. The first phase of Project Design mainly focuses on formulating systems requirement, background/literature review, and defining scope, objective and apply project management/modeling tools to design proposed solution. This enables students to apply their technical acumen and innovativeness in proposing methodology, milestones, and expected outcome.

GUIDELINES

1. Every project group should consist of minimum 03 and maximum of 04 students.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Project group members and title of the project need to be approved by Project Guide and School.
4. Projects should preferably have a national/international industry/academic/research collaboration.
5. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
6. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
7. Define proposed solution and apply project management/modeling tools for project planning and design.
8. Critically analyze various solutions/techniques to solve real world problems and perform feasibility study to select and justify proposed solution.
9. Define outcome, milestones, definite roadmap for project design, implementation, evaluation and documentation.

Collaborative/Sponsored Project

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization, anytime before the commencement of the sixth semester.
3. Proposed Collaborative Project work need to reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of minimum 12 months to 18 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Exploration of fore front research/specialization areas and opportunities in the various fields.
2. Formation of Project Group. Finalization of area of work/title as per forefront areas.
3. Exploration of abridged courses, valid resources, challenges, relevance with current opportunities.
4. Background study Systematic literature review.
5. Literature review documentation for Project Report and Research Article.
6. Project Review I Presentation.
7. Define problem statement and objectives.
8. Define scope of the work and Outline of the work.
9. Project Design, Modelling, Simulation etc.
10. Proposed Methodology of the solution and its documentation.
11. Project Review II Presentation.
12. Project Documentation: Ethics in Writing
13. Project Documentation: Final Synopsis
14. Project Documentation: Project Report Writing

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Student Internship Program (Technical/ Research Skills)
	COURSE CODE	CS400
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS400.CEO.1: To get acquainted with the professional organization structure
CS400.CEO.2: To enable students to apply their knowledge for development of product/system/software
CS400.CEO.3: To work individually as well as in groups
CS400.CEO.4: To get Hands-on experience in the related field
CS400.CEO.5: To formulate the engineering problem statement

COURSE OUTCOMES :

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

CS400.CO.1: Analyze a given engineering problem
CS400.CO.2: Identify an appropriate problem solving methodology
CS400.CO.3: Cultivate hands-on professional work experience prior to their graduation
CS400.CO.4: Understand the real time technical, managerial and communication skills required at the job
CS400.CO.5: Develop appropriate workplace attitudes and understand the importance of ethics in professional life

INTRODUCTION:

The main aim of Student Internship Program (SIP) is to assist all Final Year B.Tech. students to obtain internships at various centers of excellence in the industry and the academia. The ultimate goal is to imbue students with professionalism and networking capabilities using internships as a tool for providing comprehensive practical experience. Using SIP, MITAoE students will enhance their academic and professional skills, making themselves more marketable in today's competitive world. The students can harness this lucrative opportunity to apply the knowledge they acquired all through the academic career in the professional realm.

SCOPE AND STRUCTURE OF SIP:

Summer Internship Program (SIP) is offered to entrants of Final Year B.Tech. (after semester VI) that meet the eligibility criteria stated below:

Final year B.TECH entrants should apply for 4 to 6 weeks duration internships during June-July of every academic year. For this internship, REGULAR credits will be awarded. (Credit Based Internship - 4 Credits). This internship is compulsory for all the entrants of final year B.TECH. Awarded credits will be considered for the calculation of final year CGPA and will be reflected in Regular Grade Card. Student has to work for 160 hours minimum as an Intern during the said period.

MITAoE will be responsible for identifying internship oppportunities and assisting students to apply for such positions. However, any financial liability, including but not limiteed to travel, accomodation, insurance etc. incurred as direct or indirect consequence of such a position is the sole responsibility of the student and his/her guardians.

STUDENT ELIGIBILITY CRITERIA:

Students applying for internships must meet the following criteria:

After completion of sixth academic semester, Third Year B. Tech. students (Final Year B. Tech. entrants) of all schools are eligible to apply for 4 to 6 weeks duration internships under SIP. All students have to complete the internship successfully as stated in the scope of Student Internship Program. However, students who fail to earn the 4 credits for any reason, shall be required to earn the same at a later instant of time to be eligible for the award of degree as per the internship policy.

RULES FOR APPLICATION TO SIP:

Students applying to the Student Internship Program are required to adhere the following rules and need to go through SIP policy document:

1. Students must complete an undertaking to abide by the rules and regulations of the institution / industry for which they are applying for SIP.

2. Students must obtain academic and school clearances to ensure completion of prerequisite courses or other requirements as a part of their application to SIP.

3. Students must submit a well formatted CV, requisite form, financial declaration, if any, along with the undertaking stated above to the Internship Coordinator through Faculty Mentor before April 30 of every year.

4. Last date for completing all relevant formalities pertaining to SIP is 15 days prior to the start of the internship.

5. Within the first week of the internship, students are required to submit their supervisor's contact information to the Faculty Mentor and Internship Coordinator.

6. **During the internship, students must submit brief fortnightly report duly signed by their supervisor to the Faculty Mentor.**

7. **Annexure IV is the final approval for the SIP and without which no internship is approved and no queries will be entertained at a later stage.**

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Design and Analysis of Algorithm
	COURSE CODE	CS347
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50		150

PRE-REQUISITE :

1. CS 201 Data Structure & Files
2. CS 211 Discrete Structure & Graph Theory

COURSE OBJECTIVES :

CS347.CEO.1: To be able to design an efficient algorithm for any specified problem.

CS347.CEO.2: To be able to carry out the analysis of various algorithms in terms of its computational Complexity.

CS347.CEO.3: To identify appropriate algorithmic design strategies to optimize the performance of a given problem.

CS347.CEO.4: To distinguish between P and NP class of problems.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

CS347 1: Make use of the Five problem solving strategy to design an algorithm. (L3)

CS347 2: Analyze the given algorithm in terms of its computational complexity. (L4)

CS347 3: Apply prior knowledge of standard algorithm to solve new problem. (L3)

CS347 4: Evaluate the intractable problems using approximation algorithms. (L5)

CS347 5: Compare various string-matching Algorithms. (L2)

THEORY

UNIT 1	Introduction of Algorithmic Strategy	6 HOURS

App/System/Case study:
Packet switched network, Binary Search.
Contents:
Algorithm, performance analysis, Amortized analysis, Asymptotic Notation, Problem solving strategies Divide and Conquer: Basic method, Example: Quick Sort, Max-Min Problem, Strassen's Matrix Multiplication, Recurrence: Substitution method, Master Theorem
Self-study: Median of Two sorted array of same size
Further reading: Large integer multiplication algorithm.

UNIT 2	Greedy Method	6 HOURS

App/System/Case study:
CPU Scheduling Algorithms, Network Routing
Contents:
Greedy Algorithm: Basic Method and Algorithms, Example: Fractional Knapsack Problem, Job Sequencing with Deadline, Huffman Algorithm, Activity Selection Problem.
Self-study: Coin Changing Problem
Further reading Task scheduling problem as a matroid

UNIT 3	Dynamic Programming	8 HOURS

App/System/Case study:
Google Map, Google search engine
Contents:
Dynamic Programming: Basic Method, Example: 0/1 Knapsack, Chain Matrix Multiplication OBST, All pairs shortest path, Single source shortest path: Floyd-Warshall's Algorithm Bellman Ford algorithm. Travelling Salesman Problem.
Self-study: : Coin changing problem
Further Reading: Longest common Subsequence Problem.

UNIT 4	Backtracking and Branch	8 HOURS

App/System/Case study:
Parser, Crossword puzzle, Sudoku.
Contents:
Backtracking: Basic Method, Examples: Eight Queen Problem, Backtracking Algorithms for Enumerating Independent Sets of a Graph, Branch and Bound: Basic Method, FIFO and LC approach, 0/1 knapsack problem using FIFO LC Approach, Travelling Salesperson problem FIFO LC Approach.
Self-study: : Sum of Subset problem
Further Reading: :15 Puzzle problem

UNIT 5	Computational Complexity Theory	6 HOURS

App/System/Case study:
Airline crew scheduling, TSP and Graph coloring problem.
Contents:
Classifying Problems, Nondeterministic Deterministic problems, Tractable Non Tractable problems, Reductions, Cook's Theorem, NP Complete problem, NP Hard problem,3SAT Problem Approximation algorithm: vertex cover problem **Self-study:** :Approximation algorithm for TSP
Further Reading: Clique Decision problem.

UNIT 6	Advanced Algorithms and Applications	6 HOURS

App/System/Case study:
Plagiarism detector, spell checker, web search engines
Contents:
Randomized algorithms : Monte Carlo and Las Vegas algorithm, String matching algorithm: KMP, Boyer Moore Algorithm, Robin Karp Algorithm, Number theoretic algorithm: : the GCD – Modular Arithmetic – The Chinese Remainder Theorem.
Self-study: :Naïve string matching algorithm.
Further Reading: : The general string problem as a finite automata

PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
Design and implement Binary search algorithm using Divide and Conquer method for a given input. Determine the time required to search an element. Determine the time required to search an element for large values of n. Compare the time taken by Binary Search with the time taken by linear search. Modify the binary search by dividing it using a random number in the appropriate range. Show how this Modified algorithm compares with the original algorithm in terms of Performance.		
PRACTICAL NO.02		**4 HOURS**
Design and implement Quick Sort algorithm using Divide and Conquer method for a given input. Use Median of medians algorithm to find median of the list. Determine the time required to sort the list for large values of n. (n=$10^5 onwards$)		
PRACTICAL NO.03		**4 HOURS**
Assume that, There are N Person and each person needs exactly one cab. For each person you are given the start time and end time (both inclusive) during which that person will travel. Find the Minimum number of cans required. Which Strategy will be best suitable to solve this problem.		
PRACTICAL NO.04		**4 HOURS**
Suppose we have a set of coins of denominations Cn-1, Cn-2,..... C0 for some C¿1. Coins of each denominations are available unlimited quantity. The problem is to make up an exact amount A using a minimum total number of coins. Device a solution for this problem and analyze the time complexity of the algorithm.		
PRACTICAL NO.05		**2 HOURS**
Design Implement Prims Algorithm using Greedy Approach. Calculate the time complexity of the algorithm.		
PRACTICAL NO.06		**2 HOURS**
Design Implement Huffman Algorithm using Greedy Approach. Calculate the time complexity of the algorithm.		
PRACTICAL NO.07		**4 HOURS**
Design Implement Travelling salespersons Problem using Dynamic Programming. Also calculate the Time complexity for this algorithm.		
PRACTICAL NO.08		**4 HOURS**
Design and implement a solution for a problem of placing eight chess queens on an 88 chessboard so that no two queens threaten each other. Thus, a solution requires that no two queens share the same row, column, or diagonal.		

TEXT BOOK

1. 1. E.Horowitz , S. Sahni, S. Rajasekaran "Fundamentals of Computer Algorithms" , 2nd Edition, Universities Press pvt Ltd 2008, ISBN 9788173716126.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein", Introduction to Algorithm", 3rd Edition, PHI Learning Pvt Ltd, 2011, ISBN 978-81-203-40007-7

REFERENCE

1. 1. V. Aho , J.D. Ullman, "Design and Analysis of Computer Algorithms"1st Edition , Pearson Education 2002, ISBN 8131702057 PHI Learning Pvt Ltd, 2011, ISBN 978-81-203-40007-7.
2. 2. Brassard G. and Bratley P.," Algorithms, Theory and Practices", PHI. ISBN 0-13-023243-2.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022(Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Compiler Design
	COURSE CODE	CS348
	COURSE CREDITS	3
RELEASE DATE : 1/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
3	–	30	35	35	–	–	100

PREREQUISITE : CS342– Theory of Computation

COURSE OBJECTIVES :

CS348.CEO.1: To learn the design principles of a Compiler
CS348.CEO.2: To study the various parsing techniques and different levels of translation
CS348.CEO.3: To get introduced with the algorithms and data structures involved in compiler design

COURSE OUTCOMES :

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

CS348.CO.1: Use different compiler construction tools to show the working of every compiler phase.(L3)
CS348.CO.2: Demonstrate working of lexical analyzer and parser by using Flex and Bison.(L3)
CS348.CO.3: Choose efficient parsing technique for given grammar(L4)
CS348.CO.4: Develop syntax directed translation schemes for given grammar (L6)
CS348.CO.5: Apply code generation and optimization techniques(L3)

COURSE ABSTRACT

Compiler basics, phases of compiler, Lexical analysis, Syntax analysis, Top down parsing, bottom up parsing,Translation and type checking,syntax directed translation, code generation, code optimization, FLEX and BISON tools

THEORY COURSE CONTENT

UNIT 1	**Compiler Basics**	**4 HOURS**

App/System/Case study: Turbo C++ Compiler, GCC

Content: Analysis of the Source Program, the Phases of a Compiler, Cousins of the Compiler, the Grouping of Phases, The evolution of programming languages. The science of building a compiler, Applications of Compiler Technology, Programming Language Basics in the context of compilation

Self-Study: Data Structure of Symbol Table (Text book no.1)
Further reading: Challenges in Compiler Design(Ref Book No. 1)

UNIT 2	**Lexical Analysis**	**6 HOURS**

App/System/Case study: Lex and Flex tools(Lexical Analyzers)

Contents: Need and Role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens Language for Specifying Lexical Analyzers , Expressing Tokens by Regular Expressions , importance of regular expression to NFA conversion in lexical analysis, Optimization of DFA-based pattern matchers, Introduction to lexical analyzer generator, demonstration of working of lexical analyzer using Flex tool.

Self-Study: Exercises from Ref book no 2 3
Further reading: Design of Lexical Analyzer Generator(Textbook No. 1)

UNIT 3	**Syntax Analysis- I**	**8 HOURS**

App/System/Case study: Yacc and Bison (Parser Generators)

Contents: Need and role of the parser, use of Context Free Grammars in parser, Introduction to Top Down parsing and Bottom up Parsing, Types and working of Top Down parsers- Recursive Descent Parser , Predictive Parser , FIRST and FOLLOW procedures ,LL(1) Parser

Self Study: Exercises from Ref book no 1 and text book no 1
Further reading: Data Structures for Representing Parsing Tables (Ref No. 2)

UNIT 4	**Syntax Analysis- II**	**6 HOURS**

Contents: Types and working of bottom up parsers- Shift Reduce Parser , LR Parser, canonical collections, construction of GOTO graph, Construction of SLR-canonical LR-LALR Parsing tables, Operator precedence parser, Demonstration of working of a parser for C language using FLEX, Design implement a parser for the control statements like If-else, nested if-else, for, while, do-while, switch-case, using FLEX Bison tools.

Self-Study: Exercises from Ref book no 2 and text book no 1
Further reading: Why LR parsing is attractive(Ref No. 2)

UNIT 5	Translation and Type Checking	6 HOURS

App/System/Case study: Metacompilers - META II and TREE-META

Contents: Syntax-Directed Definitions, Evaluation orders for SDD's, Applications of Syntax Directed translation(SDT), SDT schemes, Implementing L-attributed SDD's Type checking- Types and declarations, translation of Expressions, rules for type checking, type conversions, demonstration of string matching with given regular expression using FLEX and Bison tools

Self-Study: Exercises from text book no 1
Further reading: Type Checking(Chapter 4 from ref No.1)

UNIT 6	Code Generation And Optimization	6 HOURS

App/System/Case study: Loop optimizations , Code generator optimizations

Contents: Intermediate code generation- syntax tree, DAG, three address code, implementations of three address statements- quadruple, triple and indirect triple, translation of logical expressions, flow of control structures, SDT for control structures translating for Boolean expressions, short circuit code, back patching

Issues in the design of code generator, The target language, Addresses in the target code, Run time Storage management , Basic Blocks and Flow Graphs , Next-use Information , A simple Code generator, DAG representation of Basic Blocks, Peephole Optimization, Principal sources of Optimization, optimization of basic blocks, loops in flow graphs, data flow analysis of structured programs

Self-study: Demonstration of code generation – To generate intermediate code(Three address Code) and to show implementations of three address statements(Quadruples Triples) for the given mathematical expression using FLEX and Bison tools

TEXT BOOKS

1. Alfred V. Aho, Monica S. Lam,Ravi Sethi Jeffrey. D. Ullman,"Compilers Principles, Techniques and Tools", Pearson Education, 2^{nd} edition, 2012(9^{th} Impression), ISBN: 978-81-317-2101-8
2. Alfred V. Aho, Ravi Sethi Jeffrey. D. Ullman,"Compilers Principles, Techniques and Tools", Pearson Education, 3^{rd} edition, 2007,ISBN-13: 978-8173716065

REFERENCE BOOKS

1. Shantanu Chatopadhyay, "Compiler Design", PHI publication,2005-ISBN-81-203-2725-X
2. Dr.O.G.Kakde, "Compiler Design",University Science Press, 4^{th} Edition, ISBN 978-81-318-0564-0
3. K.Muneeswaran, "Compiler Design", Oxford University press,2015, ISBN- 978-0-19-806664-4
4. V. Raghavan, " Principles of Compiler Design",McGraw Hill Education, 2015,ISBN 978-0-07-014471-2
5. Allen I. Hollub, "Compiler Design in C", PHI, 2015. ISBN: 978-93-325-4950-0
6. Steven Muchnik, " Compiler Design Implementation, Elsevier 2014, ISBN 978-81-312-1403-9
7. Ronald Mak, "Writing Compilers and Interpreters", WILEY,2015, ISBN 978-81-265-24044
8. Keith D.Cooper, and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann, 2011, ISBN 978-93-80931-87-6
9. Dhamdhere D M, "Compiler Construction Principles and Practice", second edition, Macmillan India Ltd., New Delhi, 2001

MIT Academy of Engineering (An autonomous Institute Affilated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Software Engineering
	COURSE CODE	CS349
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	-0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE :

COURSE OBJECTIVES :

CS349.CEO.1: To identify the software process model.
CS349.CEO.2: To process requirement engineering for product development.
CS349.CEO.3: To learn design concepts and modelling for software development.
CS349.CEO.4: To comprehend the estimation and management of software metrics.
CS349.CEO.5: To Understand test driven environment in software development.

COURSE OUTCOMES :

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

CS349.CO.1: Classify process models.
CS349.CO.2: Analyze conformance of the requirement related to project development.
CS349.CO.3: Develop design models using UML diagram
CS349.CO.4: Mitigate the risk associated with project development.
CS349.CO.5: Evaluate the schedule, cost and staff associated with project.
CS349.CO.6: Review quality assurance through test driven development.

THEORY COURSE CONTENT		
UNIT 1	**Basics of Software Engineering**	**9 HOURS**

App/System/Case study: Learning Game Design and Software Engineering through a Game Prototyping Experience.

Contents: Generic process model: Process framework, umbrella activities, Process Adaptation, Perspective Process Models - Waterfall Model, Prototyping, Incremental, and Agile Process Model: XP and Scrum, introduction to Principles of framework Activities, DevOps concepts and process: continuous development, continuous integration, continuous monitoring

Self -Study: Component based development process model.

Further Reading: Dynamic System Development Method

UNIT 2	**Understanding Requirements and Modeling**	**9 HOURS**

App/System/Case study: Online Marketing Software Platform

Contents: Requirement Engineering: Elicitation, Analysis, Specification and verification; Scenario based requirement modeling: Creating a Preliminary Use Case, Refining a Preliminary Use Case, Writing a Formal Use Case, Requirement modeling class based: Identifying Analysis Classes, Specifying Attributes, Defining Operations, Class-Responsibility-Collaborator Modeling, Associations and Dependencies, Requirement modeling Behavior, patterns and mobile apps: Creating a Behavioral Model, Identifying Events with the Use Case, State Representations, Discovering Analysis Patterns, Web and Mobile Apps; Requirements Modeling Input/output, Content and Navigation modeling;

Self-Study: Interaction Model for Web and Mobile Apps

Further Reading: Configuration Models for WebApps

UNIT 3	**Design Concepts**	**8 HOURS**

App/System/Case study: Banking software user interaction and dependencies

Contents: Design Concepts, Design models, Architectural design: Representing the System in Context, Defining Archetypes, Refining the Architecture into Components, Describing Instantiating of the System, Architectural Reviews, Static and Dynamic UML Diagrams: Class diagram, object diagram, Use case, activity, sequence, block diagram, architectural diagrams and deployment diagram.

Self-study: Pattern based Design

Further Reading: Mobile application design models

UNIT 4	**Process Management and Estimation**	**8 HOURS**

App/System/Case study: Successful Application of Software Reliability By Norman F. Chneide wind

Contents: Software Configuration Management. Software Project Planning: Project Planning objectives. Software Metrics: Size, Function Point, Staffing, Project Estimation Methods Decomposition Techniques; Empirical Estimation Models COCOMO Model. Risk Management: Risk Identification, Analysis, mitigation methods.

Self- Study: Software Quality ISO Standards

Further Reading: ISO/IEC 9126 Software engineering

UNIT 5	Test Driven development	8 HOURS

App/System/Case study: Manual Testing (Online Marketing Software Platform)
Contents: System Testing - System Integration Techniques-Incremental, Top-Down Bottom, White box Testing, Black box Testing, Performance Testing, Security Testing, Acceptance testing.
Self- Study: Automated Testing life cycle
Further Reading: Software Reliability

PRACTICAL: Perform following experiments using Open source tools		
PRACTICAL NO.01		**4 HOURS**
Students are required to take a real-life scenario for software development (ERP, Mobile app, IOT project) and apply a correct Development paradigm for it with justification. OR Students can take Mini or Minor project/ DBMS project / DSF Project and explain which software development paradigm was used, what were the limitations of that paradigm. Students should propose a revised paradigm to overcome the limitations of existing one with justification.		
PRACTICAL NO.02		**4 HOURS**
Take your Project statement and make a SRS in IEEE format. IEEE SRS must have preliminary as well as detailed design.		
PRACTICAL NO.03		**4 HOURS**
Take your problem statement and design modelling using UML Diagrams		
PRACTICAL NO.04		**4 HOURS**
Prepare a suitable cost estimation model, WBS, Gantt chart (using MS project tool) and all necessary estimation for your project.		
PRACTICAL NO.05		**4 HOURS**
Prepare the Risk mitigation plan for the selected project.		
PRACTICAL NO.06		**4 HOURS**
Design test cases for project based on associated risk and possible threats.		
PRACTICAL NO.07		**4 HOURS**
Final presentation: Report and PPT		

TEXT BOOK

1. Roger Pressman, "Software Engineering: A Practitioner's Approach", McGraw-Hill Education; 8th edition ISBN : 9789339212087
2. Ian Somerville, "Software Engineering" Pearson Publication; 9th Edition, ISBN-: 978-0-13-703515-1
3. Srinivasan Desikan," Software Testing Principals and practices", Pearson Publication ISBN-: 978-8-17-758295-6

REFERENCE BOOK

1. Software Testing And Quality Assurance-Theory and Practice, Kshirasagar Nak Priyadarshi Tripathy, John Wiley Sons Inc,2008
2. Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement, Jeff Tian, John Wiley Sons, Inc., Hoboken, New Jersey. 2005.
3. Software Quality Assurance - From Theory to Implementation, Daniel Galin, Pearson Education Ltd UK, 2004 Software Quality Assurance, MilindLimaye, TMH ,New Delhi, 2011.
4. The Art of Software Testing, by Glenford J. Myers , Corey Sandler, Tom Badgett, 3rd Edition, Wiley; 3 edition, ISBN-13: 978-1118031964. Testing Tools Cookbook - Second Edition, UnmeshGundecha , Publisher: Packt Publishing, ISBN:13 -9781784392512

MIT Academy of Engineering (An autonomous Institute Affilated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Predictive Analytics
	COURSE CODE	CS356
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	30	20	150

PRE-REQUISITE :

1: CS-351: Descriptive Analytics

COURSE OBJECTIVES :

CS351.CEO.1: To implement various association algorithms.
CS351.CEO.2: To summarize the supervised learning methods.
CS351.CEO.3: To understand the advanced classification techniques.
CS351.CEO.4: To explain the basic terminology of artificial neural network.
CS351.CEO.5: To explain the unsupervised learning methods.
CS351.CEO.6: To explain the conceptual clustering and ensemble learning.

COURSE OUTCOMES :

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

CS351.CO.1: Analyse various Association Algorithms.
CS351.CO.2: Apply the classification and prediction techniques to solve real world problems.
CS351.CO.3: Use advanced classification techniques.
CS351.CO.4: Apply artificial neural network on a real application.
CS351.CO.5: Analyse the unsupervised learning methods.
CS351.CO.6: Apply the conceptual clustering and ensemble learning methods on a real-life example.

THEORY COURSE CONTENT		
UNIT 1	**Mining Association Rules**	**6 HOURS**

App/System/Case study: Retail-Industry Case Study
Contents:
Mining Association Rules, Frequent Item Set Generation, Bruit Force Approach, The Apriori Algorithm (Greedy): advantages and limitations of Apriori, Rule generation of Apriori, multiple minimum support, interestingness measures (support, confidence, lift, conviction, leverage). Maximal and closed item- sets, Improving the Efficiency of Apriori- hash based technique, Partition-based technique, sampling,dynamic item-set counting, Mining Frequent Item-sets Using Vertical Data Format (ECLAT), Mining Closed Frequent, FP growth (ARM approach), Multilevel, multi-dimensional Association Rules Generation **Self -Study:** Adaptive Apriori Algorithm
Further Reading: Association Mining for Sequence Data

UNIT 2	**Classification and Prediction: Supervised Learning Methods**	**6 HOURS**

App/System/Case study: House price prediction Case
Contents: Classification and Prediction, Classification- A Two-Step Approach, Types of Learning, Issues in Classification, Decision Tree-Based Classification- ID3, C.45, CART (Features, Advantages, Limitations and Advancements for Overcoming Limitations of each). Probabilistic Classification: Naïve Bays Classification, Issues of Naïve Bays And Remedies of it, Bayesian Belief Network (BBN), Advantages and Limitations of BBN.
Self-Study: Classification Assessment
Further Reading: A Fast Scalable Classifier for Data Mining

UNIT 3	**Advanced Classification Techniques**	**5 HOURS**

App/System/Case study: Retail-Industry Case Study
Contents: OEager Learning, Lazy Learning, KNN, Advantages of KNN, Issues and Remedies of KNN,Support Vector Machine (SVM), Soft Versus Hard Margin, Local and Global Minima, Linear and Non-Linear SVM, Kernel Functions, Weakness of SVM, Handling Multi Class SVM.
Self-study: Advanced Kernel Functions
Further Reading: : Advanced SVM

UNIT 4	**Artificial Neural Network**	**7 HOURS**

App/System/Case study: Grocery/Shopping Cart Case Study
Contents: Artificial Neural Network (ANN): Neurons, perceptron, parameter settings of ANN, Topologies of ANN, transfer functions, learnings in ANN, Activation functions, Learning rate, Gradient descent, Back- Propagation, Basic forms of Neural processing, Advantages and Limitations of ANN. Introduction to Deep Learning, Reinforcement learning
Self- Study: Convolutional Neural Networks
Further Reading: Deep Architecture

UNIT 5	Clustering Techniques	6 HOURS

App/System/Case study: Online Shopping Case Study
Contents: Basics of Clustering, Quality Parameters of Clustering, Various Clustering Approaches. Partitioning Methods: K-Means, K-Medoids (Partition Around Medoids), CLARA (Clustering Large Applications).
Hierarchical Methods: Agglomerative and Divisible Clustering. Expectation Maximization (EM) Algorithm, Discussion On EM.
Self- Study: Spectral Clustering
Further Reading: Graph Clustering

UNIT 6	Conceptual Clustering and Ensemble Learning	6 HOURS

App/System/Case study: Food Recommender Case Study
Contents:: Conceptual and Model based Clustering: Cobweb, Advantages and Issues of COBWEB. Ensemble learning such as Random Forests and Ada- Boost.
Self -Study: Stacking
Further reading: Feature Engineering

PRACTICAL:Perform following experiments using programming language (R/Python)		
PRACTICAL NO.01		**4 HOURS**
Implementation of advancements and variations of association algorithms		
PRACTICAL NO.02		**4 HOURS**
Detailed study and Implementation of classification algorithms (any two) (Naïve bays, BBN, KNN, CART, SVM etc)		
PRACTICAL NO.03		**4 HOURS**
Deep learning applications for real life problem solving.		
PRACTICAL NO.04		**4 HOURS**
Problem solving using clustering algorithms. (Branch Specific problem statements to be provided)		
PRACTICAL NO.05		**4 HOURS**
DData science solution for real word problems – project (Group of 3 students) duration 1 month (Problems include image processing, video processing will be preferred) Real life problem statements from associated industries will be shared with students and assessment will be done with the help of industry experts. These problems would cover all branches of engineering.		

TEXT BOOK

1. Jiawei Han, Micheline Kamber, Jian Pei Professor, "Data Mining: Concepts and Techniques", The Morgan Kaufmann Series in Data Management Systems, ISBN 978-9380931913
2. Rick Sherman, "Business Intelligence Guidebook: From Data Integration to Analytics", The Morgan Kaufmann Series in Data Management Systems, ISBN 012411461X.
3. Sheldon Ross, "Introductory Statistics", Academic Press; 4th edition, Hardcover ISBN: 9780128043172 eBook ISBN: 9780128043615.

REFERENCE BOOK

1. Paulraj Ponniah,"Data Warehousing: Fundamentals for IT Professionals", 2nd Edition, Paperback, McGraw Hill Publishers, ISBN 978-0-07-352332-3.
2. Ralph Kimball, "Data Warehouse Lifecycle Toolkit", Willey, ISBN 0471200247.
3. Maria Sueli Almeida, Missao Ishikawa, Joerg Reinschmidt, Torsten Roeber, "Getting Started with Data Warehouse and Business Intelligence", IBM.
4. Ramesh Sharda, DursunDelen, Efraim Turban, "Business Intelligence, Analytics, and Data Science: A Managerial Perspective", Pearson Publication, 4th Edition, ISBN 0134633288.
5. Grolemund, Garrett "R for Data Science", O'Reilly.
6. Murrey R Spiegal, Larry Stifens, "Statistics" , 5th edition ,Schaum's Series, McGraw-Hill Education; 5 edition, ISBN-10: 0071822526 , ISBN-13: 978-0071822527.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABUS**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**2021 - 2022 (Rev.2019)**
THIRD YEAR BACHELOR OF TECHNOLOGY IN COMPUTER ENGINEERING	**COURSE NAME**	Machine Learning
	COURSE CODE	CS355
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	NA	50	150

PRE-REQUISITE : CS102-Application Programming

COURSE OBJECTIVES :

CS355.CEO.1: To explain various statistical learning algorithms in real time applications.
CS355.CEO.2: To select appropriate model by evaluating its predictive performance.
CS355.CEO.3: To apply statistical techniques and algorithms for Natural Language Processing.
CS355.CEO.4: To elaborate various applications of machine learning in Computer Vision and Pattern Recognition.

COURSE OUTCOMES :

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

CS355.CO.1: Design and implement various machine learning algorithms in a range of real-world applications [L3].
CS355.CO.2: Analysis of the fundamental issues and challenges of model selection and its complexity [L4].
CS355.CO.3: Make use of various algorithms for Natural Language Processing and Information Retrieval[L3].
CS355.CO.4: Decide appropriate methods for applications of machine learning in Computer Vision and Pattern Recognition.[L4].

THEORY :		
UNIT 1	**Decision Tree**	**7 HOURS**
App/System/Case study: Weather Forecasting, Credit Scoring. **Contents:** Decision tree: Introduction, Representation, and Applications, Basic Decision Tree Algorithm, Rule of Extraction, Issues in Decision Tree Learning, Regression Tree, Random Forest. **Self Study:** Rule Post-Pruning. **Further reading:** Statistical Methods for Decision Making.		
UNIT 2	**Support Vector Machine**	**6 HOURS**
App/System/Case study: Diabetes Prediction. **Contents:** Support Vector Machine (SVM): Introduction and Applications, Linearly Separable Data, Linearly Non Separable Data, Classifier Margin: Thine and Thick Margin, Support Vectors, Optimal Hyperplane, SVM Kernels, Handling Error using Least Square SVM. **Self Study:** Cardiovascular Disease Prediction. **Further reading:** Digit Recognition using SVM.		
UNIT 3	**Neural Network and Ensemble Learning**	**8 HOURS**
App/System/Case study: Business Analytic:Customer Segmentation. **Contents: Neural Network:** Introduction to Neural Networks, Fundamental Concepts: Neuron Models And Basic Learning Rules, Perceptron Training Rule, Gradient Descent And Delta Rule, Back-Propagation Algorithm, Convergence, Multi layer Network. **Ensemble Learning:** Introduction, Bagging, Boosting, ADA boosting, Stacking. **Self Study:** Evaluation of Predictive Performance. **Further reading:** Deep Neural Network.		
UNIT 4	**Dimensionality Reduction and Hidden Markov Model**	**8 HOURS**
App/System/Case study: Real Estate Price Prediction. **Contents: Dimensionality Reduction:** Introduction, Subset Selection, Principal Component Analysis, Feature Embedding, Factor Analysis, Canonical Correlation Analysis, Linear Discriminate Analysis and Generalized Discriminant Analysis. **Hidden Markov Model:** Statistical Pattern Recognition, Discrete Hidden Markov Models, Continuous Density Hidden Markov Models, Algorithms: Forward / Backward, Baum Welch Algorithm, Viterbi Algorithm. **Self Study:** Iris Segmentation using Principal Component Analysis. **Further Reading:** Time Series Analysis using Hidden Markov Model		
UNIT 5	**Natural Language Processing**	**7 HOURS**
App/System/Case study: Disease Detection. **Contents:** Introduction, Steps in Natural Language Processing, Lexical Analysis, Syntactic Analysis, Semantic Analysis, Discourse Integration, Pragmatic Analysis, Language Model, N-gram, Smoothing, POS tagging using Hidden Markov Model. **Self Study:** Information Retrieval, Vector Space Model. **Further Reading:** Sentimental Analysis		

UNIT 6	Computer Vision and Applications	6 HOURS
App/System/Case study: Face Recognition, Gesture Recognition **Contents:** Introduction to Computer Vision and Basic Concepts of Image Formation. **Image Processing Concepts:** Image Transforms, Image Enhancement, Image Filtering, Image Segmentation. **Image Descriptors and Features:** Texture Descriptors, Colour Features, Edges/Boundaries, Object Boundary and Shape Representations, Interest or Corner Point Detectors, Histogram of Oriented Gradients. Object detection and Recognition using machine learning algorithms. **Self Study:** Plant Disease Detection. **Further Reading:** License plate recognition, Cancer Diagnosis.		
PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
a) Write a program to demonstrate the working of the decision tree ID3 algorithm. b) Write a program to demonstrate the working of the decision tree for Regression.		
PRACTICAL NO.02		**4 HOURS**
Implement the Support Vector Machine linear classifier and find the accuracy for any selected dataset.		
PRACTICAL NO.03		**4 HOURS**
Build an Artificial Neural Network using Back-propagation algorithm and test the same using appropriate dataset.		
PRACTICAL NO.04		**4 HOURS**
a) To implement Principal Component Analysis for Iris Segmentation or selected application. b) Implement Hidden Markov Model for Statistical Pattern Recognition.		
PRACTICAL NO.05	**Minimum Two**	**4 HOURS**
a) Estimate the Likelihood of the sentences using N-Gram Model. b) Write a program to implement POS tagging using Hidden Markov Model. c) Implement Vector Space Model for Technical Article Recommendation.		
PRACTICAL NO.06		**4 HOURS**
Implement any one of following Vision/Image processing application of Cancer detection: Brain tumor, Breast Cancer, Lungs Cancer.		
PRACTICAL NO.07		**6 HOURS**
Project		

TEXT BOOK

1. Ethem Alpaydin, “Introduction to Machine Learning”, Forth Edition, The MIT Press,2020, ISBN: 978-0-262-04379-3
2. Tom Mitchell, “Machine Learning” , McGraw Hill, 1997, ISBN 007-0-42807-7
3. Jason Bell, ”Machine Learning: Hands-On for Developers and Technical Professionals”, Wiley 2014, ISBN-10: 8126553375, ISBN-13: 978- 8126553372
4. James, G., Witten, D., Hastie, T. and Tibshirani, R., ”An Introduction to Statistical Learning”, 2014.

REFERENCES

1. Andreas Muller, “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Shroff/O’Reilly First edition 2016, ISBN-10: 9352134575, ISBN-13: 978-9352134571.
2. Christopher M. Bishop, ”Pattern Recognition and Machine Learning”, Springer New York, 2016.
3. Jiawei Han, Micheline Kamber, Jian Pei, ”Data Mining: Concepts and Techniques”, The Morgan Kaufmann Series in Data Management Systems (Selected Titles), 2011, ISBN 978-0-12-381479-1.
4. Prateek Joshi, ”Python Machine Learning Cookbook”, Packt Publishing Limited (23 June 2016), ISBN-10: 1786464470 ISBN-13: 978-TMH, 2009, ISBN-13: 978-8120337312

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Cloud Native Application Development
	COURSE CODE	CS356
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	REVISION NO	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	2	35	35	30	NIL	40	10	150

PRE-REQUISITE :

1: Data Structures
2: Database Management Systems
3: Cloud Computing Foundations

COURSE OBJECTIVES :

CS228.CEO.1: To study SDKs available for AWS based Application Development
CS228.CEO.2: To learn how to program various AWS services using SDK
CS228.CEO.3: To understand the function of various database services provided by AWS
CS228.CEO.4: To learn the concept of Ifrastructure as a Code
CS228.CEO.5: To develop the serverless applications

COURSE OUTCOMES:

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

CS228.CO.1: To configure the Software Development Kit for various AWS Services
CS228.CO.2: To develop various compute services in cloud
CS228.CO.3: To access various databases services through a web application
CS228.CO.4: To distinguish between protocols for developing own API
CS228.CO.5: To select an appropriate configuration for provisioning infrastructure as a code
CS228.CO.6: To develop a web application using various cloud services

THEORY COURSE CONTENT		
UNIT 1	**Programming AWS Compute Services**	**6 HOURS**
App/System/Case study: AWS EC2, AWS ImageBuilder, AWS ElasticBeanStalk **Contents:** Introduction to AWS SDK, Configuring AWS SDK for Java, Python and Node JS. Configuration of SDK for various IDEs like Eclipse, PyCharm, Visual Studio Code. Using the various AWS compute services like EC2, EC2 Image Builder and Elastic Beanstalk through programming **Self study:** SDK for Microsoft Azure **Further Reading:** AWS LaunchWizard		
UNIT 2	**Programming AWS Identity and Storage Services**	**6 HOURS**
App/System/Case study: AWS IAM, AWS S3, AWS EFS, AWS Glacier **Contents:** Programmatically accessing Identity and Access Management Services – create users, groups, security groups, roles, policies and permissions, permission boundaries, Access Analyzer Programmatically accessing AWS S3, S3 Glacier and EFS, Backing up data programmatically. **Self study:** AWS Cognito **Further Reading:** AWS Firewall Manager		
UNIT 3	**Programming AWS Database Services and API Gateway**	**6 HOURS**
App/System/Case study: AWS RDS, AWS DynamoDB, AWS Aurora, Amazon API Gateway **Contents:** Programming with AWS RDS, AWS DynamoDB, AWS Aurora – Interfaces, Low level API API Gateway – concepts, use cases. Choosing HTTP or REST API, Working with HTTP APIs, Working with REST APIs, Working with WebSockets APIs, API Gateway Security **Self Study:** AWS ElastiCache **Further Reading:** Amazon CloudFront		
UNIT 4	**Provosioning Infrastructure as Code**	**6 HOURS**
App/System/Case study: Amazon CloudFormation **Contents:** Cloud Formation concepts, How does Cloud Formation works, Setting up VPC End Points for Cloud Formation, Working with Stacks, Working with Templates, Working with StackSets, Using the Cloud Formation Registry, Security – Controlling access with IAM, Loggin API Calls, Infrastructure Security, Configuration and vulnerability analysis **Self Study:** AWS LakeFormation **Further Reading:** Terraform		
UNIT 5	**AWS Serverless**	**6 HOURS**
App/System/Case study: AWS Lambda, AWS Step Functions **Contents:** Need for Serverless architecture, How serverless architecture works Foundations of Lamdba Functions – concepts, features, programming model, architectures, function scaling, Lambda Permissions – Execution role, resource based policies, user policies, resources and conditions, permission boundaries, Configuration Functions, Managing Functions, Invoking Functions, lambda Functions AWS Step Functions **Self Study:** AWS LakeFormation **Further Reading:** Writing AWS Lambda Functions in JavaScript		

UNIT 6	AWS CI/CD	6 HOURS
App/System/Case study: Amazon CodeCommit, Amazon CodeBuild, AWS CodeDeploy, AWS CodePipeline **Contents:** What is CI/CD? CodePipeline concepts, How pipeline execution works, Integration with CodePipeline action types, working with pipelines, working with actions, working with stage transitions, monitoring pipelines, security in pipelines **Self Study:** ClouWatch Events for Pipelines **Further Reading:** Jenkins		

PRACTICAL:		
PRACTICAL NO.01	**First Virtual Machine on AWS using SDK**	**4 HOURS**
Launching the virtual machine on Amazon AWS and doing basic settings using AWS SDK		
PRACTICAL NO.02	**Storage Conftguration using SDK**	**4 HOURS**
Configuring various storages available on AWS and storing, retrieving, deleting the data from those storage applications using AWS SDK		
PRACTICAL NO.03	**Database Connectivity**	**4 HOURS**
Connecting to the database services like RDS, DynamoDB using AWS SDK and implementing CRUD Applications		
PRACTICAL NO.04	**Developing REST Based API**	**4 HOURS**
Developing REST based API using AWS API Gateway and invoking it through the web applications		
PRACTICAL NO.05	**Launching Infrastructure using CloudFormation**	**4 HOURS**
Launch a specific set of configurations using AWS CloudFormation		
PRACTICAL NO.06	**Developing a Serverless Application**	**4 HOURS**
Developing a Serverless Application using AWS Lambda		
PRACTICAL NO.06	**Developing Application using CI/CD**	**4 HOURS**
Developing an Application using AWS CI/CD services		
PRACTICAL NO.07	**Project**	**4 HOURS**
Implement a Web Application using all the services studied		

TEXT BOOKS

1. Wittig, Michael, Andreas Wittig, and Ben Whaley. Amazon web services in action. Manning,, 2018.
2. Murty, James. Programming amazon web services: S3, EC2, SQS, FPS, and SimpleDB. " O'Reilly Media, Inc.", 2008.
3. Tankariya, Vipul, and Bhavin Parmar. AWS Certified Developer-Associate Guide: Your one-stop solution to pass the AWS developer's certification. Packt Publishing Ltd, 2017.
4. Alteen, Nick, et al. AWS Certified Developer Official Study Guide: Associate (DVA-C01) Exam. John Wiley Sons, 2019..
5. van Vliet, Jurg, Flavia Paganelli, and Jasper Geurtsen. Resilience and Reliability on AWS: Engineering at Cloud Scale. " O'Reilly Media, Inc.", 2013.
6. Sarkar, Aurobindo, and Amit Shah. Learning AWS: Design, build, and deploy responsive applications using AWS Cloud components. Packt Publishing Ltd, 2018.

REFERENCE BOOKS

1. Kavis, Michael J. Architecting the cloud: design decisions for cloud computing service models (SaaS, PaaS, and IaaS). John Wiley Sons, 2014.
2. Vacca, John R., ed. Cloud computing security: foundations and challenges. CRC Press, 2016.
3. Furht, Borivoje, and Armando Escalante. Handbook of cloud computing. Vol. 3. New York: springer, 2010.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022(Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Cryptography and Network Security
	COURSE CODE	IT351
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSEE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NA	150

PRE-REQUISITE : CS343-Computer Networks

COURSE OBJECTIVES :

CS352.CEO.1: To understand Cryptography Theories, Algorithms and Systems.
CS352.CEO.2: To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.
CS352.CEO.3: To understand the basic categories of threats to computers and networks.
CS352.CEO.4: To understand the fundamental ideas of public-key cryptography and symmetric key cryptography.
CS352.CEO.5: Discuss IP Security , Web security and Firewalls

COURSE OUTCOMES :

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

CS352.CO.1: Identify the security threats, and the security services and mechanisms to counter them.
CS352.CO.2: Apply security principles to protect the data.
CS352.CO.3: Analyze symmetric key and asymmetric key algorithm.
CS352.CO.4: Identify the different Authentication method in digital signature
CS352.CO.5: Analyze network security protocols.
CS352.CO.6: Identify and investigate network security threat and provide solution to protect the network.

THEORY :

UNIT 1	Security in Computing Environment	8 HOURS

App/System/Case study: Threats, Vulnerabilities, and Controls.
Contents: Need for Security; Security Attack – Threats, Vulnerabilities, and Controls, Types of Threats (Attacks); Security Services – Confidentiality, Integrity, Availability; Information Security; Methods of Protection Terminologies used in Cryptography; Substitution Techniques – The Caesar Cipher, One-Time Pads, The Vernam Cipher, Book Cipher; Transposition Techniques – Encipherment/Decipherment Complexity, and Other Patterns
Further reading: steganography- Foundations of modern cryptography

UNIT 2	Symmetric Key Encryption or Block Cipher	8 HOURS

App/System/Case study: Properties of Trustworthy Encryption Systems.
Contents: Modular Arithmetic, Euclidean and Extended Euclidean algorithm, Prime numbers , Data Encryption Standard (DES) Algorithm – Overview of the DES Algorithm; Double and Triple DES – Double DES, Triple DES; Security of the DES; Advanced Encryption Standard (AES) IDEA, Blowfish ,RC4 , Strength of the Algorithm; .
Further reading: DES and AES Comparison.

UNIT 3	Public Key Encryption	6 HOURS

App/System/Case study: Case study on Public key cryptography.
Contents: Characteristics of Public Key System; RSA Technique – Encryption-Method; Key Exchange; Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.
Further reading: Knapsack Algorithm.

UNIT 4	Hash Functions and Digital Signature	6 HOURS

App/System/Case study: Demonstration Digital Certificate Creation.
Contents: Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – EI Gamal – Schnorr, private key management, the PKIX model, Public key cryptographic standards (PKCS).
Further reading: Different version of PKIX

UNIT 5	IP Security and Web Security	6 HOURS

App/System/Case study: case study on security policy.
Contents: Overview of IP Security (IPSec); IP Security Architecture; Modes of Operation; Security Associations (SA) – Security Parameter Index (SPI), SA Management, Security Policy; Authentication Header (AH); Encapsulating Security Payload (ESP); Internet Key Exchange.
Web Security Requirements; Secure Socket Layer (SSL) – SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) – Features, Components, Dual Signature, Purchase Request. Self-Study: Applications of SET .
Further Reading: Secure E-Mail System – PGP (Pretty Good Privacy).

UNIT 6	Security Practice ad System Security	6 HOURS

App/System/Case study: Demonstration of Windows firewall or Sonic firewall.
Contents: Authentication applications – Kerberos – X.509 Authentication services, Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles Self-Study: Single KDC
Further Reading: Firewall configuration.

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Write a program to encrypt and decrypt the message using encryption decryption techniques a) Substitute Method b) Transposition Method		
PRACTICAL NO.02		**4 HOURS**
Develop a program in C++/Java/Python on Advanced Extended Euclidean Algorithm		
PRACTICAL NO.03		**4 HOURS**
Write a program to implement one of Symmetric Key Cryptography (AES, /DES/ RC4 etc.)		
PRACTICAL NO.04		**4 HOURS**
Write a program to implement public key cryptography algorithm RSA		
PRACTICAL NO.05	**Minimum Two**	**4 HOURS**
Implement Diffie Hellman key exchange algorithm in client server architecture		
PRACTICAL NO.06		**4 HOURS**
Calculate the message digest of a text using the SHA-1 or MD5 algorithm in JAVA/Python/C++		
PRACTICAL NO.07		**2 HOURS**
Create your own digital certificate using java key tool		
PRACTICAL NO.08		**4 HOURS**
Security Tools : 1. Configure and demonstrate firewall 2. Configure and demonstrate use of traffic monitoring tool such as wireshark with security perspective		

TEXT BOOK

1. Atul Kahate, "Cryptography and Network Security",The McGraw Hill Publication Second Edition, ISBN – 13: 978-0-07-064823-4.
2. 2. Eric Maiwald , "Network Security: A Beginners' Guide" , ISBN: 978-0-07-179571-5.

REFERENCES

1. William Stallings , "Cryptography and Network Security", Prentice Hall, Fourth Edition ISBN-13: 978-0-13-187316-2.
2. Peter Harrington, "Machine Learning in Action", Dreamtech Press, 2012, ISBN 978-1-617-29018-3
3. Bernard Menezes ," Network Security and Cryptography: Bernard Menezes", CENGAGE Learning.
4. Charlie Kaufman, Radia Perlman and Mike Speciner , "Network Security - Private Communication in a Public World", Pearson/PHI.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Skill Development Course - Advanced Java
	COURSE CODE	CS357
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE: :

1. CS226 Skill Development Course - CPP
2. IT201 Skill Development and Project- Core Java

COURSE OBJECTIVES :

CS357.CEO.1: To Apply the core Java fundamentals to learn the advanced concepts in J2SE
CS357.CEO.2: To Develop web application development Servlets, JSP
CS357.CEO.3: To Make use of advanced Java frameworks for improving the web application design

COURSE OUTCOMES:

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

CS357.CO.1: Construct java applications using multithreading and networking concepts
CS357.CO.2: Build web applications using Servlet, JSP
CS357.CO.3: Explore JSF framework for the better user interfaces.
CS357.CO.4: Integrate Hibernate and spring framework with applications
CS357.CO.5: Develop advanced enterprise web applications

GUIDELINES FOR CONDUCTION OF LAB: :

1. Course Teacher or Lab Instructor may frame the assignments/mini-project by understanding the prerequisites, technological aspects, utility and recent trends related to the respective courses.
2. According to assigned number of hours, course instructor has to decide minimum number of practical assignments
3.Preferably there should be multiple sets of assignments/mini-project and distribute among batches of students.
4.Mini-project can be completed in group of 2 to 3 students

CONTENTS: :

1. Multithreading
2. Networking
3.Servlet
4.Java Server Pages (JSP)
5.Hibernate
6.Java Web Frameworks: Spring
7.Java Server Faces

PRACTICAL:		
PRACTICAL NO.1	**Core Java Fundamentals**	**4 HOURS**
Assignments based on Exception Handling, Abstraction, Package and JDBC		
PRACTICAL NO.2	**Multithreading**	**6 HOURS**
a) Assignment based on Create thread, scheduler, thread methods all b) Assignment based on thread using runnable interface and creating multiple thread c) Assignment based on priorities of thread, Thread pool, thread group.		
PRACTICAL NO.3	**Networking**	**6 HOURS**
a) AAssignemnt based on to retrieve IP address for given website and content of the given URL b) Program to two – way network based chat application using TCP/IP. c) Assignment based on connection-oriented communication and connection-less communication.		
PRACTICAL NO.4	**Servlet**	**8 HOURS**
a) Assignment based on simple servlet, testing servlet and deployment descriptor b) Assignment based on doget and doPost method, life cycle of servlet. c) Program to create servlet file for different database operation. d) Program to error handling, authentication and context interface		
PRACTICAL NO.5	**Java Server Pages (JSP)**	**6 HOURS**
a) Assignment based on JSP actions and Objects b) Assignment based on cookies handing and session tracking c) Assignment to demonstrate core ,format, function and SQL tags of JSTL		
PRACTICAL NO.6	**Hibernate**	**6 HOURS**
a) Program to implement Hibernate. b) Assignment based on Hibernate Annotations. c) Assignment based on Hibernate Query Language and types of relation		
PRACTICAL NO.7	**Java Web Frameworks: Spring**	**8 HOURS**
a) Program to implement MVC using Spring Framework. b)Assignment based on Inject Service using Aspect Oriented Programming. c) Assignment based on Jdbc Template,Spring ORM, Spring MVN d) Assignment based on Spring Template manages, Spring Transaction Management, Spring Restful Services		
PRACTICAL NO.8	**Java Server Faces**	**4 HOURS**
a) Assignment on JSF Standard Components and Facelets Tags. b)Assignment on JSF Converter Tag and Validation Tags.		

TEXT BOOK

1. Java Server Programming Java EE 7 (J2EE 1.7), Black Book
2. Complete Reference J2EE by James Keogh mcgraw publication

REFERENCE BOOK

1. Head First Servlets and JSP: Passing the Sun Certified Web ComponentDeveloper Exam -2nd
2. Edition-Bryan Basham, Kathy Sierra, Bert Bates- O'REILLY
3. Hibernate 2nd edition, Jeff Linwood and Dave Minter, Beginning Après publication
4. Java Server Faces in Action, Kito D. Mann, Manning Publication

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Skill Development Lab - RHA II
	COURSE CODE	CS358
	COURSE CREDITS	2
RELEASE DATE : 01-01-2019	REVISION NO	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
-	4	-	-	20	10	45	75

AIM: : To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES

CS344.CEO.1: To install Red Hat Enterprise Linux using scalable methods
CS344.CEO.2: To access security files, file systems, and networks
CS344.CEO.3: To deploy shell scripting and automation techniques
CS344.CEO.4: To control the boot process, system services and running containers

COURSE OUTCOMES

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

CS344.CO.1: Illustrate essential Linux administration tasks.
CS344.CO.2: Experiment with installation, networking and user profiles.
CS344.CO.3: Examine physical storage, file systems and log files.
CS344.CO.4: Inspect the Linux processes, control services, daemons and basic security administration.
CS344.CO.5: Analyze Redhat Linux System with a comprehensive and systematic approach.

Red Hat Administration - II	40 HOURS

Automate installation with Kickstart: Automate the installation of Red Hat Enterprise Linux systems with Kickstart.

Use regular expressions with grep: Write regular expressions that, when partnered with grep, isolate or locate content within text files.

Create and Edit text ftles with vim: Introduce the vim text editor, open, edit, and save text files.

Schedule future Linux tasks: Schedule tasks to automatically execute in the future.

Manage priority of Linux processes: Influence the relative priorities at which Linux processes run.

Control access to ftles with access control lists (ACL): Manage file security using POSIX access control lists.

Manage SELinux security: Manage the Security Enhanced Linux (SELinux) behavior of a system to keep it secure in case of a network service compromise.

Connect to network-deftned users and groups: Configure systems to use central identity management services.

Add disks, partitions, and ftle systems to a Linux system: Manage simple partitions and file systems.

Manage logical volume management (LVM) storage: Manage logical volumes from the command line.

Access networked attached storage with network ftle system (NFS): Access (secure) NFS shares.

Access networked storage with SMB: Use autofs and the command line to mount and unmount SMB file systems.

Control and troubleshoot the Red Hat Enterprise Linux: Manage boot process, limit network communication with firewall and configure a basic firewall.

REFERENCE BOOK

1. Red Hat Enterprise Linux 8.0, ”RH124: RED HAT SYSTEM ADMINISTRATION I”, Student Guide.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2022 - 2023 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Skill Development Course-.Net
	COURSE CODE	CS359
	COURSE CREDITS	2
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE: :

The course assumes knowledge of any programming language

COURSE OBJECTIVES :

CS359.CEO.1: To understand .NET Framework Architecture, Components, Visual Studio Software Installation and the different languages supported in .NET.

CS359.CEO.2: To understand C.NET program structure

CS359.CEO.3: To learn about the System. Windows. Forms Namespace, understand the development and execution of Windows Form available Tools/controls and their events.

CS359.CEO.4: To Learn ADO.NET Architecture with its API, available classes and objects in API.

CS359.CEO.5: To understand the need of Collections and Assemblies

CS359.CEO.6: To understand ASP.NET MVC Architecture

COURSE OUTCOMES:

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

CS359.CO.1: Implement object-oriented programming and C multitasking concepts(L3)

CS359.CO.2: Explore application development with C 8.0 and .NET (L3)

CS359.CO.3: Design windows forms for different applications(L6)

CS359.CO.4: Use Entity Framework and work with relational databases(L3)

CS359.CO.5: Develop web applications using a combination of client-side and server-side technologies (L3)

MODULE:		
MODULE NO.1	**.NET Architecture, Visual Studio IDE**	**6 HOURS**
Introduction to .NET Framework, Architecture, Evolution, .NET Versions, .NET Framework Components, Visual Studio Versions, Installation, Components of IDE, Features of Visual Studio IDE, Creating Project, Solution Using Visual Studio IDE and Shortcuts in IDE.		
MODULE NO.2	**Introduction to CSHARP.NET and OOPs using CSHARP.NET**	**8 HOURS**
C Sharp language basics (Syntax, keywords, operators, data types), Importing namespace, Create Console Application. Using Convert, String, Datetime, Arrays, OOPS in C.NET., Create and implement class, Object, Method, Polymorphism , inheritance, Abstract class, Interface, Exception Handling, Properties and indexers, Delegates, Data Objects		
MODULE NO.3	**Windows Forms using C Sharp.NET**	**8 HOURS**
Visual Studio IDE for Windows Forms, Creating Windows Forms, Working with controls like Label, TextBox, Button, RadioButton, CheckBox, ListBox, ComboBox, PicureBox, Dialog, Timer and Handling Events.		
MODULE NO.4	**ADO.NET -Data Access from SQL Server**	**8 HOURS**
Ado.NET Architecture and ADO.NET Library, Creating and Establish database connectivity, Connection vs Disconnection Model, CRUD operations using Connection Oriented Model with SqlCommand and SqlDataReader, Navigation of data in data objects using Disconnection oriented model with SqlDataAdapter DataSet, DataTable, etc.		
MODULE NO.5	**Collections and Assemblies**	**8 HOURS**
Collection, Collection API, Generics, Generic Collection, Index and Key-Value paired collections, Assembly, Types of assemblies, Create Assembly, Create strong name, Install Assembly in GAC, Consume class library		
MODULE NO.6	**ASP.NET MVC Architecture**	**10 HOURS**
The MVC Pattern - MVC Page Life Cycle ,Controllers, Models, and Views ,URL Routing ,Controller Actions ,Razor View Engine ,URL Routing, Introducing URL Patterns ,Creating and Registering a Simple Route ,Defining Default Values ,Razor View Engine ,Razor Basics ,Implementation of Razor view ,Razor syntax ,Using Razor Expressions ,Accessing Model Data in Razor views Views -View Engines ,Templates and Scaffolding ,ViewData and ViewBag ,Strongly-Typed Views HTML Helpers - Basic Helpers ,Strongly-Typed Helpers ,Creating Custom Helpers ,Declarative Helpers Controllers and Actions - IController, ControllerBase, and Controller , Defining Actions ,Action Selectors , Action Filters , Returning Data with ActionResult Model Binding -Object Relational Mapping (ORM) ,Entity Framework (EF) Database-first approach ,Entity Framework (EF) Code-first approach ,Entity Framework (EF) Model-first approach , Repository Pattern ,Model Validation ,Data Annotations , ModelState ,Security in MVC ,Authentication and Authorization ,ASP.NET Identity ,Configuring Forms Authentication ,Areas in MVC 5 ,Filters in MVC 5 ,Authorization Filter , Action Filter,Result Filter ,Exception Filter		

Guidelines for Laboratory Conduction

1. The assignments to be framed by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. All problem statements or the assignments should be based on real world problems/applications. In addition to these, instructor can assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus. Team of 3 to 4 students may work on mini-project. During the assessment, the expert evaluator should give the maximum weightage to the satisfactory implementation and software engineering approach followed .The supplementary and relevant questions may be asked at the time of evaluation to test the student's for advanced learning, understanding, effective and efficient implementation and demonstration skills.

Practical Assignments:

1. 6 to 8 Assignments will be framed based on the topics covered in syllabus

Mini Project

1. Team of 3 to 4 students may work on mini-project.
2. Mini project implementation and its demonstration will carry 50 marks weightage

REFERENCE BOOK

1. "Csharp 4.0 The Complete Reference" by Herbert Schildt , McGraw-Hill. ISBN: 9780071741170.
2. "Beginning Visual C 2010" by Karli Watson, John Wiley Sons Inc ISBN: 9780470502266, 0470502266
3. "Essential C 4.0" by Mark Michaelis and Eric Lippert, ISBN-13: 978-0321694690,3rd edition
4. C 8.0 and .NET Core 3.0, Mark J. Price, Packt Publishing Limited

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABUS**	
SCHOOL OF COMPUTER ENGINEERING & TECHNOLOGY	**W.E.F**	**2021 - 2022 (Rev.2019)**
THIRD YEAR BACHELOR OF TECHNOLOGY IN COMPUTER ENGINEERING	**COURSE NAME**	Project Implementation
	COURSE CODE	CS360
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	**REVISION NO**	0.0

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

COURSE OBJECTIVES :

CS360.CEO.1: To understand latest techniques, algorithms, models and design process in the field of project.

CS360.CEO.2: To implement/develop/experiment/simulate techniques, algorithms and processes in software and in real time.

CS360.CEO.3: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

CS360.CO.1: Analyze techniques, algorithms and design process related to the project.

CS360.CO.2: Infer conclusions by implementing/developing/experimenting/simulating/testing the different techniques/processes.

CS360.CO.3: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project design phase in Sem V (project design), next step is project implementation (Sem VI). The goal of this project phase is to implement/develop/experiment/simulate/test the techniques/processes of the project and give a mature shape. The implementation can be a combination of algorithms, techniques, processes, testing etc. This will also include drawing inferences from the results and discussion.

GUIDELINES

1. Preferably project group students of Sem V would be continued in the semester VI.
2. Every project group should consist of minimum 03 and maximum of 04 students.
3. The group members may be from different programs to support the interdisciplinary functioning.
4. Project group members and title of the project need to be approved by Project Guide and School.
5. Projects should preferably have a national/international, industry/academic/research collaboration.
6. User Oriented Collaborative Development: The student needs to develop the identified solutions in discussion with various stakeholders and expert-opinions.
7. Develop proposed solution as per project planning and design done in earlier semester.
8. Perform refinement of system architecture and methodology.
9. Students should give a mature shape to their idea in terms of implementation/development/experimentation/simulation/testing/building the techniques/processes.
10. Perform periodic formal technical reviews for tracking milestones, project objectives, outcomes and documentation.

COLLABORATIVE/SPONSORED PROJECT

1. Students are encouraged to take real time problems from national/international industry/academic/ repute research organizations (like NCL, BARC, IISER, DRDO, CDAC, etc) for project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization at the start of semester VI.
3. Proposed collaborative project work need to be reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Refinement of project statement and objectives if required. Freezing of project group and title.
2. Final synopsis of the project.
3. Finalization of Methodology / System Design / Block Diagram.
4. Project Review I Presentation.
5. Project Implementation: Module wise project implementation / development / experimentation / simulation / testing / experimental yield / building the techniques / processes.
6. Draw inference from results and discussion.
7. Project Review II Presentation.
8. Awareness of Technical Article Quality Standards and Researcher Credentials: Information about research article types, paper quality metrics (SCI/SCOPUS/WOS) and author credentials (citation count, h-index, I10 index etc)
9. Project Documentation: Project Report Writing

ASSESSMENT AND EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I: Problem statement and Objectives, Implementation plan & Action (algorithms/techniques/models/mathematical understanding/implementation) (10 Marks)
2. Illustration of methodology and relevant documentation (10 marks)
3. Project Review II: Results and Implementation, Observations, Inferences, Discussion on algorithms / techniques /models / testing) (10 Marks)
4. Activity on Technical Article Quality Standards and Researcher Credentials (5 marks)
5. Project Report (10 Marks)
6. Project Documentation, Final Presentation and Demonstration (30 Marks)

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Larsen Samuel Bruning, "Doing Projects And Reports In Engineering", Macmillan Education UK, Bloomsbury Publishing PLC, 2019, ISBN: 9781352005639, 1352005638.
3. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
4. Sara Efrat Efron and Ruth David, "Writing the Literature Review: A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
5. Helmut Kopka and Patrick Daly, "A Guide to Latex: Document preparation for beginners and advanced users", Addison Wesley, 1999.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Employability and Career Development
	COURSE CODE	HP305
	COURSE CREDITS	2
RELEASE DATE : 01/07/2021	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EVALUATION SCHEME :					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	60	15	75

PRE-REQUISITE : Professional Skills :

COURSE OBJECTIVES :

HP305.CEO.1: To define the importance of Employability skills in students life.
HP305.CEO.2: To explain them necessary, specific Employability Career Development skills.
HP305.CEO.3: To appraise students for placements through acquisition of professional skills.
HP305.CEO.4: To support them detect their present level in respect of each Career Development skill and show direction for improvement.

COURSE OUTCOMES :

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

HP305.CO.1: Relate the importance of Employability Career Development (L2)
HP305.CO.2: Build necessary, specific professional skills (L3)
HP305.CO.3: Analyze the environment of employability (L4)
HP305.CO.4: Develop various techniques of effective team building in their professional life (L6)

SECTION A : Personal Development With Help of Professionals (30 MARKS)		
PRACTICAL NO.01	**Self-Management**	**2H**
Concept of Johari Window,Advantages and disadvantages of every quadrant,Identifying the proportion of each quadrant in respect of self, Using the tools of self-evaluation, self-development and Goal Setting, Stress management, Career anchor.		
PRACTICAL NO.02	**Personal Interviews**	**4H**
Preparing for Interviews, Typical expected questions suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions.		
PRACTICAL NO.03	**Group Discussion and Public Speaking**	**4H**
Parameters of assessment,Initiating the discussion,Effective listening,Own contribution,Paraphrasing,Arguing and counter-arguing, Giving direction to the discussion, Public Speaking skills.		
PRACTICAL NO.04	**Team building and Motivation**	**2H**
Hallmark of effective teams, Barriers to teamwork, Subjugation of Individual interests for achievement of teams goal, Leading motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2H**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique,Collective and individual Brain Storming.		
PRACTICAL NO.06	**Proftle Development**	**4H**
Resume Writing: Introduction to the Resume, Key Components of a Resume and Cover Letter, Enhancing tips for Resume and Cover Letter. Letter of recommendation (LOR) preparation: Details on types, samples, structure, content tips format for letters of recommendation for student. Statement of Purpose (SOP) preparation: SOP Formats, Templates, and Guidelines for SOP Writing. Job application and professional email writing.		

Section B	Aptitude Training With Help of BtechGuru Platform	30 Marks

1. Number System
2. HCF LCM , Surds and Indices.
3. Percentages and Average.
4. Time and work.
5. Time, Speed and Distance.
6. Probability.
7. Quadratic Equations.
8. Profit and Loss.
9. Simple and Compound Interest.
10. Ratio and proportion.
11. Permutation and Combination.
12. Boats and Streams, Pipes and Cisterns.
13. Mixtures and Allegations, Mensuration.
14. Data Interpretation – Tables, Pie Charts, Bar Graphs, Line Graphs.

Section C	Final Assessment With Help of Career Assessment Test.	15 Marks

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGrawHill Education; 2 edition, ISBN-10: 1259643271.
3. R S Agrawal, Quantitative Aptitude, S. Chand Publishing (2020), ISBN: 9789352534029, 9789352534029.
4. Shakuntala Devi, Puzzles to Puzzle You, Orient Paperbacks, ISBN: 9788122200140, 9788122200140

REFERENCE BOOK

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

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Final Year

Bachelor of Technology in

Computer Engineering

2019-2023

(With Effect from Academic Year: 2022-2023)

MIT Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2022-2023 (Rev.2019)
FINAL YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: VII												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CS481	Distributed Systems	3	2	-	35	35	30	50	0	150	4
DE01	CS472/CS472/CS	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	IT 461/ CS461/	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP12	CS 485/ CS486	Skill Development Course AWS cloud services/ Android Application Development	-	4	-	0	0	25	50	0	75	2
SDP13	CS470	Project Evaluation	-	8	-	0	0	50	0	100	150	4
SDP14	CS400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC15	CS482	Human Computer Interaction	3	2	-	35	35	30	50	0	150	4
DE02	CS474/CS475/CS	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP15	CS480	Capstone Work	-	8	-	0	0	75	0	75	150	4
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	-	-	0	50	25	0	0	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**185**	**50**	**75**	**550**	**15**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2022 – 2023 (Rev.2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Distributed System
	COURSE CODE	CS481
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	REVISION NO	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	-	150

PRE-REQUISITE: :

1. CS341: Operating Systems
2. CS343: Computer Networks

COURSE OBJECTIVES :

CS481.CEO.1: To comprehend the goals and architectures of distributed system.
CS481.CEO.2: To apply the MPI communication primitives for distributed systems applications.
CS481.CEO.3: To identify naming and synchronization method for a given distributed system. application.
CS481.CEO.4: To select suitable fault tolerance method for a given distributed system application.
CS481.CEO.5: To perceive the need of Distributed File System.

COURSE OUTCOMES:

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

CS481.CO.1: Identify the goals of Distributed System for a particular Architecture type. (RBT- L2)
CS481.CO.2: Implement the MPI programs for distributed system applications. (RBT- L3)
CS481.CO.3: Differentiate between different clock synchronization algorithms. (RBT- L3)
CS481.CO.4: Choose appropriate algorithms for incorporating replication and consistency in the given distributed system application. (RBT- L5)
CS481.CO.5: Decide fault tolerance mechanism to be used for particular distributed system application. (RBT- L5)
CS481.CO.6: CS481.CO.6: Explain distributed File System with reference to scalability, concurrency, transparency, replication and Fault Tolerance. (RBT- L2)

THEORY COURSE CONTENTS		
UNIT 1	**Introduction of Distributed System**	**6 HOURS**
App/System/Case study: Massively Multiplayer Online Games, Blockchain Technology **Contents:** Distributed System Definition, Design Goals, Challenges, Trends in Distributed Systems, Types, Architecture styles, System Architecture Types: Centralized - Client Server, Layered and Multitiered Architecture; Decentralized - Structured Peer to Peer Architecture, Chord, CAN, Unstructured Peer to Peer, Super peers, Hybrid Architecture - Edge Server System, Collaborative Distributed System, BitTorrent **Self-study:** Amoeba **Further Reading:** Overlay case studies: Pastry, Tapestry		
UNIT 2	**Distributed File System**	**7 HOURS**
App/System/Case study: Google File System **Contents:** Storage System and their Properties, Characteristics and Requirement of Distributed File System, File Service Architecture, Sun Network File System, Apache Hadoop Distributed File System, JuiceFS, OpenIO, OrangeFS, Lustre **Self-study:** The Andrew File System **Further Reading:** FileCoin File System		
UNIT 3	**Communication in Distributed System**	**7 HOURS**
App/System/Case study: Remote Method Invocation **Contents:** Remote Procedure Call, Message Passing Interface, Message Oriented Communication: Berkely Sockets, Message Queuing Model, Message Brokers, IBM WebSphere Message Queuing, Stream Oriented Communication, Publish Subscribe Systems, Multicast Communication: Application-level Multicasting, Gossip based Data Dissemination **Self-study:** Advanced Message Queuing Protocol **Further Reading:** DCOM (TangramCOM) and Java Distributed Object Model		
UNIT 4	**Naming and Synchronization in Distributed System**	**7 HOURS**
App/System/Case study: Domain Name Server, GPS **Contents:** Naming, Naming Types, Distributed Hash table, Clock Synchronization: Physical Clock-Network Time Protocol, Berkeley Algorithm, Clock synchronization in wireless environment, Logical Clock- Lamport's Logical Clock, Vector clocks, Mutual Exclusion, Election Algorithms **Self Study:** Distributed Event Matching centralized implementation **Further reading:** Gossip Algorithms		
UNIT 5	**Replication and Consistency**	**7 HOURS**

App/System/Case study: Amazon's Dynamo **Contents:** Need of Replication, Replication as scaling techniques, Data centric consistency model -Continuous consistency, FIFO, Causal consistency, Client centric consistency models, Consistency Protocol-Continuous consistency, Primary based protocols, Replicated write protocols, Cache Coherence protocols, Bigtable, Distributed Logging, Delos, Tango. **Self Study:** Replica Management **Further reading:** Replication in Hadoop		
UNIT 6	**Fault Tolerance**	**6 HOURS**
App/System/Case study: Fault tolerance in RAFT, Zookeeper **Contents:** Faulty System, Failure Models, Failure Techniques, Process resilience, Agreement in Faulty System, Byzantine Agreement Problem, Secure Untrusted Data Repository (SUNDR), Reliable Client Server Communication, Reliable Group Communication, Distributed Commit, Paxos Algorithm, Recovery, Leases: Fault-Tolerant Mechanism for Distributed File Cache Consistency. **Self Study:** Recovery orientated computing **Further reading:** piChain, pbft protocols		

PRACTICAL:		
PRACTICAL NO.1		**4 HOURS**
Implement Cannon's Matrix-Matrix Multiplication Algorithm using MPI making use of multiple cores.		
PRACTICAL NO.2		**4 HOURS**
Implementation of various Synchronization Algorithms.		
PRACTICAL NO.3		**4 HOURS**
Implement the synchronization for Dining Philosopher Problem using MPI Synchronization Primitives.		
PRACTICAL NO.4		**4 HOURS**
Implement various Election Algorithms for Coordinator selection in a Distributed System.		
PRACTICAL NO.5		**6 HOURS**
A. Make a key/value service fault-tolerant using a form of primary/backup replication protocol. B. Study and analysis of various open-source key management tools like Egnyte, HashiCorp, Doppler.		
PRACTICAL NO.6		**4 HOURS**
Implementation of HayStack File System (FaceBook photo storage).		
PRACTICAL NO.7		**4 HOURS**
Hadoop Map Reduce Program		

TEXT BOOK

1. Andrew.S.Tanenbaum, Maarten Van Steen, Distributed Systems –Principles and Paradigms, Third Edition, Prentice Hall -2016. ISBN-9788120322158
2. Coulouris, J. Dollimore,T. Kindberg and Gordon B Distributed Systems: Concepts and Designs, Fifth Edition, Pearson, 2017. ISBN- 9780132143011
3. A.D. Kshemkalyani, M. Singhal, Distributed Computing: Principles, Algorithms, and Systems, paperback edition, Cambridge University Press, March 2011. ISBN: 9780521189842

REFERENCE BOOK

1. Mukesh Singal, Advanced Concepts in operating System, Mcgraw Hill, ISBN-9780070472686
2. Pradeep K. Sinha," Distributed Operating Systems: Concepts and Design", Prentice Hall India Learning Private Limited, ISBN-978-8120313804.
3. https://nptel.ac.in/courses/106106168
4. https://sites.google.com/site/tangramcom/Home
5. https://www.researchgate.net/publication/3426577_Java_distributed_object_models_an_alternative_to_Corba
6. www.coursera.org/lecture/cloud-sys-software/facebook-haystack-based-design-Zay9r
7. https://en.wikipedia.org/wiki/Comparison_of_distributed_file_systems
8. https://en.wikipedia.org/wiki/List_of_file_systems
9. https://www.sciencedirect.com/topics/computer-science/distributed-file-systems
10. https://en.wikipedia.org/wiki/OrangeFS
11. https://en.wikipedia.org/wiki/Lustre_(file_system)
12. Delos:Simple,flexiblecontrolplanestorage-EngineeringatMeta(fb.com)
13. VirtualConsensusinDelos|USENIX
14. tangososp.pdf(cornell.edu)

MIT Academy of Engineering (An autonomous Institute Affilated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2022 - 2023 (Rev.2019)
FINAL YEAR, BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Wireless and Mobile Networks
	COURSE CODE	CS472
	COURSE CREDITS	3
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	-	35	35	30	-	-	100

PRE-REQUISITE : 1. CS343 : Computer Networks
2. IT351 : Cyber Security and Forensics

COURSE OBJECTIVES :

CS472.CEO.1: To build an understanding of wireless networks.
CS472.CEO.2: To understand architecture and types of Wireless Networks.
CS472.CEO.3: To identify design issues of Wireless Networks.
CS472.CEO.4: To know the challenges of Wireless Networks.

COURSE OUTCOMES :

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

CS372.CO.1: Determine issues and challenges in Wireless Networks.(L3)
CS372.CO.2: Categories different types of wireless networks. (L4)
CS372.CO.3: Determine issues and challenges of Mobile Ad-Hoc Networks. (L3)
CS372.CO.4: Assessing the features of Mobile Ad-Hoc Networks. (L3)
CS372.CO.5: Assessing the features of Wireless Sensor Networks. (L3)
CS372.CO.6: Apply different security algorithms in wireless Network. (L3)

THEORY COURSE CONTENT		
UNIT 1	**Basics of Wireless Networks**	**7 HOURS**

App/System/Case study: Smart phones, Wi-Fi, Hotspot, MANET, VANET, Wireless Mouse and Keyboard etc.

Contents:

Wireless Network Architecture and Classification, Wireless Switching Technology, Wireless Communication Problems, Wireless Network Reference Model, Wireless Networking Issues, Wireless Networking Standards.

Self -Study: Evolution of Wireless Networking.

Further Reading: Trends in Wireless Networking.

UNIT 2	Types of Wireless Networks	7 HOURS

App/System/Case study: Multitasking In Mobile Systems.Bluetooth, SHAREit, Internet Service Providers, WLAN in Inventory control, Publicly Shared Data Networks Provided by ISP, Privately Owned Networks

Contents: Basics of Wireless Networks with Protocols, Wireless, Body Area Network (WBAN) – S - MAC, T- MAC, LEACH, Wireless Personal Area Network(WPAN) – Bluetooth Protocol Stack, Wireless Local Area Network (WLAN / Wi-Fi) - Protocol Stack 802.11, Wireless Metropolitan Area Network (Wi-Max) – Protocol Stack 802.16, Wireless Wide Area Network (WWAN) – GSM (Global System for Mobile Communication) , GPRS (General Packet Radio Service).

Self-Study: IEEE Standards for WBAN, WPAN, WLAN, WMAN and WWAN.

Further Reading: 1) A review on Wireless Body Area Network for Medical Applications.
2) Wireless Personal Area Networks Architecture and protocols for Multimedia Applications.

UNIT 3	Basics of Mobile Ad-Hoc Networks	7 HOURS

App/System/Case study: Military Communication, Virtual Classrooms, Multi user Games etc.

Contents: Basics of Wireless ad-hoc Networks and MANET, MANET - MAC Protocols - Multiple Access with Collision Avoidance (MACA), Multiple Access with Collision Avoidance for wireless (MACAW), Power Control MAC (PCM), Power aware medium access control with signalling (PAMAS).

Self-study: DUCHA – Dual Channel MAC Protocol.

Further Reading: Attacks and Challenges in MANET.

UNIT 4	Routing Protocols and Transport Layer Protocol in MANET	7 HOURS

App/System/Case study: Use of MANET in Military.

Contents: Routing Basics and Protocols, Ad Hoc on demand distance vector (AODV), Dynamic source routing (DSR), Destination sequenced distance vector routing (DSDV), Global State routing Protocol (GSR), Fisheye state routing protocol (FSR), Hierarchical state routing protocol (HSR).
Transport layer Basics with its Protocols, Split-TCP, TCP-ELFN, TCP – F, TCP-Bus and ATCP

Self- Study: QoS aware routing.

Further Reading: ZRP – Zonal Routing Protocol, DYMO – Dynamic MANET on Demand

UNIT 5	Wireless Sensor Network	7 HOURS

App/System/Case study: Military, Health Care, Disaster Management, Home Control, Industrial Automation etc

Contents: Basics, Network Architecture, Design Factors, Design Issues, Challenges, Energy Consumption, Clustering, Sensing and Communication Ranges, Applications, WSN Protocol Stack and Protocol classification, MAC Protocols – Self-organizing medium access control for sensor networks (SMACS), Eavesdrops-and-register (EAR) algorithm, Adaptive transmission rate control (ARC).

Self- Study: Routing in Wireless Sensor.

Further Reading: Operating Systems for Wireless Sensor Network.

UNIT 6	Security in Wireless Network	7 HOURS

App/System/Case study: Attack in Wireless Networks.

Contents:: Basics of Wireless Encryption and its Types, Encryption Algorithm Protocol (WEP), Advanced Wireless Encryption Protocol (WPA), Advanced Wireless Encryption Protocol – 1 (WPA1), Advanced Wireless Encryption Protocol – 2 (WPA2).

Self -Study: Wireless Datagram Protocol (WDM), Wireless Transaction Protocol (WTP)

Further reading: Role of WEP in Wireless Communication.

TEXT BOOK

1. Dr. Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri, "Wireless and Mobile Networks Concepts and Protocols", 2nd Edition, 2016, Wiley India Pvt. Ltd., ISBN : 978-81-265-5855-1.
2. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols Paperback, Pearson Education, 2011.
3. . Kazem Sohraby, Daniel Minoli, Taieb Zanati, "Wireless Sensor Network Technology, Protocols and Applications", John and Wiley Sons INC., 2010, ISBN – 108126527307
4. William Stallings, "Cryptography and Network Security – Principles and Practice", Seventh Edition, PEARSON Publication, 2017.

REFERENCE BOOK

1. Carlos de Morais Cordeiro, Dharma Prakash Agrawal, "AD HOC SENSOR NETWORKS", World Scientific Publishing Co. Pte. Ltd., 2011.
2. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad hoc networking, Wiley-IEEE press, 2004.

MIT Academy of Engineering (An autonomous Institute Affilated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Information Retrieval
	COURSE CODE	CS473T
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	–	35	35	30	–	–	100

PRE-REQUISITE : 1. Data and File Structure

2. Design and Analysis of Algorithms

COURSE OBJECTIVES :

CS473.CEO.1: Learn the information retrieval methods and models.
CS473.CEO.2: To be familiar with web Search Engine
CS473.CEO.3: Understand theoretical base behind standard IR models
CS473.CEO.4: Be exposed to evaluation analysis of IR models
CS473.CEO.5: Introduce to modern IR methods

COURSE OUTCOMES :

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

CS473.CO.1: Understand the process of representing, retrieving and analyzing IR models and advanced IR models.
CS473.CO.2: Understand structure of web and working of crawlers
CS473.CO.3: Develop IR models form standard IR models.
CS473.CO.4: Develop the standard methods for web indexing and evaluation
CS473.CO.5: To analyze optimization techniques various algorithms used in web search.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**

App/System/Case study: logistic issues

Contents:

Introduction: Information Retrieval, History of IR, Semi Structured Data, Architecture of a Search Engine: Architecture, Basic Building Blocks, Components of building blocks: Text Acquisition, Text Transformation, Index Creation, User Interaction, Ranking, Evaluation

Self -Study: An example information retrieval problem

Further Reading: The role of artificial intelligence (AI) in IR

UNIT 2	**Web Crawles**	**6 HOURS**

App/System/Case study: Web Crawlers.

Contents: Deciding What to Search, Web structure , Crawling the Web, Web Search Architectures , Crawling Documents and Email, Document Feeds, The Conversion Problem, Storing the Documents, Meta Crawlers, Focused Crawling, Detecting Duplicates, Removing Noise, Crawler Algorithms and Development

Programming Assignment 1: Develop (Focused Crawlers) Domain Specific Crawler **Self-Study:** Google Bot, Bing Bot .

Further Reading: Open Source Web Crawlers

UNIT 3	**Retrieval Model**	**8 HOURS**

App/System/Case study: Similarity Based IR Models

Contents: Processing Text: From Words to Terms, Text Statistics, Document Parsing, Document Structure and Markup, Boolean Model, Vector Space Model, Probabilistic Model.

Programming Assignment 2: Implement Demonstrate Retrieval Model (Boolean Model, Vector Space Model, Probabilistic Model)

Self-study: Alternative Models

Further Reading: learning-to-rank.

UNIT 4	**Indexing and Retrieval Evaluation**	**6 HOURS**

App/System/Case study: Basic Indexing- Map Reduce.

Contents: Indexing: Inverted Indexes, Compression, Index Construction, Retrieval Evaluation: Why Evaluate? The Evaluation Corpus, Logging, Effectiveness Metrics, Efficiency Metrics, Training, Testing, and Statistics. System Issues in Efficient Retrieval and Scoring

Programming Assignment 3: Develop an inverted Index – dictionary and positioning list using standard data structures in Java or Python. Develop solution for simple queries, test run and tabulate speed for search against GREP. Calculate Precision and recall for given query set.

Self- Study: Query Processing

Further Reading: Query Interfaces.

UNIT 5	**Web-Search Optimization**	**6 HOURS**

App/System/Case study: Google Search Engines.
Contents: Web Search: History of Web, Indexing, Link Analysis (HITS Algorithm, Page-Rank Algorithm), Relevance Scoring and ranking for Web, Search Engine Optimization, On page Optimization, Off page optimization.
Programming Assignment 4: Implement and Analyze HITS and Page-Rank
Self- Study: Personalized search, Handling "invisible" Web.
Further Reading: Summarization, Question Answering, Reporting

UNIT 6	Advanced Information Retrieval	8 HOURS

App/System/Case study: Information Retrieval of Images and Videos.
Contents:: Multimedia Information Retrieval, Parallel and Distributed IR, Meta-Ranking, Searching with Communities, Filtering and Recommending, Personalized Search: Potential for personalization, Inferring and using location, Topic sensitive Page-Rank.
Self -Study: Economic, ethical, legal and political issues
Further reading: Categorization algorithms

TEXT BOOK

1. W. Bruce Croft, Donald Metzler, Trevor Strohman, "Search Engines Information Retrieval in Practice" ©W.B. Croft, D. Metzler, T. Strohman, 2015, Electronic Copy Freely Available.
2. C. Manning, P. Raghavan, and H. Schütze, "Introduction to Information Retrieval" Cambridge University Press, 2008 ISBN – 978-1107666399.

REFERENCE BOOK

1. Ricardo Baeza -Yates and Berthier Ribeiro – Neto, "Modern Information Retrieval: The Concepts and Technology behind Search" 2nd Edition, ACM Press Books 2011 ISBN - 978-0136072249.
2. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, "Information Retrieval: Implementing and Evaluating Search Engines", The MIT Press, 2010 ISBN - 978-0262528870.
3. Ophir Frieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series", 2nd Edition, Springer, 2004 ISBN - 978-1402030031.
4. Information Retrieval: Implementing and Evaluating Search Engines, by S. Büttcher, C. Clarke, and G. Cormack.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2022 - 2023 (Rev.2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Computer Vision
	COURSE CODE	CS477
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	NA	NA	100

PRE-REQUISITE : AS204-Applied Mathematics
CS102-Application Programming Using Python

COURSE OBJECTIVES :

CS477.CEO.1: To describe the fundamentals of image formation.
CS477.CEO.2: To identify design issues of computer vision applications.
CS477.CEO.3: To apply computer vision techniques to gain a visual understanding.
CS477.CEO.4: To understand different techniques for video processing.

COURSE OUTCOMES :

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

CS477.CO.1: Explain image formation and operations. [L2]
CS477.CO.2: Implement Binary Image Processing operations. [L3]
CS477.CO.3: Compare different image enhancement and feature extraction techniques. [L3]
CS477.CO.4: Apply methods of computer vision for image segmentation and recognition. [L3]
CS477.CO.5: Identify the design requirement of video processing. [L2]
CS477.CO.6: Suggest a design of a computer vision system for a specific problem [L5]

THEORY :		
UNIT 1	**Introduction to Computer Vision**	**8 HOURS**

App/System/Case study: Self Driving Car
Contents: Image Processing VS Computer Vision. Introduction to images - How images are formed, Manipulating Pixels, Displaying and Saving, Display Utility Functions, Color Image formation, Image Channels, Splitting and Merging Channels, Manipulating Color pixels, Images with Alpha Channel
Basic image operations - How to create new images, crop an image Section, copy a Region to another in an image, resize an image, create an image mask
Mathematical operations on images - Contrast Enhancement, Brightness Enhancement, Image Annotation - Draw a line/circle/rectangle/eclipse/text over an image
Assignment 1: Build a QR code Detector.
Self Study: Bit-wise operations
Further reading: Image annotation using mouse

UNIT 2	**Binary Image Processing**	**7 HOURS**

App/System/Case study: Object Tracking
Contents: Thresholding - Thresholding in OpenCV, Erosion / Dilation in OpenCV, Opening and Closing on OpenCV, Connected Component Analysis in OpenCV, Contour Analysis in OpenCV, Blob Detection in OpenCV
Assignment 1: Image Annotation using mouse
Assignment 2: Add Trackbar as controller
Assignment 3: Implement different Morphological Operations
Assignment 4: Coin Detection.
Self Study: Contour retrieval techniques
Further reading: Edge editing and enhancement

UNIT 3	**Image Enhancement**	**6 HOURS**

App/System/Case study: Instagram Filters
Contents: : Color Spaces, Color Transforms, Image Filtering, Image Smoothing, Image Gradients, Hough Transforms, High Dynamic Range Imaging, Seamless Cloning
Convert your images into different color spaces
Create your own Instagram Filter and Blemish Removal from the face
Self Study: : Image Inpainting
Further reading: Autofocus

UNIT 4	**Geometric Transforms and Image Features**	**6 HOURS**

App/System/Case study: : Document scanner
Contents: Geometric Transforms in OpenCV, Image Features, ORB Feature in OpenCV, Feature Matching, Random sample consensus (RANSAC).
Assignment 1: Create Panorama for multiple images
Assignment 2: Feature Matching based Image Alignment
Assignment 3: Finding Known Objects using OpenCV
Self Study: FLANN Matcher
Further Reading: Universal Sample Consensus (USAC)

UNIT 5	Image Segmentation and Recognition	7 HOURS

App/System/Case study: Selfie Apps
Contents: Image segmentation using Grab Cut, Image Classification, recognition, Histogram of Oriented Gradients (HOG), Support Vector Machine (SVM), Eyeglass Classifier in OpenCV,
Object Detection - Pedestrian Detection in OpenCV, Face detection using HAAR Cascade in OpenCV.
Assignment 1: Create your own Selfie App with the following features a. Skin smoothing Filter b. Sunglass Filter
Self Study: : Image Alignment
Further Reading: Mask R-CNN

UNIT 6	Video Analysis and Deep Learning with OpenCV	6 HOURS

App/System/Case study: Video Activity Detection System
Contents: Video IO using High GUI -Read and Display video, Properties of Video Capture, Reading and writing to video.
Motion Estimation using Optical Flow- What is Optical Flow, Lucas-Kanade Optical Flow Application: Video Stabilization
Object Tracking: - Different Object Tracking Algorithms-Single and multiple object tracking using OpenCV
Deep Learning with OpenCV: - Image Classification, Image Classification using TensorFlow Object Detection, Single Shot Multibook Detector (SSD), You Only Look Once Detector (YOLO) Face Detection, SSD based Face Detector
Assignment 1: Image classification and object detection using Yolo and CNN
Assignment 2: Multiple object tracking using OpenCV
Self Study: Human Pose detection using OpenPose
Further Reading: S: Kalman Filter,Meanshift, Camshif

TEXT BOOK

1. "Computer Vision: Algorithms and Applications" by Richard Szeliski, Second Edition, Springer-Verlag London Limited, 2022, ISBN: 978-3030343712.
2. "Computer Vision: A Modern Approach" by Michael Sipcer, Second Edition, Pearson Education,2015 ISBN: 978-9332550117.

REFERENCES

1. "Multiple View Geometry in Computer Vision" by Richard Hartley and Andrew Zisserman, Third Edition, Cambridge University Press,March 2012. ISBN: 978-0521540513.
2. "Computer Vision: Principles, Algorithms, Applications, Learning" by E.R. Davies,Fifth Edition, Academic Press Elsevier,2017. ISBN: 978-0128092842
3. "Learning OpenCV 4 Computer Vision with Python 3" by Joseph Howse, Joe Minichino,Third Edition, Packt Publishing Ltd, February 2022. ISBN: 978-1789531619.

MIT Academy of Engineering (An autonomous Institute Affilated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev.2019)
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Ethical Hacking
	COURSE CODE	IT461
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : IT351-Cryptography and System Security and IT352-Cyber Security Forensic

COURSE OBJECTIVES :

CS341.CEO.1: Explain Ethical Hacking Concepts and its scope.
CS341.CEO.2: To understand Footprinting concept through search engine , web services and Social Networking Sites
CS341.CEO.3: Identify different types of vulnerabilities and vulnerability Assessment Tools and Techniques
CS341.CEO.4: Explain the privilege escalation technique and gain the access of a targeted system
CS341.CEO.5: Identify different web server attack and countermeasures
CS341.CEO.6: To understand web application hacking methodology

COURSE OUTCOMES :

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

CS341.CO.1: Describe hacking concepts, and scopes [L2]
CS341.CO.2: Apply different approaches to perform Footprinting through search engine, web and network sites [L3]
CS341.CO.3: Analyze vulnerability assessment reports [L4]
CS341.CO.4: Apply different techniques to privilege escalation and gain the access to a system [L3]
CS341.CO.5: Perform various web server attacks its countermeasures[L4]
CS341.CO.6: Demonstrate different techniques to perform various web application attack[L4]

THEORY COURSE CONTENT		
UNIT 1	**Basics of Ethical Hacking**	**6 HOURS**
App/System/Case study: Open Source Operating Systems-Fedora **Contents:** Information Security Overview, Cyber kill chain concepts, Hacking Concepts, Ethical Hacking Concepts, Information security controls, Information security laws and standards **Self -Study:** Ethical hacking phases **Further Reading:** Cyber Laws in global perspective		
UNIT 2	**Footprinting and Reconnaissance**	**8 HOURS**
App/System/Case study: Demonstration to gather the information of targeted system **Contents:** Footprinting: Concept, Footprinting through search engines, Web services, Social Networking Sites, Website, email, Social engineering, Whois, DNS. Footprinting Countermeasures Scanning Networks: Network Scanning Concepts, Scanning Tools, Port and Service Discovery, OS Discovery **Self-Study:** Nmap Scanning techniques **Further Reading:** Banner grabbing using Nmap		
UNIT 3	**Vulnerability Analysis**	**6 HOURS**
App/System/Case study: Demonstration NESSUS tool for Vulnerability Assessment **Contents:** Vulnerability Assessment Concepts, Classification and Assessment Types, Assessment Solutions and tools, Assessment Reports. **Self-study:** Explore the different methods in NESSUS. **Further Reading:** Examples of IPC Systems.		
UNIT 4	**System Hacking**	**6 HOURS**
App/System/Case study: Demonstration on Social Engineering technique using Kali Linux. **Contents:** System Hacking Concepts, Gaining Access, Escalating Privileges, Maintaining Access, Clearing Logs Sniffing , Social Engineering and Denial of Services **Self- Study:** DDoS Attack and preventation methods. **Further Reading:** Methods of authentication bypass .		
UNIT 5	**Hacking Web Servers**	**8 HOURS**
App/System/Case study: Case study on web server attack. **Contents:** Web server Concepts, Web Server attacks, webserver attack methodology, web server attack tools, Countermeasures , patch management, web server security tools. **Self- Study:** Explore web security tools in kali Linux. **Further Reading:** Web server password hacking , Session hijacking		

UNIT 6	Hacking Web Application and Wireless Network	8 HOURS

App/System/Case study: Demonstrate on SQL inject on web application.

Contents:: Web application concepts, threats, hacking methodology, Web Application Security, SQL Injection tools and techniques.

Wireless Networks: Concept, Encryption , Threats , Methodology and Tools.

Self -Study: Identify different web application attacks and tools

Further reading: Packing sniffing methodology

PRACTICAL: Perform following experiments using Open source tools

PRACTICAL NO.01		2 HOURS

Footprinting and Reconnaissance:

a. Through Search Engine.

b. Web Services

c. Web Site

PRACTICAL NO.02		4 HOURS

Scanning Networks:

a.Host Discovery

b.Port and Service Discovery

c.OS Discovery Scan beyond IDS and Firewall

PRACTICAL NO.03		4 HOURS

Vulnerability Analysis: Preform Vulnerability Assessment using various Vulnerability Assessment Tools

PRACTICAL NO.04		4 HOURS

a.Sniffing: ARP Poising using arpspoofing

b.Social Engineering

c.DoS or Session Hijacking

PRACTICAL NO.05		4 HOURS

Hacking Web Servers: Perform Privilege Escalation to Gain Higher Privileges

PRACTICAL NO.06		4 HOURS

Hacking Web Application (SQL Injection and SQL Map)

PRACTICAL NO.07		2 HOURS

Hacking Wireless Network:

a.Crack a WEP Network Using Wifiphisher

b.Crack a WEP Network using Aircrack-ng

PRACTICAL NO.08 | **2 HOURS**

Evading IDS, Firewall, and Honeypots:

a. Perform Intrusion Detection using Snort

b. Bypass windows firewall using Nmap

TEXT BOOK

1. Ethical Hacking and Countermeasures V11, Professional Series by EC-Council.
2. Hacking: The Art of Exploitation, 2nd Edition by Jon Erickson

REFERENCE BOOK

1. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, 2nd Edition by Dafydd Stuttard and Marcus Pinto
2. Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition" by Allen Harper and Shon Harris

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Big Data Analytics
	COURSE CODE	CS461
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	20	30	150

PRE-REQUISITE: :

1. CS311: Descriptive Analytics
2. CS331: Predictive Analysis

COURSE OBJECTIVES :

CS461.CEO.1: To optimize business decisions and create competitive advantage with Big Data analytics

CS461.CEO.2: To introduce various operations of HDFS

CS461.CEO.3: To analyze the Hadoop concepts required for developing map reduce programs.

CS461.CEO.4: To derive business benefit from unstructured data

CS461.CEO.5: To exercise the programs on PIG HIVE, HBase, Spark, Scala Hadoop eco-system

COURSE OUTCOMES:

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

CS461.CO.1: Prepare for data summarization, query, and analysis. (RBT-L2)

CS461.CO.2: Apply data modeling techniques to large data sets. (RBT-L3)

CS461.CO.3: Inspect applications for Big Data analytics. (RBT-L4)

CS461.CO.4: Build a complete business data analytic solution (RBT-L5)

THEORY COURSE CONTENTS		
UNIT 1	**Introduction To Big Data And Hadoop**	**8 HOURS**

App/System/Case study: Healthcare Monitoring and cause Detection

Contents:

Introduction to Big Data, Sources of Big Data, 5 V's of Big Data, Big Data Analytics, Challenges of Traditional System, Challenges of Big data, Distributed Systems, Introduction to Apache Hadoop, Hadoop Features, Components of Hadoop Ecosystem, Hadoop Architecture, Commercial Hadoop Distributions, Case Study- Bank of India.

Self-study: Environmental Setup and Custer management of Hadoop

Further Reading: Hadoop Security Architecture

UNIT 2	**HDFS(Hadoop Distributed File System)**	**8 HOURS**

App/System/Case study: CERN- Large Hadron collider

Contents:

Introduction to HDFS, Features and Goals, Internal Architecture and HDFS Workflow, HDFS Concepts, Command Line Interface (CLI), Hadoop file system interfaces, HDFS File Operations, YARN Components, Benefits of YARN,Data flow, Data Ingestwith Flume and Scoop, Hadoop archives, Hadoop I/O: Compression, Serialization - Avro, parquet, File-Based Data structures.

Self-study: Performance Evaluation in HDFS

Further Reading: HDFS architecture in cloud computing

UNIT 3	**Map Reduce Framework**	**6 HOURS**

App/System/Case study: Govt-Royal mail : British Postal Service

Contents: Introduction to MapReduce, Framework, Compilation and Execution Process Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map-Reduce Types and Formats, Map Reduce Features. MapReduce Use Cases. Input Splits, Relation between Input Splits and HDFS Blocks Combiner Practitioner.

Self-study: Map reduce for desktop Grid Computing

Further Reading: Map reduce in Cloud Computing

UNIT 4	**Hadoop Eco System-Pig 6 Hour**	**6 HOURS**

App/System/Case study: Transport- British Airways

Contents:

Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig data types, Built-in functions used with the LOAD and STORE operators, The difference between storing and dumping a relation, The Pig operators, Pig evaluation Functions User Defined Functions, Data Processing operators, Pig Data Types , Shell and Utility Commands Pig Latin : Relational Operators, File Loaders, Group Operator, COGROUP Operator, Joins and COGROUP, Union, Diagnostic Operators, Specialized joins in Pig , Built In Functions (Eval Function, Load and Store Functions, Math function, String Function, Date Function, Pig UDF, Piggybank, Parameter Substitution (PIG macros and Pig Parameter substitution)Aviation use case in PIG, Pig Demo on Healthcare Data set

Self Study: Data Analysis using Pig

Further reading: Crime Data Analysis using Pig

UNIT 5	Apache Hive	8 HOURS

App/System/Case study: Hospitality-Hotels. Com, Kings.com(candy crush Game)
Contents:
Hive : Introduction, Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, Basics and Internal Table, external table, Loading Different File Formats, Load Data Into Hive Table, Hive Indexes and View, Hive Partitions Buckets, Hive Function — Built-in User Defined Functions HiveQL: Simple Operations On Hive Table, query operations on hive table, Querying Complex Structures From A Table, Join SubQuery.
Self Study: Difference in Pig and Hive
Further reading: Hive ETL

UNIT 6	Apache HBase and Spark-Scala	8 HOURS

App/System/Case study: Retail- Marks and Spenser (DatHub)
Contents:
Apache HBase: Introduction, Concepts, HBase Vs RDMBS, Hbaseprerequisites, Base Architecture, Components, and Data Model,HBase Shell Commands ,HBase Table –operations, Create, Insert Retrieve Data in HBase, , Using Apache HBase Shell, Conceptual Physical View, Namespace, Tables, Rows, Cells Column Family, Sort Order, Column Metadata, joins, ACID, Schema Design,Row Key design,Constraints,Catalog Tables, Storing Medium-sized Objects, Backup and Restore commands, Spark: Introduction, components of spark, Resilient distributed databases (RDD), Spark core programming concepts, compilation and execution of spark program. Introduction to Scala ,Basic Programming Constructs of Scala , Case Study Word Count Program
Self Study: Hadoop MapReduce Vs Apache Spark
Further reading: Mobile big data analysis using Apache Spark

PRACTICAL:		
PRACTICAL NO.1		**6 HOURS**
A. Installation of the Hadoop under windows 10 and Under Ubuntu (min 2 GBRAM) B. Installation of the Hadoop under VM (Windows) or Hadoop Distribution of Cloudera (Min Requirement 8 GB RAM) C. Execution of basic Hadoop Commands		
PRACTICAL NO.2		**4 HOURS**
Implementation of Word Count program using Map Reduce		
PRACTICAL NO.3		**4 HOURS**
Apache PIG Installation and Exercises using Given dataset Create two file as fil11.txt and file2.txt, Insert students details (least 10 records) like (rollno, name, age, city, etc) but not limited to, and perform following operations 1. Load the files using PigStorage 2. Perform task using Diagnostic Operator • Dump operator • Describe operator • Explain operator • Illustration operator 3. Grouping and Joining • Group Operator • Cogroup Operator • Join Operator • Cross Operator 4. Combining Splitting • Union Operator • Split Operator 5. Filtering • Filter Operator • Distinct Operator • Foreach Operator 6. Sorting • Order By • Limit Operator 7. Built-in Functions • Eval Functions • Load Store Functions • Bag Tuple Functions		
PRACTICAL NO.4		**4 HOURS**
Apache Hive: DDL, DML Statement using Apache Hive Execution of Given Queries on various dataset		
PRACTICAL NO.5		**6 HOURS**
Apache HBase: DDL, DML Operations, HBase Operations- read and Write using Metatable		
PRACTICAL NO.6		**4 HOURS**
Spark Programming - Implement the WordCount program by using RDD (Resilient distributed Dataset) SCALA-SPARK Apache Spark Programming Exercise : Twitter Analysis using Spark Find all the tweets by user Find how many tweets each user has Find all the persons mentioned on tweets Count how many times each person is mentioned Find the 10 most mentioned persons Find all the hashtags mentioned on a tweet Count how many times each hashtag is mentioned Find the 10 most popular Hashtags		

TEXT BOOK

1. Big Data, Black Book(covers Hadoop 2, Mapreduce, Hive, Yarn, Pig, R And Data Visualization, Black Book, Dreamtech
2. Hadoop: The Definitive Guide ,by Tom White,June 2009, O'Reilly Media, Inc., Publications,ISBN: 9780596521974
3. Practical Hadoop Ecosystem:A Definitive Guide to Hadoop Frameworks and Tools,1st ed. Edition, by Deepak Vohra, ISBN: 978-1484221983

REFERENCE BOOK

1. Müller, Andreas C., and Sarah Guido. Introduction to machine learning with Python: a guide for data scientists. " O'Reilly Media, Inc.", 2016.
2. Bahga, Arshdeep, and Vijay Madisetti. Big data science analytics: A hands-on approach. VPT, 2016.
3. Alan Gates, "Programming Pig: Dataflow Scripting with Hadoop", O'reilly
4. Vaddeman, Balaswamy. Beginning Apache Pig. Berkeley, CA: Apress, 2016.
5. Stefano Baghino, Andrea Bessi, Bertrand Bossy, "Scala and Spark for Big Data Analytics", Packt
6. Bill Chambers, "Spark: The Definitive Guide: Big Data Processing Made Simple", O'reilly
7. George, Lars. HBase: the definitive guide: random access to your planet-size data. " O'Reilly Media, Inc.", 2011.
8. Mittal, Mamta, et al., eds. Big data processing using spark in cloud. Berlin, Germany: Springer, 2019.
9. Odersky, Martin, Lex Spoon, and Bill Venners. Programming in scala. ArtimaInc, 2008.
10. Karau, Holden, and Rachel Warren. High performance Spark: best practices for scaling and optimizing Apache Spark. " O'Reilly Media, Inc.", 2017.

MIT Academy of Engineering (An autonomous Institute Affilated to SPPU)	COURSE SYLLABI	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2022 - 2023 (Rev.2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Deep Learning
	COURSE CODE	CS462
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	NIL	50	150

PRE-REQUISITE :

1.CS 352 Artificial Intelligence and Neural Network.

2.CS 355 Machine Learning and its applications.

COURSE OBJECTIVES :

CS462.CEO.1: To identify the fundamentals of deep learning.

CS462.CEO.2: To interpret stable representations and handling of high dimensional data.

CS462.CEO.3: To develop model using deep learning algorithm to solve real time problems.

CS462.CEO.4: To analyze the performance of various approaches of algorithms.

COURSE OUTCOMES :

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

CS462.CO.1: Understand the fundamentals of deep learning. (L2)

CS462.CO.2: Recognize significances of deep learning algorithms to handle high dimensional data. (L2)

CS462.CO.3: Interpret the application requirements in field of Computer vision and Natural language processing. (L3)

CS462.CO.4: Analyze experimental results of different algorithms in deep learning. (L4)

CS462.CO.5: Optimize algorithms using various approaches to improve performance of model. (L5)

CS462.CO.6: Assemble variety of deep learning algorithm to develop the model.(L5)

THEORY COURSE CONTENT		
UNIT 1	**Introduction to deep learning and Convolutional Neural Network**	**8 HOURS**

App/System/Case study: Detection of COVID-19 from Chest X-Ray.
Contents:
Fundamentals of deep learning, Comparison of AI-ML-DL, Convolutional Neural Networks, Hyper parameters of CNN, Computation of Number of Parameters and Tensor Sizes in a CNN, Optimizers in deep learning, Types of CNN architectures.
Unix: Architecture and System concepts
Self -Study: Significances of CNN over Artificial Neural Network.
Further Reading: Parameter optimization in neural networks

UNIT 2	**Transfer learning and Object recognition**	**8 HOURS**

App/System/Case study:A Real-Time Street Actions recognition.
Contents: Transfer Learning -Strategies and Types. Object recognition - Object localization, detection, segmentation and recognition algorithms, Object detection CNN models-R-CNN, Fast R-CNN, Faster R-CNN, YOLO —Action Recognition from Videos using Deep Neural Networks.
Self-Study: Object detection with deep learning on Raspberry Pi.
Further Reading: Transfer learning from pre-trained models.

UNIT 3	**Autoencoder and Generative Adversarial Networks**	**8 HOURS**

App/System/Case study: Generate photographs of Human Faces.
Contents: Unsupervised Learning models, Autoencoders -Fundamentals and Significances, architecture, properties with hyperparameters, types of autoencoder, compression, Generative Adversarial Networks –Fundamentals and Architecture
Self-study: Deep convolutional denoising autoencoders for image classification
Further Reading: Photos to emoji using GAN.

UNIT 4	**Sequence Models**	**7 HOURS**

App/System/Case study: Stock Market Prediction, Sentiment text Categorization
Contents: Sequence Models, Recurrent Neural Networks, Back propagation through time (BPTT), Vanishing and Exploding Gradients, Gated Recurrent Unit (GRU), Long Short-Term Memory (LSTM), Bidirectional Long Short-Term Memory (BILSTM).
Self- Study: Time series prediction.
Further Reading: NLP tasks using deep sequence model.

UNIT 5	**Sequence to sequence model**	**8 HOURS**

App/System/Case study: Image Caption Generation, Chatbot and Text Summarization.
Contents: Sequence to sequence model, Encoder Decoder Models-Fundamentals, Architecture and Significance over LSTM, Attention based Mechanism and its significances over encode decoder model, BERT - Bidirectional Encoder Representations from Transformers.
Self- Study: Attention over images.
Further Reading: Hierarchical Attention

UNIT 6	Deep reinforcement learning	6 HOURS

App/System/Case study: Self-driving car

Contents:: Introduction to Deep reinforcement learning, Q-Learning, Deep Q-Learning, Policy Gradient, Foundation Techniques of Deep Reinforcement Learning.

Self -Study: Industry Automation with reinforcement learning

Further reading: Domain Selection for Reinforcement Learning

PRACTICAL: Perform following experiments using Open source tools		
PRACTICAL NO.01		**4 HOURS**
Implement vehicle classification using CNN.		
PRACTICAL NO.02		**2 HOURS**
Implement vehicle detection using RCNN model		
PRACTICAL NO.03		**4 HOURS**
Implement Deep learning-based stacked denoising and autoencoder for ECG heartbeat classification.		
PRACTICAL NO.04		**2 HOURS**
Automatic speech recognition using LSTM and BILSTM and analyze the experimental results of both algorithm.		
PRACTICAL NO.05		**4 HOURS**
Implement time Series Forecasting using Attention Mechanism or BERT model.		
PRACTICAL NO.06		**6 HOURS**
Mini-project in class and out class activity		

TEXT BOOK

1. Deep Learning from Scratch: Building with Python from First Principles (English, Paperback, Seth Weidman) (English, Paperback, Seth Weidman).2019
2. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MIT Press book in preparation. (2015).

REFERENCE BOOK

1. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau: Operating Systems: Three Easy Pieces, https://www.overleaf.com/project/60508e799f7fac226457bf7c Arpaci-Dusseau Books, August, 2018
2. Deep Learning in Natural Language Processing by Li Deng and Yang Liu, 2019
3. Hands-On Deep Learning Algorithms with Python: Master deep learning algorithms with extensive math by implementing them using TensorFlow Paperback – 25 July 2019

THEORY COURSE CONTENT		
UNIT 1	**SDLC Automation**	**8 HOURS**
App/System/Case study: Web Application Development using CICD Pipeline **Contents:** CICD Overview, CodeCommit - Overview, options, securing repository and branches, Triggers and notifications. CodeBuild - Overview, buildspec.yaml, Docker, ECR using buildspec.yaml, Environment varialbles and Parameter Store, Artifacts and S3, Events and Logging CodeDeploy - Overview, Application Deployment Groups, Deployment configurations, Hooks and Environement Variables, Rollbacks, Deploy to AWS Lambda CodePipeline - Overview, Adding CodeCommit, CodeDeploy and CodeBuild, Manual approval steps, Stage Actions, All Intergartions **Self study:** Jenkins Architecture **Further Reading:** AWS Plugins for Jenkins		
UNIT 2	**Advanced Conftguration Management**	**8 HOURS**
App/System/Case study: Launching infrastructure for executing a Web Application **Contents:** Advanced CloudFormation - User Data, cfn-init, cfn-signal and wait conditions, Rollbacks, Nested Tasks, Change Sets, Deletion Policy, Deploying Lambda Functions, Drift Detection Advanced Elastic Beanstalk - Saved configurations, .ebextensions for config and resources, Rolling updates strategies, Swap URL, Worker environements Advanced Lambda - Security, Environment variables, KMS and SSM, Versions, Aliases and Canary routing, SAM Framework **Self study:** EBS Multi Docker Deployment **Further Reading:** Lambda CodeDeploy		
UNIT 3	**Elastic Container and Elastic Kubernetes Services**	**6 HOURS**
App/System/Case study: Deploying a Web Application using Containers **Contents:** What is Docker, ECS Clusters, ECS Task Definition, ECR, Fargate, Elastic Kubernetes - Overview, deployment **Self Study:** ECS Autoscaling **Further Reading:** ECS CloudWatch Integration		
UNIT 4	**Policies and Standards Automation**	**6 HOURS**
App/System/Case study: Developing policies and standards for Monitoring and Logging of a Web Application **Contents:** SSM - Overview, EC2 steup, On Premise Setup, Resource Groups, Run Command, Parameter Store, Patch Manager, Inventory, Automation Config - Rules, Automation, Multi Account Inspector - Setup and Automation Trusted Advisor, GuardDuty, Secrets Manager **Self Study:** AWS Maccie **Further Reading:** EC2 Instance Compliance		

UNIT 5	High Availability, Fault Tolerance, Disaster Recovery	6 HOURS

App/System/Case study: Developing High Availability, Fault Tolerance features for a Web Application

Contents: AutoScaling Groups - Scheduled Actions, Scaling Policies, ALB Integration, Lifecycle Hooks, Termination Policies, Integration with SQS, CodeDeploy Integration, Deployment Strategies
Multi AZ and Multi Region - Overview, CloudFormation StackSets, CodePipeline
Disaster Recovery - Overview, Strategies

Self Study: AWS Organizations

Further Reading: HTTPS on ALB

UNIT 6	Terraform	6 HOURS

App/System/Case study: Launching the infrastructure to run a Web Application using Terraform

Contents: Jenkins - Overview, Installation and basic configuration, creating and running first job, adding and managing slaves, Building triggers, Continuous Integration, Using AWS functionality

Self Study: Difference between Terraform and AWS CloudFormation

Further Reading: Using AWS Services through Terraform

PRACTICAL:		
PRACTICAL NO.01	**SDLC Automation**	**4 HOURS**
Create a sample application to demonstrate the use of CodeCommit, CodeBuild, CodeDeploy		
PRACTICAL NO.02	**Advanced Conftguration Management**	**4 HOURS**
Launch the infrastructure using AWS CloudFormation advanced features like cfn-init, cfn-signal		
PRACTICAL NO.03	**Elastic Container and Kubernetes Service**	**4 HOURS**
Using AWS ECS service, create a sample docker image for running a web application		
PRACTICAL NO.04	**AWS Policies and Standards**	**4 HOURS**
Implement password saving application using AWS Parameter Store		
PRACTICAL NO.05	**High Availability and Disaster Recovery**	**4 HOURS**
Implement Life cycle hook for AWS Autoscaling Groups		
PRACTICAL NO.06	**Terraform**	**4 HOURS**
Launching AWS infrastructure using Terraform		
PRACTICAL NO.07	**Project**	**4 HOURS**
Implement a demo Web Application to demonstrate the use of AWS Devops related services		

TEXT BOOKS

1. Wittig, Michael, Andreas Wittig, and Ben Whaley. Amazon web services in action. Manning,, 2018.
2. Raheja, Yogesh, Giuseppe Borgese, and Nathaniel Felsen. Effective DevOps with AWS: Implement continuous delivery and integration in the AWS environment. Packt Publishing Ltd, 2018.
3. Vehent, Julien. Securing DevOps: security in the cloud. Simon and Schuster, 2018.
4. van Vliet, Jurg, Flavia Paganelli, and Jasper Geurtsen. Resilience and Reliability on AWS: Engineering at Cloud Scale. " O'Reilly Media, Inc.", 2013.
5. Sarkar, Aurobindo, and Amit Shah. Learning AWS: Design, build, and deploy responsive applications using AWS Cloud components. Packt Publishing Ltd, 2018.

REFERENCE BOOKS

1. Kavis, Michael J. Architecting the cloud: design decisions for cloud computing service models (SaaS, PaaS, and IaaS). John Wiley Sons, 2014.
2. Vacca, John R., ed. Cloud computing security: foundations and challenges. CRC Press, 2016.
3. Furht, Borivoje, and Armando Escalante. Handbook of cloud computing. Vol. 3. New York: springer, 2010.

MIT | Academy of Engineering (An autonomous Institute A□liated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING & TECHNOLOGY	W.E.F	2022–2023
FINAL YEAR BACHELOR OF TECHNOLOGY IN COMPUTER ENGINEERING	COURSE NAME	Project Evaluation
	COURSE CODE	CS470
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	REVISION NO	0.0

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

PRE-REQUISITE : NIL

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the e□ectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project implementation (Sem VI), next step is project evaluation (Sem VII). The goal of this phase of the project is to draw Inferences and Detail Analysis/Final Testing/Re-development/etc. Showcasing the work - Technical documentation in Conferences/Journal/Patent/Product/Working model.

GUIDELINES

1. Preferably project group students of Sem VI would be continued in this semester VII.
2. Every project group should consist of minimum 03 and maximum of 04 students.
3. The group members may be from di□erent programs to support the interdisciplinary functioning.
4. Projects should preferably have a national/international, industry/academic/research collaboration.
5. Students should give a mature shape to their idea in terms of implementation. This is expected in this semester. This may include one or many of these points. Implementation /development/experimentation/simulation/testing/building the techniques/processes
6. Carry out detail analysis w.r.t Final Testing/Re-development/etc.
7. Showcase the work in Conferences/Journal/Patent/Product/Working model.

COLLABORATIVE/SPONSORED PROJECT

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization at the start of semester VI.
3. Proposed Collaborative Project work need to be reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of 12 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I: (10 Marks)
2. Activity 1: (20 Marks)
3. Project Review II: (10 Marks)
4. Project Report (10 Marks)
5. Project: Final Presentation and Demonstration (100 Marks)

(Parameters of evaluation: Final implemented work, report, presentation and paper drafted based on work)

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Larsen Samuel Bruning, "Doing Projects And Reports In Engineering", Macmillan Education UK, Bloomsbury Publishing PLC, 2019, ISBN: 9781352005639, 1352005638.
3. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
4. Sara Efrat Efron and Ruth David, "Writing the Literature Review: A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
5. Helmut Kopka and Patrick Daly, "A Guide to Latex: Document preparation for beginners and advanced users", Addison Wesley, 1999.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Student Internship Program (Technical/ Research Skills)
	COURSE CODE	CS400
	COURSE CREDITS	4
RELEASE DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS400.CEO.1: To get acquainted with the professional organization structure
CS400.CEO.2: To enable students to apply their knowledge for development of product/system/software
CS400.CEO.3: To work individually as well as in groups
CS400.CEO.4: To get Hands-on experience in the related field
CS400.CEO.5: To formulate the engineering problem statement

COURSE OUTCOMES :

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

CS400.CO.1: Analyze a given engineering problem
CS400.CO.2: Identify an appropriate problem solving methodology
CS400.CO.3: Cultivate hands-on professional work experience prior to their graduation
CS400.CO.4: Understand the real time technical, managerial and communication skills required at the job
CS400.CO.5: Develop appropriate workplace attitudes and understand the importance of ethics in professional life

INTRODUCTION:

The main aim of Student Internship Program (SIP) is to assist all Final Year B.Tech. students to obtain internships at various centers of excellence in the industry and the academia. The ultimate goal is to imbue students with professionalism and networking capabilities using internships as a tool for providing comprehensive practical experience. Using SIP, MITAoE students will enhance their academic and professional skills, making themselves more marketable in today's competitive world. The students can harness this lucrative opportunity to apply the knowledge they acquired all through the academic career in the professional realm.

SCOPE AND STRUCTURE OF SIP:

Summer Internship Program (SIP) is offered to entrants of Final Year B.Tech. (after semester VI) that meet the eligibility criteria stated below:

Final year B.TECH entrants should apply for 4 to 6 weeks duration internships during June-July of every academic year. For this internship, REGULAR credits will be awarded. (Credit Based Internship - 4 Credits). This internship is compulsory for all the entrants of final year B.TECH. Awarded credits will be considered for the calculation of final year CGPA and will be reflected in Regular Grade Card. Student has to work for 160 hours minimum as an Intern during the said period.

MITAoE will be responsible for identifying internship oppportunities and assisting students to apply for such positions. However, any financial liability, including but not limiteed to travel, accomodation, insurance etc. incurred as direct or indirect consequence of such a position is the sole responsibility of the student and his/her guardians.

STUDENT ELIGIBILITY CRITERIA:

Students applying for internships must meet the following criteria:

After completion of sixth academic semester, Third Year B. Tech. students (Final Year B. Tech. entrants) of all schools are eligible to apply for 4 to 6 weeks duration internships under SIP. All students have to complete the internship successfully as stated in the scope of Student Internship Program. However, students who fail to earn the 4 credits for any reason, shall be required to earn the same at a later instant of time to be eligible for the award of degree as per the internship policy.

RULES FOR APPLICATION TO SIP:

Students applying to the Student Internship Program are required to adhere the following rules and need to go through SIP policy document:

1. Students must complete an undertaking to abide by the rules and regulations of the institution / industry for which they are applying for SIP.

2. Students must obtain academic and school clearances to ensure completion of prerequisite courses or other requirements as a part of their application to SIP.

3. Students must submit a well formatted CV, requisite form, financial declaration, if any, along with the undertaking stated above to the Internship Coordinator through Faculty Mentor before April 30 of every year.

4. Last date for completing all relevant formalities pertaining to SIP is 15 days prior to the start of the internship.

5. Within the first week of the internship, students are required to submit their supervisor's contact information to the Faculty Mentor and Internship Coordinator.

6. **During the internship, students must submit brief fortnightly report duly signed by their supervisor to the Faculty Mentor.**

7. **Annexure IV is the final approval for the SIP and without which no internship is approved and no queries will be entertained at a later stage.**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2022 – 2023 (Rev.2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Human Computer Interactions
	COURSE CODE	CS482
	COURSE CREDITS	4
RELEASED DATE : 1/06/2022	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	–	50	150

PRE-REQUISITE :NIL

COURSE OBJECTIVES :

CS482.CEO.1: To apply the foundations of Human Computer Interaction.
CS482.CEO.2: To Understand the design technologies for individuals and persons with disabilities.
CS482.CEO.3: To apply the guidelines, principles and standards for user interface.

COURSE OUTCOMES :

The students after completion of the course will be able to

CS482.CO.1: Identify human factors and usability issues related with computing applications.
CS482.CO.2: Apply suitable design principles, models and usability guidelines for user interface design.
CS482.CO.3: Discuss the impact of usability evaluation and testing in computing applications
CS482.CO.4: Design user interfaces following required processes and standards.

THEORY COURSE CONTENT		
UNIT 1	**Foundation of HCI**	**8 HOURS**

App/System/Case study:
Web Usability

Content: Why Human Computer Interaction, what is HCI, Interdisciplinary Nature, Human Factors, Understanding the Human- Input output channels, Memory, Thinking, Emotions, Ergonomics, Usability, User Interface (UI), Contexts- Web, Business, Mobile, Game Applications, Accessibility, HCI Paradigm.

Self-Study: Psychology and the design of Interactive systems

Further Reading:: Human errors and Mental models

UNIT 2	Principles and Models	8 HOURS

App/System/Case study:
Mobile Usability

Content:

Eight Golden Rules of Interface Design, Principles of Good Design, Faulty Designs, Miller's Principle, Models of interactions- Norman's Action Model, Gulf of Execution and Evaluation, Errors – Mistakes, Slips, Lapses and Violations, Guidelines for Data Display, Guidelines for Data Entry, Conceptual, Semantic, Syntactic and Lexical Model, Task Analysis, GOMS, Keystroke-Level Model, User Persona, UI Standards and GUI Libraries.

Self-Study: Ubiquitous Computing

Further Reading: Agent based Interfaces

UNIT 3	Design Process and Interaction Styles	9 HOURS

App/System/Case study:
Social Networking Sites

Content:

Design, Three Pillars of Design, Process of Design, Ethnographic Observations, Contextual Inquiry, Iterative Design, Participatory Design, Navigation Design, Visual Design, - Layout, Color, Fonts, Labeling, LUCID, Scenarios, Interaction Styles - Direct Manipulation, Menu Selection, Form-Filling, Commands, Natural Language, Internationalization, Interaction Design Patterns. HCI in software process: interactive systems and SDLC.

Self-Study: Interactive design and Prototyping

Further Reading: Design rationale

UNIT 4	Evaluation and Case Studies	9 HOURS

App/System/Case study:

E-Governance Sites

Content:

Expert-based Evaluation, User-based Evaluation, Heuristic Evaluation, Cognitive Walkthrough, Semiotic Analysis, Expert Reviews, Usability Testing, User Surveys, Interviews, Think Aloud, Acceptance Tests, Statistical Methods, Touch Interfaces, Public Place Interfaces, Wearable Interfaces, Tangible Interfaces, Intelligent Interfaces, Ubiquitous and Context-Aware Interaction.

Self-Study: Usability evaluation **Further Reading:** User support

UNIT 5	Documentation and Groupware	9 HOURS

App/System/Case study:

e-Health Applications

Content:

Classification of Documents, Printed Manuals, Reading from Displays, Online Help, Tutorial, Error / Warning Messages, Groupware, Goals / Dimensions of Cooperation, Asynchronous Interactions, Synchronous Interactions, Online Communities, Community ware

Self-Study: Computer Mediated Communication

Further Reading: Modeling Rich Interactions

PRACTICAL: Perform following experiments using Open source tools

Note: Following are the reference case studies, can be changed with other appropriate examples with same level.

PRACTICAL NO.1	MINI PROJECT	28 Hrs
	1. Identify specialized users and related facilities for a selected product or system and make necessary suggestions for its improved accessibility design.	4
	2. Design user persona for the users of selected product or system.	8
	3. Conduct a contextual inquiry for selected product or system	4
	4. Design an interface prototype for selected product or system.	8
	5. Evaluate an interface using usability evaluation technique	4

TEXT BOOK

1. Alan Dix, Janet Finlay, “Human Computer Interaction”, 4th Edition, Pearson publication, ISBN 0130461091.

2. Ben Shneiderman, “Designing the User Interface”, 3rd Edition, Pearson Education, ISBN81-7808-262-4

REFERENCE BOOK

1. Kent Norman, JurekKirakowski “Handbook of Human Computer Interaction” Wiley Publication, ISBN 9781118976135
2. Helen Sharp, Jenifer Preece” Interaction Design beyond Human Computer Interaction” 5th Edition, ISBN 978-1119547259
3. Donald Norman, “The Design of Everyday Things”, 2002 Edition, Basic Books, ISBN 100-465-067107.
4. Wilbert O. Galitz, “The Essential Guide to User Interface Design”, 2nd Edition, Wiley-dreamtech India (P) Ltd., ISBN 81-265-0280-0.
5. John M. Carroll, “Human-Computer Interaction in the New Millennium”, Pearson Education, ISBN 81-7808-549-6.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2022 – 2023 (Rev.2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	Ubiquitous Computing
	COURSE CODE	CS474
	COURSE CREDITS	3
RELEASED DATE : 01/06/2022	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	—	35	35	30	–	–	100

PRE-REQUISITE : Human Computer Interaction

COURSE OBJECTIVES :

CS474.CEO.1: To introduce pervasive computing abilities

CS474.CEO.2: To introduce tools and techniques used while solving problems using pervasive computing.

CS474.CEO.3: To study the different application of pervasive computing

COURSE OUTCOMES :

The students after completion of the course will be able to

CS474.CO.1: To present a survey on pervasive computing building blocks.

CS474.CO.2: To create presentations using pervasive computing techniques and devices.

CS474.CO.3: To demonstrate small applications of pervasive computing

THEORY COURSE CONTENT

UNIT 1	Introduction to Ubiquitous Computing	7 HOURS

App/System/Case study:
Energy, Healthcare

Content: Definition, Advantage, Application and Scope., Mobile Computing, Pervasive Computing, Wearable Computing, Modeling the Key Ubiquitous/Pervasive Computing Properties, Mobile Adaptive Computing

Self-Study: Mobility Management and Caching

UNIT 2	Ubiquitous Computing Devices	7 HOURS

App/System/Case study:

Healthcare System

Content:

Smart Environment: Users, Mobiles, Cards and Device Networks, Smart Devices: Application and Requirements, Device Technology and Connectivity.

Self-Study: HCI Application

UNIT 3	Human Computer Interaction	6 HOURS

App/System/Case study:

Case study on Intensive Care Unit in Hospital

Content:

HCI, User Interface and Interaction for four hand-held widely used devices, Hidden UI via basic smart devices, Hidden UI via wearable and Implanted devices, user models

Self-Study: Human centered design

UNIT 4	Wearable Computing	7 HOURS

Content:

Glass and Augmented Reality, Eye-Tracking, Digital Pen and Paper Mobile social networking crowd sensing, Event based social network

UNIT 5	Security in Ubiquitous Computing	6 HOURS

Content:

Energy constraints, Security and Privacy in Pervasive Networks, Experimental Comparison of Collaborative Defense Strategies for Network Security.

UNIT 6	Challenges and Outlook	4 HOURS

Content:

Overview of challenges, smart devices, Smart Interaction, Smart physical environment device interaction, Smart human-device interaction, Human Intelligence versus machine intelligence, social issues. Case Study- Wearable Computing/ Cyber Physical System.

TEXT BOOK

1. Ubiquitous Computing Fundamentals, John Krumm, CRC Press, 2010
2. Stefan Poslad, Ubiquitous Computing, Smart devices, environment and interaction, Wiley.
3. Frank Adelstein, Sandeep Gupta, Golden Richard III, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, Tata McGraw Hills

REFERENCE BOOK

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Klaus Rindtor, Thomas Schaeck, Pervasive Computing, Pearson, Eighteenth Impression, 2014.
2. BoS Content: Books, Course Notes, Digital contents, Blogs developed by the BoS for bridging the gaps in the syllabus

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	2022 – 2023 (Rev.2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	COURSE NAME	AR/VR
	COURSE CODE	CS475
	COURSE CREDITS	3
RELEASED DATE : 01/06/2022	REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	—	35	35	30	–	–	100

PRE-REQUISITE : Human Computer Interaction

COURSE OBJECTIVES :

CS475.CEO.1: To introduce the need for Interaction Design study

CS475.CEO.2:To learn the Process of Interaction Design

CS475.CEO.3: To develop User Interface Evaluation and Testing skills

CS475.CEO.4: To study how to use Augmented Reality Software Development Toolkit for designing AR apps.

COURSE OUTCOMES :

The students after completion of the course will be able to

CS475.CO.1: Explain importance of Interaction Design study.

CS475.CO.2: Apply Interaction Design and UI design process in enhancing user-experience of an application.

CS475.CO.3: Conduct Usability Evaluation of interactive user-interfaces

CS475.CO.4: Build simple AR application using AR SDK

THEORY COURSE CONTENT

UNIT 1		11 HOURS

Interaction Design, Good and poor design, multidisciplinary, goals of ID- usability, Understanding the problem space, Conceptual Models, metaphors, paradigms Understanding Users- cognition, mental model, affective aspects, expressive interfaces, user frustration.

UNIT 2		11 HOURS

Interaction Design Process- Golden rules, guidelines, principles, standards; Evaluation techniques- Expert-based, User-based, Heuristic, Cognitive Walkthrough, Semiotic Analysis, Expert Reviews, Usability Testing, User Surveys, Interviews, Think Aloud, Acceptance Tests.

UNIT 3		11 HOURS

Introduction to Augmented Reality, Types of AR- Projection based AR, Recognition based AR- marker-based, markerless, location-based AR, Outline AR, Superimposition based AR. AR hardware, Unity, AR SDK

UNIT 4		11 HOURS

VA verses AR, Applications, Characteristics- Augmentation, Optical vs. video, Focus & Contrast, Portability, Comparison against Virtual Environment; Registration- Static Error, Dynamic Error, Vision-based Techniques, Current Status; Sensing- Input variety & bandwidth, High Accuracy, Long range.

REFERENCE BOOK

1. Helen Sharp, Yvonne Rogers, and Jenny Preece. Interaction Design: Beyond Human Computer Interaction. John Wiley & Sons. 2007.
2. Jakob Nielsen.Usability Engineering. Morgan Kaufmann Publishers Inc., San Francisco, CA, USA. 1993.
3. Cawood, Stephen, Mark Fiala, and Daniel Howard Steinberg. Augmented reality: a practical guide. Raleigh, NC: Pragmatic Bookshelf, 2007
4. Doug A. Bowman, Ernst Kruijff, Joseph J. LaViola, and Ivan Poupyrev. 3D User Interfaces: Theory and Practice. Addison Wesley Longman Publishing Co., Inc., Redwood City, CA, USA. 2004.
5. Azuma, R. T. A survey of augmented reality. Presence:Teleoperators & Virtual Environments, 6(4), 355-385. 1997.
6. SanniSiltanen. *Theory and Applications of Marker-based Augmented Reality.* Volume 3 of VTT science, ISSN 2242-119X. Valtionteknillinentutkimuskeskus. Publisher, VTT, ISBN, 9513874494, 97895138744. 2012

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP405
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP405.CEO.1: To study the basic concepts of economics
HP405.CEO.2: To use the practical applications of economic feasibility
HP405.CEO.3: To understand the concept of banking and features
HP405.CEO.4: To illustrate the financial planning and saving options

COURSE OUTCOMES :

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

HP405.CO.1: Relate the basic concepts of engineering economics
HP405.CO.2: Apply the economic viability of firm/organization under different market conditions
HP405.CO.3: Explain the bank structures and its schemes
HP405.CO.4: Execute the effective way of financial budget and skills

THEORY		
UNIT 1	**Introduction to Economics**	**6 HOURS**
Economic issues and concepts; How economist work, Theory of demand and supply; meaning, Determinants, Equilibrium between demand and supply; Elasticity of demand; Price elasticity; Income elasticity; Cross elasticity, Characteristics of an Indian economy, Concepts of foreign trade, Goods and Services Tax (GST), Globalization, Liberalization, Privatization, Global market indices, Foreign Direct Investment (FDI). **Case studies:** Housing market, General raw products/fuel market, Electronic devices, Startups, etc. **Further readings:** Introduction to Crypto-currency, Impact and analysis in the foreign market.		
UNIT 2	**Micro Economics and Macro Economy**	**6 HOURS**
Revenue concepts, Cost concepts, Short run and long run cost concepts and curves, Opportunity cost. Markets; meaning, types of markets and their characteristics, National Income (NI); meaning, stock and flow concept, NI at current price, NI at constant price, Gross National Product (GNP), Gross Domestic Product (GDP), Net National Product (NNP), Net Domestic Product (NDP), Personal income, Disposal income, Inflation: meaning, types, causes, measures to control. **Case studies:** Economics network, Economic influences of COVID-19 pandemic, etc.		
UNIT 3	**Capital Cost Estimation and Economic Viability Study**	**5 HOURS**
Typical capital cost component, Cost Index (CI), Typical operating cost components, Classes of cost estimates, Cost estimation by applying factors, Detailed cost estimation method, Financial viability calculation (Payback period, Break-even point, Internal rate of return (IRR) and Net present value (NPV); numerical), Cash flow diagrams, Profitability criteria – Project evaluation and index. **Case studies:** Detailed spreadsheet of product cost, Determination of project cost, Net profit/loss, etc.		
UNIT 4	**Introduction to Banking & Money Market**	**5 HOURS**
Banking; meaning, types, functions, Commercial banks- Instruments in operation of an account, Central bank- Reserve Bank of India (RBI); its functions, Concepts and influences- Cash Reserve Ratio (CRR), Bank rate, Repo rate, Reverse repo rate, Statutory Liquidity Ratio (SLR), Introduction to money and capital market, Introduction to fiscal policy- meaning and tools. **Further readings:** Retail banking, Demonetization, Banking management, etc.		
UNIT 5	**Financial Literacy and Planning**	**6 HOURS**
Importance of financial planning, literacy and budgeting, Savings related products, Insurance related products, Pension, Retirement and estate planning, Borrowing related products, Basic and advanced investing, Government schemes for various savings and investment options, Tax savings options. **Case studies:** Shore Financial, Real life examples, Goal-Planning, etc. **Self studies:** Protect your family financial and retirement planning.		

REFERENCE BOOKS

1. N G. Mankiw: Economics: Principles of Economics, Cengage Learning (2003), ISBN: 1305585127.
2. J. Bradfield, Introduction to the Economics of Financial Markets, Oxford University Press, New York (2007), ISBN: 9780195310634.
3. F. Vega-Redondo, Economics and the theory of games, Cambridge University Press (2003), ISBN: 9780521775908.
4. C. S. Park, Fundamentals of Engineering Economics, Prentice Hall (2003), ISBN: 9780130307910.
5. D. E. O'Connor, The Basics of Economics, Greenwood Publisher (2004), ISBN: 9780313325205.
6. V. V. Mahajani, S. M. Mokashi, Chemical Project Economics, Macmillan India Ltd. (2005), ISBN: 1403928142.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Psychology
	COURSE CODE	HP406
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP406.CEO.1: To introduce the basic concept of Psychology.

HP406.CEO.2: To explain how learning and conditioning occurs in everyday life through both nature and nurture factors.

HP406.CEO.3: To know the main schools of thought and prime contributors to the theory of workplace motivation.

HP406.CEO.4: To develop insight into one's own and others behavior and underlying mental processes.

HP406.CEO.5: To develop Positive Psychology interventions to increase personal well-being.

COURSE OUTCOMES :

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

HP406.CO.1: Explain the basic concepts of Psychology.

HP406.CO.2: Apply the concept of conditioning in day to day life.

HP406.CO.3: Explain the main schools of thought and prime contributors to the theory of workplace motivation.

HP406.CO.4: Demonstrate effetely the personality traits in regular life.

HP406.CO.5: Employ Positive Psychology interventions to increase personal well-being.

THEORY

UNIT 1	Basics of Psychology	6 HOURS

Meaning, Nature, Objective of Psychology, Learning: meaning, classical conditioning, operant conditioning; Attention and Perception: definition, types of attention, determinants of attention.

UNIT 2	Social Interactions	6 HOURS

Conformity, Compliance, Obedience, Stereotypes, Attitudes: nature, characteristics, attitude formation and attitude change; Prejudice and Discrimination- characteristics and types of prejudice, development and maintenance of prejudice and discrimination, manifestation of prejudice, methods of reducing prejudice and discrimination.

UNIT 3	Need and Motivation	6 HOURS

Meaning; extrinsic and intrinsic motivation, Vroom's Expectancy Theory of Motivation, Herzberg's Motivators and Hygiene Factors, Maslow's Hierarchy of Needs.

UNIT 4	Self and Identity	6 HOURS

Meaning and Need, Erik Erikson's Stages of Psychosocial Development, Carl Rogers' Theory of Personality, Thomas Harris's Transactional Analysis, Johari Window, SWOT .

UNIT 5	Positive Psychology	4 HOURS

Introduction to Positive Psychology; From Learned Helplessness to Learned Optimism, 'Building the Skill of Gratitude, VIA Classification of Character Strengths and Virtues, Identifying and Using Your Signature Strengths, Resilience and Optimism, Cognitive Strategies to Increase Optimism and Resilient Thinking, Managing Anxiety and Increasing Positive Emotions .

TEXT BOOK

1. S. Cicearelli, J. Noland White, Psychology 4th Edition, Pearson Publisher, ISBN-13:9780208972241.
2. Robert A. Baron, Introduction to Psychology 3rd Edition, Pearson Education Company, ISBN-10:0536813906.
3. Stephen P. Robbins, Timothy. A. Judge, Organizational Behavior 15th Edition, Pearson Education Inc., ISBN-10:0-13-283487-1.
4. Robert. A. Baron, Nyla. R. Branscombe, Social Psychology 13th Edition, Pearson Education India, ISBN-13:978-9332569911.

REFERENCE BOOK

1. Kathleen M. Galotti, Cognitive Psychology 2nd Edition, SAGE Publications India Pvt. Ltd. ISBN:978-93-515-0277-7.
2. Robert S. Feldman, Understanding Psychology 10th Edition, McGraw Hill Education (India) ISBN:10: 1-25-900305-1.
3. Elliot Aronson, Timothy D. Wilson, Robin M. Akert, Social Psychology 8th Edition, Pearson Education, ISBN:9788131730898.
4. Calvin S. Hall, Gardner Lindzey, John B. Campbell, Theories of Personality 4th Edition Choudhary Press, Delhi, ISBN: 978-81-265-1092-4.

MIT | Academy of Engineering (An Autonomous Institute Affiliated to Savitribai Phule Pune University)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING & TECHNOLOGY	W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN COMPUTER ENGINEERING	COURSE NAME	Capstone Portfolio
	COURSE CODE	CS480
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	REVISION NO	0.0

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

PREREQUISITE : NIL

COURSE OBJECTIVES :

CS480.CEO.1: Improve individual perspectives to find solutions at different scales

CS480.CEO.2: Identify the capstone work, formulate the methodology along with a significant collection of artifacts and outcomes.

CS480.CEO.3: Synthesize a reflective report to effectively communicate and explore findings.

CS480.CEO.4: Create a professional portfolio that technically, graphically and verbally describes pertinent achievements and the progressive growth during the program.

COURSE OUTCOMES :

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

CS480.CO.1: Portray individual skill for solving the problem.

CS480.CO.2: Showcase the best techniques and suitable methodology.

CS480.CO.3: Cognize the significance of report and comprehend its reflections.

CS480.CO.4: Assimilate digital and visual literacies.

COURSE ABSTRACT

Capstone work is an individual, self-identified project that focuses on technical/non-technical issues. Capstone work requires taking risks, high productivity, strong design research, quick turnaround times, creating an advanced design. A Digital portfolio is an integrative collection of work that draws together skills gained from across the taught phase of the program. It comprises a structured set of papers that enabled application and critical reflection. It is an amalgamation of both written and visual content that draws out the evolution of thinking around the ways in which design, social constructs, and emerging technologies intercept. It exposed process, critical thinking, as well as final artifacts, concepts, and its contents articulated in depth. The student enables to learn powerful new methods to promote his online self-design profile. It will help to established a professional voice by writing a personal design philosophy and a reflective article for the Linked In profile page. The opportunity to choose the project,formulate solution, negotiate deliverable, work individually, and present digitally is what makes the Capstone portfolio unique.

Capstone portfolio is divided into two section

a) Capstone work

b) Digital Portfolio

CAPSTONE WORK

Individual student can choose the topic from one of the below capstones to carry out the work during the entire semester

1. Technical Capstone
    - Industry identified problem
    - Institute identified problem
    - Urban city identified problems
    - Rural Development
    - Environmental related problems
    - Student Conceived problems
    - Satisfactory solution to Open ended problems
    - Innovative Design stemming from Student/Faculty
    - Product Development
    - App/ Software Development
    - Multidisciplinary approach to existing problem
    - Modeling/Optimization/Analysis study

2. Writing Intensive Capstone

   - Design
   - Literature Survey
   - Commercial Survey
   - Social media Survey
   - Idea/ Design Philosophy
   - Research Methodology
   - Consultancy Project work
   - Collaborative Project work
   - Laboratory/Digital classroom
   - Manage/lead any Event/activity

3. General Capstone

   - State of art
   - Creating YouTube channel
   - Design Blog/Forum
   - Challenges and Prospect of Technology (Engineering) Education in Primary and Secondary Schools
   - Market Statistics

DIGITAL PORTFOLIO

Individual student should create there own digital portfolio by using the standard professional platforms/blogs based on the record during their entire Under Graduate program. Digital portfolio should be professional, amalgamation of technical, written, graphical/Visual content and Verbal culmination of the skills and knowledge that students have developed over their under graduate program.

1. Process Portfolio
2. Show case Portfolio
3. Hybrid Portfolio

GUIDELINES

1. Individual student will work for Capstone work for entire semester.
2. Individual student will create their own digital portfolio.
3. Individual student should choose the title of the capstone work with approval from the Supervisor and School Dean
4. Student should work on the topic approved with all necessary information, evidences and the measurable outcomes.
5. Student will have to write the graduation book on the capstone work.
6. Students have to follow the guidelines of plagiarism for graduation book.
7. If Student perceive exemplary achievement it can can consider as capstone work review 2. This will ensure the competency of students which they have learn during their undergraduate program. However supervisor can take stand if the capstone work is remarkable, he/she may ask to write a small report for the record.However supervisor can take stand if the capstone work is good, he/she may ask to write one small report.
    - Published Article in Scopus Index Journal
    - Approved Research Proposal
    - Winner for Design Competitions/Tech fest/ Workshop
    - Winner for State/National/International Event (Technical/Non-technical)
    - Valid score in Competitive exams (GATE/CAT/GRE-TOEFL/IELTS)
8. Capstone work and Digital portfolio need to be reviewed by supervisor and one faculty of same department to ensure whether student have followed all the guideline and work is appropriate and worth for evaluation.
9. Final examination will be conducted in the presence of Jury.

ASSESSMENT and EVALUATION

The Jury will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the Capstone work supervisor. Assessment shall be done jointly by the supervisor and jury members.

1. Capstone work Review 1 (25 Marks)
2. Capstone work Review 2 (25 Marks)
3. Creating Digital Portfolio (50 Marks)
4. Graduation book (25 Marks)
5. Final Demonstration (25 Marks)

REFERENCES

1. https://design.berkeley.edu/
   Berkeley M.Des. University of California, U.S.
2. https://design.gatech.edu/
   Georgia Institute of Technology, College of Design Atlanta, U.S.
3. https://www.apus.edu/
   American Public University
4. https://msu.edu/
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5. https://www.cranfield.ac.uk
   Cranfield University, Shrivenham Swindon UK
6. https://my.bulbapp.com/personalized-learning/assessment-infographic-blog/
7. https://edtechjeffco.weebly.com
8. https://www.invisionapp.com/inside-design/10-portfolio-websites-to-show-off-your-design-work/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Semester Long Internship Program (SLIP)-Design
	COURSE CODE	CS467
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS467.CEO.1: To get acquainted with the organization structure
CS467.CEO.2: To gain learning and living experience
CS467.CEO.3: To develop appropriate workplace attitudes
CS467.CEO.4: To get Hands-on experience in the related field to relate and reinforce what has been taught at the university
CS467.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CS467.CO.1: Analyze a given engineering problem
CS467.CO.2: Identify an appropriate problem solving methodology
CS467.CO.3: Prepare themselves to work in cross-cultural, multi-national environment
CS467.CO.4: Improve self-confidence and independency
CS467.CO.5: Develop ability to work individually as well as in groups

ELIGIBILITY:

I. No live backlogs

II. 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.

APPLICATION PROCEDURE:

The student must submit a proposal of the semester-long internship including the 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 corporatee relations (CR) coordinator. The application must be prescibed in the SLIP policy.

TIMELINE:

The Semester Long Internship Program (SLIP) is carried out in two phases viz. SLIP - Design and SLIP - Implementation. SLIP - Design is a mandatory phase.

ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

I. Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel. The Panel for the evaluation should be 3 members or 4 members. The composition of the team would be as follows:

a. Dean, Respective School
b. Project Guide
c. CR Coordinator / Project Coordinator
d. Project Guide (Industry)
e. The domain expert

II. Presentation I in the mid of the internship and Presentation II at the end of the internship combined to a total weightage of 4 credits. **In grade card it will be mentioned as SLIP - Design.**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Semester Long Internship Program (SLIP)-Implementation
	COURSE CODE	CS468
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS468.CEO.1: To get acquainted with the organization structure
CS468.CEO.2: To gain learning and living experience
CS468.CEO.3: To develop appropriate workplace attitudes
CS468.CEO.4: To get Hands-on experience in the related field to relate and reinforce what has been taught at the university
CS468.CEO.5: To formulate the problem statement

COURSE OUTCOMES :

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

CS468.CO.1: Analyze a given engineering problem
CS468.CO.2: Identify an appropriate problem solving methodology
CS468.CO.3: Prepare themselves to work in cross-cultural, multi-national environment
CS468.CO.4: Improve self-confidence and independency
CS468.CO.5: Develop ability to work individually as well as in groups

ELIGIBILITY:

I. No live backlogs

II. Semester Long Internship Program (SLIP) - Design must be completed.

III. If Recruiter/s (MNCs) have asked for semester long internship to the selected student/s (before joining the organization after his / her graduation), then in special case recruited students can apply for the same. (Only criteria-I should be satisfied by the student).

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

ASSESSMENT METHOD FOR SEMESTER LONG INTERNSHIP:

I. Credits for the semester-long internship need to be earned by the students by the following assessment in front of the panel. The Panel for the evaluation should be 3 members or 4 members. The composition of the team would be as follows:

a. Dean, Respective School

b. Project Guide

c. CR Coordinator / Project Coordinator

d. Project Guide (Industry)

e. The domain expert

II 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 4 credits and should be as per the template.

In grade card it will be mentioned as SLIP - Project Implementation.

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)

2019 -2023

BoS Chairman	Member Secretary	Chairman
Dean, School of	Academic Council	Academic Council
Electrical Engineering	Dean Academics	Director MITAOE

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to SavitribaiPhule Pune University

CURRICULUM FRAMEWORK (REVISION 2019)

ELECTRONICS ENGINEERING

The Bachelor of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION : SEMESTER WISE									
S.N.	TYPE OF COURSE	NO. OF COURSES/SEMESTER							TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science (NSC)	2	2	1						**5**
2.	Engineering Science (ESC)	4	3		1					**8**
3.	Discipline Core (DC)			3	3	3	3	1	1	**14**
4.	Discipline Elective (DE)							1	1	**2**
5.	Open Elective (OE)					1	1	1		**3**
6.	Humanities and Social Science (HSS)		1		1	1	1		2	**6**
7.	Skill Development and Project (SDP)			3	2	2	2	3	1	**13**
TOTAL		**6**	**6**	**7**	**7**	**7**	**7**	**6**	**5**	**51**
AUDIT COURSE			**1**	**2**	**1**	**1**				**5**

CREDIT DISTRIBUTION : SEMESTER WISE											
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit											
S.N.	TYPE OF COURSE	NO. OF CREDITS/SEMESTER								TOTAL	%
		1	2	3	4	5	6	7	8		
1.	Natural Science (NSC)	8	8	4						**20**	**12.5**
2.	Engineering Science (ESC)	13	9		4					**26**	**16.25**
3.	Discipline Core (DC)			12	12	11	11	4	4	**54**	**33.75**
4.	Discipline Elective (DE)							3	3	**6**	**3.75**
5.	Open Elective (OE)					4	4	4		**12**	**7.5**
6.	Humanities and Social Science (HSS)	0	2		2	2	2		4	**12**	**7.5**
7.	Skill Development and Project (SDP)			5	3	4	4	10	4	**30**	**18.75**
TOTAL		**21**	**19**	**21**	**21**	**21**	**21**	**21**	**15**	**160**	**100**

CREDITS				
1Lecture Hour = 1 Credit, 2 Lab Hours = 1 Credit, 1 Tutorial Hour = 1 Credit				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	21/19	19/21	**40**
2.	Second Year	21	20	**41**
3.	Third Year	22	22	**44**
4.	Final Year	21	15	**36**
TOTAL				**161**

CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	29/27	28/30	**57**
2.	Second Year	31	29	**60**
3.	Third Year	30	32	**62**
4.	Final Year	25	20	**45**
TOTAL				**224**

ABBREVATIONS		
1.	MSE	Mid Semester Exam
2.	ESE	End Semester Exam
3.	IA	Internal Assessment
4.	T/P	Term Work / Practical
5.	DM	Demonstration
6.	L	Lecture
7.	P	Practical
8.	T	Tutorial
9.	Lab	Laboratory

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)												
INDUCTION PROGRAM: 3 WEEKS												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (Version I)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC6	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
ESC7	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	**Audit**	
TOTAL			**11**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
ESC7	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
PE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	**Audit**	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III												
SUMMER INTERNSHIP												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC01	ET221	Electronic Devices and Circuits	3	2	-	35	35	30	50	0	150	4
DC02	ET222	Digital Systems and Applications	3	2	-	35	35	30	50	0	150	4
DC03	ET223	Signals & Systems	3	2	-	35	35	30	50	0	150	4
SDP1	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP2	ET230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP3	ET225	Skill Development Course-Data Structures & Algorithms	0	4	-	0	0	25	0	50	75	2
ESC9	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	18	0	140	140	170	200	150	800	21

SEMESTER: IV												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC8	IT221	Engineering Informatics	3	2	-	35	35	30	50	0	150	4
DC04	ET231	Electromagnetic Theory	3	0	-	35	35	30	0	0	100	3
DC05	ET232	Network Analysis Techniques	3	2	-	35	35	30	50	0	150	4
DC06	ET233	Microcontroller & Interfacing	3	2	-	35	35	30	50	0	150	4
SDP4	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP5	ET240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	16	0	140	140	170	150	150	750	20

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V

SUMMER INTERNSHIP

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	ET341	Control Systems	3	2	-	35	35	30	50	0	150	4
DC08	ET342	Digital Signal Processing	3	2	-	35	35	30	50	0	150	4
DC09	ET343	Embedded Systems Design	3	2	-	35	35	30	50	0	150	4
OE01	ET35# / EX35#	Open Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP6	ET34#	Skill Development - Data Science	0	4	-	0	0	25	50	0	75	2
SDP7	ET350	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			**14**	**16**	**0**	**140**	**190**	**195**	**200**	**50**	**825**	**22**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	ET361	Power Electronics	3	2	-	35	35	30	50	0	150	4
DC11	ET362	Principles of Communication Systems	3	2	-	35	35	30	50	0	150	4
DC12	ET363	Soft Computing	3	2	-	35	35	30	50	0	150	4
OE02	ET37# / EX37#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP8	ET36#	Skill Development course	0	4	-	0	0	25	50	0	75	2
SDP9	ET360	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability Skills	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**20**	**0**	**140**	**140**	**195**	**250**	**100**	**825**	**22**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: VII												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC13	ET461	HDL-Digital Circuit Design	3	2	-	35	35	30	50	0	150	4
DE01	ET48# / EX48#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	ET47# / EX47#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	ET46#	Skill Development Course	0	4	-	0	0	25	50	0	75	2
SDP11	ET470	Project Evaluation	0	8	-	0	0	50	0	100	150	4
SDP12	ET400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	ET462	Process Automation	3	2	-	35	35	30	50	0	150	4
DE01	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	-	-	0	50	25	0	0	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**185**	**50**	**75**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DE02	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
SDP14	ET467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP15	ET468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**70**	**70**	**60**	**50**	**300**	**550**	**15**

Natural Science (NSC) : 5 Courses and 20 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	AS105	Calculus and Differential Equations	4
2.	AS106	Engineering Physics	4
3.	CH101	Science of Nature	4
4.	AS107	Statistics and Integral Calculus	4
5.	AS204	Applied Mathematics	4

Engineering Science (ESC) : 8 Courses and 26 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	EX102	Electrical and Electronics Engineering	4
2.	CV102	Applied Mechanics	4
3.	ME104	Engineering Graphics	4
4.	CS101	Logic Development	3
5.	CS102	Application Programming	3
6.	ME221	Material Engineering	4
7.	CV203	Environmental Sciences	Audit
8.	IT221	Engineering Informatics	4

Humanities and Social Science (HSS) : 10 Courses			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	HP103	English for Engineers	2
	HP104	German	
	HP105	Japanese	
Audit	HP106	Indian Constitution	Audit
2.	HP202	Professional Skill	2
Audit	HP203	Liberal Learning	Audit
3.	CS361	Project Management	2
4.	HP305	Professional Skills	2
5.	HP405	Engineering Economics	2
6..	HP406	Psychology	2

Discipline Core (DC) : 14 Courses and 55 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ET221	Electronic Devices and Circuits	4
2.	ET222	Digital Systems and Applications	4
3.	ET223	Signals & Systems	4
4.	ET231	Electromagnetic Theory	3
5.	ET232	Network Analysis Techniques	4
6.	ET233	Microcontroller & Interfacing	4
7.	ET341	Control Systems	4
8.	ET342	Digital Signal Processing	4
9.	ET343	Embedded Systems Design	4
10.	ET361	Power Electronics	4
11.	ET362	Principles of Communication Systems	4
12.	ET363	Soft Computing	4
13.	ET461	HDL-Digital Circuit Design	4
14.	ET462	Process Automation	4

Discipline Elective (DE) : 2 Courses and 6 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ET481	Deep Learning	3
	ET482	Digital Image Processing	
	ET483	Electric Vehicles	
	ET484	RTOS	
2.	ET491	ASIC Design	3
	ET492	Network Security	
	ET493	Signal Detection and Estimation Techniques	
	ET494	Biomedical Engineering	
	ETSWAYAM01	Discipline Elective Swayam MOOC Course	
	ETSWAYAM02	Discipline Elective Swayam MOOC Course	
	ETSWAYAM03	Discipline Elective Swayam MOOC Course	

Skill Development and Project (SDP) : 13 Courses and 30 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ET224	Digital Prototyping	2
2.	ET230	Minor Project Design	1
3.	ET225	Skill Development Course - Data Structures & Algorithms	2
4.	ET235	Rapid Prototyping	2
5	ET240	Minor Project Implementation	1
6. A	ET344	Skill Development course – Data Science	2
6. B	ET345	Skill Development - Infosys Springboard : Foundation in Data Science	2
7	ET350	Project Design	2
8. A	ET364	Skill Development Course - Networking	2
8. B	ET365	Skill Development Course – MATLAB Based System Modeling	2
9	ET360	Project Implementation	2
10. A	ET463	Skill Development Course – Embedded Linux	2
10. B	ET464	Skill Development Course – Cloud Computing	2
10. C	ET465	Skill Development Course – System Verilog	2
11	ET470	Project Evaluation	4
12	ET400	B Tech Summer Internship	4
12	ET480	Capstone Work	4
14	ET467	Semester Long Internship Design (Elective)	4
15	ET468	Semester Long Internship Implementation (Elective)	4
Audit	ET200	SY Summer Internship	Audit
Audit	ET300	TY Summer Internship	Audit

Open / Minor Elective School Wise : Electronics Engineering				
Minor Track	**Semester**	**Course Code**	**Course Name**	**Course Credits**
IoT	V	ET352	IoT Architecture & Sensors	4
	VI	ET372	IoT Network & Protocols	4
	VII	ET472	Data Management & Analytics	4
Robotics	V	ME352	Robot fundamentals and Kinematics	4
	VI	EX371	Robot Dynamics and Control	4
	VII	EX471	AI in Robotics	4
Healthcare Technology	V	ET351	Fundamentals of Healthcare Technology	4
	VI	ET371	Healthcare Informatics	4
	VII	ET471	AI in Healthcare	4

Honors Elective Tracks : 4 Courses					
Sl. No.	**Minor Track**	**Semester**	**Course Code**	**Course Name**	**Course Credits**
1	Entrepreneurship	V	HP311	Foundation Course in Entrepreneurship	4
2		VI	HP312	Advanced Course in Entrepreneurship	4
3		VII	HP411	Startup and Incubation	4
4		VIII	HP412	Project: Startup/Venture Development	4
1	Product Design	V	PD301	Fundamental of Design Elements	4
2		VI	PD302	Packaging Design	4
3		VII	PD401	Ergonomics & Human - Product Interface	4
4		VIII	PD402	Product / Systems Design Project	4

List of Skill Development Courses				
Programme Name	**Skill Development Course 1**	**Skill Development Course 2**	**Skill Development Course 3**	**Skill Development Course 4**
Chemical	CFD	ASPEN ONE	Aspen EDR	Plant Design Piping
Civil	REVIT/ MS EXCEL	ETABS	Open Road Designer / WaterGEMs	CFD / QGIS
Computer and Information Technology	CPP / Core Java	RHA I / Web Technology	Adv. Java / .Net Core / RHA II	AWS cloud services / Android App Development
Mechanical	Industrial Measurements & Instrumentation	Computer Aided Product Design	Mechanical Simulations	Object Oriented Programing with Python
Electronics Engineering and ENTC	Data Structures and Algorithms	OOP JAVA / C++	Networking Data Science	EMB Linux/Cloud Computing / System Verilog

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP) NPTEL / SWAYAM COURSES RECOMMENDED BY SEE					
Sl. No.	**Course Code**	**Course Name**	**Credits**	**Duration in Week**	**Offering Institute**
1	ETSW01	Deep Learning for Computer Vision	3	12	IIT Hyderabad
2	ETSW02	Natural Language Processing	3	12	IIT Kharagpur
3	ETSW03	Modern Digital communication Techniques	3	12	IIT Kharagpur
4	ETSW04	Digital Speech Processing	3	12	IIT Kharagpur
5	ETSW05	Introduction To Industry 4.0 And Industrial Internet of Things	3	12	IIT Kharagpur
6	ETSW06	Introduction To Cloud Computing	3	12	IIT KGP
7	ETSW07	Introduction To Biomedical Imaging System	3	12	IIT Madras
8	EXSW01	Introduction to Robotics	3	12	IIT Madras
9	ETSW08	Data Analytics with Python	3	12	IIT Roorkee
10	ETSW09	Artificial Intelligence: Knowledge Representation And Reasoning	3	12	IIT Madras

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP) NPTEL / SWAYAM COURSES RECOMMENDED BY SEE					
Sl. No.	**Course Code**	**Course Name**	**Credits**	**Duration in Week**	**Offering Institute**
11	ETSW10	Computer Networks And Internet Protocol	3	12	IIT Kharagpur
12	ETSW11	Programming In Java	3	12	IIT Kharagpur
13	ETSW12	Introduction To Internet Of Things	3	12	IIT Kharagpur
14	ETSW13	Microprocessors and Interfacing	3	12	IIT Guwahati
15	ETSW14	Digital System Design	3	12	IIT Ropar
16	ETSW15	Computer Vision and Image Processing - Fundamentals and Applications	3	12	IIT Guwahati

Open Electives (OE): 03 Courses and 12 Credits							
Programme Name	**Minor Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Chemical Engineering	Process Engineering	CH351	Process Engineering	CH371	Process Modeling and Simulation	CH471	Process Intensification and Integration
	Piping Design and engineering	CH352	Piping Engineering	CH372	Piping Layout	CH472	Piping Design & Engineering
Civil Engineering	Construction Project Management	CV325	Construction Planning and Management	CV332	Operation Research	CV422	Financial Management
	Environmental Engineering	CV326	Solid Waste Management	CV333	Unit Operations for Liquid Waste / Effluent Treatment	CV423	Environmental Impact assessment and Climate Change
	Structural Engineering	CV327	Advanced mechanics of Solids	CV334	Advanced Structural Analysis	CV424	Advanced RC design
Computer Engineering	Data science	CS351	Descriptive Analytics	CS353	Predictive Analysis	CS461	Big Data Analytics
	Machine Learning	CS352	Artificial Intelligence	CS354	Machine Learning	CS462	Deep Learning
Electronics Engineering	Robotics	ME352	Robot fundamentals and Kinematics	EX371	Robot Dynamics and Control	EX471	AI in Robotics

Open Electives (OE): 03 Courses and 12 Credits							
Programe Name	**Minor Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Electronics & Telecommunication Engineering	Internet of Things	ET352	IoT Architecture and Sensors	ET372	IoT Network & Protocols	ET472	Data Management and Analytics
	Healthcare Technology	ET351	Fundamentals of Healthcare Technology	ET371	Healthcare Informatics	E471	AI in Healthcare
Information Technology	Computer Security	ET471	Cryptography and System Security	ET471	Cyber Security and Forensics	IT461	Ethical Hacking & Cyber Laws
Mechanical Engineering	Computer Aided Engineering	ME351	Finite Element Analysis	ME361	Computational Fluid Dynamics	ME491	Advanced Analysis
	Robotics and Automation	ME352	Fundamentals of Robotics	ME362	Kinematics & Dynamics of Robots	ME492	Electrical and Electronics Systems of Robots
	Industrial Engineering & Management	ME353	Industrial Engineering	ME363	Operations Management	ME493	Supply Chain Management
	Automobile Engineering	ME354	Automobile System Design	ME364	Vehicle Dynamics	ME494	Autotronics and e-Vehicles
Entrepreneur-ship Cell	Innovation, Entrepreneurship & Venture Development	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation

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Curriculum for

First Year

Bachelor of Technology

2019-2023

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF ENGINEERING SCIENCES AND HUMANITIES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (Version I)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
PE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**11**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF ENGINEERING SCIENCES AND HUMANITIES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
PE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
SS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Calculus and Differential Equations
	COURSE CODE	AS105
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS105.CEO.1: Classify and solve first order and first degree ordinary differential equations.
AS105.CEO.2: Categorize and inspect the applications of first order differential equations.
AS105.CEO.3: Inspect and solve linear differential equations of second and higher order.
AS105.CEO.4: Apply the concepts of partial differentiation.
AS105.CEO.5: Demonstrate an understanding towards the applications of partial differentiation.
AS105.CEO.6: Identify and classify first order linear and nonlinear partial differential equations.

COURSE OUTCOMES :

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

AS105.CO.1: Solve first order and first degree ordinary differential equations.
AS105.CO.2: Analyze and solve real world phenomenon governed by first order ordinary differential equations.
AS105.CO.3: Apply concepts of linear differential equations of second and higher order to solve different systems in engineering world.
AS105.CO.4: Infer the problems based on properties of partial differentiation.
AS105.CO.5: Examine the applications of partial differentiation.
AS105.CO.6: Solve and examine the solution of partial differential equations by theoretical methods.

THEORY COURSE CONTENT		
UNIT 1	**Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors, Linear differential equations, Differential equations reducible to linear form.		
UNIT 2	**Applications of Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Orthogonal Trajectories, Newtons law of cooling, Growth & Decay, Electric circuits, Chemical applications- Mixing problems.		
UNIT 3	**Linear Differential Equation of Second Order and Higher Order**	**7 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters, Equations reducible to linear differential equations with constant coefficients: Cauchy and Legendres linear differential equation, Simultaneous linear differential equations, Applications.		
UNIT 4	**Partial Differentiation**	**7 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 5	**Applications of Partial Differentiation**	**6 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function using Jacobians, Functional dependence, Maxima and Minima of functions of two variables.		
UNIT 6	**Partial Differential Equations**	**7 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration, Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors.		
TUTORIAL NO.02		**1 HOURS**
Linear differential equations, Differential equations reducible to linear form.		
TUTORIAL NO.03		**1 HOURS**
Orthogonal Trajectories, Newtons law of cooling, Growth & Decay		
TUTORIAL NO.04		**1 HOURS**
Electric circuits, Chemical applications- Mixing problems.		

TUTORIAL NO.05		**1 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		
TUTORIAL NO.06		**1 HOURS**
Cauchy and Legendres linear differential equation, Simultaneous linear differential equations, Applications.		
TUTORIAL NO.07		**1 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables.		
TUTORIAL NO.08		**1 HOURS**
Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
TUTORIAL NO.09		**1 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function.		
TUTORIAL NO.10		**1 HOURS**
Functional dependence, Maxima and Minima of functions of two variables.		
TUTORIAL NO.11		**1 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration.		
TUTORIAL NO.12		**1 HOURS**
Linear differential equations of first order, Non-linear differential equations of first order, Charpits method.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1

REFERENCE BOOK

1. G.B. Thomas, Maurice D. Weir, Joel R. Hass, Thomas Calculus, 12 th edition, Pearson Education, 2002, ISBN: 9789332519091
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house , 2010, ISBN: 8173194203.
4. Peter V. ONeil, Advanced Engineering Mathematics, 7 th edition, Cenage Learning, 2012, ISBN: 13: 9788131503102.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Physics
	COURSE CODE	AS106
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS106.CEO.1: Make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.

AS106.CEO.2: Analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.

AS106.CEO.3: Apply the concept of behavior of light and understand the polarization phenomena.

AS106.CEO.4: Classify and understand the difference of classical mechanics and quantum mechanics.

AS106.CEO.5: Derive the basic laws governing the motion of quantum particles.

AS106.CEO.6: Apply the concept of quantum mechanics to different applications and supplement the reasoning.

COURSE OUTCOMES :

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

AS106.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.

AS106.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.

AS106.CO.3: Apply that light is transverse in nature.

AS106.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.

AS106.CO.5:	Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.
AS106.CO.6:	Apply the concepts of Quantum Physics in different branches of engineering.

THEORY COURSE CONTENT		
UNIT 1	**Measurement and importance of span (order) of physical quantities**	**6 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. 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 Electromagnetic wave**	**6 HOURS**
Polarization of electromagnetic wave, Production and analysis of polarized electromagnetic wave, Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.		
UNIT 4	**Quantum Mechanics-I**	**7 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, 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	**LASER and Optical Fiber**	**5 HOURS**
Stimulated Absorption, 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 (Ruby Laser), Application of LASER in optical fiber communication.		

PRACTICAL		
PRACTICAL NO.01	**Significant Figures**	**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02	**Interference of Light Waves**	**2 HOURS**
Calculate the refractive index of a given liquid using Newton Rings' Experiment.		
PRACTICAL NO.03	**Diffraction of Light Waves**	**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04	**Interference of Light Waves**	**2 HOURS**
Calculate the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05	**Phase and Phase Difference**	**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06	**Bohr's Atomic Model**	**2 HOURS**
Verification of Bohr's atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07	**Polarization**	**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08	**Stoke's Law**	**2 HOURS**
Calculation of wavelength of a laser beam using Lloyds mirror arrangement.		
PRACTICAL NO.09	**Division of Amplitude of Light Waves**	**2 HOURS**
Determination of Radius of Curvature of a given planoconvex lens using Newton's Rings apparatus.		
PRACTICAL NO.10	**Diffraction as a Particular Case of Interference**	**2 HOURS**
Calculation of wavelength of different colors present in a white light.		

TEXT BOOK

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

REFERENCE BOOK

1. Alan S Morris, Butterworth Heinemann, Measurement and Instrumentation Principles,3rd Edition, Butterworth-heinmann,2001, ISBN 0750650818
2. Ajoy Ghatak ,Optics, 6th Edition Tata Mc Graw Hill Publishing Company. Ltd., 2016, ISBN-10-9339220900

3. Jenkins & White, Fundamentals of Optics, 4th Edition,Mc Graw Hill Science,2016, ISBN-0070853460.

4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-,6th Edition, Mc Graw Hill Education (India) Pvt. Ltd., 2009, ISBN-10- 0070151555.

5. L I Schiff ,Quantum Mechanics,3rd Edition, Tata Mc Graw Hill Education (India) Pvt. Ltd.,ISBN-10- 0070856435, ISBN- 13- 9780070856431.

6. PAM Dirac,Principles of Quantum Mechanics,4th Edition, CBS publishers and Distributors,2004, ISBN-10- 0195671074, ISBN- 13- 978019567107

7. D J Griffiths, Introduction to Quantum Mechanics,2nd Edition,Cambridge India ,2016,ISBN-9781316646513.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Science of Nature
	COURSE CODE	CH101
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH101.CEO.1: Make students conversant with basic Biology regarding the life processes.
CH101.CEO.2: Study biology and engineering as biologically inspired technologies like designs in nature, bioenergetics, bioprocesses, biomaterials, biomechanics, bioinstrumentation.
CH101.CEO.3: Outline the technology involved in improving quality of water for its industrial use.
CH101.CEO.4: Illustrate the basic principles, instrumentation & applications of analytical techniques.
CH101.CEO.5: Get familiarize with the new concepts of Nano Science and Technology.
CH101.CEO.6: Define the basic aspects and applications of polymers, biomaterials & composites.

COURSE OUTCOMES :

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

CH101.CO.1: Explain natural biological processes and their technical aspects in view of optimizing Engineering solutions.
CH101.CO.2: Explain important biological inventions that changed the human life and their impact on engineering.
CH101.CO.3: Identify different methodologies for water quality analysis for industrial application.
CH101.CO.4: Apply basic concepts of analytical techniques for analysis of various chemical compounds.
CH101.CO.5: Apply the knowledge of nano science for betterment of the society.
CH101.CO.6: Categorize the different engineering materials and to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Science of Nature**	**7 HOURS**
The basics of science of nature. Exploring science in nature, specially symmetry, spiral, golden ratio, pattern and fractal. The phenomenon observed in nature viz., Physical, Chemical and Biological. Case studies and Applications. The diversity and commonality of cells, protein structure and function, basic molecular genetic mechanisms, bio membranes and cell architecture, transport of ions and small molecules across Cell membranes, cellular energetics, cell birth, lineage and death.		
UNIT 2	**Applications of Biology**	**6 HOURS**
Physiologic Systems - An Outline of Cardiovascular Structure and Function, Endocrine System, Nervous System, Vision System, Defense mechanisms in plants and animals. Introduction to Bio Sensors, Performance Factors, Factors Affecting the Performance of Sensors, Areas of Application. Biological Sensing Elements, Biological transducers. Discovery and Innovations in applications of Biology.		
UNIT 3	**The Role of Chemistry for Engineers**	**7 HOURS**
(A) **Introduction:** This section is an introduction to chemistry and chemical methods for engineering students. It describes how chemistry is used in engineering and how chemical principles aid engineers in the choice of materials for a particular application. Principles of Green chemistry are reviewed. The classification of separation methods used for mixtures. (B) **Periodic Table:** This section covers the names and symbols of the elements. The basic structure of the atom is reviewed including an explanation of isotopes. A discussion of the atomic structure describes electronic shells, subshells, their quantum numbers, orbital shapes, electron filling order, and the determination of the complete electron configuration of the elements. General description of the modern periodic table. Correlation between the valence electron configurations and the chemical properties of the elements. The periodic trends according to the position of the elements in the periodic table.		
UNIT 4	**Chemical Bonding - The Formation of Materials**	**8 HOURS**
(A) **The Formation of Materials:** This section covers chemical bonding and its effect on the chemical properties of the elements. Ionic bonding & covalent bonding are compared in terms of the octet rule and valence bond theory. Polar and non-polar covalent bonds. Molecular orbital theory is introduced to explain magnetism, bond order and hybridization helpful in Carbon chemistry. Intermolecular forces, including hydrogen bonding, are discussed with a special Case Study focusing on the special properties of water. (B) **Engineering Materials:** This section covers the Resources of Natural Materials, Introduction to Material Sciences viz. Polymers, Specialty polymers, Biomaterials, Nano materials and Smart materials with their examples and applications.		
UNIT 5	**Chemical Analysis and Instrumentation**	**6 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	Water Treatment and Effluent Management	5 HOURS
This chapter covers types of impurities in water & the conventional water treatment methods. Hardness, Alkalinity and Chloride content of water, its causes, types and volumetric methods for their determinations are reviewed along with numerical. Various water softening & treatment methods which includes filtration methods by Carbon adsorption, ion-exchange methods and membrane techniques are explained		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Distillation**	**2 HOURS**
Separation of two miscible liquids using distillation process		
PRACTICAL NO.02	**Polymerization**	**2 HOURS**
Synthesis by condensation polymerization reaction		
PRACTICAL NO.03	**Nano Particle**	**2 HOURS**
Synthesis of nano particles using reduction method		
PRACTICAL NO.04	**pH Metry**	**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.05	**Paper Chromatography**	**2 HOURS**
Separation of inorganic cations by paper chromatography		
PRACTICAL NO.06	**TLC**	**2 HOURS**
Separation of organic compounds by TLC		
PRACTICAL NO.07	**Conductometry**	**2 HOURS**
Conductometric titration for mixture of acids.		
PRACTICAL NO.08	**Colorimetry / Spectrophotometry**	**2 HOURS**
Absorption studies		
PRACTICAL NO.09	**Hardness of Water**	**2 HOURS**
Determination of Hardness of water by EDTA method		
PRACTICAL NO.10	**Alkalinity**	**2 HOURS**
Determination of alkalinity of water by neutralization titration		
PRACTICAL NO.11	**Adsorption Studies**	**2 HOURS**
Water purification by activated charcoal		

PRACTICAL NO.12	Physical Phenomenon	2 HOURS
Case Studies of Physical Phenomenon		
PRACTICAL NO.13	**Chemical Phenomenon**	**2 HOURS**
Case Studies of Chemical Phenomenon		
PRACTICAL NO.14	**Biological Phenomenon**	**2 HOURS**
Case Studies of Biological Phenomenon		

TEXT BOOK

1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai Publications company,2015, ISBN: 978-93-5216-000-6
2. S.M. Khopkar , Basic Concept of Analytical Chemistry,3rd edition, New Age International (P) Ltd., 2008, ISBN-10: 81-224-2092-3; ISBN-13: 978- 81-224-2092-0
3. Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, University Science Press (Laxmi Publications Pvt. Ltd).,2009, ISBN: 978-81-318-0579-4.
4. Lodish H, Berk A, Zipursky SL, et al., Molecular Cell Biology, 5th Ed., W. H. Freeman publications, 2000.
5. Palsson B.O. and Bhatia S.N., Tissue Engineering, Pearson, 2009,
6. Brian R. Eggins, "CHEMICAL SENSORS AND BIOSENSORS", JOHN WILEY & SONS, LTD, 2004.

REFERENCE BOOK

1. Jeffrey S. Gaffney and Nancy A. Marley General Chemistry for Engineers, Elsevier, 2018, ISBN: 978- 0-12-810425-5
2. Skoog, West, Holler, Crouch, Fundamentals of Analytical Chemistry, 8th Edition Cengage Learning, 2009, ISBN-13: 97881-315-0051-4, ISBN-10: 81-315-0051-9
3. Willard, Merritt, Dean and Settle, Instrumental Methods of analysis (Chemistry), 6th edition, Wadsworth Publishing Co., 1988, 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, ISBN: 0495668028.
5. O. G. Palanna, Engineering Chemistry, 1st Edition, Tata McGraw Hill education Pvt. Ltd., 2009, ISBN-13: 978-0-07-014610-5, ISBN (10): 0-07-014610-1.
6. Pradeep T., A Text Book of Nanoscience and Nanotechnology, Tata McGraw Hill, New Delhi, 2012.
7. Reece, J. B., Taylor, M. R., Simon, E. J. and Dickey, J. L. (2013) Campbell Biology: Concepts and Connections (Seventh Edition) (Pearson) ISBN 1292026359

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical and Electronics Engineering
	COURSE CODE	EX102
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX102.CEO.1: Impart knowledge of single-phase AC circuit and use of renewable energy systems.
EX102.CEO.2: Explain relations in three-phase systems and study power measurement methods.
EX102.CEO.3: Explain power supply components, electronic devices.
EX102.CEO.4: Summarize various Digital systems and application.
EX102.CEO.5: Build the knowledge of measuring system and signal conditioning circuits.
EX102.CEO.6: Get acquainted with different electrical machines.

COURSE OUTCOMES :

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

EX102.CO.1: Develop Renewable energy system (PV) & power factor improvement circuits.
EX102.CO.2: Distinguish behavior of three phase circuits & power measurement methods.
EX102.CO.3: Analyze analog circuits.
EX102.CO.4: Design Digital circuits.
EX102.CO.5: Demonstrate the use of Instrumentation system in various fields.
EX102.CO.6: Identify electrical machines used in typical domestic and industrial sector Application.

THEORY COURSE CONTENT		
UNIT 1	**AC Circuits**	**7 HOURS**
Energy Scenario, General structure of electrical power systems, A.C. fundamentals, RMS and average value, R-L,R-C,RLC series and parallel circuits, phasor diagram, power triangle and power factor, measures to improve power factor and its effects on Power system and consumer. Work, Power & Energy, costing of electricity, Application of Renewable Energy Systems, Design of PV system (offgrid), Battery selection and its series parallel connections		
UNIT 2	**Three Phase Circuit and Power Measurement**	**7 HOURS**
Three phase voltage generation and its waveform, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, three phase 4 wire system, Difference between neutral and ground conductors, Safety measures in electrical system, types of wiring, Active and Reactive Power measurement in single and three phase balanced system.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply, Clipper, Clamper. BJT - Structure and operation, CE, CB, CC configurations, biasing methods, DC Load Line, Transistor as a switch and Amplifier. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Logic gates, Boolean algebra, KMap, SOP representation. Combinational circuit Design: Adder, Subtractor, MUX, DMUX, Comparator, Code converter Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor and Microcontroller based systems.		
UNIT 5	**Measuring System**	**7 HOURS**
Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, Level, 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, VA Rating, Efficiency and Voltage regulation, OC/SC Test on Transformer. Construction, principle of operation and types of DC motor, Speed Control, characteristics equation, PMDC, BLDC, Universal motor, Single phase Induction Motor, Stepper motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICAL:		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test both theorems.		
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 variations in X_L and X_C (3 cases) To justify the lagging and Leading nature for the three cases. To find power losses in total R, L and C and verify with total power consumed.		
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 between Line and Phase Quantities. To connect Bulb load in Delta connection and verify the relation between Line and Phase Quantities.		
PRACTICAL NO.05	**Power Measurement in Three Phase Balanced Circuit and Single Phase Circuit.**	**2 HOURS**
To measure active and reactive power by Two wattmeter method in three phase circuit. To measure reactive power by One wattmeter method in three phase circuit.		
PRACTICAL NO.06	**Open Circuit & Short Circuit Test on a Single Phase Transformer**	**2 HOURS**
To find iron losses and no load circuit parameters To find full load copper losses and Equivalent circuit parameters To determine efficiency and regulation of transformer at various different loading conditions.		
PRACTICAL NO.07	**Speed Control of D.C. Shunt Motor**	**2 HOURS**
To vary field current and measure speed To vary armature voltage and measure speed Draw conclusion from both the methods through graphs.		
PRACTICAL NO.08	**Step Angle Measurement of Stepper Motor.**	**2 HOURS**
To become familiar with the properties of Stepper Motor. To calculate the step angle of motor.		
PRACTICAL NO.09	**Electronics Components and Measuring Instruments**	**2 HOURS**
To study Passive components - Resistors, Capacitors & Inductor. To test semi-conducting components - Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		

PRACTICAL NO.10	D.C. Regulated Power Supply	2 HOURS
To design 12V/ 9V/ 5V 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 OP-AMP as summing and difference amplifier. To verify the application of OP-AMP 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 (Min.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.		

In addition to total 8 Experiments, two case study reports must be attached with Laboratory Course Record.

TEXT BOOK

1. Edward Hughes, Electrical and Electronic Technology 10th Edition, Pearson India, 2011, ISBN-13: 978-8131733660
2. Thomas L. Floyd, Electronics Devices & Circuits, 5th Edition, Pearson Education India, 1998, ISBN-13: 978-0136491385.
3. A. Anand Kumar, Fundamentals of Digital Circuits, 4th Edition, Prentice Hall of India, 2016, ISBN-13: 978-8120352681

REFERENCE BOOK

1. V. N. Mittle and Arvind Mittal, Basic Electrical Engineering, 2nd Edition, McGraw Hill Education, 2005, ISBN-13: 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, 4th Edition, McGraw Hill, 2010, 978-0070699670.
3. Paul Horowitz, Winfield Hill, The Art of Electronics, 3rd Edition, Cambridge University press, ISBN-13: 978-0521809269.
4. Thomas E. Kissell, Industrial Electronics, 3rd Edition, Prentice Hall of India, 2003, ISBN-13:9788120322608
5. B. H. Khan, Non-Conventional Energy Resources, 2nd Edition, Tata McGraw Hill, 2009, ISBN-13: 978-0070142763.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV102
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV102.CEO.1: Classify force systems and explain the conditions of equilibrium.
CV102.CEO.2: Illustrate laws of friction.
CV102.CEO.3: Demonstrate the concepts of Centroid and moment of inertia.
CV102.CEO.4: Describe kinematic parameters of motion.
CV102.CEO.5: Make use of laws of motion for kinetics.
CV102.CEO.6: Explain energy and momentum methods.

COURSE OUTCOMES:

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

CV102.CO.1: Determine the resultant and support reactions.
CV102.CO.2: Equilibrium Analysis of bodies involving frictional forces.
CV102.CO.3: Evaluate Centroid of bodies and moment of inertia of sections.
CV102.CO.4: Identify the type of motion and its kinematic parameters.
CV102.CO.5: Analyze the motion under action of constant and variable forces.
CV102.CO.6: Apply energy and momentum methods for kinetics problems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Statics**	**8 HOURS**
Basic concepts in mechanics, Fundamental principles/laws of mechanics, Force, moment of a force and couple, Resolution and composition of forces, Resultant of coplanar forces, Free body diagrams, Equilibrium of coplanar forces, Applications to simple beams and cables. **Further Reading:** *Self study-Application to jib crane.		
UNIT 2	**Friction**	**6 HOURS**
Introduction to friction, Types of friction, Laws of friction- coefficient of friction, Theory of friction- angle of friction, angle of repose, cone of friction, Engineering applications - Block and wedge friction, ladder friction, Belt Friction. **Further Reading:** *Self study-Screw friction.		
UNIT 3	**Properties of Surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity. Centroid of standard objects, Centroid of composite 1D and 2D objects, Concept of area moment of inertia, Radius of gyration and its significance, Parallel and perpendicular axis theorems, Moment of inertia of standard and composite 2D figures. **Further Reading:** *Self study- Mass moment of Inertia.		
UNIT 4	**Kinematics of Planar Motions**	**7 HOURS**
Basic concepts in kinematics, Rectilinear motion with uniform and variable acceleration, Motion under Gravity, Motion curves, Curvilinear Motion in Rectangular and path coordinates, Projectile motion. **Further Reading:** *Self study- Curvilinear motion in polar coordinates.		
UNIT 5	**Kinetics- Force and Acceleration**	**6 HOURS**
Newton's second laws of Motion, Free body diagram equation- Rectilinear motion, Concept of dynamic equilibrium. Motion of connected bodies, Equations of motion in rectangular and path coordinates for curvilinear motion. **Further Reading:** *Self study- Free Vibrations.		
UNIT 6	**Kinetics Energy and Momentum**	**6 HOURS**
Concepts of Work, power and energy, Work done by gravity, spring and frictional forces, Principle of work and Energy, Conservation of mechanical energy, Concept of Impulse and linear momentum, Impulse-momentum theorem, Conservation of linear momentum, Collisions- Types of collisions, Coefficient of restitution, Applications to vehicles and sports. **Further Reading:** *Self study- Space mechanics.		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Basic Principles/Laws**	**2 HOURS**
To verify basic laws of mechanics.		
ACTIVITY NO.01	**Exploring Scientific Calculator**	**2 HOURS**
To complete the given task of calculations in a stipulated time with desired accuracy using a scientific calculator.		
PRACTICAL NO.02	**Friction**	**2 HOURS**
To determine coefficient of friction for a given surfaces		
ACTIVITY NO.02	**Presentations**	**2 HOURS**
To prepare and deliver a PPT presentation on engineering application of friction.		
PRACTICAL NO.03	**Centroid**	**2 HOURS**
To determine Centroid of a given 1D object		
ACTIVITY NO.03	**Act of Balancing**	**2 HOURS**
To cut a 2D figure precisely and locate a balancing point on it.		
PRACTICAL NO.04	**Motions**	**2 HOURS**
To study and analyze a given set of motion.		
ACTIVITY NO.04	**Graphing the Motion**	**2 HOURS**
To draw x-t, v-t, a-t graphs for given description of motion in stipulated time.		
PROJECT		**10 HOURS**
To fabricate a model of simple structure or mechanism from low cost materials.		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", 1st edition ,Tata McGraw-Hill Education, 2009, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics: Statics and Dynamics ",12th edition, Pearson Education, 2010, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II",10th edition, Tata Mc-Graw-Hill Education, 2012, ISBN: 978-0077402327
2. Ferdinand Singer, "Engineering Mechanics Statics and Dynamics", 3rd edition Harper and Row, 1994 ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics",1st edition, Cengage Learning, 2009, ISBN:8131509907

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME104
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	NIL	60	40	60	40	200

PRE-REQUISITE : NIL

COURSE OBJECTIVES:

ME104.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME104.CEO.2: To develop & apply visualization skills to simple Objects.
ME104.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES:

The students after completion of the course will be able,

ME104.CO.1: Develop and/or comprehend a simple engineering drawing in both First and Third angle orthographic projections.
ME104.CO.2: Interpret engineering drawings.
ME104.CO.3: Apply visualization skills to development of surfaces.
ME104.CO.4: Analyze engineering drawings.
ME104.CO.5: Decide annotations for two dimensional drawings.
ME104.CO.6: Create manual drawing & CAD data using SP46 standards.

THEORY COURSE CONTENT		
UNIT 1	**Visual Thinking and Solid Geometry**	**12 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections and Sectional Views**	**4 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views, Missing views.		
UNIT 3	**Isometric Projections**	**4 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	**Development of Surfaces**	**2 HOURS**
Development of lateral surfaces of simple and sectioned solids Prisms, pyramids cylinders and cones.		
UNIT 5	**Auxiliary Projections**	**2 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View		
UNIT 6	**Freehand Sketching and 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.		

PRACTICAL: **Each Assignment carries 2 questions to be draws on A2 Size Drawing Sheet**		
ASSIGNMENT NO.1	Projection of Lines	**4 HOURS**
Two Questions on line inclined to both planes		
ASSIGNMENT NO.2	Projection of Planes	**2 HOURS**
Two Questions on plane inclined to both planes		
ASSIGNMENT NO.3	Projection of Solids	**2 HOURS**
Two Questions on solid inclined to both planes		
ASSIGNMENT NO.4	Orthographic Projections	**4 HOURS**
Two Questions on Orthographic Projection of Simple Mechanical Element		
ASSIGNMENT NO.5	Development of surface	**4 HOURS**
Two Questions on Development of regular Solids		
ASSIGNMENT NO.6	Isometric View	**6 HOURS**
Two Questions on Isometric view of Mechanical Element		

ASSIGNMENT NO.7	Auxiliary View	**4 HOURS**
Two Questions on auxiliary view of Mechanical Element		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 2D CAD software package**		
PRACTICAL NO. 1	Absolute & incremental drafting	**4 HOURS**
Drawing of two sketches using absolute and incremental commands		
PRACTICAL NO. 2	Draw commands, Modify commands, Array, fillet, offset commands	**6 HOURS**
Drawing of four sketches using draw & modify commands		
PRACTICAL NO. 3	Project Drafting	**2 HOURS**
Drafting of a small project using all drafting standards		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 3D CAD software package**		
PRACTICAL NO. 4	Sketching, Solid Modeling, Assembly	**12 HOURS**
Modeling of five Mechanical models using 3D Software package		
PRACTICAL NO. 5	Project Modeling	**4 HOURS**
Modeling of small Mechanical Project of Minimum three components		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to AutoCAD, 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 TextBook of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	English for Engineers
	COURSE CODE	HP103
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	CA	
NIL	4	NIL	NIL	NIL	NIL	60	40	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP103.CEO.1: Introduce a variety of English texts to the students.
HP103.CEO.2: Teach basic English grammar.
HP103.CEO.3: Enrich the vocabulary of the students with AWL and NAWL
HP103.CEO.4: Guide the students to write in English coherently and formally.
HP103.CEO.5: Improve the students overall communicative competence in English through activities like group discussions and debates.
HP103.CEO.6: 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,

HP103.CO.1: Interpret texts written in English.
HP103.CO.2: Apply English grammar rules correctly.
HP103.CO.3: Choose and employ appropriate words from AWL and NAWL in communication.
HP103.CO.4: Develop sentence and text in English coherently and formally.
HP103.CO.5: Demonstrate overall improvement in communication skills.
HP103.CO.6: Analyze and infer from written, audio and video texts.

PRACTICAL:		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**4 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Parts of Speech**	**3 HOURS**
Use of parts of speech in a sentence composition		
PRACTICAL NO.03	**Tenses**	**5 HOURS**
Use of tenses in day to day communication and academic writing		
PRACTICAL NO.04	**Vocabulary Enrichment and Common Errors**	**8 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills and Common errors in grammar while speaking and writing English		
PRACTICAL NO.05	**Letter and Email Writing**	**4 HOURS**
How to write an email, characteristics and essentials of a good email, formal letter writing and layout of business letters		
PRACTICAL NO.06	**Essay Writing**	**4 HOURS**
What is an essay? Tips to write a good essay, Types of essays		
PRACTICAL NO.07	**Report Writing and Summarizing**	**4 HOURS**
Types of reports, format and writing a report, what is summarizing? Rules of summarizing		
PRACTICAL NO.08	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos and Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.09	**Presentation Skills**	**4 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.10	**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.11	**Debate**	**4 HOURS**
Concept, Dos and Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.12	**Listening Skills**	**4 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		

PRACTICAL NO.13	Reading Comprehension	4 HOURS
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Ashok Thorat and Munira Lokhandwala: Enriching Oral and Written Communication in English, ISBN 9788125037446
2. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
3. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
4. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
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 (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	German Language
	COURSE CODE	HP104
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP104.CEO.1: To introduce German as a foreign language and enhance knowledge, communication and intellectual capabilities which helps to improve cognitive skills and creativity vital for problem solving and innovation.

HP104.CEO.2: To develop an awareness of German culture along with providing better career opportunities later in life.

COURSE OUTCOMES:

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

HP104.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics

HP104.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively

HP104.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Germany

HP104.CO.4: Enhance their knowledge of German culture and society

THEORY COURSE CONTENT		
UNIT 1		**2 HOURS**
Introduction- Alphabets, Numbers 0-20, Self Introduction and Introducing third person. Grammar- wh Questions(w-frage), pronouns.		
UNIT 2		**4 HOURS**
Greetings, Speaking about different Languages and Countries, numbers above 20, seasons Grammar- Yes or no Questions, Sentence Construction verbs and conjugations of regular verbs		
UNIT 3		**4 HOURS**
Speaking about hobbies and interests, different professions, weekdays, months Grammar- Nouns, Articles, conjugations of irregular verbs		
UNIT 4		**6 HOURS**
Vocabulary related to food, different places in the city, transport Grammar- Imperative sentence		
UNIT 5		**4 HOURS**
Relations, understanding clock timings Grammar- Cases, Nominative case, nominative verbs pronouns and articles		
UNIT 6		**6 HOURS**
Body parts, directions, asking for the address email address and telephone number Grammar- Accusative case, accusative verbs pronouns and articles		

TEXT BOOK

1. Netzwerk Deutsch als Fremdsprache- Kursbuch A1(Stefanie Dengler), Goyal Publications.

REFERENCE BOOK

1. https://www.klett-sprachen.de , https://www.duolingo.com/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Japanese Language
	COURSE CODE	HP105
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP105.CEO.1: To perform daily basic activities including below mentioned.
HP105.CEO.2: Self Introduction, Greetings in Japanese.
HP105.CEO.3: Introduction to Japanese scripts- Hiragana, Katakana, Kanji.
HP105.CEO.4: Develop basic vocabulary throughgroup activities, videos.
HP105.CEO.5: Develop an understanding business etiquette.
HP105.CEO.6: Introduce topics related daily conversation, listening skills, cultural awareness.

COURSE OUTCOMES:

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

HP105.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics.
HP105.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively.
HP105.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Japan.
HP105.CO.4: Enhance their knowledge of Japanese culture and society.

THEORY COURSE CONTENT		
UNIT 1		**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 2	**Hiragana, vocabulary and listening.**	**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 3		**4 HOURS**
Hiragana and Katakana, and Japanese games.		
UNIT 4		**4 HOURS**
Family Members understanding in Japanese. and Vocab.		
UNIT 5		**5 HOURS**
Japanese cultures study, and business etiquette.		
UNIT 6		**5 HOURS**
Daily conversation and cultural study.		

TEXT BOOK

1. Minna Na Nihongo, Goyal Publications.

REFERENCE BOOK

1. Nil

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Logic Development-C Programming
	COURSE CODE	CS101
	COURSE CREDITS	3
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME & MARKS**						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS101.CEO.1: Develop programming skills using the fundamentals and basics of C Language.

CS101.CEO.2: Enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

CS101.CEO.3: Teach the issues in file organization and the usage of file systems.

COURSE OUTCOMES:

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

CS101.CO.1: List the various data types, control structures and looping structures supported by C language.

CS101.CO.2: Differentiate between various data types supported by C language.

CS101.CO.3: Implement the solutions for various algorithms in C language.

CS101.CO.4: Analyze various parameter passing methods to functions in C language.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of C Language**	**2 HOURS**
Overview of C, Character set, Constants, Variables and Keywords, Data types (Primitive and Derived), Operators (arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators) and Expressions (Type Conversion, precedence and order of evaluation), C Storage Classes, Managing Input and Output Operations, A structure of C Program, C Preprocessor, C Macro, Compilation, Execution, Debugging and Testing of C program.		
UNIT 2	**Control Structures**	**2 HOURS**
Decision Control Structure-If statement, if-else statement, Nested if-else statement, Ternary operator, Case Control structure- Switch Case Statements, GOTO statement, Loop Control Structure- while statement, do while statement, for statement, odd loop, nesting of loops, break and continue statement, finite & infinite Loop.		
UNIT 3	**Arrays and Functions**	**3 HOURS**
Arrays: Array Declaration and Initialization, Bounds Checking, Array arithmetic, One dimensional arrays and multi-dimensional Arrays, Strings - Standard Library String Functions, Array of strings. **Functions:** Function definition and prototype, Scope Rule of Functions, Calling Conventions, Passing Values between Functions - Call by Values and Call by References, Recursive functions, Passing Array Elements to a Function.		
UNIT 4	**Pointers**	**3 HOURS**
Pointers and Addresses, Pointer Notation & Arithmetic, Pointer to array, Array of pointers, Pointer to a function, Passing pointers as function arguments, Strings and Pointers, Structures and Pointers.		
UNIT 5	**User Defined Data Types**	**1 HOURS**
Structures & Union: Declaration of Structure and Union, Difference between Structure and Union, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures.		
UNIT 6	**File Handling**	**2 HOURS**
File Operations-open, read, write, append, delete, Error Handling, File Opening Modes Using command line argument(argc and argv), line input and output operations, Miscellaneous Functions.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
• Write a program in C to display "Hello World" • Write a menu driven program in C to display addition, subtraction, multiplication, division of two numbers		
PRACTICAL NO.02		**2 HOURS**
• Write a program in C to display the quotient and remainder after the division of two numbers • Write a menu driven program in C to demonstrate the use of left shift, right shift, and, or, xor operators		
PRACTICAL NO.03		**2 HOURS**
• Write a menu driven program in C to demonstrate the use of mathematical functions supported by math.h library • Write a program in C to display the grade obtained by the student in a course. The input will be the marks obtained and the output will be the grade obtained		
PRACTICAL NO.04		**2 HOURS**
• Write a program in C to display first N numbers on the screen using while, do while and for loop • Write a program in C to display first N number in reverse order on the screen using while, do while and for loop		
PRACTICAL NO.05		**2 HOURS**
Write a program in C display various patterns using *		
PRACTICAL NO.06		**2 HOURS**
• Write a program in C to display the addition of N numbers stored in an array • Write a program in C to copy the array of N numbers into another array in reverse order • Write a program in C to display the minimum and maximum element in an array		
PRACTICAL NO.07		**2 HOURS**
• Write a program in C to display the prime numbers within a given range • Write a program in C to display the fibonacci series within a given range		
PRACTICAL NO.08		**2 HOURS**
Write a menu driven program in C to perform addition, subtraction, division and transpose of matrices		

PRACTICAL NO.09		**2 HOURS**
• Write a program in C to convert every lowercase letter to uppercase letter and vice versa in a given string • Write a program in C to implement the string functions using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, sub string		
PRACTICAL NO.10		**2 HOURS**
• Write a program in C using functions to display addition, subtraction, multiplication, division of two numbers • Write a program in C using functions to display the minimum and maximum element in an array		
PRACTICAL NO.11		**2 HOURS**
Write a program in C using functions to implement the string functions without using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, string palindrome		
PRACTICAL NO.12		**2 HOURS**
• Write a program in C using functions and pointers to display addition, subtraction, multiplication, division of two numbers • Write a program in C using function and pointers to swap two numbers		
PRACTICAL NO.13		**2 HOURS**
Write a program in C using function and pointers to demonstrate the use of pointer arithmetic by taking input in an array		
PRACTICAL NO.14		**2 HOURS**
• Write a program in C using recursion to display the factorial of a number • Write a program in C using recursion to display fibonacci series within a given range		
PRACTICAL NO.15		**2 HOURS**
• Write a program in C to accept the information of single student and store it in structure and display the same • Write a program in C to accept the information of students and store it in array of structure and display the same		

PRACTICAL NO.16		2 HOURS
• Write a program in C to display Semester Grade Point Average (SGPA). Input will be stored in array of structure • Write a program in C to demonstrate the concept of union		
PRACTICAL NO.17		**2 HOURS**
Write a program in C to read a single line from the file using functions like fgetc, fgets, fscanf, and fread		
PRACTICAL NO.18		**2 HOURS**
Write a program in C to write a single string in a file using functions like fputc, fputs, fprintf and fwrite		
PRACTICAL NO.19		**2 HOURS**
Write a program in C to display contents of whole file on the screen		
PRACTICAL NO.20		**2 HOURS**
Write a program in C to read and write the record stored in structure from file		
PRACTICAL NO.21		**2 HOURS**
Write a program in C to implement student information system using array of structures		
PRACTICAL NO.22		**2 HOURS**
Write a program in C to implement Linear Search and Binary Search		
PRACTICAL NO.23		**2 HOURS**
Write a program in C to check whether a given matrix contains a saddle point		
PRACTICAL NO.24		**2 HOURS**
Write a program in C to implement union and intersection of two sets		

TEXT BOOK

1. E. Balguruswamy , "Programming in ANSI C" , Tata Mc-Graw Hill
2. Yashvant Kanitkar, "Let Us C" BPB Publication
3. "Programming With C", Schaum Series

REFERENCE BOOK

1. Kernighan and Ritchie , "The 'C' programming language" , Prentice Hall
2. V. Rajaraman , "Computer Programming in 'C' " , Prentice Hall
3. R.G. Dromey , "How to solve it by Computer", Pearson Education

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques
	COURSE CODE	ME105
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	60	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME105.CEO.1: Introduce different tools and study various measurement techniques.
ME105.CEO.2: Study different parts of the system along with its functions and applications.
ME105.CEO.3: List various tools used for the said application.
ME105.CEO.4: Identify the function of various parts of the system.
ME105.CEO.5: Impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME105.CEO.6: Apply the knowledge to find the solution for basic engineering problems.

COURSE OUTCOMES :

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

ME105.CO.1: Recall the tools required for the measurements.
ME105.CO.2: Summarize the application of various engineering tools used.
ME105.CO.3: Identify the right tools for selected purpose.
ME105.CO.4: Inspect various parts of the system.
ME105.CO.5: Justify the most appropriate technique which can be compatible with the existing environment.
ME105.CO.6: Develop the system which will give appropriate solution to the identified problem.

PRACTICAL:		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Any 6 Practicals from the following list)**	**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
16. Creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Any 06 practicals from the following list)**	**12 HOURS**

1. Study of basic electronics component and Switches.
2. PCB and Soldering Tools and Technique.
3. Relay and application.
4. Domestic wiring for Extension Board and Inverter.*
5. Load test of D.C. series motor.*
6. Brake test on D.C. Shunt motor.*
7. Load test on 3-phase induction motor.
8. V-I Characteristics of Thyristor & measurement of holding & latching current
9. V-I Characteristics of MOSFET.
10. V-I Characteristics of IGBT.
11. V-I Characteristics of TRIAC.
12. Solar cell and application (Generation of Energy).
13. Speed control of DC Motor (Toy Motor)
14. Actuators and application (Electrical and Mechanical).

15 Study of Virtual Instrumentation.

16 Open IT : Optical Mouse, Cathode Ray Oscilloscope, Study of Power Supply PA System, CD Player, TV, Microwave oven (Any Two)

PRACTICAL NO.03	**Mechanical Engineering (Any 6 practicals from the following list)**	**12 HOURS**

1. Linear and angular measurements.
2. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
3. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
4. Types of mechanism and making any one mechanism containing four links using cardboard.
5. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
6. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
7. Measurement of Relative humidity of air in the lab.
8. Measurement of hardness of Steel and Aluminum.
9. Measurement of stiffness of helical spring (compression or tension)
10. Servicing of 2 wheeler and 4 wheeler system.
11. Study of various components of automobile system.
12. Open IT: Mixer or kitchen machine, Refrigerator, Boiler and accessories thermal power plant (Mini), Two stroke and four stroke engine, Introduction to threaded fasteners and joints using threaded fasteners. Bearing and its lubrication, Bicycle /Two wheeler/ 4 wheeler(Any Two)

PRACTICAL NO.04	**Chemical Engineering (Any 3 practicals from the following)**	**6 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. Plate type heat exchanger
9. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Any 3 Practicals from the following)	6 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 parcel of land 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 life saving do s and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

Assessment	Common to all branches	4 HOURS

TEXT BOOK

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

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME106
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	NIL	60	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME106.CEO.1: Disseminate the philosophy of design thinking.
ME106.CEO.2: Impart the information regarding User centric approach.
ME106.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME106.CEO.4: Enhance thinking in order to inspect diverse solutions.
ME106.CEO.5: Sensitize about the feasibility, desirability and viability criterias for selection of Appropriate solution.
ME106.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES:

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

ME106.CO.1: Recall fundamental principles of design thinking.
ME106.CO.2: Explain all the dimensions of user and his needs using design thinking approach.
ME106.CO.3: Outline user centric problem by using information gathering techniques.
ME106.CO.4: Compare multiple solutions through ideation process.
ME106.CO.5: Interpret most appropriate solution for defined user centric problem.
ME106.CO.6: Develop the most optimum solution.

PRACTICAL:		
PRACTICAL NO.01	**Human Centred Design**	**2 HOURS**
Introduction to Human Centred Design, Human Centred Design Phases, Human Centred Design Process, Human Centred Design case study		
PRACTICAL NO.02	**Research Methodology (Problem Definition, Information Gathering)**	**4 HOURS**
Design thinking Models & Methodology - General Problem Statement, Random check list, mind mapping Categorization of random check list. Brainstorming of problem areas, Research Methodology - Information gathering - Primary, Secondary Sources, data presentation, Preparation of survey forms, Survey Analysis, Drawing Inference.		
PRACTICAL NO.03	**Ideation**	**4 HOURS**
SWOT analysis, Vein Diagram (User Desirability, Feasibility, Viability check) Drawing inferences, Translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of simple form of products (Isometric views, layout, circuit diagram, Ideation sketches), Ergonomic and aesthetic consideration in design.		
PRACTICAL NO.04	**Prototyping**	**2 HOURS**
Concept validation, evaluation and detailing, Different methods of Prototyping, selection of right method of prototyping.		
PROJECT		**40 HOURS**
PRACTICAL NO.05	**Phase 1 : General Problem Statement and problem background**	**4 HOURS**
PRACTICAL NO.06	**Phase 2 : Research methodology**	**4 HOURS**
PRACTICAL NO.07	**Phase 3 : Product Specification**	**4 HOURS**
PRACTICAL NO.08	**Phase 4 : Ideation**	**6 HOURS**
PRACTICAL NO.09	**Phase 5 : Concept Evaluation, Validation and Concept detailing**	**8 HOURS**
PRACTICAL NO.10	**Phase 6 : Prototyping**	**10 HOURS**
PRACTICAL NO.11	**Phase 7 : Documentation**	**4 HOURS**

TEXT BOOK

1. Emrah Yayici, Design Thinking Methodology Book, Amazon Digital Services LLC - Kdp Print Us, 2016, ISBN: 6058603757, 9786058603752
2. Idris Mootee, Design Thinking for Strategic Innovation, Wiley (2017), ISBN-13: 978-8126572694
3. Thomas Lockwood, Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Allworth Press; Original edition (10 November 2009), ISBN-13: 978-1581156683

REFERENCE BOOK

1. Harper Perennial, Lateral Thinking: Creativity Step by Step; Reissue edition, 2015 (Perennial Library).
2. John Chris Jones, Design Methods, John Wiley & Sons, David Fulton Publishers, London, 1980, ISBN 0-471-28496-3.
3. Nigel Cross, Design Thinking: Understanding How Designers Think and Work, Berg Publishers (May 15, 2011), ISBN-13: 978-1847886361
4. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Published September 29th 2009 by Harper Business, ISBN 0061766089

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Statistics and Integral Calculus
	COURSE CODE	AS107
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS107.CEO.1: Study different statistical methods for solving problems.
AS107.CEO.2: Analyze different probability distribution functions.
AS107.CEO.3: Extend the basic concepts of integration for evaluation of complex integration problems.
AS107.CEO.4: Categorize and use equation of curves to trace the given curve.
AS107.CEO.5: Demonstrate an understanding towards evaluating multiple integrals.
AS107.CEO.6: Relate and examine the applications of multiple integrals.

COURSE OUTCOMES:

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

AS107.CO.1: Assess statistical problems.
AS107.CO.2: Solve the probability distribution problems.
AS107.CO.3: Evaluate complex integrals.
AS107.CO.4: Sketch curves by analyzing the given equation of curves.
AS107.CO.5: Evaluate the multiple integrals.
AS107.CO.6: Apply the knowledge of multiple integrals to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Statistics**	**6 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression		
UNIT 2	**Probability**	**6 HOURS**
Probability, probability density function, probability distribution: Binomial, Poisson, Normal		
UNIT 3	**Integral Calculus**	**7 HOURS**
Reduction formulae, Gamma function, Beta function, Differentiation under integral sign.		
UNIT 4	**Curve Tracing and Rectification**	**7 HOURS**
Tracing of Curves: Cartesian curves, Parametric curves, Polar curves. Rectification: Rectification of Cartesian, Parametric and Polar curves		
UNIT 5	**Multiple Integrals**	**7 HOURS**
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 6	**Applications of Multiple Integrals**	**6 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		

TUTORIAL: Problem solving session		
TUTORIAL NO.01		**1 HOURS**
Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.02		**1 HOURS**
Moments, skewness and kurtosis		
TUTORIAL NO.03		**1 HOURS**
Correlation and regression		
TUTORIAL NO.04		**1 HOURS**
Probability, probability density function, Probability distribution: Binomial		
TUTORIAL NO.05		**1 HOURS**
Probability distribution: Poisson, Normal. Reduction formulae, Gamma function		
TUTORIAL NO.06		**1 HOURS**
Beta function, DUIS Rule1 & 2.		

TUTORIAL NO.07		**1 HOURS**
Tracing of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.08		**1 HOURS**
Rectification of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.09		**1 HOURS**
Double Integration, Evaluation of Double Integration, Change the order of integration, Integration by transforming Cartesian to Polar Coordinate system		
TUTORIAL NO.10		**1 HOURS**
Triple integration, Integration by transforming to spherical and cylindrical polar coordinates. Applications of multiple integrals: To find Area, Volume		
TUTORIAL NO.11		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.12		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		

TEXT BOOK

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd, 2015, ISBN: 9788126554232, 8126554231,
2. B.S. Grewal ,Higher Engineering Mathematics ,39th edition, Khanna Publications,2005 , ISBN: 81-7409- 195-5

REFERENCE BOOK

1. G.B. Thomas & R.L.Finney, Calculus, 9th edition, Pearson Education, 2002, ISBN: 81-7758-325-5.
2. Dr. B.V. Ramana ,Higher Engineering Mathematics,4 th edition, Tata McGraw Hill,2016, ISBN: 978-0-07-063419-
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house,2002,ISBN No.0849324173
4. Peter V. ONeil , Advanced Engineering Mathematics,7th Edition , Cenage Learning ,2012, ISBN-13: 9788131503102.
5. Dennis G. Zill & Warren S. Wright ,Advanced Engineering Mathematics ,4th edition ,Jones and Bartlett Publishers, 2011, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.
6. Douglas C. montgomery , George C runger ,Applied statistics and probability for engineers, 5 th edition, wiley ,2012, ISBN No: 9788126537198, 8126537191 .
7. Richard A Johnson, Irwin Miller,John freund ,Miller & Freunds Probability and statistics for engineers 8th edition, Pearson, 2011,ISBN no:978-93325-5041-4.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applications Programming-Python
	COURSE CODE	CS102
	COURSE CREDITS	3
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS102.CEO.1: Get familiar with basics of Python programming.
CS102.CEO.2: Understand usage of conditional and looping statements in Python.
CS102.CEO.3: Learn different simple data structure supported in Python.
CS102.CEO.4: Acquire knowledge and skills of strings and dictionary.
CS102.CEO.5: Implement Object Oriented Programming concepts using Python.
CS102.CEO.6: Introduce the concepts of Pandas & NumPy.

COURSE OUTCOMES :

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

CS102.CO.1: Debug syntax and semantics in Python programs.
CS102.CO.2: Demonstrate proficiency in handling strings and file system.
CS102.CO.3: Implement the programs using core data structures like Lists and Dictionaries.
CS102.CO.4: Interpret the concepts of Object Oriented Programming in Python
CS102.CO.5: Develop solution for real life problems using Python.

THEORY COURSE CONTENT		
UNIT 1	**Python Fundamentals and Data Handling**	**2 HOURS**
Introduction, Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types ,Mutable and immutable types, Input output operation , Comments, Reserved words, Indentation, Operators and expressions.		
UNIT 2	**Decision and Iterative Statements**	**2 HOURS**
Introduction to Decision Statements: Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. **Introduction to Iterative Statements:** Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, break, continue, pass, else statement used with loops.		
UNIT 3	**List manipulation, Tuples and Python Function**	**2 HOURS**
List: Introduction, creating & accessing lists, list operations, working with lists, list functions & methods. **Tuples:** Introduction, creating & accessing tuples, tuples operations, tuples functions & methods. **Functions:** Need for functions, definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.		
UNIT 4	**Strings and Dictionary**	**3 HOURS**
Strings: Introduction, string operations- concatenation, appending, multiplication and slicing. Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, Iterating strings, the string module. **Dictionary:** Introduction, working with dictionaries, dictionary functions and methods		
UNIT 5	**Object Oriented Programming**	**2 HOURS**
Programming Paradigms-monolithic, procedural, structured and object oriented, Features of Object oriented programming-classes, objects, methods and message passing, inheritance, polymorphism, containership, reusability, delegation, data abstraction and encapsulation. Classes and Objects: classes and objects, class method and self-object, class variables and object variables, public and private members, class methods		
UNIT 6	**Data Structure and Libraries in Python**	**2 HOURS**
Introduction to data structure, pandas, NumPy.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mc2 where m is the mass of the object and c is its velocity.		
PRACTICAL NO.02		**2 HOURS**
Write a Python program for following conditions. • If n is single digit print square of it. • If n is two digit print square root of it. • If n is three digit print cube root of it.		
PRACTICAL NO.03		**4 HOURS**
Solve the Fibonacci sequence using recursive function in Python.		
PRACTICAL NO.04		**4 HOURS**
Write a Python program to print different patterns.		
PRACTICAL NO.05		**2 HOURS**
To accept students five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade if first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division.		
PRACTICAL NO.06		**4 HOURS**
To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.		
PRACTICAL NO.07		**2 HOURS**
Write a program in Python to enter two unequal nos. if first no. is greater than display square of the smaller no. and cube of the greater no. otherwise vice-versa. If no. are equal display the message both no. are equal find square, square root and cube root of a number.		
PRACTICAL NO.08		**4 HOURS**
Write a Python program to perform following string operations. a) String concatenation b) String Reverse c) String compare d) String length e) Palindrome f) Case change.		
PRACTICAL NO.09		**2 HOURS**
Select the number from the entered list and find its position in Python (use Linear Search).		
PRACTICAL NO.10		**4 HOURS**
Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain) using dictionary.		

PRACTICAL NO.11		6 HOURS

1. Write Python class for bank customer with withdraw and deposit operations (use inheritance) (Introduce class, object concepts).
2. Using concepts of polymorphism write Python application program.

Write a Python program to perform addition and multiplication of 2 matrices.

PRACTICAL NO.12		4 HOURS

Write a Python program to convert a Panda module Series to Python list and it's type.

PRACTICAL NO.13		4 HOURS

Write a NumPy program for Plotting and analyzing data.

Mini Project:

1. Project is for a period of 2 weeks.
2. Group of two or three has to choose project topic from the list designed by concerned faculty of particular division.
3. Each group has to collect requirements for project and get approved by concerned teachers in first weeks.
4. implementation and testing need to be performed in second week.
5. Demonstration along with presentation need to be given as final project submission.
6. Project carries 20 Marks.

TEXT BOOK

1. Charles R. Severance, Python for Everybody: Exploring Data Using Python 3, 1st Edition, Create Space Independent Publishing Platform, 2016. (http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf) (Chapters 1 13, 15)
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist, 2ndEdition, Green Tea Press, 2015. http://greenteapress.com/thinkpython2/thinkpython2.pdf) (Chapters 15, 16, 17) (Download pdf files from the above links)

REFERENCE BOOK

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014.
2. Mark Lutz, Programming Python, 4th Edition, OReilly Media, 2011.ISBN-13: 978-9350232873
3. Wesley J Chun, Core Python Applications Programming, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, Data Structures and Algorithms in Python, 1stEdition, Wiley India Pvt Ltd, 2016. ISBN-13: 978- 8126562176.

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Second Year

Bachelor of Technology in Electronics Engineering

2019-2023

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III												
SUMMER INTERNSHIP												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC01	ET221	Electronic Devices and Circuits	3	2	-	35	35	30	50	0	150	4
DC02	ET222	Digital Systems and Applications	3	2	-	35	35	30	50	0	150	4
DC03	ET223	Signals & Systems	3	2	-	35	35	30	50	0	150	4
SDP1	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP2	ET230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP3	ET225	Skill Development Course-Data Structures & Algorithms	0	4	-	0	0	25	0	50	75	2
ESC9	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	18	0	140	140	170	200	150	800	21

SEMESTER: IV												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC8	IT221	Engineering Informatics	3	2	-	35	35	30	50	0	150	4
DC04	ET231	Electromagnetic Theory	3	0	-	35	35	30	0	0	100	3
DC05	ET232	Network Analysis Techniques	3	2	-	35	35	30	50	0	150	4
DC06	ET233	Microcontroller & Interfacing	3	2	-	35	35	30	50	0	150	4
SDP4	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP5	ET240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	16	0	140	140	170	150	150	750	20

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY IT/COMP/ETX AND E&TC ENGINEERING	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS204
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS204.CEO.1: To evaluate the rank of a matrix and solve the system of equations.
AS204.CEO.2: To compute the eigenvalues and eigenvectors of a matrix and diagonalize a matrix.
AS204.CEO.3: To evaluate the derivative of vector-valued functions.
AS204.CEO.4: To evaluate the area and the surface integrals of the vector functions.
AS204.CEO.5: To evaluate the derivative and line integral of complex valued functions.
AS204.CEO.6: To execute the program on problems of numerical methods using MATLAB.

COURSE OUTCOMES :

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

AS204.CO.1: Evaluate the rank of a matrix and solve the system of equations.
AS204.CO.2: Determine the eigenvalues and eigenvectors of a matrix.
AS204.CO.3: Differentiate a vector valued function in plane or space.
AS204.CO.4: Compute the area and volume of the objects.
AS204.CO.5: Apply the Cauchy's Integral Theorem and evaluate the integrations.
AS204.CO.6: Execute the program codes using MATLAB.

THEORY		
UNIT 1	**Linear Algebra I**	**9 HOURS**
Basic Concepts, Matrix Addition, Scalar Multiplication, Matrix Multiplication, Linear Systems of Equations, Gauss Elimination Method, Rank of a Matrix, Linear Independence, Vector Spaces, Inner Product Spaces.		
UNIT 2	**Linear Algebra II**	**9 HOURS**
Eigenvalues, Eigenvectors, Symmetric Matrices, Skew-Symmetric Matrices, Orthogonal Matrices, Similarity of Matrices, Basis of Eigenvectors, Digonalization.		
UNIT 3	**Functions of Complex Variables**	**6 HOURS**
Complex Numbers, Complex Plane, Polar Form, Powers, Derivative, Analytic Functions, Cauchy-Riemann Equations, Line Integrals in the Complex Plane, Cauchy's Integral Theorem, Cauchy's Integral Formula.		
UNIT 4	**Vector Differentiation**	**6 HOURS**
Vectors in 2-D and 3-D, Scalar Product, Vector Product, Vector/scalar functions and fields, Derivative of vectors, Velocity and Acceleration, Gradient of a Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field.		
UNIT 5	**Vector Integration**	**6 HOURS**
Line Integration, Line Integrals Independent of Path, Double Integrals Green's Theorem in the Plane, Surfaces for Surface Integrals. Surface Integrals, Volume Integrals, Divergence Theorem, Stoke's Theorem.		
UNIT 6	**Numerical Methods**	**6 HOURS**
Numerical Differentiation and Integration, Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method, LU-Decomposition method.		

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 / Row Spaces.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms/Null Spaces.		
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. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232.
2. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0.
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2003, ISBN-13: 9788126537204, 8126537205.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electronic Devices and Circuits
	COURSE CODE	ET221
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

COURSE OBJECTIVES :

ET221.CEO.1: To realize some of the basic electronic components diodes, transistors, OP-AMP

ET221.CEO.2: To analyze the analog electronic circuits, both discrete and integrated, required of an electronics engineer

ET221.CEO.3: To familiarize with the circuit design techniques involving discrete devices as well as the integrated circuits.

ET221.CEO.4: To comprehend frequency response, feedback and stability of an amplifier

ET221.CEO.5: To analyze and model the transistors at low and high frequencies

COURSE OUTCOMES :

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

ET221.CO.1: Identify and correctly utilize the external lead structure and basic electrical characteristics of common semiconductor devices (PN junctions, MOSFETs, and BJTs)

ET221.CO.2: Illustrate the feedback mechanism in the design of electronic circuits

ET221.CO.3: Scrutinize and project electronic circuits for various signals at low and high frequencies

ET221.CO.4: Analyze performance parameters of various electronics circuits

ET221.CO.5: Compile component ideas into electronic circuits

THEORY COURSE CONTENT		
UNIT 1	**Semiconductor Devices**	**6 HOURS**
Diode circuits - Clipper and Clamper, BJT-Types, Construction, Operation, Input and Output Characteristics. Introduction to MOSFETs, operation, Construction of n-channel E-MOSFET, E-MOSFET characteristics & Non ideal voltage current characteristics of EMOS, Introduction to BICMOS technology, **Protection circuits**.		
UNIT 2	**BJT - DC and AC Analysis**	**6 HOURS**
Biasing circuits of BJT-Fix Bias & Self Bias, DC load line, Bias stability, Thermal runway, Thermal stability BJT. Small signal amplifier, Two port system approach ,Hybrid model of BJT, Approximate and exact analysis of BJT, Hybrid Model, Frequency response of amplifiers, **Multistage amplifiers**.		
UNIT 3	**MOSFET - DC and AC Analysis**	**8 HOURS**
Common source circuit, Load Line & Modes of operation, common MOSFET configurations: DC Analysis, constant current source biasing. The MOSFET CS small signal amplifier, Small signal parameters, small signal equivalent circuit, Modeling, Body effect, Analysis of CS amplifier. The MOSFET internal capacitances and high frequency model. Introduction to MOSFET as basic element in VLSI, V-I characteristic equation in terms of W/L ratio, **MOSFET scaling and small geometry effects, MOSFET capacitances**.		
UNIT 4	**Feedback Amplifiers and Oscillators**	**8 HOURS**
Concept of negative feedback, Effects of negative feedback on gain, bandwidth & 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 in FM transmitter circuit**.		
UNIT 5	**Linear Applications of OP-AMP**	**8 HOURS**
Inverting and Non-inverting amplifier, voltage follower, 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	**Non-linear Applications of OP-AMP**	**6 HOURS**
Comparators, Applications of Comparator, Schmitt Trigger(symmetrical/asymmetrical), Need of precision rectifier, Half wave , Full wave precision rectifiers, Square wave & Triangular wave generator, Sample and hold circuit, peak detectors , **Converters using OP-AMP**.		

PRACTICAL: Perform following experiments using MULTISIM or PROTEUS		
PRACTICAL NO.01		**2 HOURS**
Limiter circuits in FM transmitter circuit		
PRACTICAL NO.02		**2 HOURS**
Small signal amplifier for Public Address (PA) system		
PRACTICAL NO.03		**2 HOURS**
Frequency response of the amplifier		
PRACTICAL NO.04		**2 HOURS**
Tuned circuit in FM transceiver		
PRACTICAL NO.05		**4 HOURS**
OP-AMP parameters		
PRACTICAL NO.06		**4 HOURS**
Low Pass and High Pass filter using OP-AMP		
PRACTICAL NO.07		**4 HOURS**
Precision rectification in peak detector circuit		
PRACTICAL NO.08		**4 HOURS**
Level detector using OPAMP.		

TEXT BOOK

1. Millman and Halkias, Integrated Electronics, Tata McGraw-Hill (TMH) Education, 2001, ISBN: 9780074622452
2. Donald A. Neamen, Electronic Circuit Analysis and Design, TMH Publishing Company Limited, 3^{rd} Edition, ISBN:9780070634336
3. Boylestad & Louis Nashelsky, Electronic Devices & Circuit theory, Pearson New International Edition, 11^{th} Edition, ISBN: 9780133109047

REFERENCE BOOK

1. Millman and Halkias, Microelectronics, Tata McGraw-Hill (TMH) Education, 2001,ISBN: 9780074637364
2. Thomas L. Floyd, David L. Buchla, Electronics Fundamentals: Circuits, Devices and Applications, 8^{th} Edition, Pearson Education Limited 2014, ISBN: 978-1292025681
3. David A. Bell, Operational Amplifiers and Linear ICs, Prentice Hall of India, 2^{nd} Edition ISBN: 8120323599 4. Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits , TMH, 2002,3^{rd} Edition, ISBN: 9780070530447

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Systems & Applications
	COURSE CODE	ET222
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

COURSE OBJECTIVES :

ET222.CEO.1: To design various combinational and sequential logic circuits
ET222.CEO.2: To analyze sequential circuits using state machines
ET222.CEO.3: To design digital circuits using semiconductor memories
ET222.CEO.4: To model digital circuits using hardware description language

COURSE OUTCOMES :

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

ET222.CO.1: Design combinational circuits and its applications
ET222.CO.2: Design various sequential circuits
ET222.CO.3: Construct state diagrams for various sequential circuits
ET222.CO.4: Identify various logic families and semiconductor memories
ET222.CO.5: Develop VHDL code for various combinational and sequential digital circuits

THEORY COURSE CONTENT		
UNIT 1	**Combinational Logic Design**	**8 HOURS**
BCD Arithmetic operations, Digital Codes and Parity, Applications of data selector and distributers, Applications of Multi I/O combinational circuits, Parity generators / checkers. Applications: Adder / Subtraction System, Process controller using comparator. **Further Reading:** Data transmission system with error detection		
UNIT 2	**Sequential Circuits**	**8 HOURS**
Latches, applications of Flip Flops, Shift Registers, Universal shift register and its applications (Ring, twisted ring counters and pulse train generators), counters and its design, counters as a frequency dividers. Applications: Counting Real world events, Experimental tachometer . **Further Reading:** Digital clock		
UNIT 3	**State Machines**	**8 HOURS**
Mealy and Moore models, state machine notations, synchronous circuit analysis, Clocked synchronous state machine design, design of state diagram for Up-Down decade counter, Sequence detector, Algorithmic state machines Applications: Traffic Light Controller. **Further Reading:** ATM Machine		
UNIT 4	**Digital Logic Families and Semiconductor Memories**	**8 HOURS**
Classification of Logic families, Characteristics of TTL and CMOS, TTL to CMOS interface, CMOS to TTL interface, Design and functioning of ROM, PAL and PLA, Comparison between ROM, PAL and PLA, Introduction to CPLD and FPGA.		
UNIT 5	**Introduction to HDL**	**10 HOURS**
Introduction to hardware description languages, Modeling and signal assignments in VHDL, Basic constructs and Programming using VHDL. **Further Reading:** Application for VHDL: Design of combinational circuits		

PRACTICAL: Practicals will be performed either using Digital Works software or kit.		
PRACTICAL NO.01		**4 HOURS**
Design and implementation of Code Converter using IC 74HC154.		
PRACTICAL NO.02		**4 HOURS**
Design and implementation of Parity Generators and Checkers.		
PRACTICAL NO.03		**4 HOURS**
Design & implementation of BCD Adders and Subtractors		
PRACTICAL NO.04		**4 HOURS**
Design & implementation of Synchronous Counters.		
PRACTICAL NO.05		**2 HOURS**
Design & implementation of Asynchronous Counters.		
PRACTICAL NO.06		**2 HOURS**
Design & implementation of 8- Bit Universal Shift Register		
PRACTICAL NO.07		**2 HOURS**
Design & implementation of Sequence detector.		
PRACTICAL NO.08		**4 HOURS**
Study of Traffic Light controller design using logic gates and digital IC.		

TEXT BOOK

1. Floyd, Digital Fundamentals, Pearson Education India, 10^{th} edition (2011) (ISBN-10: 813173448X,ISBN-13: 978-8131734483).
2. Tokheim, Digital Electronics Principles and Applications, McGraw Hill Education, 6^{th} edition (20 May 2004) (ISBN-10: 0070587906,ISBN-13: 978-0070587908).
3. J. Bhasker, VHDL Primer, Pearson India, 3^{rd} edition (ISBN: 978-9332557161).

REFERENCE BOOK

1. M. Morris Mano, Digital Design, PHI, 8^{th} Edition, 2006 (ISBN: 9780131989245).
2. D. P Leach, A. P. Malvino and G. Saha, Digital Principles and Applications, Tata McGraw-Hill, 3^{rd} Edition, 2006 (ISBN-: 978-0028018218).
3. S. Salivahanan, S. Pravin Kumar, Digital Circuits and Design, Vikas Publishing House,4^{th} edition (2012) (ISBN-10: 9325960419, ISBN-13: 978-9325960411).
4. John F. Wakerly, Digital Design: Principles and Practices, Pearson, 4^{th} Edition, 2008(ISBN: 9788131713662).
5. A. Anandkumar, Fundamental of Digital Circuits, PHI, 2^{nd} Edition, 2009 (ISBN: 9788120336797).

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Signals and Systems
	COURSE CODE	ET223
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

COURSE OBJECTIVES :

ET223.CEO.1: To classify signals and systems and describe their properties on continuous and discrete domains.

ET223.CEO.2: To describe linear time invariant (LTI) systems.

ET223.CEO.3: To describe and perform different time and frequency domain transformations.

ET223.CEO.4: To explore the concept of correlation, energy spectral density (ESD), power spectral density (PSD).

ET223.CEO.5: To illustrate sampling and reconstruction theorem.

ET223.CEO.6: To understand Laplace and z-Transform

COURSE OUTCOMES :

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

ET223.CO.1: Classify various types of signals and systems.

ET223.CO.2: Classify systems based on their properties and determine the response of LTI system using convolution.

ET223.CO.3: Analyze the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis.

ET223.CO.4: Describe sampling theorem and reconstruction of signal.

ET223.CO.5: Apply the Laplace transform and Z- transform for analyze of continuous-time and discrete-time signals and systems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Signals and Systems**	**8 HOURS**
Definition of signals, Elementary signals, Basic operation on signals, Classification of signals, Study basic of speech signal, image signal, medical signals, Vector and orthogonal vector space, Definition of systems, Classification of systems, Examples of systems.		
UNIT 2	**Time-Domain Representation for Linear Time-Invariant (LTI) Systems**	**8 HOURS**
Representation of LTI systems, Convolution sum, Convolution integral, Properties of the impulse response representation of LTI system, System interconnection.		
UNIT 3	**Fourier Representation for Signals**	**8 HOURS**
Fourier series, Fourier Transform and Fourier Transform properties on signal, Discrete Time Fourier Transform, Correlation, Autocorrelation, Energy spectral density (ESD) and Power spectral density (PSD), Application to communication systems.		
UNIT 4	**Continuous-Time System Analysis Using the Laplace Transform**	**8 HOURS**
The Laplace Transform, Properties of Laplace Transform, Solution of differential equations, Analysis of electrical networks using Laplace Transform.		
UNIT 5	**Sampling Theorem**	**6 HOURS**
Sampling, Reconstruction, Sampling theorem, Nyquist Rate, Aliasing, Mapping between analog frequency and digital frequency.		
UNIT 6	**Discrete Time System Analysis Using the Z-Transform**	**8 HOURS**
The z-Transform, Region of convergence for z-Transform, Properties of z-Transform, z-Transform Solution of linear difference equations, System realization, Pole-Zero stability consideration in z domain, Connection between the Laplace Transform and the z-Transform.		

PRACTICAL		
PRACTICAL NO.01	**Generation of elementary signals**	**2 HOURS**

a. To generate standard elementary signals in continuous and discrete time domain.

b. To study behavior of plots of elementary signals.

PRACTICAL NO.02	Dependent and independent operations on signals	2 HOURS

a. To perform signal addition and multiplication in continuous and discrete time domain.

b. To perform time shifting, scaling operations in continuous and discrete time domain.

c. To observe the effect of change of parameter on signal like speech/image signal.

PRACTICAL NO.03	Response of Linear Time Invariant (LTI) system	2 HOURS

a. To observe responses of LTI system whose impulse response is known

b. To observe responses of LTI system for various impulse responses.

PRACTICAL NO.04	Fourier analysis of on a speech signal	2 HOURS

a. Applying Fourier and Inverse Fourier transform on speech signal.

b. To observe spectra and calculate ESD of speech signal.

PRACTICAL NO.05	Correlation of a signal	4 HOURS

a. To correlate speech signals.

b. To comment on results of autocorrelation and cross correlation.

PRACTICAL NO.06	Solving differential equation using Laplace Transform	2 HOURS

a. To formulate differential Equation using Laplace Transform.

b. To solve differential equation using inverse Laplace transform.

PRACTICAL NO.07	Sampling Theorem	2 HOURS

a. To analyze under sampled and oversampled signals.

b. To comment on reconstructed signal while observing sampling signal.

c. To observe the effect of changing sampling rate on reconstructed audio signal.

PRACTICAL NO.08	LTI system using z Transform	2 HOURS

a. To study the transfer function of the system.

b. To check if the given system is stable and causal.

PRACTICAL NO.09	Audio signal processing	2 HOURS

a. To read .wav file and plot audio input signal.

b. To implement sampling and reconstruction of audio/music signals.

c. To perform filtering audio/music signals.

PRACTICAL NO.10	Image analysis	2 HOURS

a. To show image information.

b. To perform image filtering

TEXT BOOK

1. Signals and Systems, Alan V. Oppenheim, Alan S. Willsky and Ian T. Young, 2^{nd} Edition, Pearson, 2015 (ISBN: 978-9332550230)
2. Principles of Linear Systems and Signals, B. P. Lathi, 2^{nd} Edition, Oxford Press, 2009 (ISBN: 978-0198062271)
3. Fundamentals of Signals and Systems, Michael Robert and Govind Sharma, 2^{nd} Edition, McGraw Hill Education, 2010 (ISBN: 978-0070702219)

REFERENCE BOOK

1. Signals and Systems, Simon Haykin,Barry Van Veen, 2^{nd} Edition, John Wiley & Sons, 2007 (ISBN: 978-8126512652)
2. An Introduction to Analog and Digital Communications, Simon Haykins, ,2^{nd} Edition Wiley India, 2006 (ISBN: 978-0471432227)
3. Signals and Systems - principles and applications, Shaila Dinkar Apte, 1^{st} Edition, Cambridge University press, 2016. (ISBN: 978-1107146242)
4. Signals and Systems with MATLAB, Won Young Yang, 1^{st} Edition, Springer, 2011 (ISBN: 978-8132203957)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Prototyping
	COURSE CODE	ET224
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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 : NIL

COURSE OBJECTIVES :

ET224.CEO.1: To learn about materiality and techniques.
ET224.CEO.2: To justify the product development cycle through prototype project.
ET224.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET224.CEO.4: To 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,

ET224.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET224.CO.2: Apply acquired skills to the construction of a prototype project.
ET224.CO.3: Develop a prototype project by performing tasks in team.
ET224.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. Hardware Prototyping (HP)
2. Software Prototyping(SP)

In the module hardware prototyping students will develop a prototype of electronic product. Student will be acquiring different skills in electronics like Soldering, Wiring and PCB Design using Electronic Design Automated tools, Assembly of electronic product, Testing and troubleshooting, requirement Analysis , Product concept development in electronic product design.

On the other hand in software prototyping students will learn Software development life cycle (SDLC) concepts, AEIOU framework, UML diagrams, Requirement analysis, data flow diagrams, creating high fidelity prototypes, Testing and Analysis etc.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Digital Prototyping, Semester - III

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Software Prototyping (SP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Software Prototyping (SP)	

MODULE: 1/2	Hardware Prototyping (HP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to design and construction of electronic prototyping	02 HOURS

1. Gain familiarity with basic product design stages; Conceptualization, Detailed Design and Implementation. Form a group of students. (04 max)
2. Acquire concepts of basic processes in electronic prototyping. Develop Concept Description Sheet (CDS) for product to be designed.
3. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span. Hence draw Physical and Mechanical Drawing.
4. Perform Customer Survey and Competitor Analysis
5. Develop Specifications and Make requirement analysis. Hence develop Bill of Material.
6. 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.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	06 HOURS

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

PRACTICAL NO. 04	PCB fabrication	06 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
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.
8. Develop Customer feedback sheet and Take feedback from Customers.
9. Make Customer feedback Analysis based on ratings.

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.
6. Present Customer feedback analysis.

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: 2/2	**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	**Requirement analysis**	**04 HOURS**
Find the requirement specification of given problem statement and formulate the feasible solution.		
PRACTICAL NO. 03	**Design UML Diagrams for given problem statement**	**06 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. 04	Design analysis	02 HOURS
Create High Fidelity Prototype		
PRACTICAL NO. 05	**Prototype Implementation**	**06 HOURS**
Use of prototype development tools such as Proto.io, Invision		
PRACTICAL NO. 06	**Presentation**	**04 HOURS**
Each group will be given 10 min to present their work.		

REFERENCE BOOK

1. Software Engineering A practitioners Approach, Roger S, Pressman, 7th Edition, ISBN: 9780073375977
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Minor Project Design
	COURSE CODE	ET230
	COURSE CREDITS	1
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET230.CEO.1: To categorize and define a problem to be solved.
ET230.CEO.2: To realize the ethical principles in general and its importance.
ET230.CEO.3: To make the students aware of project requirement analysis, design and planning.
ET230.CEO.4: To appreciate the importance of documenting and ethics of writing.

COURSE OUTCOMES :

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

ET230.CO.1: Delineate the problem to be solved.
ET230.CO.2: Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession.
ET230.CO.3: Embark project planning and design.
ET230.CO.4: Inculcate problem solving skills and critically analyze the options available to solve the problem.
ET230.CO.5: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

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. This will help students to understand the process of product/project development, best practices and encourage their creativity to solve real life problems. The students will learn effective team building, designing, budgeting, planning, engineering skills and processes, safety norms and standards while developing the application/ product. The students will be able to understand importance of documentation and professional ethics.

Guidelines

1. Every student shall undertake the Minor Project in semester III and IV.
2. Every student shall work on an approved project, a group of 03/04 students (maximum) shall be allotted for each minor project.
3. The group members may be from different programme to support the interdisciplinary functioning.
4. The students have to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
5. Collect the sufficient data and survey to establish the criticality of the problem to be solved.
6. Apply various tools for project planning and design.
7. Critically analyze various solutions/techniques to solve real world problems.
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use.
9. Learn and apply standards of engineering ethics and professional behavior.
10. Adherence to the highest principles of ethics, conduct and practices.

TIMELINE

The four member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Formation of Project Group: 2 Weeks (1^{st} week and 2^{nd} week)
2. Finalizing title, feasibility study and approval: 3 Weeks (3^{th} week to 5^{th} week)
3. Engineering Ethics: 3^{rd} week
4. Project Review 1 Presentation: 6^{th} week
5. Analysis and Design of the Project: 3 Weeks (7^{th} week to 9^{th} week)
6. Project Review 2 Presentation: 10^{th} week
7. Report Writing, Documentation and Presentation: 2 Weeks (11^{th} week and 12^{th} week)
8. Project Review 3 Presentation: 13^{th} week (Assessment by Guide)
9. Final Evaluation/Examination Presentation: 14^{th} week

Project Demonstration (50 Marks)

1. **Review 1 (Problem Statement and Literature Survey) (10 marks)**
2. **Review 2 (Project Modeling and Designing) (10 marks)**
3. **Project Activities (10 Marks)**
    - Quiz on Ethics
    - Drafting of Literature Review and Synopsis
    - Project Planning and Design
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration & Presentation (10 marks)**

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 1	Introduction to different forefront areas available within the School. Discussion on innovative application in domain area and resources such as Books, Blog, Publication Houses	To search the domain area of interest	At least 4 subtopics in area of interest (Template I)
Week 2	To brief at least two Innovative products with complete details and their Evolution	To search the domain area/innovative products of interest	Search in area of interest (Template II)
Week 3	Ethics, Morals, Values and Integrity, Work Ethic, Civic Virtue, Senses of Engineering Ethics, Business Ethics, Media Ethics, Environmental Ethics, Bio Ethics, Computer Ethics, Research Ethics	Graded Activity Quiz on Engineering Ethics	Understand the Ethics of an Engineer (Template III)
Week 4	Introduction to Research publication, its type, science citation index, methods to search Journals. Introduction to Ethics of writing(Plagiarism)	Search domain related five papers (from Journal Paper, Conference paper, Technical report, Manual, Thesis)	Student will learn searching SCI journal and understand Ethics of writing
Week 5	Presentation on how to make Project Presentation. Title, problem statement, objective, Scope etc (Select suitable topic of domain and explain it as per the template-IV)	Graded Activity on background study (market survey, customer survey, literature Survey) of domain area of interest	Drafting literature review and Synopsis (Template IV)
Week 6	NIL	Project Review 1 Presentation	Problem Definition and Objectives

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 7	Guidelines and tools for Analysis and Design of the Project and problem solving sessions	Analysis and Design of the Project	Best practices for Analysis and Design
Week 8	Guidelines and tools for the Project Planning, Introduction to Block Diagram, System Architecture	Make use of Project Planning Tools and Design Tools	Best practices for Project Planning and Design
Week 9	Presentation, discussion and doubt clearing based on • Working on Algorithms • Working on Design/ System Architecture • Working on Analysis/ CAD modeling	Graded Activity on Project Design and Planning	Best practices of Project Planning and Design
Week 10	NIL	Project Review 2 Presentation	Project Planning, Design of a solution
Week 11	Guidelines and tools for report writing	Project Report Writing	Effective Report Writing Practices
Week 12	How to give effective presentation on project	Report Writing and Presentation	Effective Documentation of the Project
Week 13	NIL	Project Review 3 Presentation	Final Report and Presentation
Week 14	NIL	Examination: Final Demonstration and Presentation	Problem Statement, Objectives, Design and Planning

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Data Structures and Algorithms
	COURSE CODE	ET225
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

COURSE OBJECTIVES :

ET225.CEO.1: To explore the basic concepts of data structures and algorithms.
ET225.CEO.2: To understand the different ways of data representation.
ET225.CEO.3: To study the representation, implementation and applications of linear data structures.

COURSE OUTCOMES :

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

ET225.CO.1: Summarize the searching and sorting techniques.
ET225.CO.2: Develop and implement code for linked list , stack and Queue data structures.
ET225.CO.3: Design code for various real time application.

Data Structure is the mechanism by which you can store data in a computer system. It allows an application to fetch and store data in the computers memory in an efficient manner. It is very important to identify and select the correct type of data structure for particular application. We are exploring the different types of data structures and learn how to implement them to solve real world problems.

PRACTICAL		
PRACTICAL NO.01	**Array and Structure with Functions**	**2 HOURS**

- Introduction to Data Structures
- Array and Structure in C and basic operations on it .
- Function implementation by passing array and structure as an argument.
- Assignment No.1.1
- Assignment No.1.2

PRACTICAL NO.02	**Searching and Sorting Techniques**	**4 HOURS**

- Sequential Searching and Binary Searching
- Bubble , Selection and Insertion sorting .
- Assignment No.2.1
- Assignment No.2.2

PRACTICAL NO.03	**Database Management**	**4 HOURS**

- Array of Structures.
- Create, display, search and delete operations on Database.
- Assignment No. 3.1

PRACTICAL NO.04	**Dynamic Memory Management**	**4 HOURS**

- Need of Memory Handling Technique
- Dynamic Memory Allocation Function
- Linked List and its Types
- Assignment No.4.1

PRACTICAL NO.05	Stack (LIFO Structure)	4 HOURS

- Concept of Stack LIFO Principle.
- Various Operations on the Stack Data Structure
- Implementation using Array and Linked List
- Assignment No. 5.1.

PRACTICAL NO.06	Queue (FIFO Structure)	4 HOURS

- Concept of Stack FIFO Principle.
- Various Operations on the Stack Data Structure
- Implementation using Array and Linked List
- Assignment No. 6.1

PRACTICAL NO.07	Project	4 HOURS
Capstone Project.		

TEXT BOOK

1. Seymour Lipschutz, Data Structure with C, Schaums Outlines, Tata McGrawHill , 4^{th} Edition , (ISBN 13 : 978-1259029967).
2. Yashavant Kanetkar, Data Structures Through C, BPB Publication, 2^{nd} Edition (ISBN-13: 978-8176567060).
3. E. Horowitz , S.Sahani, S.Anderson-Freed , Fundamentals of Data Structures in C, Universities Press , 2008 , (ISBN-10 : 8173716056)

REFERENCE BOOK

1. E Balguruswamy, Data Structure using C, Tata Magrawhill, 3^{rd} Edition, 2010 (ISBN: 9781259029547).
2. D. P Yedidyah Langsam, Moshe J Augenstein, Aaron M Tenenbaum, Data structures using C, Pearson India , 2^{nd} Edition (ISBN-: 978-8131702291).
3. S.K. Srivastav, Deepali Srivastav, Data Structure Through C, BPB Publication , 2^{nd} Edition, (ISBN-13: 978-8176567411).
4. A. Aho, J. Hopcroft, J. Ulman, Data Structures and Algorithms, Pearson Education, 1998,(ISBN- 10 : 0-201-43578-0)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Environmental Science
	COURSE CODE	CV203
	COURSE CREDITS	AUDIT
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
0	2	NIL	NIL	NIL	NIL	NIL	NIL

PRE-REQUISITE :

COURSE OBJECTIVES :

CV203.CEO.1: Create awareness about environmental problems among future citizens.
CV203.CEO.2: Interpret basic knowledge about the environment and its allied problems.
CV203.CEO.3: Develop an attitude of responsibility for the environment and society.
CV203.CEO.4: Acquire skills to identify and solve environmental problems.
CV203.CEO.5: Perceive the importance of sustainable development
CV203.CEO.6: Strive to attain harmony with nature.

COURSE OUTCOMES :

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

CV203.CO.1: summarize the importance of ecosystem and biodiversity for maintaining ecological balance.
CV203.CO.2: identify environmental problems arising due to engineering and technological activities and the science behind those problems
CV203.CO.3: categorize the major pollutants along with sources and abatement devices for the environmental management.
CV203.CO.4: analyze material balance for different environmental systems.
CV203.CO.5: perceive the social and professional responsibility towards the environment.
CV203.CO.6: appraise the environmental factors so as to ensure sustainable development

Activity Based Learning and Evaluation		
Activity No. 1	**Any of the following activity can be selected by students**	**2 HOURS**
Students have to select any one of the following activities and prepare the detailed report on it along with the statistics or photos. This could be completed individually or in group of students: 1. Calculate individual (per capita) use of water for a day and find ways to reduce that use. 2. Make presentations for awareness regarding water resources among students, villagers and local people (at least 10 households). 3. Find out individual activities which lead to various types of pollution and suggest possible preventive measures for it. 4. Explore and register varieties of plants in the institute campus or Alandi city or its surroundings and prepare the biodiversity register. 5. Study any threatened bird or animal.		
Activity No. 2	**Site Visit**	**2 HOURS**
Students have to visit any one non hazardous polluted site for finding the various reasons of its pollution and suggest preventive measures for it. Prepare the detailed report on it along with the photos. This could be completed in a group.		
Activity No. 3	**Any of the following activity can be organized by students**	**4 HOURS**
Students have to organize any one of the following activities in the institute and prepare a detailed report on their experience of organizing the activity, its possible benefits to the environment along with the photos. This could be completed in group of students: 1. No Car and Bike Day 2. Shutting down the fans and air conditioning systems of the campus for an hour. 3. Environmental awareness programs like organizing essay competition, poster competition, slogan making competition or any other related to it. 4. Celebrating various environmental days. 5. Any other similar activity related to the environment.		
Activity No. 4	**Expert Lecture**	**2 HOURS**
Instructor has to plan an expert lecture on use of recent technologies for environmental monitoring. Students have to prepare a detailed report on it.		
Activity No. 5	**Project Work**	**10 HOURS**
Students have to identify the real life environmental problems from their daily observations and try to find out the various feasible solutions for it as their project work. They are supposed to prepare the prototype or poster, detailed report and present it to the evaluators. The project should be related to the below mentioned heads: 1. Reuse, Recycle and Reduce 2. Environmental Pollution Monitoring and Control 3. Material Balance Concept 4. Sustainable Development 5. Environmental Innovations The evaluation is based on at least two number of project presentation reviews apart from the final project presentation.		

TEXT BOOK

1. R. J. Ranjit Daniels and Jagdish Krishnaswamy, Environmental Studies, Wiley India Publications, ISBN: 9788126519439.
2. Rao C.S. Environmental Pollution Control Engineering, Wiley Eastern Publications, ISBN: 9780470217634.
3. Cunningham W.P. and Cunningham M.A., Principles of Environmental Science, Tata McGraw-Hill Publishing Company, New Delhi, 2002.
4. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co., ISBN-10: 1111988935 ISBN: 9781111988937.

REFERENCE BOOK

1. H. S. Peavy, D. R. Rowe and G. Tchobanoglous, Environmental Engineering, McGraw Hill, ISBN: 84-282-0447-0.
2. Helen Kavitha Principles of Environmental Science, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
3. Henry J.G. and Heinke G.W., Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
4. Metcalf Eddy Wastewater engineering: Treatment and reuse, McGraw Hill, ISBN: 007041878.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT221
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	2	35	35	30	NIL	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

IT221.CEO.1: To introduce facts, concept and theory of an information system for decision making.
IT221.CEO.2: To understand information evolution using data processing cycle.
IT221.CEO.3: To explain information transmission for its visualization and interpretation.
IT221.CEO.4: To design digital data acquisition system for information generation.

COURSE OUTCOMES :

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

IT221.CO.1: Interpret Data, Information and Knowledge.
IT221.CO.2: Make use of data acquisition techniques for an information system.
IT221.CO.3: Categories different storage techniques.
IT221.CO.4: Develop dashboard for effective communication of information.
IT221.CO.5: Determine components of Human computer interface interaction.
IT221.CO.6: Design digital information acquisition system.

THEORY :

UNIT 1	Fundamentals of Informatics	6 HOURS

Data, Types of Data: Primary data, Secondary data, Operational data, Derived data, Structured, Semi-Structured, Unstructured
Meta data : Administrative and Descriptive
Data forms: Analog and Digital (Telephone and Stenography) ADC and DAC.
Information, Information Life Cycle
Knowledge, Types of Knowledge: Procedural, Declarative, Tacit and Explicit etc.
Self-Study: Grade Sheet Generation system
Further Reading: Customer Relationship Management (CRM)

UNIT 2	Data Acquisition and Information generation	6 HOURS

Data Collection Methods:
Human Interface Interview, Interrogation, Survey and Observation
Hardware and Software Interface Digital Data Acquisition System: Introduction to Microprocessor and Micro-controller
Web Interface: Web scrapper
Data Processing Cycle, Data Processing Stages Activities, Business Pyramid Model, Information System.
Self-Study: Weather forecasting System
Further Reading: Trivago, Spot Code, QR Code

UNIT 3	Information Storage and Transmission	6 HOURS

Need of data storage, Types of storage: stand alone, centralized, distributed
Cloud: Deployment Model, Services, Advantages and Disadvantages
Transmission Modes : Simplex, Half Duplex and Full Duplex
Transmission Types :- Serial (Synchronous and Asynchronous) and Parallel, Satellite Transmission : Features and Types (GEO,MEO and LEO)
Wireless Communication : Bluetooth, Zigbee and RFID
Encryption and Decryption.
Self-Study: Evolution of Storage
Further Reading: LoRa and Sigfox

UNIT 4	Information Visualization	6 HOURS

Dashboard: Definition, Components: Pivot Table, Pivot Chart, Slicer and General Charts
Types: Operational, Strategic and Tactical, Advantages
KPI / Grains: Definition, Design Rules, Assessing Quality of Dashboard
Dashboard Vs Scoreboard.
Self-Study: Dashboard Vs. Scoreboard
Further Reading: Information Dashboard Design

UNIT 5	Interactive Interface attributes	6 HOURS

Human interaction interface
User specific goals, Interface design life cycle, Neilsons Attributes
Interaction Evaluation and Guidelines: Normans Principles, Shneidermans Rules
Compliance of interaction goals : Neilsons and Normans 10 Heuristics.
Self-Study: Web based systems interactivity
Further Reading:GUI Design

UNIT 6	Acquisition system and IoT	6 HOURS

Machine to Machine interaction, IoT: Overview, Characteristics and Architecture
Componants: Sensors, Actuators, Controller and Processor
Basic elements / building blocks of IOT
Applications: Asset management, Industrial automation, Smart cities.
Self-Study: IoT Essentials
Further Reading:IOT and big Data

PRACTICAL :

PRACTICAL NO.01		8 HOURS

In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow:

- Identification of an interdependent elementary data items which have facts and figures
- Data collection through sensors
- Processing using Arduino
- Data Storage using MySQL in an accessible form
- Data visualization using graphs

PRACTICAL NO.02		8 HOURS

Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system.

- Create a graph showing how revenue evolves throughout the year for each of the sales channels
- Create an interactive chart that can be used to switch between different sales channels.
- Create three different views of the data: monthly sales revenue, sales revenue by category, and revenue by the top five distributors.

PRACTICAL NO.03		8 HOURS

Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi.

- Identify the home appliances that require human interaction for its operations and state the need of automation.
- Identify system component
- Design circuit diagram
- Assemble system components
- Program the interface
- System Testing
- System Deployment

TEXT BOOK

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

REFERENCE BOOK

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

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electromagnetic Theory
	COURSE CODE	ET231
	COURSE CREDITS	3
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	0	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET231.CEO.1: To understand the basic laws governing electrostatics and magnetostatics

ET231.CEO.2: To understand application of Maxwell's equations in antenna systems and wireless communication

ET231.CEO.3: To understand fundamentals of propagation through transmission line and waveguides

ET231.CEO.4: To explore and apply the concept of Smith chart

ET231.CEO.5: To understand the radio wave propagation through the atmosphere

COURSE OUTCOMES :

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

ET231.CO.1: Apply appropriate coordinate system and transformations to describe spatial variation of EM quantities.

ET231.CO.2: Explain laws governing electrostatics and magnetostatics for wireless communication and antenna systems.

ET231.CO.3: Analyze basic electromagnetic problems using Maxwell's equation to demonstrate propagation of fluctuating electric and magnetic fields.

ET231.CO.4: Appreciate the working of transmission line, waveguides and impedance calculations using Smith chart.

ET231.CO.5: Explain different modes of wave propagations for terrestrial, satellite and 5G communication.

THEORY COURSE CONTENT		
UNIT 1	**Electrostatic Fields**	**10 HOURS**

Coordinate Systems and Transformation, Electrostatic field: Introduction, Coulomb's law & Field Intensity, Field due to continuous charge distribution, Electric flux density, Gauss Law, Electric Potential, Electric Dipole and Flux Lines, Energy Density in Electrostatic Field.

Self-Study: Review of Vector Algebra & Vector Calculus

Application: Electrostatic Discharge & Cathode Ray Oscilloscope

Book: R Shevgaonkar, Electromagnetic Waves & Matthew N. O. Sadiku, Elements of Electromagnetics

UNIT 2	**Magnetostatic Fields**	**8 HOURS**

Steady magnetic field, Biot-Savarts Law, Amperes Circuit Law, Magnetic Flux Density, Scalar and Vector Potentials, Magnetic Forces, Magnetic Torque & Moment, Magnetic Dipole.

Self-Study: Applications of ACL

Application: Lightning & Polywell

Book: E. C Jordan, K. G Balmain, Electromagnetic Waves & Radiating Systems, Matthew N. O. Sadiku, Elements of Electromagnetics

UNIT 3	**Maxwell's Equations**	**8 HOURS**

Faraday's law, Transformer and Motional EMFs, Displacement current, Maxwell's Equations: Point Form, Integral Form for Steady Fields, Time Varying Fields and Harmonically Varying Fields. Poynting Vector & Poynting Theorem.

Application Note: Memristor

Case Study: EMI/EMC Testing Labs

Demonstration: Maxwells Equation using MATLAB

Book: Matthew N. O. Sadiku, Elements of Electromagnetics

UNIT 4	**Electromagnetic Waves**	**10 HOURS**

Waves in General, Wave Propagation in Lossy Dielectrics, Plane waves in dielectric media, conducting media, Skin Effect & Surface Impedance. Reflection of Plane Waves.
Transmission Lines: Distributed Parameters, Transmission Line Equations, Standing Waves, Impedance Matching, Smith chart, Scattering Parameter, Microstrip Transmission Line. Introduction to waveguides.

Self Study: Applications of Transmission Line Quarter Wave Transformer, Single Stub Tuner

Application: Microwave Oven The Cheese Experiment

Case Study: Analysis of RMSA using HFSS

Book: R Shevgaonkar, Electromagnetic Waves & Matthew N. O. Sadiku, Elements of Electromagnetics

UNIT 5	Radio Wave Propagation	6 HOURS

Fundamental Equations for Free Space Propagation, Ground Wave, Sky Wave, Space Wave, Structure of atmosphere, Characteristics of Ionized Regions, Virtual Height, MUF, Skip Distance, Effect of Earths Magnetic Field, Space Link Geometry.

Self Study: Radar Range Equation, Phase & Group Velocity, Ionospheric Abnormalities.

Application Note: Block diagram of Satellite and Radar Communication

Book: Matthew N. O. Sadiku, Elements of Electromagnetics & William H. Hayt Jr., Engineering Electromagnetics

TEXT BOOK

1. Matthew N. O. Sadiku, Elements of Electromagnetics, Oxford Univ Press (Sd); 6^{th} edition, 2014, ISBN-13: 978-019974300.
2. R Shevgaonkar, Electromagnetic Waves, McGraw Hill Education, 1^{st} Edition, 2017, ISBN-13: 978-0070591165.

REFERENCE BOOK

1. William H.Hayt, Jr., Engineering Electromagnetics, McGraw Hill Education (India) Private Limited; 8^{th} edition, 2011, ISBN-13: 978-0073380667.
2. E. C Jordan, K. G Balmain, Electromagnetic Waves & Radiating Systems, PHI Learning Pvt Ltd.; 2^{nd} edition, 1964, ISBN-13: 978-8120300545.
3. Karl E. Lonngren, Sava Savov, Randy J. Jost, Fundamentals of Electromagnetics with MATLAB, SciTech Publishing Inc; 3^{rd} edition, 2012, ISBN-13: 978-8120337374.
4. Joseph Edminister, Electromagnetics (Schaum's Outline Series), McGraw Hill Education (India) Private Limited; 2^{nd} edition, 2010, ISBN-13: 978-0070681958.

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Network Analysis Techniques
	COURSE CODE	ET232
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET232.CEO.1: To learn the analysis of AC and DC circuits using various techniques.
ET232.CEO.2: To study time-domain and frequency-domain analysis of RL, RC and RLC circuits.
ET232.CEO.3: To learn resonance and filter circuits.
ET232.CEO.4: To study the two port networks parameters and relationship.
ET232.CEO.5: To understand transmission line fundamentals and applications there-of.

COURSE OUTCOMES :

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

ET232.CO.1: Analyze complex linear circuits analytically and graphically. [L4]
ET232.CO.2: Examine the performance of first and second order circuits in time and frequency domain. [L4]
ET232.CO.3: Design and analyze the response of resonance circuits. [L4]
ET232.CO.4: Analyze different filter configurations and applications there-of. [L4]
ET232.CO.5: Inspect two port network of a given electronic circuit. [L4]
ET232.CO.6: Derive general solution of a transmission line and extend the concept to distortion-less line. [L3]

THEORY COURSE CONTENT		
UNIT 1	**Circuit Analysis and Graph Theory**	**8 HOURS**
Circuit analysis: mesh and nodal analysis techniques, Network theorems and applications, Network graphs and its matrices, Equilibrium equations.		
UNIT 2	**Time and Frequency Domain Analysis**	**8 HOURS**
Response of RL and RC circuits for source free and source driven circuits, Concept of Natural and forced response, Natural and forced response of RLC circuits, Analysis of RL, RC and RLC circuits in 's' domain.		
UNIT 3	**Resonance Circuits**	**6 HOURS**
Series Resonance: Impedance, Phase angle variations with frequency, Voltage and current variation with frequency, Bandwidth, Selectivity, Effect of generator resistance on Bandwidth and Selectivity, Magnification factor. Parallel resonance: Resonant frequency and admittance variation with frequency, bandwidth and selectivity, MRI (Case Study).		
UNIT 4	**Filters and Applications**	**7 HOURS**
Properties of symmetrical and asymmetrical networks, Filter fundamentals, Constant k-filters and m-derived filters, terminating half sections, and composite filters, Design of attenuators, study of AM/FM radio (Case study).		
UNIT 5	**Two Port Networks**	**6 HOURS**
Two port networks: Z, Y, h, g, ABCD and abcd parameters along with condition of reciprocity and symmetry, Relation between two port network parameters, Equivalent networks.		
UNIT 6	**Network Transmission Line**	**7 HOURS**
Lines and line parameters, Line of cascaded T section, General solution of transmission line, wave-length, velocity of propagation in transmission line. Distortion-less line, Application to telephone and strip line, Introduction to impedance matching techniques (Self Study).		

PRACTICAL		
PRACTICAL NO.01	**Verification of network theorems**	**4 HOURS**

1. Solve the circuit mathematically to find voltage and current across load
2. Convert given circuit to equivalent circuit using theorems
3. Design and validate above circuits on bread-board

PRACTICAL NO.02	Analysis of RL, RC and RLC circuits	2 HOURS
1. Measure and interpret the transient response of a first-order and second-order circuit 2. Simulate the frequency response of a tuned circuit using circuit simulation software		
PRACTICAL NO.03	**Analysis of series resonance circuits**	**2 HOURS**
To observe the resonance and calculate resonant frequency, band width, quality factor in series resonance circuit		
PRACTICAL NO.04	**Analysis of parallel resonance circuits**	**2 HOURS**
To observe the resonance and calculate resonant frequency, band width, quality factor in Parallel resonance circuit		
PRACTICAL NO.05	**Analysis of Filters**	**4 HOURS**
1. Reactance vs attenuation constant and characteristic of a low pass filter and its impedance 2. Attenuation vs frequency, phase shift vs frequency characteristics		
PRACTICAL NO.06	**Design of symmetrical type attenuator**	**2 HOURS**
1. Design & measure attenuation of symmetrical T attenuator 2. Design & measure attenuation of symmetrical Pi attenuator		
PRACTICAL NO.07	**Calculation of Z and Y parameters**	**2 HOURS**
To find Z and Y parameters of two port network (T and Pi)		
PRACTICAL NO.08	**Design of two port network**	**4 HOURS**
1. Interconnection of two ports (series connection, parallel connection) 2. Design Equivalent networks		
PRACTICAL NO.09	**Measurement of transmission line parameters**	**2 HOURS**
1. Measurement of characteristics impedance, propagation constant. 2. Measurement of VSWR for a given transmission line.		

TEXT BOOK

1. Robert L. Boylestad, Introductory Circuit Analysis , 12^{th} edition, Pearson Education, ISBN-978-0137146666.
2. Ravish R. Singh, Electrical Network, 1^{st} Edition, McGraw Hill Education ISBN-13: 978-0070260962
3. John Douglas Ryder, Networks Lines and Fields, 2^{nd} Edition, PHI, 1949, ISBN: 9788120302990

REFERENCE BOOK

1. D. Roy Choudhary, Network and Systems, 2^{nd} Edition, New Age International, 2010 ISBN: 9788122427677
2. William Hayt, Jack Kemmerly and Steven Durbin, Engineering Circuit Analysis, 8^{th} Edition, Mcgrawhill, 2013, ISBN: 9781259098635
3. Franklin F. Kuo, Network Analysis and Synthesis, 2^{nd} Edition, Wiley, 2010 (ISBN: 9788126510016).
4. M. E. Van Valkenburg, Network Analysis, 3^{rd} Edition, Pearson Education India, 2015 (ISBN: 978-9332550131).
5. S. P.Ghosh and A. K. Chakraborty, Network Analysis and Synthesis, 1^{st} edition, 2009, McGraw Hill Education, ISBN-9780070144781
6. William D. Stanley, Network Analysis with Applications, 4^{th}, 2003, Pearson Education India, ISBN-978-8131703182.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Microcontroller and Interfacing
	COURSE CODE	ET233
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

COURSE OBJECTIVES :

ET233.CEO.1: To get acquainted with the role of microcontroller in embedded system.
ET233.CEO.2: To understand architecture and features of typical microcontroller.
ET233.CEO.3: To study various hardware and software tools for developing applications.
ET233.CEO.4: To learn interfacing of various peripherals with microcontrollers.

COURSE OUTCOMES :

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

ET233.CO.1: Compare the features of different families of the microcontrollers. (L2)
ET233.CO.2: Explain the architecture and features of the 8 bit microcontroller. (L2)
ET233.CO.3: Categorize the software and hardware tools for embedded system development. (L2)
ET233.CO.4: Apply the interfacing techniques for various peripherals with the microcontroller. (L3)

THEORY COURSE CONTENT		
UNIT 1	**Overview of Microcontroller & Microprocessor**	**8 HOURS**
CICS vs RISC architecture, Harvard & Von neumann architecture, Microcontroller vs Microprocessor, Survey on 8/16 bit microprocessor (8085/8086), Inside the microcontroller, Pin diagram, Port Structure, Register Bank, Special Function Registers, Concept of reset, Oscillator, Concept of interrupt, Survey of different families of microcontrollers, Selection Criteria for choosing microcontroller, Instruction Set (Ex. 8051)		
UNIT 2	**Software and Hardware Tools**	**6 HOURS**
Introduction to ALP, Introduction to Embedded-C, Assembler, Compiler, Integrated Development Environment (IDE), Development board, Programmer, Test and Measuring instruments etc.		
UNIT 3	**Microcontroller - Advanced 8 bit**	**6 HOURS**
Architecture [Block Diagram and Pin Diagram], Memory organization, Port Structure, Hardware Stack, Configuration bits (Ex. PIC18Fxxx) .		
UNIT 4	**GPIO Interface**	**8 HOURS**
Interfacing with LEDs, Push Buttons/switch, Buzzer, Relay, 7-segment display, LCD, Matrix Keypad, Digital sensor interface, Analog to Digital Converter (ADC)/Analog sensor, Digital to Analog Converter (DAC), Stepper motor and DC motor		
UNIT 5	**On-chip modules Interface**	**8 HOURS**
Interface of Timers, UART/USART module, Software and hardware interrupts, External interrupt interface		
UNIT 6	**Special Feature Interface**	**6 HOURS**
Master Slave Serial Protocol (MSSP) Communication, Capture-Compare-PWM (CCP) module		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Study of Integrated Development Environment (IDE)		
PRACTICAL NO.02		**4 HOURS**
Perform the interfacing of LEDs, buzzer, relay, push button		
PRACTICAL NO.03		**4 HOURS**
Perform the interfacing of 16 $\times$ 2 LCD display		
PRACTICAL NO.04		**4 HOURS**
Perform the interfacing of ADC module		

PRACTICAL NO.05		**2 HOURS**
Generate a delay using timer module		
PRACTICAL NO.06		**2 HOURS**
Generate Pulse Width Modulation (PWM) of a duty cycle		
PRACTICAL NO.07		**2 HOURS**
Program UART for serial communication		
PRACTICAL NO.08		**4 HOURS**
Perform the interfacing of matrix keypad		

TEXT BOOK

1. Muhammad Ali Mazidi, Rolin McKinlay and Danny Causey, PIC Microcontroller and Embedded Systems Using Assembly and C for PIC18, 1st Edition, Pearson, 2007 (ISBN: 9780131194045)
2. Muhammad Ali Mazidi, Rolin McKinlay and Danny Causey, The 8051 Microcontroller and Embedded Systems: Using Assembly and C 2nd Edition, Pearson Education India, (ISBN: 9788131710265)

REFERENCE BOOK

1. Ramesh Gaonkar, Fundamentals of Microcontrollers and Applications in Embedded Systems with PIC18 Microcontroller Family, 1st Edition, Thomson and Delmar, 2007 (ISBN: 9781401879143)
2. Myke Predko, Programming and Customizing The PIC Microcontroller, 3rd Edition, TMH, 2007 (ISBN: 9780070223509)
3. Douglas V Hall, Microprocessors and Interfacing, 3rd edition, McGraw, (ISBN: 9781259006159)
4. Manuals and Datasheets of PIC Series Microcontroller and Peripherals and 8051
5. Application Notes PIC Series Microcontroller

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Rapid Prototyping
	COURSE CODE	ET235
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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 : NIL

COURSE OBJECTIVES :

ET235.CEO.1: To learn about materiality and techniques.
ET235.CEO.2: To justify the product development cycle through prototype project.
ET235.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET235.CEO.4: To 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,

ET235.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET235.CO.2: Apply acquired skills to the construction of a prototype project.
ET235.CO.3: Develop a prototype project by performing tasks in team.
ET235.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. Civil Prototyping (CP)

In Mechanical prototyping, students will learn rapid prototyping skills. Students will focus on basics of CAD modeling, hands on practice on CAD software, 3D Modeling , 3D Printing, Fabrication of prototype and testing etc.

On the contrary in civil prototyping students will learn developing bamboo structures by testing and analyzing bamboo, designing bamboo joinery, and testing of bamboo structures.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Rapid Prototyping, Semester - III

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Civil Prototyping (CP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Civil Prototyping (CP)	

MODULE: 1/2	Mechanical Prototyping (MP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to prototyping	04 HOURS

1. Introduction to different prototyping, traditional prototyping vs. advance rapid prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Different types of materials used in prototyping model.
3. Introduction of multi axis (4D and 5D) machines used in prototyping and machining.
4. Making of paper prototyping (virtual or physical).
5. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.

PRACTICAL NO. 2a	Basics of CAD modeling	04 HOURS

1. Introduction of CAD software.
2. Introduction of 2D, 3D Modeling using CAD software package.
3. Hands on practice of CATIA or any other CAD software.
4. Formation of students group per project team.

PRACTICAL NO. 2b	3D Modeling for prototyping	04 HOURS

1. Introduction of 3D modelling and its interaction with prototype machine
2. Identify physical constraints of prototyping.
3. Sketcher-workbench and its applications
4. Part design workbench.
5. Preparation of 3D prototyping model by CAD software for final project

PRACTICAL NO. 03	Preprocessing of 3D printing slicing	03 HOURS

1. Generating STL files of 3D models from CAD software & working on STL files.
2. Pre-Processing the 3D Model in Cuba software / kisslicer - repeater for slicing.
3. Selection of orientation of model, support generation, skin and wall thickness- depth setting.
4. Setting of printing speed, flow rate, volume, mass and time require for printing or manufacturing.
5. Practice of slicing on 3D Cad model and decide optimize parameters.

PRACTICAL NO. 04	Orientation and support generation, manufacturing planning	03 HOURS

1. Suitable filament material for 3D printing and selection and its properties.
2. Selection of material and process for making physical models by other tradition methods (machining, wood, clay, paper, polymer, etc).
3. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Manufacturing and fabrication of model	06 HOURS

1. Introduction 3D printer machines, and other machines used for prototyping.
2. Demonstration of 3D printing machine pre-setting and filament material loading.
3. Hands on experience of rapid prototype machine for part/object/model, manufacturing of conventional prototype model if any, assembly if required.
4. Calculation of cost of product, financial aspect, Bill of material (BOM), testing for prototyping, Plan to promote product/model in market, etc.

PRACTICAL NO. 06	Project presentation	02 HOURS

1. Final Presentation and demonstration of models.
2. 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: 2/2	Civil Prototyping (CP))	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**02 HOURS**
Introduction of bamboo, its physical, mechanical properties, selection, seasoning and treatment, case studies of bamboo structures.		
PRACTICAL NO. 02	**Testing & Analysis of Bamboo**	**04 HOURS**
Study of different test on Bamboo & Analysis of structures made by bamboo.		
PRACTICAL NO. 03	**Design of bamboo Joinery**	**04 HOURS**
Study of different bamboo structures, Hands on different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo structures**	**08 HOURS**
Making of bamboo structures		
PRACTICAL NO. 05	**Testing on bamboo structure (Post Testing)**	**04 HOURS**
Testing of different bamboo structures		
PRACTICAL NO. 06	**Final project presentation**	**04 HOURS**
Comparative study of analytical and test results of the bamboo Structure, 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.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Minor Project Implementation
	COURSE CODE	ET240
	COURSE CREDITS	1
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET240.CEO.1: To disseminate different methodical approaches to make solution.
ET240.CEO.2: To explain different conventional and modern engineering tools/techniques.
ET240.CEO.3: To engage them in creative thinking to improve the project performance using recent trends.
ET240.CEO.4: To educate about different types of prototyping.
ET240.CEO.5: To be more self efficient to solve problem in real time design environment.
ET240.CEO.6: To create awareness about Intellectual Property Rights(IPR).

COURSE OUTCOMES :

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

ET240.CO.1: Select appropriate method for making of solution.
ET240.CO.2: Compare various engineering tools/technique to develop solution.
ET240.CO.3: Justify the selected method/tools opted for making of solution.
ET240.CO.4: Develop tangible solution to defined problem.
ET240.CO.5: Test the developed solution.
ET240.CO.6: Document solution in the form of Project report / IPR drafts.

COURSE ABSTRACT

Project is an avenue to cater Societal and Industrial needs. Minor project is one of the platform which students will use to solve real time problems. This course focuses on Selection of Methods/Engineering tools/Analytical techniques for making of solution.Further it emphasizes on importance of testing of solution by various stake holders.Through this course student learns to comprehensively understand engineering fundamentals and concepts, gets practical experience, chance to showcase skills, learns about team work, communication skills and responsibilities. It also imparts knowledge of Intellectual Property Rights.

Guidelines

1. Group members should deliberate upon different methodical approaches and finalize the appropriate method.
2. Students group should explore different Engineering tools/techniques for making of solution.
3. Justify the selected method/Engineering tools/analytical techniques identified based on the feasibility, affordability and ease of use.
4. While making the solution ,its imperative to take inputs/suggestions from various stake holders.
5. Solution must be critically analyzed from aspects.
6. Completed solution must be tested by target user/stake holders.
7. Students must protect their innovation,proof of concept through IPR .
8. While working in team, individual student should contribute and communicate effectively to maintain team balance.

TIMELINE

1. IPR Activity on Earlier allocated Group : 2 Weeks (1^{st} ,2^{nd} week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (4^{th}, 5^{th} week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (9^{th}, 10^{th} week)
4. Preparation of Project Progress Report I (week 11^{th} and 12^{th}) Project Phase-II
5. Project Review III (10 marks) (11^{th} week)
6. Evaluation by external examiner (End Semester by 12^{th}, 13^{th} week)

Demonstration and Presentation (50 Marks)

1. **Review 1 (Project Implementation) (10 marks)**
2. **Review 2 (Project Demostration) (10 marks)**
3. **Project Activities (10 Marks)**
   - Quiz on IPR (5 marks)
   - Patent Drafting (5 marks)
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration and Presentation (10 marks)**

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Introduction to IPR (Patent & Right) (30 min) Videos on Patent: (30 min)	Student will attempt Quiz-I IPR after the lecture (10 Questions) Graded Activity 5marks Template I	Student will learn the patents and how to search patent
Week 2	How to check patent through CDAC online portal.	Student will do prior art search for their project, and try to generate patent Abstract as per the (Template- II)	Submission of Patent Abstract as per the prescribed Template.
Week-3	Design, Architectural overview /feasibility analysis of the project, Recent trends available to improve the performance.	Discussion on system architecture/ design method/ feasibility of project idea.	Student will implement the best feasible method to generate prototype
Week-4	NIL	Review I (10 Marks) - Presentation	Student will present progress done in project prototype building.
Week-5	Searching of Patents, Drafting of Patents , Filing of Patents , types of patent Application, Patent Documents. Expert lecture on above topic.	Final Drafting of complete patent document (5 marks) Graded Activity	Student will understand the basics of drafting patents, important of filling patent Submission in LMS
Week-6	Presentation, discussion and doubt clearing based on • Working on Algorithms / Design • Working on Analysis • Developing Prototype / Programming/ Circuits etc	As per department / school	Student will learn to prevent design flaws.

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week-7	Presentation, discussion and doubt clearing based on • Working on Algorithms/Design • Working on Analysis • Testing of Prototype/ Code/ Circuits of project	As per department / school	Student will analyze for project outcome
Week-8	NIL	Review-II (10 Marks) - Presentation	Student will work for performance improvement if project not working satisfactorily.
Week-9	Regarding Final PPT For Project Faculty himself gives a presentation based on how to make effective presentation on research topics.	Student will submit the Draft PPT through LMS at the end of Week-10	Student will learn to generate PPT covering all final outcomes of the project.
Week-10	Regarding Final report Generation For Project Faculty himself gives a presentation based on how to make effective project report should explain all guidelines to be followed while preparing report	Student will submit the Draft Project report through LMS at the end of Week-10	Student report are expected to have design Analysis, and the project should be expected to one year with the same guide
Week-11	NIL	Review-III (10 Marks)-Presentation	Students are expected to prepare a detailed project report and Project PPT , they should also check for plagiarism.
Week-12	Final Project presentation and project report submission to the project coordinator. Faculty will review the student projects with external examiner	Presentation and demonstration of project.	Prototypes/Software and Final Project report

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP202
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP202.CEO.1: To increase students confidence during everyday communication.

HP202.CEO.2: To increase impact of students communication during presentations and public speaking.

HP202.CEO.3: To develop Leadership qualities among students.

COURSE OUTCOMES :

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

HP202.CO.1: Express themselves effectively in routine and real-world interactions through verbal and written communication.

HP202.CO.2: Show Confident Public Speaking skills.

HP202.CO.3: To showcase leadership qualities during tough tasks, make decisions and actions effectively within time.

TUTORIALS: (SECTION A)		
TUTORIAL NO.01	**Role Plays and Picture Description**	**4 HOURS**
It helps students to sharpen their extempore skills with effective articulation and logical sequencing of content.		
TUTORIAL NO.02	**Creative Writing Skills and Presentation Skills**	**8 HOURS**
It aims at evolving effective writing skills and presentation skills.		
TUTORIAL NO.03	**Voice Modulation and Audio - Video Listening and Debate**	**8 HOURS**
To enhance listening skills and to teach the students the basic components of voice modulations and helping them practice it. It helps overcome stage fear and learn audience engagement		
TUTORIAL NO.04	**Leadership**	**6 HOURS**
Leadership qualities helps person to lead a team in achieving the set vision. It helps in planning to execute it, utilizing resources and motivating people involved in it.		
TUTORIAL NO.05	**Decision Making**	**4 HOURS**
It helps to make necessary courageous and difficult decisions and carry them into action.		
TUTORIAL NO.06	**Time Management**	**6 HOURS**
It helps organizing and planning how to divide valuable time between specific activities and prioritizing activities.		
SECTION B:	**Verbal, Reasoning and Aptitude Training through BtechGuru**	**12 HOURS**

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Simon Wootton and Terry Horney, Strategic Thinking A Nine Step Approach to Strategy and Leadership for Managers and Marketer, ISBN13: 9780749460778.
5. Lorin Woolfe, The Bible on Leadership: From Moses to Matthew – Management Lessons for Contemporary Leaders, ISBN-10 : 0814439438; ISBN-13 : 978-0814439432.

REFERENCE BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Garr Reynolds, Presentation Zen: Simple Ideas on Presentation Design and Delivery (Voices That Matter) , New Riders; 2 edition (8 December 2011), ISBN-10: 0321811984.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Liberal Learning
	COURSE CODE	HP203
	COURSE CREDITS	AUDIT
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP203.CEO.1: To create awareness about joy of learning among students
HP203.CEO.2: To teach the skills necessary to be a lifelong learner
HP203.CEO.3: To provide students with broad knowledge of the wider worlds.
HP203.CEO.4: To develop a sense of social responsibility as well as strong and transferable intellectual and practical skills.
HP203.CEO.5: To inculcate intellectual, civic, and practical capacities in students.

COURSE OUTCOMES :

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

HP203.CO.1: Develop a skill in the domain of their interest.
HP203.CO.2: Demonstrate the skills learnt in the course.
HP203.CO.3: Apply the concepts learnt in real-life situations.

NOTE : Students may select any one of the following tracks

COURSE CONTENTS

Track 1	**Introduction to photography**	**12 HOURS**

Types of camera, Basic camera controls. Light & Lenses, Understanding the Exposure Triangle. Aperture, Shutter Speed, and ISO. Auto and manual focus, Depth of field Landscape & nature photography, Creative aspects.

Track 2	**Dance**	**12 HOURS**

Study and demonstration of various dance forms such as classical, Bollywood, street dance, ballroom dance and Contemporary.

Track 3	**Creative Writing**	**12 HOURS**

Introduction to Creative Writing-How, literary aspects, different genres, forms of writing and script writing, Short Story Writing. Blog Writing.

Track 4	**Guitar**	**12 HOURS**

Parts of guitar, Names of strings, Proper right hand techniques, Proper left hand techniques, Tuning Guitar, Tuning by Ear, Tuning to a keyboard

Introduction to guitar fret board & The Chromatic Scale- The Chromatic Scale, Fret board, How to read Guitar Tablature, Finger exercises, how to read Chord Blocks.

Track 5	**Art and Craft**	**12 HOURS**

Sketching & Drawing, Elements of Art, types of art forms, types of Painting, Craft, Wrap in scrap, Best out of waste, Paper craft, Cloth craft & Rangoli.

Track 6	**Robotics**	**12 HOURS**

Introduction to Robotics, Robotics Links and joints, Selection & types of sensors, Actuators.

Track 7	**Drama**	**12 HOURS**

Learning & practicing narrations, craft and art conceptualization as an effective presentation, Survey for identification of social and global issues as a concept in script writing, Sound and illumination measures.

Understanding the audition for various sections like drama & film.

Illustrating the dialog delivery, expressions, volume, pitch in the dialog, Expression through photography and editing skill with an expertise in handling cameras, microphone, effective management skill enabling the justification through foundation till representation.

Track 8	**Yoga and Meditation**	**12 HOURS**

Concept of mind, Consciousness. Concentration techniques, Breathing exercises, Visualizations, Walking meditations. Simple yoga, Meditation and prayer, Asana and its types , Pranayama, its types and principles.

Track 9	**Automotive Skills**	**12 HOURS**

Introduction to Automotive system, Brake system, Power train of automotive, Suspension system, Computer Aided Engineering, Manufacturing and safety, Assembly and finishing.

Track 10	**Empathy & Compassion**	**12 HOURS**

Importance of Empathy, Role of empathy and compassion for engineers, Empathy activities, Skepticism About the Self, Free Will and the Situation, Recognizing emotions reading body language, improving listening skills, mindful self compassion, Compassionate Leadership,Origins of Morality, joy of giving, social responsibility, exercising social services.

Track 11	**Singing**	**12 HOURS**

Vocal cords, Voice types, Female: Soprano or alto, Male: Tenor, baritone or bass, Breathing Techniques, Role of breathing in singing, types of scales and pitches, Musical notes foundation of any song, warm-up exercises: Humming exercise, tongue twisters, vowels, Tempo of song, Tempo Markings, Practicing all octaves, analysis of songs, practicing songs.

Track 12	**Chess**	**12 HOURS**

Introduction to game of Chess. Rules, movement of pieces, strengths and weaknesses of all pieces. Stalemate, touch move, etiquette, pawn promotion and zugzwang, square of the pawn. Fundamental checkmate patterns, basic rules, special moves and rules such as castling, promotion, EnPassant, good moves for the opening.

Track 13	**RC Plane**	**12 HOURS**

Introduction to RC planes, study with categorization of planes and study of control forces on RC plane. Study of control surfaces. Study of airfoil, Studying the concepts of take-off, cruising, landing and motions during flight. Study of graphs. Study on factors affecting the flight of plane. Control and propulsion system of RC aircraft. Introduction and making of Electrical glider.

Track 14	Drone Making	12 HOURS

Three thumb rules, Basic of FAA, Combination of electronics, Frame design , Motor stator reading and dimension, Basic of electronics, Introduction to Drones, Fundamental of Flight, Airframes and Electric Motors, ESC and flight controller, Receivers And Transmitter, Battery and chargers, Basic building Tutorial with working on software(Betaflight), FPV and LOS Simulations, Working on development of Betaflight.

NOTE : More tracks will be added as per demand of the students

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Third Year

Bachelor of Technology in Electronics Engineering

2019-2023

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V

SUMMER INTERNSHIP

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	ET341	Control Systems	3	2	-	35	35	30	50	0	150	4
DC08	ET342	Digital Signal Processing	3	2	-	35	35	30	50	0	150	4
DC09	ET343	Embedded Systems Design	3	2	-	35	35	30	50	0	150	4
OE01	ET35# / EX35#	Open Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP6	ET34#	Skill Development - Data Science	0	4	-	0	0	25	50	0	75	2
SDP7	ET350	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			**14**	**16**	**0**	**140**	**190**	**195**	**200**	**50**	**825**	**22**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	ET361	Power Electronics	3	2	-	35	35	30	50	0	150	4
DC11	ET362	Principles of Communication Systems	3	2	-	35	35	30	50	0	150	4
DC12	ET363	Soft Computing	3	2	-	35	35	30	50	0	150	4
OE02	ET37# / EX37#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP8	ET36#	Skill Development course	0	4	-	0	0	25	50	0	75	2
SDP9	ET360	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability Skills	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**20**	**0**	**140**	**140**	**195**	**250**	**100**	**825**	**22**

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Control Systems
	COURSE CODE	ET341
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET341.CEO.1: Learn the mathematical model and transfer function of LTI systems.
ET341.CEO.2: Study time-domain and frequency-domain analysis of LTI systems.
ET341.CEO.3: Understand concept of stability and methods for inferring stability of a systems.
ET341.CEO.4: Study state variable modeling and its analysis for SISO and MIMO systems.
ET341.CEO.5: Understand the concept of motion control using PID.

COURSE OUTCOMES :

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

ET341.CO.1: Develop the mathematical model of the physical systems.
ET341.CO.2: Develop and analyze state space models.
ET341.CO.3: Analyze the response of the closed and open loop systems.
ET341.CO.4: Analyze the stability of the closed and open loop systems.
ET341.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. **Further Reading:** MAAB & MISRA modelling guidelines		
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. **Case Study:** Developing mathematical model of Battery		
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, Introduction to Model-In-Loop, Software-In-Loop and Processor-In-Loop Testing. **Case Study:** Model Based Design for Embedded Control Systems		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Analysis of Systems.		
PRACTICAL NO.02		**2 HOURS**
Performance Analysis of Closed Loop Systems.		
PRACTICAL NO.03		**2 HOURS**
Analysis of a system using Root Locus.		
PRACTICAL NO.04		**2 HOURS**
Design using Root Locus Method.		

PRACTICAL NO.05		**2 HOURS**
Frequency Response Analysis.		
PRACTICAL NO.06		**2 HOURS**
Design using Frequency Response Method.		
PRACTICAL NO.07		**4 HOURS**
State feedback control of a System.		
PRACTICAL NO.08		**4 HOURS**
PID control of a System.		

TEXT BOOK

1. Katsuhiko Ogata, Modern Control Engineering, 5 th edition, PHI, 2010, ISBN: 978-0136156734.
2. Norman S. Nise, Control Systems Engineering, 8 th edition, Wiley India Edition, 2018, ISBN: 978-8126571833.

REFERENCE BOOK

1. R. C. Dorf and R. H. Bishop, Modern Control Systems, 13 th Edition, Pearson, 2017, ISBN: 978-0134408323.
2. Benjamin C. Kuo and Farid Golnaraghi, Automatic Control Systems, 9 th edition, Wiley-India, 2018, ISBN: 978-8126513710.
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 (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Signal Processing
	COURSE CODE	ET342
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET342.CEO.1: To understand the concept of digital signal processing and its implications
ET342.CEO.2: To explore different transforms & their use in design and analysis of LTI systems
ET342.CEO.3: To explore the design techniques of IIR and FIR filters by different methods
ET342.CEO.4: To analyze concept of multi-rate signal processing & its applications
ET342.CEO.5: To introduce architecture of DSP processor TMS320C5xxx

COURSE OUTCOMES :

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

ET342.CO.1: Analyze LTI systems using DFT
ET342.CO.2: Model & Synthesize IIR and FIR filters
ET342.CO.3: Develop single stage and multi-stage sampling rate converters
ET342.CO.4: Build practical applications using DSP processor in the context of architecture and programming

THEORY COURSE CONTENT		
UNIT 1	**Discrete Fourier Transform**	**9 HOURS**
Introduction to DSP, Basic Elements, Requirements, Advantages and Features Review, Discrete Fourier Transform (DFT): Concept, Properties, Circular and Linear Convolution, FFT Algorithms: Decimation in Time (DIT) and Decimation in Frequency (DIF), Linear Filtering: Overlap-Add and Overlap-Save method **Applications:** Spectral Analysis, JPEG Image compression using DCT & Video Compression using MPEG		
UNIT 2	**IIR Filter Design**	**9 HOURS**
Concept of IIR, Design methods Impulse Invariance, Bi-linear Transformation, Butterworth, Chebychev, Frequency transformations, Filter Structures, Finite word length effect in IIR filter design **Applications:** IIR filter design for real time Applications		
UNIT 3	**FIR Filter Design**	**8 HOURS**
Concept of FIR, Need of Linear Phase, Concept of Group Delay and Phase Delay, Linear phase constraint: Symmetric and Anti-symmetric response, Types of linear phase filter, Design using Window Method and Frequency Sampling Method, Basics of Adaptive Filters. Filter Structures **Applications:** Removal of ECG Signal noise using FIR filter		
UNIT 4	**Multirate Signal Processing**	**8 HOURS**
Concept, Decimation by factor D, Interpolation by factor I, Sampling rate conversion by a rational factor I/D, Filter Design for sampling rate conversion, Multistage approach to sampling rate conversion. Wavelet transform and its relation to multi-rate filter banks **Applications:** Speech & audio coding using Multirate Signal Processing		
UNIT 5	**DSP Processors**	**8 HOURS**
Architecture, Hardware Units, Fixed-Point and Floating-Point Formats Finite Word Length Effects, Programming Issues, Real-Time Implementation. Case Study of Digital Signal Processor TMS320C5xxx: Architecture **Applications:** Implementation of IIR and FIR Filters, FFT Algorithm, Fast Convolution		

PRACTICAL:

The labs 1 to 5 are to be performed using software like C/ MATLAB/ SCILAB etc.

The labs 6 to 7 are to be performed using DSP Processor

PRACTICAL NO.01	**Discrete Fourier Transform (DFT) - Properties and Applications**	**4 HOURS**

1. To implement properties of DFT
2. To find the frequency response from the impulse response using DFT
3. To implement Spectral Analysis Using the DFT

PRACTICAL NO.02	**Spectral Analysis and Leakage Effect**	**4 HOURS**

1. To implement DIT & DIF FFT algorithm
2. To implement Spectral Analysis Using the FFT
3. To find the Spectral Leakage Effect using FFT algorithm
4. To implement DCT using FFT

PRACTICAL NO.03	**IIR Filter Design**	**4 HOURS**

1. To design and implement Butterworth IIR filter using FDA tool and Simulink
2. To design and implement Chebychev IIR filter using FDA tool and Simulink

PRACTICAL NO.04	**FIR Filter Design**	**4 HOURS**

1. To design and implement FIR filter using windowing method
2. To design and implement Low Pass FIR Filtering for high frequency noise removal
3. FIR filter to remove 50/60Hz from an ECG signal

PRACTICAL NO.05	**Multirate Filter Design**	**2 HOURS**

1. Design and Simulate Multirate Filter
2. To design and implement speech signal using Multirate Filter

PRACTICAL NO.06	**DSP Processor**	**2 HOURS**

DSP Starter Kit - Signal Generation, Convolution, I/O Interface

PRACTICAL NO.07	Case Study	2 HOURS
Course project based on society, science and technology problem clubbed with paper implementation (MATLAB or Scilab or Simulink or combination of these) and presentation (Define problem, data collection, requirement analysis, functional analysis. Design solution, progressive presentation of solution and final presentation)		
PRACTICAL NO.08	**DSP Processor Implementation**	**4 HOURS**

1. Implementation of Filter IIR, FIR
2. Implementation of FFT Algorithm

TEXT BOOK

1. John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 4^{th} Ed., Pearson, 2007, ISBN: 9788131710005
2. S. K. Mitra, Digital Signal Processing - A Computer Based approach, 3^{rd} Ed., McGraw Hill Education, 2007, ISBN: 978-007066756
3. Emmanuel C. IFaeachor and Barrie W. Jervis, Digital Signal Processing: A Practical Approach, 2^{nd} Edition, Pearson, 2008, ISBN: 9788131708248

REFERENCE BOOK

1. Alan V. Oppenheim and Ronald W. Schafer, Discrete Time Signal Processing, 3^{rd} Edition, Pearson, 2013, ISBN: 9789332505742
2. Sen M. Kuo and Woon-Seng S. Gan, Digital Signal Processors: Architectures, Implementations and Applications, 1^{st} Ed., Pearson, 2010, ISBN: 9788131717936
3. Li Tan, Digital Signal Processing: Fundamentals and Applications, 1^{st} Edition, Elsevier-Academic Press, 2008, ISBN: 9780123740908
4. P. P. Vaidyanathan, Multirate Systems And Filter Banks, 1^{st} Edition, Pearson, 2008, ISBN: 978-0136057185
5. Wills Tompkins, Biomedical Digital Signal Processing, Prentice Hall, 1999, ISBN: 9780130672162
6. TMS320C5XXX CPU and Instruction Set Reference guide, Texas Instruments, 2000 (www.ti.com)
7. V.K Ingle and J. G. Proakis, Digital Signal Processing using MATLAB, Thompson Brooks / Cole Singapore, 2007

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Embedded System Design
	COURSE CODE	ET343
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET343.CEO.1: To Introduce Hardware/ Software co-design in embedded system
ET343.CEO.2: To Illustrate ARM Cortex processor & its features
ET343.CEO.3: To discuss ARM Cortex based microcontroller & its applications in embedded system
ET343.CEO.4: To explain real world interfacing & programming with ARM

COURSE OUTCOMES :

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

ET343.CO.1: Interpret H/W & S/W co-design.
ET343.CO.2: Explain architecture of ARM processor
ET343.CO.3: Analyze ARM cortex microcontroller with its applications in embedded system.
ET343.CO.4: Develop applications using ARM Cortex based microcontroller.

THEORY COURSE CONTENT		
UNIT 1	**Hardware/ Software Co-design**	**6 HOURS**
Introduction to embedded systems, Characteristics of embedded system, hardware software partitioning techniques, Components & categories of co-design, Hardware / Software system model, Embedded system design and development cycle		
UNIT 2	**Introduction to ARM**	**4 HOURS**
Design approaches - RISC design philosophy, ARMs approach towards RISC, ARM processors and its versions, ARM7, ARM9 & ARM11 features, advantages , Embedded system Hardware & Software, Memory , AMBA bus, Pipeline in ARM		
UNIT 3	**ARM Cortex Processor**	**8 HOURS**
Introduction to ARM CORTEX series processors, Features & Applications, Improvement of CORTEX over classical series, block diagram, Register set and operating modes, Bit banding, Tail Chaining, Thumb & Thumb2 instructions, Mixing ARM and Thumb instructions, Interrupts & Exceptions, Memory Mapping, CMSIS standard for ARM Cortex		
UNIT 4	**ARM Cortex based Microcontroller**	**8 HOURS**
Survey on ARM Cortex based microcontrollers, its features and comparison, ARM CORTEX based controller architecture, Memory mapping, System Control, Clocking & Power control, NVIC, GPIO, Pin connect block.		
UNIT 5	**Real World Interfacing**	**6 HOURS**
Interfacing of LED , GLCD, Keypad, Programming of on chip peripherals ADC, UART, Timer, PWM Case Studies- Home Automation, Patient monitoring system , Smart precision irrigation system		
UNIT 6	**Configuring Communication Protocols**	**8 HOURS**
Programming of I2C, SPI, CAN , ETHERNET, USB, Wi-Fi Case Studies- ECU & ABS control using CAN, Ethernet for IoT, SD card using SPI		

PRACTICAL		
PRACTICAL NO 01		**2 HOURS**
Interfacing & Programming of LED with different patterns		
PRACTICAL NO 02		**4 HOURS**
Interfacing & Programming of Graphical LCD with different patterns		
PRACTICAL NO 03		**2 HOURS**
Programming of on chip UART		

PRACTICAL NO 04		**2 HOURS**
Implementation of on-chip 10-bit ADC (4 / 8 channels)		
PRACTICAL NO 05		**2 HOURS**
Programming on chip PWM for motor control		
PRACTICAL NO 06		**4 HOURS**
Interfacing of EEPROM using in-built I2C Protocol		
PRACTICAL NO 07		**4 HOURS**
Implementation and programming of CAN bus protocol		
PRACTICAL NO 08		**4 HOURS**
Implementation and programming of Ethernet bus protocol		
PRACTICAL NO 09		**4 HOURS**
Implementation and programming of SPI protocol		
PRACTICAL NO 10		**2 HOURS**
Programming of on chip Timer		

TEXT BOOK

1. Andrew N. Sloss, Dominic Symes and Chris Wright, ARM System Developers Guide Designing and Optimizing System Software, 1st Edition, 2014, Morgan Kaufmann Publishers, ISBN:1-55860-874-5
2. Joseph Yiu, The Denitive Guide to ARM Cortex-M3 and Cortex-M4 Processors, 3rd Edition, Elsevier, ISBN: 978-0-12-382090-7
3. Arnold S Berger, Embedded System Design, 1st edition, CMP books, ISBN:1-57820-073-3

REFERENCE BOOK

1. Trevor Martin, The Designers Guide to the Cortex-M Processor Family, 2nd Edition, 2013, Elsevier, ISBN: 9780080982991
2. Steve Furber, ARM System on Chip Architecture, 2nd Edition, 2001, Pearson, ISBN: 9788131708408.
3. Daniel Gajski, Frank Vahid, Sanjiv Narayan, Jie Gong, Specification & Design of embedded system, 2nd edition, 2008, Pearson, ISBN: 978-81-317-1612-0.
4. Technical references and user manuals on www.arm.com

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	IoT Architecture & Sensors
	COURSE CODE	ET352
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET352.CEO.1: Understand the fundamental basics of the Internet of Things
ET352.CEO.2: Explain IoT reference model and its architecture
ET352.CEO.3: Identify sensors, actuators used for IoT applications
ET352.CEO.4: Explain the basic architecture of cloud computing
ET352.CEO.5: Analyze the real world IoT design constraints in IoT application

COURSE OUTCOMES :

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

ET352.CO.1: Apply the basic fundamental to build an IoT application
ET352.CO.2: Analyze various M2M and IoT architectures
ET352.CO.3: Create IoT solutions using sensors, actuators and Devices
ET352.CO.4: Analyze the IoT data with the help of Cloud Computing
ET352.CO.5: Analyze IoT platform design methodology and its constraints

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Internet of Things**	**8 HOURS**
Introduction : History and Evolution of IoT , Definition and Characteristics of IoT, Physical and logical Design of IoT, Communication models APIs, IoT enabling Technologies : WSN, 5G, RFID, Introduction to M2M, Difference between IoT and M2M		
UNIT 2	**IoT Architecture-state of the art**	**10 HOURS**
IoT Architecture: Building architecture, Main design principles and needed capabilities, An IoT architectural overview. **IoT Reference Model:** IoT domain model, Information model, Functional model, Communication Model, Security Model. **IoT Reference Architecture:** Deployment and Operational view.		
UNIT 3	**Sensors and Actuators**	**6 HOURS**
Introduction to Sensors, Classification, Different Types, Properties and Working Principles of Sensors, Introduction to Actuators and its Types		
UNIT 4	**Cloud Computing**	**6 HOURS**
Introduction to Cloud Computing, Cloud Service Models , Cloud Computing Architecture, Management and Security in Cloud Computing		
UNIT 5	**IOT Platform Design Methodology**	**6 HOURS**
Purpose and Requirements specification for IoT, IoT level Specification, Operational view specification, application development **Case studies:** Home automation, Cities: Smart parking, Environment: Whether monitoring system, Air pollution monitoring, Forest fire detection, Agriculture: Smart irrigation		

PRACTICAL		
MODULE 01	**Introduction to IoT Programming**	**2 HOURS**
To implement the Queue using array.		
MODULE 02	**CISCO Packet Tracer** (Any 3)	**6 HOURS**

- To introduce a Blockly Programming
- To use Blockly Programming for interfacing of sensors and actuators with SBC Board
- To build an alarm system with the help of motion sensor and MCU board
- To build an Home automation system using Home Gateway
- To configure various end devices in Packet tracer.

MODULE 03	ESP 8266	12 HOURS

- To build real-time Environment Monitoring System using ESP8266 and ThingSpeak
- To build an Home Automation System using Thinger.io Platform
- To build an Automatic Smart Street Light by Intensity Controller Using Blynk
- To control the LED by ESP8266 as Web Server–IoT

MODULE 04	Raspberry pi	4 HOURS

- Raspberry Pi OS Installation
- Introduction of basic Linux commands

TEXT BOOK

1. Arshdeep Bahga and Vijay Madisetti, Internet of Things, A Hands-on Approach, 1^{st} Edition 2015, University Press, ISBN: 978-81-7371- 954-7
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand and David Boyle, From Machine-to-Machine to the Internet of Things, Academic Press, Elsevier, 2014, ISBN: 978-0-12-407684-6

REFERENCE BOOK

1. Adrian McEwen and Hakim Cassimally, Designing the Internet of Things, Wiley, 2014, ISBN: 978-1-118-43062-0
2. Parikshit N. Mahalle and Poonam N. Railkar, Identity Management for Internet of Things, River Publishers, ISBN: 978-87-93102-90-3
3. Rajkumar Buyya and Amir Vahid Dastjerdi, Internet of Things Principles and Paradigms, Elsevier, 2016, ISBN: 978-0-12-805395-9
4. H. S. Kalsi, Electronic Instrumentation, 3^{rd} Edition 2010, Mcgraw Higher Ed, ISBN: 9780070702066
5. Ramon Pallas-Areny and John G. Webster, Sensors and Signal Conditioning, 2^{nd} Edition 2012, Wiley, ISBN: 9780470054574
6. Reese, G., Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, Sebastopol, CA: O' Reilly Media, Inc., ISBN: 9780596157647, 2009.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Robot Fundamentals and Kinematics
	COURSE CODE	ME352
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME352.CEO.1: To understand the basics of robotics and various robot structures.
ME352.CEO.2: To describe different types of sensors and actuators
ME352.CEO.3: To discuss forward kinematics and Inverse kinematics of robots
ME352.CEO.4: To analyze different transmission system used in robot.
ME352.CEO.5: To evaluate the Trajectory planning techniques used for robots
ME352.CEO.6: To apply the concepts of balancing the robots

COURSE OUTCOMES :

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

ME352.CO.1: List the key components of Industrial robot. [L1]
ME352.CO.2: Classify, sensors and actuators of industrial robots. [L2]
ME352.CO.3: Select transmission system for robots. [L4]
ME352.CO.4: Apply the kinematics and Inverse kinematics principles to robot. [L3]
ME352.CO.5: Determine Trajectory for given robot. [L5]
ME352.CO.6: Build the task based robot by applying knowledge of sensors, actuators. [L6]

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**
Introduction and History, Specifications of Robots, Law of robots, Links and Joints, robot mechanisms ,Classifications of robot, Different configuration of robot, Work envelope ,Degree of freedom of robot , Performance of Robot ,Flexible automation versus Robotic technology Applications of robots. **Self Learning topics:** Recent advancement in Robotics.		
UNIT 2	**Sensor and Actuators**	**8 HOURS**
Sensors: Sensor classification, Internal Sensors, External Sensors, Sensor Selection Criteria, Interfacing with microcontrollers. **Actuators:** Pneumatic, hydraulic, electric (DC, servomotor, stepper motor), Selection of motors, Interfacing with microcontrollers. **Self Learning topics:** Remote Center Compliance Device (RCC)		
UNIT 3	**Power Transmission System & Robot End Effectors**	**6 HOURS**
Power transmitting elements, Transmission system for Industrial Robots and non Industrial Robots, Classification of End effectors, Introduction to robotics grippers, Active and passive grippers. Drive system for grippers. Gripper force analysis and gripper design. **Self Learning topics:** Harmonic Drive and its construction		
UNIT 4	**Kinematics of Robot**	**8 HOURS**
Translational Matrix, Rotation Matrix, Homogenous transformation, Euler's Angle, Denavit Hardenberg parameters, Direct kinematics of a manipulator, Inverse kinematics by Geometric approach and Algebraic approach. Velocity and Static forces in Manipulators **Self Learning topics:** Kinematics model of Industrial Robot		
UNIT 5	**Trajectory Planning and Manipulator Control**	**6 HOURS**
Introduction to trajectory planning, Trajectory generation, Steps in Trajectory planning, Cartesian space & Joint Space Technique, Manipulator control Linear, 2nd order, force control, modeling and control of a single joint. **Self Learning topics:** Potential field method for motion planning		
UNIT 6	**Balancing of Robots**	**6 HOURS**
Centre of Gravity, Static balancing, Dynamic balancing, Balancing of revolving masses and Balancing of reciprocating masses, Critical speed. **Self Learning topics:** Balancing machines. Vibration Isolators		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Topic Selection and component requirement analysis of particular robot.		
PRACTICAL NO.02		**4 HOURS**
Interfacing and programming of different types of sensors with Microcontroller using Electronics Trainer Kit.		
PRACTICAL NO.03		**4 HOURS**
Interfacing and programming DC, Servo motors using Microcontroller with and without Joystick.		
PRACTICAL NO.04		**2 HOURS**
Performance on Pneumatic Actuators using trainer kit.		
PRACTICAL NO.05		**2 HOURS**
Build and simulate the kinematic model of a given robot using a suitable software		
PRACTICAL NO.06		**4 HOURS**
To determine trajectory for a given robot using trajectory planning technique		
PRACTICAL NO.07		**2 HOURS**
Study of Robot operating System (ROS).		
PRACTICAL NO.08		**6 HOURS**
Capstone Project - Build a task based Robot with sensors and Actuators		

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, 2^{nd} edition, ISBN: 978-0201543612
4. Reza Jazar, Theory of Applied Robotics, 2010, Springer US, ISBN: 978-0-387-68964

REFERENCE BOOK

1. Richard Klafter, Robotic Engineering: An Integrated Approach, Prentice Hall, ISBN: 978-8121926164.
2. R K Mittal and I J Nagrath, Robotics and Control, McGraw Hill Publication, 2015, ISBN: 9780070482937
3. Fu K S, Gonzalez R C and Lee C.S.G, Robotics: Control, Sensing, Vision and Intelligence, McGraw Hill, 1987, ISBN: 9780070226258
4. S. K. Saha, Introduction to Robotics, Tata McGraw Hill Publication, ISBN: 978-0070140011

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Fundamentals of Healthcare Technology
	COURSE CODE	ET351
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET351.CEO.1: To acquire the concepts of engineering principles in anatomy and physiology of human body.
ET351.CEO.2: To study sensors, electrodes, basic and latest technological development in Healthcare related to human systems
ET351.CEO.3: To discern the role of engineers in Healthcare sector and e-health services.
ET351.CEO.4: To learn the necessity and applications of Healthcare 4.0
ET351.CEO.5: To get the concepts of smart healthcare instrumentation.
ET351.CEO.6: To study technical aspects of E-healthcare System

COURSE OUTCOMES :

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

ET351.CO.1: Connect the concepts of engineering principles with anatomy, physiology, bio-signals and disorders of the human system.
ET351.CO.2: Explore the sensors, electrodes, basic and latest technological development in Healthcare related to human systems.
ET351.CO.3: Relate the role of engineers in Healthcare sector and tele- health services.
ET351.CO.4: Intricate the Healthcare 4.0
ET351.CO.5: Correlate the necessity of Smart and 3D printing medical devices with the current health-care requirements.
ET351.CO.6: Discover the opportunities of development in e-healthcare System

THEORY COURSE CONTENT		
UNIT 1	**Human Physiology and Bio signal**	**3 HOURS**
Human Anatomy, Physiology, Pathology. Cellular, extra cellular matrix, tissues, organs and systems as integrated system. Bio signal Generation and propagation Action and Resting potential **Self-Study:** Physiological systems of Human body and their Interrelation with each other.		
UNIT 2	**Human Body Systems**	**9 HOURS**
Basic Anatomy, Physiology, deceases / disorders, Bio-signals, Sensors and Electrodes, Basic Technologies, latest technological development in Healthcare for following Human body systems: Cardiovascular System, Nervous System, Respiratory system. **Self-Study:** Special senses (vision, hearing, equilibrium, smell, taste).		
UNIT 3	**Management of Healthcare systems**	**4 HOURS**
Healthcare System/ Hospital: Structure and organization, Management and IT Healthcare. Fostering relation among medical sciences and Engineering - Psychology, Logic interfaces, Social role and Application. Role of Engineer, Equipment and Technologies in every department of a Healthcare System. Biomedical Ethics. Hazards safety.		
UNIT 4	**Healthcare 4.0**	**4 HOURS**
Healthcare 4.0: Overview, necessity and requirements, Management and Technologies, Applications		
UNIT 5	**Smart Healthcare Instrumentation system**	**10 HOURS**
Healthcare Instrumentation system: Smart Medical devices - Internet of Medical Things (IoMT), Affordable medical devices, 3-D Printing Medical devices		
UNIT 6	**e-connected Healthcare system**	**6 HOURS**
E-Healthcare System IT Healthcare, Biotelemetry System, Telemedicine System, M-Healthcare System, E-Pharmacy **Case study:** Tele-ambulance, eICU		

PRACTICAL		
PRACTICAL NO.01	**Charts and Models Home Assignment**	**2 HOURS**
Identification of various organs and skeletal parts from charts and models.		
PRACTICAL NO.02	**Modeling Resting and Action Potential**	**2 HOURS**
Simulate and understand the different stages of action potential and the biophysical explanation behind the generation of action potential.		

PRACTICAL NO.03	ECG measurement and analysis	4 HOURS

- ECG Electrodes, ECG extraction and ECG Analysis.
- Design and Simulate to count pulse rate from ECG.
- Measure pulse rate using finger plethesmography

PRACTICAL NO.04	EEG measurement and analysis	2 HOURS
EEG Electrodes, EEG extraction and EEG Analysis.		

PRACTICAL NO.05	Spirometry	2 HOURS
Recording respiratory parameters through spirometry		

PRACTICAL NO.06	BP Measurement and Analysis	2 HOURS
To study, measure and analyze Blood Pressure using sphygmomanometer / Digital BP Instrument		

SHORT TERM INTERNSHIP (STI):

The main objective of keeping Internship in the course is to give exposure of real world problems in healthcare industry through interaction with medical experts and technician, operating procedure and manufacturing of medical equipment and their limitations.
It will be in two parts: one in healthcare organization and second in healthcare industry.

STI 01	Healthcare organization	8 HOURS
In any hospitals / diagnostic center / Blood bank / pathology labs		

STI 02	Healthcare Industry	8 HOURS
In any Biomedical equipment manufacturing industry		

Outcome of STI:

- Need to present the exposure of work experience gained.
- Identify the problems or requirements in the existing healthcare system / instrument
- Propose the possible solution for identified problem / requirements.
- Work on the proposed solution as a project in next two semesters.

TEXT BOOK

1. K. Saladin, Anatomy & Physiology: The Unity of Form and Function, McGraw-Hill College, 7th edition, 2014.
2. L. Cromwell, F. J. Weibell and E. A. Pfeiffer, "Biomedical Instrumentation and Measurements", Pearson Education, 2nd edition, ISBN: 81-317-0315-0.
3. D. Jude Hemanth, J. Anitha, George A. Tsihrintzis, Internet of Medical Things: Remote Healthcare Systems and Applications (Internet of Things)

REFERENCE BOOK

1. Shalini Suri, Hospital Management and Hospital Operations, APH
2. Gupta Joydeep Das, Hospital Administration And Management: A Comprehensive Guide, Jaypee
3. Joel Rodrigues, Sandra Sendra Compte and Isabel Dez, e-Health Systems- Theory and Technical Applications, 1st Edition

FURTHER READINGS

1. S Ramakrishnan, Manual of Medical Laboratory Techniques, Jaypee Brothers Medical Publishers , First edition, 2012
2. VirtualLabs-NPTELLabsforBiotechnologyandBiomedicalEngineering(vlab.co.in)
3. NeuronSimulationVirtualLab(pilot):BiotechnologyandBiomedicalEngineering: AmritaVishwaVidyapeethamVirtualLab
4. VirtualLabs(vlabs.ac.in)
5. https://www.ncbi.nlm.nih.gov/books/NBK44714/
6. https://www.ncbi.nlm.nih.gov/books/NBK221803/

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Management
	COURSE CODE	CS361
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	NA	NA	50	25	NA	NA	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS361.CEO.1: To create awareness of organizational strategy for project implementation.
CS361.CEO.2: To understand the rules for creating a Work Breakdown Structure for a Project. .
CS361.CEO.3: To illustrate approaches for risk identification, analysis, and assessment.
CS361.CEO.4: To identify key characteristics of a high-performance project team.
CS361.CEO.5: understand the critical success factors in project management.

COURSE OUTCOMES :

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

CS361.CO.1: Identify the Project Management Knowledge Areas and Processes.
CS361.CO.2: Classify the responsibilities while designing the Project Master Plan.
CS361.CO.3: Outline the Cost Estimating and Cost Escalation Process.
CS361.CO.4: Demonstrate and highlight The Processes of Project Quality Management.
CS361.CO.5: Analyze Management of a Project and Maturity Models.

THEORY :		
UNIT 1	**Basics of Project Management**	**6 HOURS**
Contents: Introduction, Need for Project Management, SMART Project, Knowledge Areas and Processes, The Project Manager and Project Management Office, Phases of Project Management Life Cycle, Project environments, Impact of Delays in Project Completions **Case Study:**		
UNIT 2	**Systems and Procedures for Planning and Control**	**5 HOURS**
Contents: Type of Projects, The Project Master Plan, The Project Charter, Project Organization and Responsibilities, Work Breakdown Structure (WBS), Networks Diagrams, The Critical Path, Gantt Charts and Calendar Schedules, CPM, PERT (Project Management Tools: GanttProject, OpenProj) **Case Study:**		
UNIT 3	**Cost Estimating, Budgeting and Risk Management**	**5 HOURS**
Contents: Cost Estimating and Cost Escalation, Cost Estimating Process, Elements of Budgets and Estimates, Risk Management process, Project Risk by Phases, Risk Assessment, Risk Response Planning, Risk Tracking and Response **Case Study:**		
UNIT 4	**Project Quality Management and Organization Behavior**	**5 HOURS**
Contents: The Concept of Quality, The Processes of Project Quality Management, Techniques for Quality Assurance during System Development, Stakeholders, Managing Participation, Teamwork and Conflict. **Case Study:**		
UNIT 5	**The Corporate Context**	**5 HOURS**
Contents: Project Management Maturity and Maturity Models, Knowledge and Time Management, International Projects and associated problems, Entrepreneurs and Startup. **Case Study:**		

TEXT BOOK

1. Project Management for Business, Engineering, and Technology, 3rd Edition, John M. Nicholas and Herman Steyn ELSEVIER ISBN: 978-0-7506-8399-9.
2. Project Management Planning and Control, Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards, Seventh Edition, Eur Ing Albert Lester, B H Copyright 2017 Elsevier Ltd, ISBN: 978-0-08-102020-3.
3. Project Management in Product Development, George Ellis, Copyright 2016 Elsevier Inc, ISBN: 978-0-12-802322-8.
4. Project Management best Practices, 4th Edition, HAROLD KERZNER, Wiley Copyright 2018, ISBN 978-111-9-46885-1.

REFERENCES

1. Project Management Toolbox, Second Edition, Russ J. Martinelli, Dragan Z. Milosevic, Wiley Copyright 2018, ISBN 978-1-118-97312-7.
2. Project Management Essentials You Always Wanted To Know, Kalpesh Ashar, VIBRANT PUBLISHERS
3. The Practical guide to Project Management, 1st Edition, Christine Petersen, ISBN 978-87-403-0524-1
4. Beginning Project Management (e book), John M. Preston
5. Project Management from Simple to Complex, Russell W. Darnall, John M. Preston, The Open University of Hong Kong

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course: Data Science
	COURSE CODE	ET344
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET344.CEO.1: Familiarize basic concepts of python programming
ET344.CEO.2: Summarize the concepts of algebra, calculus and statistics
ET344.CEO.3: Make use of data visualization libraries and feature engineering techniques

COURSE OUTCOMES :

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

ET344.CO.1: Apply python programming concepts
ET344.CO.2: Relate basic concepts of algebra, calculus and statistics
ET344.CO.3: Apply different data visualization libraries and feature engineering techniques

MODULES		
MODULE NO.01	**Python Programming**	**12 HOURS**

1. Basic Python Programming (Syntax, Comments, Variables, Data types, Operations)
2. Data Structures (List, Dictionary, Set, Tuple and operations)
3. Loops and statements (if-else, for, while, continue, break)
4. In-built functions, User defined functions, Lambda function
5. Handling dates
6. Some useful libraries/packages
7. Numpy package
8. Pandas package

MODULE NO.02	Algebra & Calculus	04 HOURS

1. Matrix Algebra
   - Types of matrices
   - Algebraic Operations on matrices
   - Transpose, Determinant, Inverse of matrix
   - Solving System of Linear Equations
   - Eigen values Eigen vectors
   - G-inverse
   - Singular Value Decomposition
   - Applications of Matrix algebra in Business cases
2. Calculus
   - Mathematical Functions
   - Derivatives
   - Integration
   - Gradient Descent Algorithm
   - Applications of Calculus algebra in Business cases

MODULE NO.03	Statistics	18 HOURS

1. Introduction, Visualizing and Summarize different types of data
2. Random variable, Probability and Probability distributions
3. Bernoulli, Binomial, Poisson
4. Normal
5. Population and Sample
6. Sampling Distributions
7. Tests of hypothesis (t-test, Chi-square test, F-test for mean, variance, proportion, attribute dependency)
8. Correlation and Simple Linear Regression

MODULE NO.04	Data Visualization	04 HOURS

1. Data Visualization Libraries in Python
2. Pandas, Matplotlib, Seanborn
3. Data Visualization for different types of data
4. Bar chart, Pie chart, Histogram, Density plot, scatter-plot, scatter-matrix

MODULE NO.05	Feature Engineering	02 HOURS

1. Transformations on data
2. Min-max, Binary, Discrete, Standardize, Log and Power transformations, One-hot-encoding, Zero-One.

REFERENCE BOOK

1. Samir Madhavan, "Mastering Python for Data Science", Packt Publishing; 1^{st} edition, ISBN-13: 978-1784390150, August 2015.
2. Allen B. Downey, "Think Stats: Probability and Statistics for Programmers", O'Reilly Media, Inc., ISBN: 9781449307110, July 2011.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 1^{st} edition, ISBN-13: 978-1491912058, December 2016.
4. Peter Bruce and Andrew Bruce, "Practical Statistics for Data Scientists", OReilly; 1^{st} edition, ISBN-13:978-1491952962, June 2017.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Design
	COURSE CODE	ET350
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET350.CEO.1: To embrace innovation and creativity in project design while empathizing real world needs.

ET350.CEO.2: To acquaint with requirement analysis process and techniques.

ET350.CEO.3: To inculcate the agile project management tools for project design and planning.

ET350.CEO.4: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

ET350.CO.1: Delineate the problem to be solved.

ET350.CO.2: Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges.

ET350.CO.3: Carry out systematic literature review, planning and project design.

ET350.CO.4: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation. To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation. The first phase of Project Design mainly focuses on formulating systems requirement, background/literature review, and defining scope, objective and apply project management/modeling tools to design proposed solution. This enables students to apply their technical acumen and innovativeness in proposing methodology, milestones, and expected outcome.

GUIDELINES

1. Every project group should consist of minimum 03 and maximum of 04 students.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Project group members and title of the project need to be approved by Project Guide and School.
4. Projects should preferably have a national/international industry/academic/research collaboration.
5. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
6. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
7. Define proposed solution and apply project management/modeling tools for project planning and design.
8. Critically analyze various solutions/techniques to solve real world problems and perform feasibility study to select and justify proposed solution.
9. Define outcome, milestones, definite roadmap for project design, implementation, evaluation and documentation.

COLLABORATIVE/SPONSORED PROJECT

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for final project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization, anytime before the commencement of the sixth semester.
3. Proposed Collaborative Project work need to reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of minimum 12 months to 18 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Exploration of fore front research/specialization areas and opportunities in the various fields.
2. Formation of Project Group. Finalization of area of work/title as per forefront areas.
3. Exploration of abridged courses, valid resources, challenges, relevance with current opportunities.
4. Background study Systematic literature review.
5. Literature review documentation for Project Report and Research Article.
6. Project Review I Presentation.
7. Define problem statement and objectives.
8. Define scope of the work and Outline of the work.
9. Project Design, Modelling, Simulation etc.
10. Proposed Methodology of the solution and its documentation.
11. Project Review II Presentation.
12. Project Documentation: Ethics in Writing
13. Project Documentation: Final Synopsis
14. Project Documentation: Project Report Writing

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Background Study and Literature Review (10 Marks)
2. Synopsis (5 Marks)
3. Project Review I: Problem Identification, Motivation, Relevance, Background Study, Literature Review (10 Marks)
4. Project Review II: Literature Review, Problem Definition, Project Planning, Analysis and Design (10 Marks)
5. Project Report (10 Marks)
6. Final Presentation and Demonstration (30 Marks)

REFERENCES

1. Nicholas John M.,"Project Management for Engineering, Business and Technology", Butterworth Heinemann, ISBN: 9780080967042
2. Michelle Reid, "Report Writing (Pocket Study Skills)"', Second Edition, Macmillan Eduation.
3. Sara Efrat Efron, Ruth David, "Writing the Literature Review : A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
4. Leslie Lamport,"LaTeX: A document preparation system, Users guide and reference manual", Second Edition 1994, Addison Wesley, ISBN: 978-0201529838.
5. Michel Goossens, Frank Mittelbach, Sebastian Rahtz, Denis Roegel and Herbert Voss,"The LaTeX Graphics Companion", Second Edition 2007, Addison-Wesley Professional, ISBN: 078-5342508925.

WEEK WISE ACTIVITIES : PROJECT DESIGN

SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	AY: 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Project Design
	COURSE CODE	ET350
	COURSE CREDITS	2

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Exploration of fore front research/specialization areas and opportunities in the various fields.(School Level Awareness Session)	Students may introspect within themselves to think about their choice of domain areas	Students should be clear about subjects which would lead towards research or towards product related jobs
Week 2	Students are briefed about Specialization open electives tracks and interdisciplinary project available in the institute.(School Level Awareness Session)	Students start deliberating on project ideas by referring to various sources linked directly or indirectly to their minor track.	Open electives and project domain are chosen with close connectivity.
Week 3	Mentor guidelines for abridged courses, valid resources, challenges, relevance with current opportunities	Finalization of area of work/title as per fore front area of the project work, objectives and feasibility study	Greater understanding of the project work and requirement. Synopsis of the Project
Week 4	Guideline to define outcome and roadmap of the project progress for three semester	Define Roadmap of the Project.	Project Synopsis and Review Presentation I
Week 5	Guide introduces a fundamental / recent paper / reports / manuals / book / book-chapter / moocs selective lectures / case study to provide the initial platform of the proposed project. Guideline to identify valid resources and properly read the contents of article.	Valid resources are identified by group. Every student study these resources and articles in detail. Presentation by each student on their understanding about all referred resources.	Collection of state of the art work documents / research papers / research material / industry report / books / blogs / Websites / manuals etc. for the decided topic.

Week 6	Guideline to perform background study /Literature Review and various ways of documenting literature review.(School Level Awareness Session)	Documentation of referred resources, publication details, contribution and identification of opportunities/gap in the field.	Systematic literature review, background study, and its documentation.
Week 7 and 8	Guidelines for defining problem statement, objectives, and scope of the work.	Explore related work and define problem statement, objectives etc.	Refinement in proposed work /synopsis if any.
Week 9	Verification and Validation of Project Proposal created by students.	Refinement in the proposal as per suggestion by guide and review members.	Review Presentation II.
Week 10 and 11	Introduction of tools for Project Design, Modelling, Simulation and planning etc. Verification of the Proposed Methodology of the solution.	Use various software/hardware tools for Project Management, Project Design, and Simulation. Description of methodology. Algorithm Steps, Process, Modules, milestones. System Architecture, Modeling diagrams etc.	Design Documentation, Graphical Presentation of proposed solution and entire planning of project implementation and evaluation.
Week 12 and 13	Introduction to Project Report Writing tools and plagiarism checking. Guidelines for Project Documentation and Ethics in Writing. (School Level Awareness Session)	Prepare the Project Report as per format shared by Project Coordinator.	Project Documentation: Project Report Writing, Final Synopsis.
Week 14	Verification of Project Report, Final Synopsis prepared by Students	Refinement in the project report as per suggestion by guide and review members.	Review Presentation III.
Final End Semester Examination: Project Design: Report, Presentation and Demonstration.			

NOTE:

1. *School should organize awareness sessions on topics highlighted in RED.*
2. *Suggested to provide templates for project documents at the starting of the semester such as Synopsis, Literature Review, Report, Review Presentation I, II, III and Final Presentation*

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Power Electronics
	COURSE CODE	ET361
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET361.CEO.1: Understand working & analysis of controlled converters.
ET361.CEO.2: understand the working of 1 φ and 3 φ inverters.
ET361.CEO.3: Study and analyze applications like UPS, electronic ballast, HVDC transmission.
ET361.CEO.4: Study use of power electronics for renewable energy sources.

COURSE OUTCOMES :

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

ET361.CO.1: Design and implement a triggering / gate drive circuit for power converters.
ET361.CO.2: Design and analyze different power electronic converters.
ET361.CO.3: Analyze various power quality issues and their remedies.
ET361.CO.4: Analyze applications of power electronics.

THEORY COURSE CONTENT		
UNIT 1	**Power Semiconducting Devices**	**6 HOURS**
Construction, Principle of operation : Power diodes, SCR, TRIAC, MOSFET, IGBT; Methods of turning ON SCR, Methods of Driving/Firing circuits, SCR commutation circuit, series and parallel connections, Study of datasheet, Protection of SCR.		
UNIT 2	**Converters : Rectifiers**	**8 HOURS**
Introduction to Uncontrolled Rectifier, Single phase Semi & Full wave rectifiers with R and RL load and effect of freewheeling diode, Three phase controlled Semi & Full wave rectifiers with R and RL load and effect of freewheeling diode and effect of source inductance. Input and output performance parameters like power factor. **Application:** Triggering circuit for mobile charger, Control circuit for Household UPS.		
UNIT 3	**Converters : Inverters**	**8 HOURS**
Operation of Single phase half / full bridge voltage source inverter with R and RL load and performance parameters. Voltage control of single phase PWM inverter, harmonic neutralization technique. Three phase voltage source inverter with balanced R star load with 120and 180 mode of operation.		
UNIT 4	**DC-DC converters & AC Voltage Controller**	**6 HOURS**
Working principle of step down chopper, step up chopper, Control strategies, Classification of Chopper, Online and Offline UPS. Single-phase AC voltage controller with R load, Cyclo-converters, types of cyclo-converter. **Application:** Control circuit for SMPS of a desktop.		
UNIT 5	**Power Electronics Applications - Electric Vehicle - I**	**6 HOURS**
Overview, Components of electric vehicles, General Layout of EV, EV Classification, Comparison with Internal combustion Engine and hybrid electric vehicle : Technology, Advantages and Disadvantages of EV. Energy Sources Techniques; Introduction to EV charging strategies, EV charging options and infrastructure. Overview of Tesla car.		
UNIT 6	**Power Electronics Applications - Electric Vehicle - II**	**6 HOURS**
Introduction and operation of brushless DC motor, Commutation of brushless motor, Speed change of brushless motor using PWM technique. PI control of brushless motor with electric vehicle as load and calculation of performance parameters overshoot, rise time, settling time and stability.		

PRACTICAL: Perform following experiments using PSIM, MATLAB or Open source software		
PRACTICAL NO.01		**2 HOURS**
Design and Implement Triggering circuit for Thyristor (Using R or RC or UJT or IC-785)		
PRACTICAL NO.02		**2 HOURS**
VI Characteristics of SCR, IGBT, MOSFET / Study of datasheets.		

PRACTICAL NO.03		**2 HOURS**
Simulation of AC-DC conversion		
PRACTICAL NO.04		**2 HOURS**
Simulation of DC-AC conversion		
PRACTICAL NO.05		**2 HOURS**
Simulation of DC-DC conversion		
PRACTICAL NO.06		**2 HOURS**
Simulation of AC-AC conversion		
PRACTICAL NO.07		**2 HOURS**
Study of various elements of the transmission system (clutch, differentials, gearbox, etc.)		
PRACTICAL NO.08		**2 HOURS**
Speed control of DC motor using IGBT		
PRACTICAL NO.09		**2 HOURS**
Speed Control of BLDC Motor		
PRACTICAL NO.10		**2 HOURS**
Case study of Tesla car/ Toyota prius.		

TEXT BOOK

1. M. H. Rashid, "Power Electronics circuits, devices and applications", 3^{rd} edition, Pearson Education, 2014, ISBN-13: 978-93325357704.
2. Robert W. Erickson, "Fundamentals of Power Electronics", 2^{nd} Edition, Kluwer Academic Publishers, 2001, ISBN-13: 978-0792372707.
3. James Larminie and John Lowry, "Electric Vehicle Technology Explained", 2^{nd} Edition, Wiley Publication, 2012, ISBN: 978-1-119-94273-3.

REFERENCE BOOK

1. U. R. Moorthi, "Power Electronics, Devices, Circuits & Industrial Applications", Oxford University Press India; 1^{st} Edition, 2005, ISBN: 978-0195670929.
2. M. S. Jamil Asgar, "Power Electronics", PHI Learning Private Limited-New Delhi; 1^{st} Edition, 2004, ISBN: 978-8120323964.
3. D. P. Kothari, "Renewable Energy Sources and Emerging Technologies", PHI Learning Private Limited-New Delhi; 2^{nd} edition, 2011, ISBN: 978-8120344709.
4. Mehrdad Ehsani, Yimin Gao and Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Standards media", 2009, ISBN: 978-1420053982.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Principles of Communication Systems
	COURSE CODE	ET362
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET362.CEO.1: Study the fundamental concepts of communication engineering
ET362.CEO.2: Scrutinize various modulation and demodulation techniques
ET362.CEO.3: Understand the concept of random variables and processes as applied to communication engineering
ET362.CEO.4: Learn transmitter and receiver techniques
ET362.CEO.5: Examine error performance in digital communication system
ET362.CEO.6: Understand information theoretic behavior in communication system, several source and channel coding techniques

COURSE OUTCOMES :

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

ET362.CO.1: Illustrate the fundamental concepts and terminologies of communication systems
ET362.CO.2: Inspect different analog modulation, demodulation schemes along with transmitter and receiver circuitry
ET362.CO.3: Explain the concept of random variables and processes with statistical parameters
ET362.CO.4: Analyze various source and channel coding methods
ET362.CO.5: Examine optimum receiving techniques and error performances of digital modulation schemes

THEORY COURSE CONTENT		
UNIT 1	**Communications Systems**	**6 HOURS**
Elements of communication Systems, Terminologies in communication, Modulation and Demodulation, Noise analysis		
UNIT 2	**Analog Modulation**	**8 HOURS**
Principles and types of analog modulation, Types of Amplitude and Angle modulation, Spectra of AM and FM, AM and FM transmitter and receiver		
UNIT 3	**Random Variables and Processes**	**8 HOURS**
Random Variables, Probability density function, Cumulative distribution function, marginal and conditional distributions, mean, variance, correlation, covariance, Gaussian distribution, Random process, Types of random processes		
UNIT 4	**Digital Modulation Techniques**	**8 HOURS**
Signal space representation, Orthogonal expansion of signals, Gram Schmidt process, Digital modulation techniques: Amplitude, phase and frequency shift keying, Pulse Code Modulation, Delta Modulation, Continuous phase modulation		
UNIT 5	**Optimum Receivers**	**8 HOURS**
Channel model, Maximum Aposteriori Probability and Maximum Likelihood receiver, Error probability, Correlation and Matched filter receiver, Optimal Detection and Error Probability for ASK, PSK and QAM		
UNIT 6	**Information Theory, Capacity and Coding**	**8 HOURS**
Introduction to information theory, Mutual Information, Source encoding and decoding, Channel capacity, Channel encoding and decoding, Hamming codes, Error correction and detection capability		

PRACTICAL: Perform following experiments using MATLAB and LabVIEW - USRP 2901		
PRACTICAL NO.01	**Amplitude Modulation**	**2 HOURS**
Investigate classical analog amplitude modulation and the envelope detector (Hardware and/or Software experiment)		
PRACTICAL NO.02	**Double Sideband Suppressed Carrier**	**2 HOURS**
Generate Double Sideband Suppressed Carrier (Hardware and/or Software experiment)		
PRACTICAL NO.03	**Frequency Modulation**	**2 HOURS**
Generate and demodulate Frequency Modulated waveform (Hardware and/or Software experiment)		
PRACTICAL NO.04	**Amplitude Shift Keying**	**2 HOURS**
Transmit and receive ASK signal (Hardware and/or Software experiment)		

PRACTICAL NO.05	**Frequency Shift Keying**	**2 HOURS**
Transmit and receive FSK signal (Hardware and/or Software experiment)		
PRACTICAL NO.06	**Binary Phase Shift Keying**	**2 HOURS**
Perform BPSK modulation technique (Hardware and/or Software experiment)		
PRACTICAL NO.07	**Quadrature Phase Shift Keying**	**2 HOURS**
Perform QPSK modulation technique (Hardware and/or Software experiment)		
PRACTICAL NO.08	**Equalization**	**2 HOURS**
Study of equalization technique to deal with inter symbol interference (Software experiment)		
PRACTICAL NO.09	**Error Performance of any Digital Modulation Scheme**	**2 HOURS**
Simulate any digital modulation scheme and analyze its error performance (Software experiment)		
PRACTICAL NO.10	**Any Source code/Channel Code implementation**	**2 HOURS**
Write a code to implement any one source code or channel code (Software experiment)		

TEXT BOOK

1. Wayne Tomasi, "Electronic Communications Systems: Fundamentals through Advanced", Pearson-Always Learning, 5^{th} edition ISBN : 987-8131719534
2. George Kennedy, Bernard Davis and S R M Prasanna, "Electronic Communication Systems", McGraw Hill Education Pvt. Ltd. 5^{th} Edition, ISBN (13) : 978-0-07-107782-8
3. John G. Prokis and Masoud Salehi, "Communication Systems Engineering", Pearson-Always learning, 2^{nd} edition ISBN-13: 9787040169058

REFERENCE BOOK

1. Simon Haykin, "Communication System", 4^{th} Edition, Wiley publications, ISBN 0471178691
2. Amitabha Bhattacharya, "Digital Communication", TMH, ISBN 9780070591172
3. Bernard Sklar, "Digital Communication" , Pearson, 2^{nd} Edition, ISBN: 9788131720929
4. P. Ramkrishna Rao, "Digital Communication", TMH, ISBN: 9780070707764
5. Peyton Z. Peebles Jr., "Probability, Random Variables and Random Signal Principles", 4^{th} Edition, Tata McGraw-Hill, New Delhi, 2002, ISBN: 978-0071127820
6. H. Stark and J. W. Woods, "Probability and Random Processes with Applications to Signal Processing", Pearson, 2003, ISBN: 978-0130200716

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Soft Computing
	COURSE CODE	ET363
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	NIL	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET363.CEO.1: Illustrate the basic concepts and techniques of machine learning.

ET363.CEO.2: Explore supervised and unsupervised learning paradigms of machine learning for regression and classification

ET363.CEO.3: Develop a deeper understanding of several algorithms in machine learning.

ET363.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,

ET363.CO.1: Explain fundamentals of machine learning.

ET363.CO.2: Describe supervised and unsupervised learning.

ET363.CO.3: Analyze mathematically various machine learning approaches and paradigms.

ET363.CO.4: Implement machine learning solutions for classification, regression, and clustering problems.

ET363.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**	**6 HOURS**
Introduction to Machine Learning, Types of Learning, Linear Regression, Logistic Regression, Concept of Underfitting and Overfitting, Bias-Variance Tradeoff, Model assessment, Cross Validations, Accuracy and Error measures, Confusion metric, Precision, Recall, F1 Score, Analysis of ROC, AUC.		
UNIT 2	**Statistics and Probabilistic Learning**	**8 HOURS**
Probability Concept, Decision Trees, Random Forest, Nave Bayes, Introduction to Ensemble Methods		
UNIT 3	**Supervised Machine Learning Algorithm**	**6 HOURS**
K Nearest Neighbors (KNN.) Support Vector Machine, Optimization Objective of SVM, Maximum Margin Principle, Lagrangian Multipliers for SVM and Kernel Function.		
UNIT 4	**Artificial Neural Network**	**8 HOURS**
Neural Network Representation, Perceptron, Activation Function and Types, Multilayer Network and Backpropagation Algorithm.		
UNIT 5	**Unsupervised Learning**	**8 HOURS**
Feature Space, Dimensionality Reduction, Principal Components Analysis (PCA), Principal of Clustering, K-Means, Hierarchical Agglomerative clustering, Case Study Using Clustering Algorithm.		
UNIT 6	**Open CV for Computer Vision**	**8 HOURS**
Introduction to OpenCV, Installation, Image Operations eg. read, display, writing, reading and setting image properties. opening video, Capture Video/Frame from Camera, applying functions on frame, Drawing geometric shapes on frame eg. line, rectangle, circle, ellipse, polygon, text. Arithmetic Operations on Image, ROI, RBG and HSV Color Space. Case Study on Computer Vision using Machine Learning Algorithm		

PRACTICAL		
PRACTICAL NO.01	**Experimental Data Analysis: Perform following operations on any open dataset available in Python/Kaggle**	**2 HOURS**

- Load data into a data frame from a csv or any other file format.
- Identification of variables and data types.
- Find Missing Values. Replace/eliminate missing values
- Drop unessential columns.
- Find average/min/max of numeric columns. Display summary of data frame.
- Bivariate analysis using plots through seaborn functions, cleaning the data, plotting graphs.

PRACTICAL NO.02	Liner Regression and Logistic Regression Model Implementation on Given Dataset	4 HOURS
• Build a Linear Regression Model using Real estate price prediction dataset. • Developed a Logistic regression model for classification.		
PRACTICAL NO.03	**Implementation of Decision Tree, Random Forest, KNN, Nave Bayes with hyperparameter tunning**	**4 HOURS**
Developed Supervised Learning Model on selected Dataset.		
PRACTICAL NO.04	**Machine Learning for Image Classification**	**2 HOURS**
• Use of SVM for Image Classification. • Implementation of PCA		
PRACTICAL NO.02	**Implementation of Unsupervised Machine Learning**	**2 HOURS**
Implement both the k-means algorithm and the Hierarchical Agglomerative Clustering (HAC) algorithm		
PRACTICAL NO.06	**Implementation of IOT Solution using Machine Learning**	**4 HOURS**
• Data Collection. • Data Cleaning, Filtering and Feature Extraction • Evaluation and Identification of ML Model • Training the ML Model • Outcome Predication • ML Model Deployment.		
PRACTICAL NO.07	**ANN for Computer Vision**	**2 HOURS**
• Creating Simple Neural Network. • Implement ANN for Image Classification.		
PRACTICAL NO.08	**Open CV for Computer Vision**	**2 HOURS**
Use Open CV Library for Image Processing		

TEXT BOOK

1. Ethem Alpaydin, "Introduction to Machine Learning", 2^{nd} Edition, MIT Press, ISBN: 978-0-262-01243-0
2. Christopher Bishop, "Pattern Recognition and Machine Learning", 2^{nd} Edition, Springer. 2006, ISBN-13: 978-0387310732
3. Andreas C. Mller and Sarah Guido, "Introduction to Machine Learning with Python: A Guide for Data Scientists", 1^{st} Edition, O'Reilly Media, ISBN 978-14-4936-941-5
4. Tom Mitchell, "Machine Learning", 1^{st} Edition, McGraw-Hill Science/Engineering/Math, 1997, ISBN: 0070428077

REFERENCE BOOK

1. Trevor Hastie, Robert Tibshirani and Jerome Friedman, "The Elements of Statistical Learning", 2^{nd} Edition, Springer-Verlag,2009, ISBN: 978-0-387-84857-0
2. Kevin Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012, ISBN: 9780262018029
3. Simon Haykin, "Neural Networks: A comprehensive foundation", Prentice Hall International Inc. 1999, ISBN: 0132733501

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	IoT Network and Protocols
	COURSE CODE	ET372
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

ET372.CEO.1: Categorize the basic taxonomy and terminology of networking.
ET372.CEO.2: Correlate the functioning of various protocol as per communication layer.
ET372.CEO.3: Appraise the importance of computer network in IoT applications.
ET372.CEO.4: Illustrate the cryptography and network security techniques.

COURSE OUTCOMES:

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

ET372.CO.1: Interpret fundamentals underlying principles of networking
ET372.CO.2: Prioritize networking protocol as per the real time applications
ET372.CO.3: Articulate the cryptography techniques used in network security
ET372.CO.4: Defend various security parameters related to network

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Networking**	**8 HOURS**
Layered Architecture, Design Issues for layers, Introduction to OSI and TCP/IP model, Addressing Types, Switching Systems: Circuit and Packet Switching, Error Detecting Techniques, Error Correction, Data Link Controls		
UNIT 2	**Networks Protocols**	**6 HOURS**
Routing Algorithm: Distance Vector Routing Algorithm, Link State Routing, Network Addressing : IPv4 and IPv6, RPL, TCP, UDP, HTTP, DHCP, CAN Protocol		
UNIT 3	**Communications Protocols**	**10 HOURS**
IEEE 802.11 : CSMA/CA, IEEE 802.15: Bluetooth and ZigBee, Z- Wave, BLE, Wireless HART, CoAP, AMQP, MQTT, NFC, LoRa, RFID		
UNIT 4	**Introduction to Cryptography**	**8 HOURS**
Threats in Networks, Introduction to the Concept of Security, Cryptographic Techniques, Symmetric and Asymmetric Key Cryptographic Algorithms, One-Time Pads, The Vernam Cipher, Data Encryption Standard (DES) Algorithm, Advanced Encryption Standard (AES) Algorithm, RSA algorithm and Diffle-Hellman key exchange algorithm		
UNIT 5	**Network Security**	**8 HOURS**
Public Key Infrastructure (PKI): Digital Signature Properties of Digital Signature, Public Key Protocol; Certificates; Certificate Authorities, Secure Socket Layer (SSL) SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) Features, Components, Dual Signature		

PRACTICAL		
PRACTICAL NO.01	**CISCO Packet Tracer (any 2)**	**4 HOURS**

1. Study of basic network command and Network configuration commands.
2. Configure a Network using Distance Vector Routing Protocol
3. Configure a Network using Link State Routing Protocols
4. Implementation of File Transfer Protocol
5. Half Duplex Chat Using UDP
6. Full Duplex Chat Using TCP/IP

PRACTICAL NO.02	IoT Programming (any 3)	6 HOURS

1. Implementation of Error Detection / Error Correction Techniques
   (a) Write a program for Error Detection using CRC-CCITT
2. Data Encryption and Decryption
   (a) Program to implement One Time Pad Cipher
   (b) Program to implement Data Encryption Standard (DES)
   (c) Program to implement RSA algorithm
   (d) Program to implement Diffle-Hellman key exchange algorithm

PRACTICAL NO.03	Raspberry pi / ESP 8266 (any 3)	6 HOURS

1. Build an Home Automation System using Google assistant, IFTTT, Adafruit. io and MQTT
2. Interfacing of Bluetooth HC-05 module
3. Interfacing of Bluetooth XBee module
4. Create a Z-Wave Smart Home hub
5. Interfacing of RFID Module

PRACTICAL NO.04	Cloud Computing AWS	8 HOURS

1. Introduction to AWS IoT Service
2. Use of IAM, SNS, SQS and AWS MQ service
3. Build an IoT application with AWS IoT

TEXT BOOK

1. Andrew S. Tenenbaum, "Computer Networks", PHI, ISBN 81-203-2175-8.2.
2. Fei Hu, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms and Implementations", ISBN 9781498723183, 2016

REFERENCE BOOK

1. Holger Karl and Andreas Willing, "Protocols and Architectures for Wireless Sensor Networks", Wiley India, ISBN:9788126533695
2. B. Fourauzan, "Data Communications and Networking", 5^{th} Edition, TataMcGraw-Hill Publications
3. Reese, G., "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud", Sebastopol, CA: O' Reilly Media, Inc., ISBN: 9780596157647, 2009.
4. Brian Russell and Drew Van Duren, "Practical Internet of Things Security", Packt Publishing Ltd. ISBN: 9781788625821, 2018.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Robot Dynamics and Control
	COURSE CODE	EX371
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

EX371.CEO.1: Introduce robotic control system and robotic control problem.
EX371.CEO.2: Understand the time domain modelling approach
EX371.CEO.3: Introduce various control techniques and methodologies applied to trajectory tracking problems in robotics.
EX371.CEO.4: Study the manipulator motion and statics
EX371.CEO.5: Explore the dynamic modeling of various types of robots

COURSE OUTCOMES:

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

EX371.CO.1: Explain block schematic of robotic control system
EX371.CO.2: Design of controller using state space.
EX371.CO.3: Develop control law for a given application
EX371.CO.4: Compute the manipulator motion and statics
EX371.CO.5: Apply knowledge of mathematics to obtain the dynamic model of robotic arm

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**
Elements of Control system, Open and Closed loop Control, Transfer function of manipulator joint, Manipulator control problem, Stability and Analysis using Root Locus and Frequency Response. **Self-Study:** Characteristics of second order linear system, SISO tool for design of system		
UNIT 2	**Modeling via State Space**	**8 HOURS**
Mathematical modeling of electro-mechanical systems for position and Velocity control: State space approach, Controllability and Observability concepts, Introduction to Observer and Controller design (based on acceleration, velocity and position feedback). **Self-Study:** Modeling of DC Motor		
UNIT 3	**Stability and Control of Manipulators**	**8 HOURS**
Lyapunov Stability, Linear Control Methods, Single-axis PID control, PD-Gravity control, Computed torque control, Variable-structure control, Impedance control **Case Study:** Control system in Industrial Automation		
UNIT 4	**Manipulators Motion and Statics**	**8 HOURS**
Velocity of Rigid Body, Manipulator Jacobian, Analysis of - 2 Axis and 3 Axis Planar, Four axis SCARA Robot		
UNIT 5	**Robot Dynamic Modeling**	**10 HOURS**
Lagranges Method, Inertial properties of rigid bodies, Newton-Euler equations for a rigid body, Dynamics of a two-link planar robot, Lagrangian for an open-chain manipulator.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
To Model and Analyze non-linear system		
PRACTICAL NO.02		**2 HOURS**
To design of compensator using Root locus/Frequency Response method/Pole placement		
PRACTICAL NO.03		**2 HOURS**
To study Lyapunov stability of given system		
PRACTICAL NO.04		**2 HOURS**
To study of PID tuning of a system		
PRACTICAL NO.05		**2 HOURS**
To study and program industrial Robot		
PRACTICAL NO.06		**2 HOURS**
To study collaborative Robot (Cobot)		

PRACTICAL NO.07		**2 HOURS**
To design line follower robot		
PRACTICAL NO.08		**2 HOURS**
To program PLC to implement control for robotic arm.		
PRACTICAL NO.09		**2 HOURS**
Project work and seminar		

TEXT BOOK

1. Richard Murray, Z Li and S Sastry, "A Mathematical Introduction to Robotic Manipulator", CRC Press, 1^{st} edition, ISBN-13: 978-0849379819
2. Katsuhiko Ogata, "Modern control engineering", Pearson, 5^{th} edition, ISBN-13 : 978-0136156734
3. R K Mittal and I J Nagrath, "Robotics and Control", McGraw Hill Publishing, 6^{th} edition, ISBN : 0-07-048293-4

REFERENCE BOOK

1. Mark Spong and M. Vidyasagar, "Robot Dynamics and Control", John Wiley & Sons, 1989, ISBN : 9812-53-078-9
2. Robert J. Schilling, "Fundamentals of Robotics-Analysis and Control", PHI, ISBN : 978-81-203-1047-6
3. Andrew J Kurdila, "Dynamics and Control of Robotic Systems", John Wiley and Sons Ltd, ISBN : 9781119524830

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Healthcare Informatics
	COURSE CODE	ET371
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET371.CEO.1: To introduce the basic concept of biomedical signal acquisition, preprocessing, and analysis

ET371.CEO.2: To study of biomedical signal preprocessing, processing, and analysis methods for various problem statements

ET371.CEO.3: To exposure of medical algorithms for diagnosis and detection

ET371.CEO.4: To introduce the advancement of technologies in healthcare

COURSE OUTCOMES :

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

ET371.CO.1: Illustrate the role of healthcare informatics and the significance of Electronics health records

ET371.CO.2: Transform biomedical signals

ET371.CO.3: Analyze biomedical signals

ET371.CO.4: Design medical algorithms for diagnosis and detection

ET371.CO.5: Elaborate the role of data visualization and analytics in healthcare

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**8 HOURS**
Introduction to Healthcare Informatics Triple aim of healthcare: Care, health and cost, Role of healthcare informatics in achieving the triple aim, Introduction to Electronics health records (EHR), EHR implementation challenges, Information Retrieval, Bioinformatics. **Case study:** Evidence-based medicine		
UNIT 2	**Biomedical signal acquisition and preprocessing**	**8 HOURS**
Acquisition of 1D, 2D, and 3D biomedical signals, Noise, Motion artifacts, Power-line interference, and other artifacts during acquisition, preprocessing, and artifact removal methods. **Self-learning:** Artifacts in various signals and image modalities		
UNIT 3	**Biomedical signal analysis**	**6 HOURS**
Statistical, Time, Frequency, and Time-Frequency analysis of the biomedical signal. **Case Study:** Feature extraction for the neurological and cardiovascular disorder **Self-learning:** Application of Transform		
UNIT 4	**Medical algorithms and Medical decision making**	**10 HOURS**
Machine Learning algorithms for healthcare data, Feature selection methods, thresholding-based detection methods, Calculation classification performance, and medical decision-making process (diagnosis, treatment, and monitoring). **Self-learning:** Study of various abnormal conditions and their correlation with the biomedical signal		
UNIT 5	**Data analytics and visualization in healthcare**	**8 HOURS**
Introduction: techniques and their applications, Data analytics life cycle, data visualization and analytical tools and their application in healthcare, Challenges and future of big data in healthcare, Introduction to Big data tools in healthcare **Case study:** Predicting onset (type-2) of diabetes from medical records using binary class classification **Self study:** Data visualization for COVID-19 data		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Import different biomedical signals.		
PRACTICAL NO.02		**2 HOURS**
Implementation of noise and artifact removal for EEG or ECG signals (for given problem statements).		

PRACTICAL NO.03		**4 HOURS**
Time-frequency analysis of the biomedical signal (for given problem statements).		
PRACTICAL NO.04		**4 HOURS**
Healthcare data classification and regression (for given problem statements).		
PRACTICAL NO.05		**4 HOURS**
Visualizing and analysis of healthcare data with data visualizing and analysis tools (for given problem statements).		
PRACTICAL NO.06		**4 HOURS**
Implementation of machine learning model using spark (for given problem statements).		

TEXT BOOK

1. R M Rangayyan Biomedical Signal Analysis: A case Based Approach, IEEE Press, John Wiley & Sons. Inc, 2002
2. D C Reddy Biomedical Signal Processing: Principles and Techniques, Tata McGraw-Hill Publishing Co. Ltd, 2005
3. Wager, K. A., Lee, F. W., & Glaser, J. P. (2017). Health care information systems: A practical approach for health care management -4th Edition
4. Pantea Keikhosrokiani Big Data Analytics for Healthcare, Academic Press

REFERENCE BOOK

1. Stephan P. KudybaHealthcare Informatics: Improving Efficiency and Productivity, CRC press
2. Edward H. Shortliffe, James J. Cimino, Biomedical Informatics: Computer Applications in Health Care and Biomedicine (Health Informatics), Springer, 2006

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course - Networking
	COURSE CODE	ET364
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET364.CEO.1: Configure various networks

ET364.CEO.2: Analyze switching and routing of information

COURSE OUTCOMES :

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

ET364.CO.1: Assign various IP address in network

ET364.CO.2: Install and configure the web server

ET364.CO.3: Configure network for routing and switching

PRACTICAL: Perform following experiments using Open source software (Packet Tracer)		
PRACTICAL NO.01		**2 HOURS**
Network commands & IP address configurations.		
PRACTICAL NO.02		**2 HOURS**
Fault detection of Cable tester for of UTP-CAT5 Cross / 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		
PRACTICAL NO.10		**2 HOURS**

Mini Project

1. Connection and configuration of a basic switch.
2. Configuration of basic router.
3. Setup an email server.

TEXT BOOK

1. Behrouz A. Forouzan, "Data Communications and Networking", 4^{th} Edition, TATA McGraw Hill , ISBN - 9780070634145
2. Andrew Tanenbaum, "Computer Networks", 4^{th} Edition, Pearson Education.ISBN-9780130661029 3. Kurose and Ross, "Computer Networking: A top Down Approach featuring the Internet". 3^{rd} edition, Pearson Education,ISBN-9788131790540

REFERENCE BOOK

1. Behrouz A. Forouzan, "TCP/IP protocol Suit", 3^{rd} edition, TATA McGraw Hill, ISBN 9780070706522
2. Wayne Tomasi, "Introduction to Data Communication & Networking", 1^{st} edition, Pearson Education, ISBN - 9788131709306

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	MATLAB Based System Modeling
	COURSE CODE	ET365
	COURSE CREDITS	2
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

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 : NIL

COURSE OBJECTIVES :

ET365.CEO.1: To reduce computational complexity and improve efficiency
ET365.CEO.2: To utilize the concept of OOP in MATLAB environment
ET365.CEO.3: To get explore to app designing part in various domain
ET365.CEO.4: To build a model using Simulink and simscape environment

COURSE OUTCOMES :

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

ET365.CO.1: Implement methodology to improve efficiency of MATLAB programming code
ET365.CO.2: Exploit the concept of OOP in MATLAB
ET365.CO.3: Create an application using App Designer
ET365.CO.4: Build a system model in electrical, mechanical and power domain
ET365.CO.5: Design a user friendly application

PRACTICAL		
PRACTICAL NO.01	**Computational Complexity and Efficiency**	**6 HOURS**
• Algorithmic complexity • Vectorization • Efficiency in practice		
PRACTICAL NO.02	**Object Oriented Programming**	**10 HOURS**
• Introduction • Handle Classes • More on OOP • Trying it together		
PRACTICAL NO.03	**App Designing**	**10 HOURS**
• New version of GUI • General example of App Designing • App designing in Image Processing, Communication, Signal processing		
PRACTICAL NO.04	**Simulink and Simscape**	**8 HOURS**
• Electrical modelling • Mechanical modelling • Power modelling		
PRACTICAL NO.05	**Application**	**8 HOURS**
• Standalone application • Project		

TEXT BOOK

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
3. Harold Klee, Randal Allen Simulation of Dynamic Systems with MATLAB and Simulink CRC Press, 3rd edition, 2017, ISBN-13: 978-1498787772

REFERENCE BOOK

1. Ned Mohan, Advanced Electric Drives: Analysis, Control, and Modeling Using MATLAB / Simulink, Wiley Publication, 1st edition, 2014, ISBN-13: 978-1118485484
2. Dorothy C. Attaway, MATLAB: A Practical Introduction to Programming and Problem Solving, Butterworth-Heinemann Pub., 5th edition, 2018, ISBN-13: 978-0128154793

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Implementation
	COURSE CODE	ET360
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET360.CEO.1: Understand latest techniques, algorithms, models and design process in the field of project

ET360.CEO.2: Implement/develop/experiment/simulate techniques, algorithms and processes in software and real time

ET360.CEO.3: Upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

ET360.CO.1: Analyze techniques, algorithms and design process relate to the project

ET360.CO.2: Implement/develop/experiment/simulate/test techniques/process and infer conclusions from it.

ET360.CO.3: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project design phase in Sem V (project design), next step is project implementation (Sem VI). The goal of this phase of the project is to implement/develop/experiment/simulate/test the techniques/processes of the project and give a mature shape. The implementation can be a combination of algorithms, techniques, processes, testing etc. This will also include drawing inferences from the results and discussing them.

GUIDELINES

1. Preferably project group students of Sem V would be continued in this semester VI.
2. Every project group should consist of minimum 03 and maximum of 04 students.
3. The group members may be from different programs to support the interdisciplinary functioning.
4. Project group members and title of the project need to be approved by Project Guide and School.
5. Projects should preferably have a national/international, industry/academic/research collaboration.
6. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
7. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
8. Define proposed solution and apply project management/modeling tools for project planning and design.
9. Define outcome, milestones, definite roadmap for project design, implementation, tools, resources, performance evaluation and documentation.
10. Perform refinement of System architecture & methodology.
11. Students should give a mature shape to their idea in terms of implementation. This is expected in this semester. This may include one or many of these points. Implementation /development/experimentation/simulation/testing/building the techniques/processes

COLLABORATIVE/SPONSORED PROJECT

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization at the start of semester VI.
3. Proposed Collaborative Project work need to be reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of 12 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Freezing of project groups and titles. Refinement of title and objectives from Sem V should freezed by the time of first review.
2. Final Synopsis of the project. (To be done at guide level)
3. Methodology / System Design / Block Diagram should be properly explained by the student
4. Project Review I Presentation.
5. Project Implementation: Students should take the work in one and/more of the points. Like Implementation/development/experimentation/simulation/testing/experimental yield/building the techniques/processes etc
6. Based on the points discussed in 5, student would be able to get results and discuss them. Students should be able to draw inferences from results.
7. Project Review II Presentation.
8. Quality of Publication and Researchers: Students would be educated on different technical papers and their importance (article types, journal metrics etc) along with author/researcher credentials.
9. Project Documentation: Project Report Writing

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I: Problem Statement and objectives, Implementation plan & action (algorithms/techniques/models/mathematical understanding/implementation) (10 Marks)
2. An activity on illustrating methodology. This may inlcude paper reading activity: Read and Summarize a paper in 1 page (Individual to every student of the group). Any other activity can also be taken take would illustrate methodology (10 marks)
3. Project Review II: Results and Implementation, Observations, Inferences, Discussion on algorithms / techniques /models / testing) (10 Marks)
4. Article Quality and Author Credentials: Information about Research Article types, paper quality metrics (SCI/SCOPUS/WOS) and Author Credentials (Citation count, h-index, I10 index etc) (5 marks)
5. Project Report (10 Marks)
6. Project: Documentation Final Presentation and Demonstration (30 Marks)

(Parameters of evaluation: Final implemented work, report, presentation and paper drafted based on work)

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Larsen Samuel Bruning, "Doing Projects And Reports In Engineering", Macmillan Education UK, Bloomsbury Publishing PLC, 2019, ISBN: 9781352005639, 1352005638.
3. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
4. Sara Efrat Efron and Ruth David, "Writing the Literature Review: A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
5. Helmut Kopka and Patrick Daly, "A Guide to Latex: Document preparation for beginners and advanced users", Addison Wesley, 1999.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Employability and Career Development
	COURSE CODE	HP305
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EVALUATION SCHEME :					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	60	15	75

PRE-REQUISITE : Professional Skills :

COURSE OBJECTIVES :

HP305.CEO.1: To define the importance of Employability skills in students life.
HP305.CEO.2: To explain them necessary, specific Employability Career Development skills.
HP305.CEO.3: To appraise students for placements through acquisition of professional skills.
HP305.CEO.4: To support them detect their present level in respect of each Career Development skill and show direction for improvement.

COURSE OUTCOMES :

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

HP305.CO.1: Relate the importance of Employability Career Development (L2)
HP305.CO.2: Build necessary, specific professional skills (L3)
HP305.CO.3: Analyze the environment of employability (L4)
HP305.CO.4: Develop various techniques of effective team building in their professional life (L6)

SECTION A : Personal Development With Help of Professionals (30 MARKS)		
PRACTICAL NO.01	**Self-Management**	**2H**
Concept of Johari Window,Advantages and disadvantages of every quadrant,Identifying the proportion of each quadrant in respect of self, Using the tools of self-evaluation, self-development and Goal Setting, Stress management, Career anchor.		
PRACTICAL NO.02	**Personal Interviews**	**4H**
Preparing for Interviews, Typical expected questions suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions.		
PRACTICAL NO.03	**Group Discussion and Public Speaking**	**4H**
Parameters of assessment,Initiating the discussion,Effective listening,Own contribution,Paraphrasing,Arguing and counter-arguing, Giving direction to the discussion, Public Speaking skills.		
PRACTICAL NO.04	**Team building and Motivation**	**2H**
Hallmark of effective teams, Barriers to teamwork, Subjugation of Individual interests for achievement of teams goal, Leading motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2H**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique,Collective and individual Brain Storming.		
PRACTICAL NO.06	**Profile Development**	**4H**
Resume Writing: Introduction to the Resume, Key Components of a Resume and Cover Letter, Enhancing tips for Resume and Cover Letter. Letter of recommendation (LOR) preparation: Details on types, samples, structure, content tips format for letters of recommendation for student. Statement of Purpose (SOP) preparation: SOP Formats, Templates, and Guidelines for SOP Writing. Job application and professional email writing.		

Section B	Aptitude Training With Help of BtechGuru Platform	30 Marks

1. Number System
2. HCF LCM , Surds and Indices.
3. Percentages and Average.
4. Time and work.
5. Time, Speed and Distance.
6. Probability.
7. Quadratic Equations.
8. Profit and Loss.
9. Simple and Compound Interest.
10. Ratio and proportion.
11. Permutation and Combination.
12. Boats and Streams, Pipes and Cisterns.
13. Mixtures and Allegations, Mensuration.
14. Data Interpretation – Tables, Pie Charts, Bar Graphs, Line Graphs.

Section C	Final Assessment With Help of Career Assessment Test.	15 Marks

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGrawHill Education; 2 edition, ISBN-10: 1259643271.
3. R S Agrawal, Quantitative Aptitude, S. Chand Publishing (2020), ISBN: 9789352534029, 9789352534029.
4. Shakuntala Devi, Puzzles to Puzzle You, Orient Paperbacks, ISBN: 9788122200140, 9788122200140

REFERENCE BOOK

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

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Final Year

Bachelor of Technology in Electronics Engineering

2019-2023

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: VII

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC13	ET461	HDL-Digital Circuit Design	3	2	-	35	35	30	50	0	150	4
DE01	ET48# / EX48#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	ET47# / EX47#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	ET46#	Skill Development Course	0	4	-	0	0	25	50	0	75	2
SDP11	ET470	Project Evaluation	0	8	-	0	0	50	0	100	150	4
SDP12	ET400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	ET462	Process Automation	3	2	-	35	35	30	50	0	150	4
DE01	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	-	-	0	50	25	0	0	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**185**	**50**	**75**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DE02	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
SDP14	ET467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP15	ET468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**70**	**70**	**60**	**50**	**300**	**550**	**15**

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	HDL - Digital Circuit Design
	COURSE CODE	ET461
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET461.CEO.1: Explore PLD applications in VLSI
ET461.CEO.2: Introduce Verilog HDL programming
ET461.CEO.3: Implement Digital Designs with Verilog
ET461.CEO.4: Give exposure of verification methodology with digital circuits

COURSE OUTCOMES :

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

ET461.CO.1: Analyse different architectures of PLDs
ET461.CO.2: Comprehend the basic concepts of Verilog
ET461.CO.3: Model digital circuits with Verilog, simulate, synthesis and prototype in PLDs
ET461.CO.4: Examine the verification process for given digital circuit

THEORY COURSE CONTENT		
UNIT 1	**VLSI Design Flow**	**8 HOURS**
Overview of the VLSI design flow, Hardware Description Language: History, Types, Brief comparison of Hardware Description Languages, Digital Logic Circuits and PLDs: PAL, PLA, CPLD-Features and Architecture, Applications; FPGA Features and Architecture, Applications **Case Study:** CPLD/FPGA Analysis with Xilinx/Altera Series		
UNIT 2	**Verilog HDL-I**	**6 HOURS**
Program Structure, Logic System, Nets, Variables, Constants, Vectors & Operators, Arrays, Logical Operators & Expressions. **Case Study:** Study and analysis of synthesis aspects with Verilog programming		
UNIT 3	**Verilog HDL-II**	**6 HOURS**
Hierarchical Modeling Concepts, data types, Modules and Ports, Gate-Level Modeling, Dataflow Modeling, Behavioral Modeling, Test Bench **Case Study:** Study and analysis of synthesis aspects with Verilog programming		
UNIT 4	**Digital circuits with Verilog**	**8 HOURS**
Verilog implementation of Digital Circuits: Combinational and Sequential circuits: Arithmetic circuit design, Multiplexers, FSM modeling, Data path, controller design, Memory modeling **Case Study:** Practical applications of FSM like traffic light/Coffee vending/ General Purpose Processor		
UNIT 5	**System Verification**	**8 HOURS**
Verification Process, Basic testbench functionality, Directed testing, Testbench components, Constrained-Random stimulus, Connecting the test bench and design, Functional coverage **Case Study:** Combinational Logic verification		
UNIT 6	**HDL Applications**	**6 HOURS**
HDL Application Study: Communication Applications, Processor Design, SoC Application, Image processing, Electric motor control, Memory Design		

PRACTICAL: Modeling and Functional Simulation, synthesis and implementation on PLDs of the following digital circuits (with Xilinx ISE/ Vivado tools/Mentor Graphics Tools) using Verilog Hardware Description Languages.		
PRACTICAL NO.01		**2 HOURS**
Design and implement Multiplexers in Verilog		
PRACTICAL NO.02		**2 HOURS**
HDL design for Arithmetic Logic Unit		
PRACTICAL NO.03		**2 HOURS**
Design and implementation of basic sequential circuits		

PRACTICAL NO.04		**4 HOURS**
Design of sequence detector (FSM)		
PRACTICAL NO.05		**4 HOURS**
Design and implement Counters in Verilog		
PRACTICAL NO.06		**2 HOURS**
Memory Design using Verilog HDL		
PRACTICAL NO.07		**2 HOURS**
Verification of Combinational Circuit		
PRACTICAL NO.08		**2 HOURS**
Verification of Sequential Circuit		

TEXT BOOK

1. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis,2nd Edition Publisher: Prentice Hall PTR Pub , February 21, 2003, ISBN: 978-0132599702.
2. Ashok B Mehta, "ASIC/SoC Functional Design Verification: A Comprehensive Guide to Technologies and Methodologies, Springer
3. Enoch O. Hwang, "Digital Logic and Microprocessor Design With VHDL, Thomson Engineering

REFERENCE BOOK

1. Wyane Wolf, "Modern VLSI Design (System on Chip), 4th Edition, Pearson Education,2008, ISBN: 9780137145003
2. Chris Spear, "System Verilog for Verification: A Guide to Learning the Testbench Language Features Springer
3. John F Wakerly, "Digital Design-Principles and Practices, 4th Edition Pearson education, ISBN : 9780131863897.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Deep Learning
	COURSE CODE	ET481
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET481.CEO.1: To illustrate the basic concepts and techniques of Deep Learning
ET481.CEO.2: To explore Convolution Neural Network and Sequence Model
ET481.CEO.3: To develop a deeper understanding of Deep Learning algorithms
ET481.CEO.4: To implement Deep Learning algorithms for solving practical problems

COURSE OUTCOMES :

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

ET481.CO.1: Explain fundamentals of Neural Network and Deep Learning
ET481.CO.2: Describe Convolution Neural Network
ET481.CO.3: Explain Sequence Model and Encoder Decoder Model
ET481.CO.4: Develop Deep Learning model for classification and object detection
ET481.CO.5: Evaluate the performance of Deep Learning models

THEORY COURSE CONTENT		
UNIT 1	**Deep Learning Basics**	**9 HOURS**
Introducing Neural Computation, Perceptron, Feedforward Neural Network, Gradient Descent, Backpropagation, Momentum, Stochastic GD, AdaGrad, RMSProp, Adam. Bias-Variance Tradeoff, Regularization, Early stopping, Dataset augmentation, Dropout. Better weight initialization methods, Batch Normalization. Difference between Classical Machine Learning and Deep Learning. Various activation functions, Deep Learning process. Deep Learning using Convolutional Neural Network (CNN). The importance of striding, dilation, pooling used in CNN **Case Study:** Image Classification using MLP and CNN		
UNIT 2	**Convolution Neural Networks and Transfer Learning**	**9 HOURS**
Convolution Neural Networks, LeNet, AlexNet, VGGNet, Inception-V3, ResNet, Mobilenet.Visualizing Convolution Neural Networks using Transfer Learning **Case Study:** Image Classification using Transfer Learning		
UNIT 3	**Object Detection**	**6 HOURS**
Object Detection Using Yolo, Object Detection Using Faster R-CNN, ROI-CNN, Mask R-CNN **Case Study:** Object Detection on Image using Yolo		
UNIT 4	**Sequence Model**	**8 HOURS**
Introduction to Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTMs), Gated Recurrent Units (GRUs), Vanishing and Exploding Gradients, Backpropagation through time (BPTT), Generative Adversarial Networks (GAN) **Case Study:** Text Analysis		
UNIT 5	**Encoder Decoder Models**	**8 HOURS**
Introduction to Encoder Decoder Models, Denoising Autoencoders, Sparse Autoencoders		

TEXT BOOK

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.10.
2. Daniel Graupe, Deep Learning Neural Networks: Design and Case Studies, WorldScientific Publishing Co., Inc., 2016.
3. Andreas C. Mller and Sarah Guido, Introduction to Machine Learning with Python: A Guide for Data Scientists, First Edition, O'Reilly Media, ISBN 978-14-4936-941-5

REFERENCE BOOK

1. Ral Rojas, Neural Networks: A Systematic Introduction, 1996
2. Christopher Bishop, Pattern Recognition and Machine Learning, 2007
3. Simon Haykin, Neural Networks: A comprehensive foundation, Prentice Hall International Inc., 1999, ISBN: 0132733501.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Image Processing
	COURSE CODE	ET482
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET482.CEO.1: To identify various basic operations on an image
ET482.CEO.2: To analyze spatial and frequency domain processing on an image
ET482.CEO.3: To design an algorithm for image compression and segmentation
ET482.CEO.4: To develop algorithms for features extraction and filtering
ET482.CEO.5: To get acquainted with basic possibilities and constraints of computer vision

COURSE OUTCOMES :

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

ET482.CO.1: Analyze fundamentals of image processing
ET482.CO.2: Develop an algorithm for spatial and frequency domain filtering
ET482.CO.3: Determine various image compression and segmentation techniques
ET482.CO.4: Design various applications based on image processing
ET482.CO.5: Solve the problems in the field of robotics and other vision based applications

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**	**10 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**	**6 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 **Case Study:** Real time application in Biomedical field		
UNIT 6	**Computer Vision in Image Processing**	**6 HOURS**
Introduction to OpenCV, Image formation and Image model, Radiometry, Representation of color, Filters and Convolution,Edge detection, Texture Representation, The Geometry of multiple views.Segmentation by fitting a model, Segmentation and fitting using probabilistic methods. Geometric methods, Data segmentation.		

TEXT BOOK

1. Rafael C Gonzalez and Richard E Woods, Digital Image Processing, 3rd Edition, Pearson, 2013 ISBN: 9789332518469.
2. S. Jayaraman, S Esakkirajan, T Veerakumar, Digital Image Processing, 3rd Edition, Tata McGraw Hill, 2011, ISBN: 9780070144798.

REFERENCE BOOK

1. S. Annadurai and R. Shammugalakshmi, Fundamentals of Digital Image Processing, 1st Edition, Pearson, 2007, ISBN : 8177584790
2. William K Pratt, Digital Image Processing, 4th Edition, Willey, 2010,ISBN: 9788126526840
3. Arthur Weeks Jr., Fundamentals of Digital Image Processing, 1st Edition, Wiley-IEEE, 1996,ISBN: 9780780334106.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electric Vehicle
	COURSE CODE	ET483
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET483.CEO.1: To understand the Vehicle Dynamics, Modelling and Simulation
ET483.CEO.2: To become familiar with Electric motor and their controller
ET483.CEO.3: To study the battery Modelling and its Parameters
ET483.CEO.4: To learn Model Based Development using MATLAB and SIMULINK
ET483.CEO.5: To become familiar with different Electric vehicle case studies

COURSE OUTCOMES :

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

ET483.CO.1: Model vehicle parameters
ET483.CO.2: Explore the EV motors and their controllers
ET483.CO.3: Develop the battery modelling and its parameters
ET483.CO.4: Illustrate the Model Based Development using MATLAB and SIMULINK
ET483.CO.5: Analyse different Electric vehicle case studies

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Vehicle Dynamics: Modelling and Simulation**	**10 HOURS**
Roadway Fundamentals, Laws of Motion, Tractive Effort,- Rolling Resistance Force, Aerodynamic Drag, Hill Climbing Force, Acceleration Force, Total Tractive Effort, Modelling Vehicle Acceleration- Acceleration Performance Parameters-Modelling the Acceleration of an Electric Scooter, Modelling Electric Vehicle Range- Driving Cycles- Range Modelling of Battery Electric Vehicles- Constant Velocity Range Modelling **Case study:** Dynamic Modelling of Three Wheeler		
UNIT 2	**Electric Motors and their Controllers**	**8 HOURS**
Electric Motors fundamentals and characteristics - Brushless Electric Motors- The Brushless DC Motor, Permanent magnet Synchronous Motors, Motor Cooling, Efficiency, Size and Mass, DC Regulation and Voltage Conversion.		
UNIT 3	**Battery Modelling**	**8 HOURS**
Battery basics, Battery Parameters- Battery Capacity, Discharge Rate, State of charge, state of discharge, Depth of discharge, Technical Characteristics- Practical Capacity, Capacity Redefined, Battery Energy, Constant Current Discharge, Specific Energy, Battery Power- Specific Power, Battery Pack Design, Ragone Plots, Battery modelling, Battery pack sizing and design issues **Electric Vehicle Case Study:** GM EV1,Nissan Leaf, Mitsubishi Miev, Design of a Battery Electric Vehicle (BEV).		
UNIT 4	**Model Based Development using MATLAB and SIMULINK**	**8 HOURS**
Overview of Automotive Industry, Software Development demands of Automotive Industry, Model Based Development in Automotive Industry & Model Based Development in MATLAB, Requirement Analysis in Model Based Development, Model Based Development Configuration Parameters Settings, Introduction to ADAS & Levels of Autonomous Driving, Overview to ADAS Features **Case study:** Vehicle Direction Detection, Adaptive Cruise Control		
UNIT 5	**Battery Charging**	**8 HOURS**
Battery Chargers: Conductive (Basic charger circuits, Microprocessor based charger circuit. Arrangement of an off-board conductive charger, Standard power levels of conductive chargers, Inductive (Principle of inductive charging, Soft-switching power converter for inductive charging), Battery indication methods Charging Infrastructure: Domestic Charging Infrastructure, Public Charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone.		

TEXT BOOK

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric,Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design,CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003

REFERENCE BOOK

1. Chris Mi, M. Abul Masrur, David Wen zhong Gao, Hybrid Electric Vehicles Principles and Applications with Practical Perspectives, 2011, Wiley publication.
2. Dharmeja Sandeep,(2000) Electric vehicle battery systems Newnes.
3. Pillai S.K., A first course on Electrical drives,New age International (P) Ltd.
4. M. H. Rashid, Power Electronics Devices, Circuits and Applications, 3rd ed., Pearson, 2004
5. C. C. Chan and K. T. Chau, Modern Electric Vehicle Technology, Oxford Science Publication, 2001

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	RTOS
	COURSE CODE	ET484
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET484.CEO.1: To Illustrate the characteristics of real-time embedded applications
ET484.CEO.2: To provide the knowledge of real time kernel
ET484.CEO.3: To make use of Scheduling and synchronization in RTX.
ET484.CEO.4: To elaborate the inter task communication in RTX
ET484.CEO.5: To study popular RTOS

COURSE OUTCOMES :

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

ET484.CO.1: Explain the characteristics of real-time embedded applications
ET484.CO.2: Interpret the RTX Kernel Structure
ET484.CO.3: Apply Scheduling and synchronization in RTX
ET484.CO.4: Utilize the inter task communication in RTX for an application
ET484.CO.5: Summarize popular RTOS

THEORY COURSE CONTENT		
UNIT 1	**Real-Time Software System Concepts**	**8 HOURS**
Foreground/ Background systems, Critical section of code, Resource, Shared resource, multitasking, Task, Context switch, Kernel, Scheduler, Non-Preemptive Kernel, Preemptive Kernel, Reentrancy, Round robin scheduling, Task Priorities, Static & Dynamic Priority, Priority Inversion, Assigning task priorities, Mutual Exclusion, Deadlock, Clock Tick, Memory requirements, Advantages & disadvantages of real time kernels		
UNIT 2	**RTOS Kernel Structure**	**8 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. **Application:** Identification of the services to lift management system **Self-Study:** RTLinux/Vxworks Kernel structure		
UNIT 3	**Scheduling in RTX**	**8 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 **Application:** Finalizing the task behavior and designing it for lift management system **Self-Study:** RTLinux/Vxworks Process states and data structures		
UNIT 4	**Synchronization in RTX**	**8 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 **Application:** Identify need of synchronization and imbibe in lift management system **Self-Study:** RTLinux/Vxworks Synchronization.		
UNIT 5	**Inter task Communication in RTX**	**8 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 **Application:** Software integration of lift management system **Self-Study:** RTLinux/Vxworks Inter task communication. Mechanism.		

TEXT BOOK

1. Rajib Mall, Real-Time Systems: Theory and Practice, Pearson Education, 2007, ISBN: 9788131700693
2. Getting Started for ARM Processor-Based Microcontrollers Building Applications with RL-ARM, by Keil Tools by ARM. (Keils Online support Document)

REFERENCE BOOK

1. Dr. K V K Prasad, "Embedded Real time Systems: Concept, design and programming, Dream tech press. New Edition (2003) ISBN-13: 978-8177224610.
2. Jonathan Valvano, "Embedded Systems: Real-Time Operating Systems for the Arm Cortex-M3, Create Space Independent Publishing Platform; Fourth edition (2012), ISBN-13: 978-1466468863
3. RL-ARM User's Guide, by Keil Tools by ARM. (Keils Online support Document)
4. Technical references and user manuals on www.arm.com

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Data Management & Analytics
	COURSE CODE	ET472
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET472.CEO.1: To identify the different types of data
ET472.CEO.2: To illustrate the basic concept of database management system
ET472.CEO.3: To demonstrate basic operations with DBMS
ET472.CEO.4: To outline the steps involved in carrying out routine data analysis tasks
ET472.CEO.5: To summarize the basic concepts of big data analytics

COURSE OUTCOMES :

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

ET472.CO.1: Demonstrate the data lifecycle
ET472.CO.2: Apply basic concepts of database management system
ET472.CO.3: Apply basic operations with DBMS
ET472.CO.4: Infer the importance of the domain context for data analytics
ET472.CO.5: Illustrate basic concepts of big data analytics and their components
ET472.CO.6: Analyze the database system design, implementation, and maintenance

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**7 HOURS**
Type of data, data classification, data lifecycle, purpose of database systems and applications, view of data, database languages, relational databases, database design, database architecture, introduction to data mining and data warehouse **Self-Study:** Data storage		
UNIT 2	**Introduction to Relational Database and SQL**	**8 HOURS**
Relational database structure, database schema, keys, relational query languages and operations, overview of the SQL query, SQL data definition language (DDL), normalization **Self-Study:** Schema diagrams		
UNIT 3	**Intermediate SQL**	**10 HOURS**
SQL data manipulation language (DML), data control language (DCL), transaction control language (TCL), basic operations, aggregate functions with grouping, sub-queries, join expressions, views, integrity constraints **Self-Study:** Date & Time types in SQL, Authorization		
UNIT 4	**Data Analytics**	**10 HOURS**
Requirements and importance of data analytics, quality issues for data analysis, data analysis task, EDA, types of data analytics, data analytics tools		
UNIT 5	**Big Data Analytics**	**7 HOURS**
Introduction to Big Data, Big Data Analytics: Hadoop, Introduction to Hadoop Distributed File System (HDFS), Introduction to Map Reduce, YARN **Self-Study:** Cloud Platform		

PRACTICAL		
MODULE 01	**SQL**	**7 HOURS**

On any relational database case study, perform and execute;

1. Data Definition Query Language (DDL)
2. Data Manipulation Query Language (DML)
3. Data Control Query Language (DCL)
4. Advance SQL features like sub-queries, view creation, indexing and different operations

Platforms: MySQL Workbench or any cloud platform, Python IDE's: Jupyter Notebook, Google Colab, Pycharm etc.

MODULE 02	NoSQL	8 HOURS

On any NoSQL database case study, perform and execute queries like;

1. Create
2. Insert
3. Update

Platforms: MongoDB Compass or any other platform, Python IDE's: Jupyter Notebook, Google Colab, Pycharm etc.

MODULE 03	Data Analytics Tool	7 HOURS

Perform data analysis using any data analytics tool
Platforms: Tableau, Power BI etc.

MODULE 04	Big Data Analytics	8 HOURS

1. Introduction to Hadoop system
2. Installation of Hadoop system
3. Connection of Hadoop-spark with python
4. Introduction and use of AWS cloud platform in big data analysis
5. Perform big data analysis using spark, AWS and python on any given case study

Platforms: AWS, Hadoop-Spark, Python IDE's: Jupyter Notebook, Google Colab, Pycharm

TEXT BOOK

1. Silberschatz A., Korth H. and Sudarshan S., "Database System Concepts", 7^{th} Edition, McGraw Hill Publishers, 2019, ISBN 9780078022159
2. Elmasri R. and Navathe S., "Fundamentals of Database Systems", 7^{th} Edition, Pearson, Education, 2017, ISBN 9789332582705
3. Radha Shankarmani and M. Vijayalakshmi, "Big Data and Analytics, 2^{nd} edition, Wiley, 2016, ISBN-13 : 978-8126565757
4. Subhashini Chellappan and Seema Acharya, "Big Data and Analytics, 2^{nd} edition, Wiley, 2019, ISBN-13 : 978-8126579518
5. Edward Mize, "Data Analytics: The Ultimate Beginner's Guide to Data Analytics, Venture Ink, 2019, ISBN-13 : 978-1925997576

REFERENCE BOOK

1. Coronel C., Steven Morris "Database Systems: Design, Implementation & Management", 13^{th} Edition, Course Technology, 2018, ISBN 1337627909
2. Date C., "An Introduction to Database Systems", 7^{th} Edition, Pearson Education, 2002,ISBN 81 -7808-23
3. DT Editorial Service, "Big Data, Black Book: Covers Hadoop 2, Map Reduce, Hive, YARN, Pig, R and Data Visualization, Dreamtech Press; 1^{st} edition, 2016, ISBN-13 : 978-8184891430
4. Venkat Ankam, "Big Data Analytics, Packt Publishing Limited, 2016, ISBN-13 : 978-1785884696
5. Oliver Theobald, "Data Analytics for Absolute Beginners, 2019, ISBN-13 : 978-1081762469

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	AI in Robotics
	COURSE CODE	EX471
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX471.CEO.1: Consolidate different techniques and algorithms for Search, Planning
EX471.CEO.2: Become familiar with Robotic vision algorithms for systems
EX471.CEO.3: Explore various algorithms in machine learning.
EX471.CEO.4: Explore various fields in robotic applications

COURSE OUTCOMES :

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

EX471.CO.1: Apply suitable algorithm for Search and Planning for AI robotics system.
EX471.CO.2: Apply Robotic vision algorithms for vision guided robotics.
EX471.CO.3: Apply suitable algorithm for machine learning algorithms for AI robotics systems.
EX471.CO.4: Analyze various applications in the field of AI Robotics & Vision guided Robotics.

THEORY COURSE CONTENT		
UNIT 1	**AI Search and Path Planning Techniques**	**8 HOURS**
Introduction to AI, Definition, Seven areas of AI for Robotics Search Techniques: Best first search, A* algorithm, Heuristics Search, Constraint Satisfaction Search Topological Path Planning: Relational Methods, Associative Methods Metric Path Planning: Configuration Space, Representations, Graph Based Planners **Case study:** Robot Global path planning using A* algorithm for maze with obstacles		
UNIT 2	**Robotic Vision-Set up and preprocessing**	**9 HOURS**
Robotic Vision System: Basic components Robotic Vision setup: Camera frame calibration, Fixed frame offset, Tool offset, Fixed camera, Robot mounted camera, Calibration grid Illumination Techniques: Structured lightening, Front/ back lightening, Beam splitter, Retro reflectors, Diffused lightening, Robotic Cell Layout: Robot Centered, Inline, Mobile, Safety Measures, Ethics considerations Image pre-processing: Geometric and Brightness transformations Image Segmentation: Thresholding, Edge detection, Region based segmentation **Case study:** FANUC (R-30iA), Kuka robot vision setup examples		
UNIT 3	**Object Recognition**	**6 HOURS**
Object Recognition: System components, Object centered representation and Viewer centered representation, Feature detection, Recognition strategies, Object Classification, Geometry & Appearance based recognition, Template matching, Texture recognition Pedestrian Detection: Dalal-Triggs pedestrian detector Face detection: Viola-Jones sliding window face detection		
UNIT 4	**Machine Learning for Robotics**	**7 HOURS**
Learning process, Machine learning system, Types of learning Clustering algorithm: Aspects of clustering, partitioning methods, k-means clustering algorithms. Inductive learning: Concept, Basic algorithm, IL by Curve fitting Learning by decision trees: Attribute based representations, Entropy approach, decision making by information gain Naive Bayes Learning: Probabilistic Models, MAP classification, NB Algorithm.		
UNIT 5	**Reinforcement Learning for Robotics**	**7 HOURS**
Reinforcement Learning: Markov Decision Process (MDP), Value function, Q function, Model based and model free approaches, Passive and Active RL Learning, Generalization, Convergence of results. **Case study:** Rover Navigation in Sand area using Reinforcement Learning		

UNIT 6	AI Robotics Real Life applications	7 HOURS
Robot Tele-operation: Environment properties, Organization of a Tele-system, Semi-autonomous and Autonomous control modes, Ethics in Deliberative Robots AI Robotics applications: Delivery Robots, Domestic Robots, Agriculture Robots, Ethics in social Robots Industrial Robotics applications: Material Handling Operations, Industry Process Operations		

PRACTICAL		
PRACTICAL NO.01	**A* Algorithm**	**4 HOURS**
Implementation of A* algorithm for path planning for an autonomous robot in a Maze with obstacles		
PRACTICAL NO.02	**Image Pre-processing**	**4 HOURS**
Implementation of image pre-processing algorithms in robotic vision system Like object detection, Face detection etc		
PRACTICAL NO.03	**Image Segmentation**	**4 HOURS**
Implement image segmentation algorithms for robot vision applications.		
PRACTICAL NO.04	**Object Defection**	**4 HOURS**
Application and development of object detection techniques in Vision guided robotic system		
PRACTICAL NO.05	**Machine Learning- Supervised (Decision Tree)**	**4 HOURS**
Implementation of Supervised classification Algorithm- Decision Tree on a suitable database		
PRACTICAL NO.06	**Machine Learning- Supervised (Nave Bayes)**	**4 HOURS**
Implementation of Supervised classification Algorithm- Nave Bayes on a suitable database		
PRACTICAL NO.07	**Machine Learning- Unsupervised (Clustering)**	**4 HOURS**
Implementation of Unsupervised machine learning Algorithm-K means clustering on a suitable database		
PRACTICAL NO.08	**Paper Critics (Lab Activity)**	**4 HOURS**
Paper critics based on a refereed research paper in the field of AI Robotics and Vision guided robotics		
PRACTICAL NO.09	**Laboratory Project and Demonstration**	**4 HOURS**
Demonstration of Laboratory project implementing AI Robotics algorithms on suitable robotic system. Presentation of implementation of results for Practical 1 to 7 for assigned problem statement		

TEXT BOOK

1. Murphy, Robin R. Introduction to AI robotics, MIT press, 2019 ISBN: 978-0262038485
2. Stuart Russell, Peter Norvig, Artificial Intelligence: A modern approach, Pearson Education, India 2003., ISBN: 978-0136042594.
3. Saeed B Niku, Introduction to Robotics: Analysis, Systems, applications, 2nd Ed New Delhi, Prentice Hall of India, 2009. 978-81-203-2379-7 Paperback
4. Fu K S, Gonzalez R C, Lee C S G, Robotics: Controls, Sensing, Vision and Intelligence, 2009, 00710990107, McGraw-Hill Education, 978-0071004213

REFERENCE BOOK

1. Roland Siegwart, Illah Reza Nourbakhsh, Davide Scaramuzza, Introduction to Autonomous Mobile Robots, Bradford Company Scituate, USA, 2011.
2. Mikell P Groover, "Automation, Production Systems, and Computer-Integrated Manufacturing", Pearson Education, 2015.
3. Hong Cheng, Autonomous Intelligent Vehicles: Theory, Algorithms and Implementation, Springer, 2011.
4. Richard D. Klafter, Robotics Engineering: An integrated approach, Prentice-Hall (4 April 1989), 978-0134687520
5. Rafael C. Gonzalez and Richard E. Woods. Digital Image Processing, Wesley, 2007. ISBN 13: 978813726952

REFERENCE PAPER

1. Qualitative vision-based mobile robot navigation, Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2006.
2. Qualitative vision-based path following, IEEE Transactions on Robotics, 25(3):749-754, June 2009.
3. Person Following with a Mobile Robot Using Binocular Feature-Based tracking, Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS), 2007
4. Visual detection of lintel-occluded doors from a single camera, IEEE Computer Society Workshop on Visual Localization for Mobile Platforms (in association with CVPR), 2008.
5. Histograms of Oriented Gradients for Human Detection, Navneet Dalal and Bill Triggs, CVPR05
6. Rapid Object Detection using a Boosted Cascade of Simple Features, Viola and Jones, 2001
7. Clustering-Based Robot Navigation and Control, Omur Arslan, Dan P. Guralnik, and Daniel E. Koditschek, 2016 IEEE International Conference on Robotics and Automation May 2016.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course: Embedded Linux Systems
	COURSE CODE	ET463
	COURSE CREDITS	2
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	30	45	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET463.CEO.1: To configure and implement Linux Kernel for embedded hardware.
ET463.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,

ET463.CO.1: Explore the features of Linux through command line and shell programming
ET463.CO.2: Demonstrate the usage of file system in Linux
ET463.CO.3: Apply toolchain in the embedded Linux environment
ET463.CO.4: Implement the various device drivers for embedded application
ET463.CO.5: Build a simple application on embedded board in Linux environment

PRACTICAL: Perform following Practical on any Linux Distribution		
PRACTICAL NO.01		**4 HOURS**
Practice of Linux Commands & Linux File System		
PRACTICAL NO.02		**4 HOURS**
Practice of C Programming in Linux using GCC		
PRACTICAL NO.03		**4 HOURS**
Create Makefile using GNU Make Utility for automatically building executable programs from the source code (in C)		
PRACTICAL NO.04		**4 HOURS**
Configure, Compile and deploy the Linux Kernel on ARM based Embedded Board		
PRACTICAL NO.05		**4 HOURS**
Write, build and execute simple applications of displaying a message in Embedded Linux Environment		
PRACTICAL NO.06		**4 HOURS**
Write, build and execute simple applications of a thread in Embedded Linux Environment		
PRACTICAL NO.07		**8 HOURS**
Implementation of Kernel Loadable Device Driver Module in Embedded Linux Environmen		
PRACTICAL NO.08		**8 HOURS**
Capstone Project		

TEXT BOOK

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

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course: Cloud Computing
	COURSE CODE	ET464
	COURSE CREDITS	2
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET464.CEO.1: To familiarize with the fundamental concept of cloud computing
ET464.CEO.2: To explain the concept of customer relationship management solutions
ET464.CEO.3: To familiarize with the ecosystem of salesforce.com and different solutions it offers
ET464.CEO.4: To make use of the model view controller architecture and its applications
ET464.CEO.5: To summarize the software delivery lifecycle and application prototype

COURSE OUTCOMES :

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

ET464.CO.1: Rewrite the core concepts of cloud computing embracing different services
ET464.CO.2: Illustrate fundamental concept of customer relationship management solutions across different business activities
ET464.CO.3: Explain the object relationship to develop user interface using model view controller
ET464.CO.4: Estimate the platform capabilities to develop custom applications
ET464.CO.5: Combine the application security concepts with the data security, data management, application security access

PRACTICAL:		
MODULE NO.01	**Cloud Computing and Salesforce.com**	**4 HOURS**

1. Introduction to Cloud Computing
2. Evolution of Cloud Computing
3. Characteristics of Cloud Services
4. Classifications of cloud services IaaS, PaaS, SaaS
5. What is CRM/Cloud CRM
6. SFDC as cloud computing technology
7. SFDC and its business offering
8. Evolution of Products
9. Different Editions of Salesforce.com
10. How to sign-up for the free developer edition

MODULE NO.02	**Introduction to the Cloud CRM**	**4 HOURS**

1. Understand SFDCs architecture
2. Technologies behind the SFDC
3. Salesforce.com cloud CRM application walkthrough
4. Understand the application/Object/Fields
5. Standard fields/Page Layouts/ Custom Fields
6. Understand the relational database
7. Master-Detail Relationship/ many to many
8. Look-up Relationship/ one to many
9. Self-Look-up /one to one

MODULE NO.03	Customization & Application setup (Part-1)	4 HOURS

- Setting up the company profile
- Setting up users /roles/ profiles
- Learn about the access control using profiles
- Custom objects/Custom fields and tabs
- Learn about business processes and record types
- Customize page layouts, related lists and fields
- Define dependent picklist
- Use field level security for access control
- Create Rollup summary fields

MODULE NO.04	Customization & Application setup (Part-2)	4 HOURS

1. Create formula fields
2. Create Validation Rules /Maintain data Quality
3. Create different types of fields and their arrangement on to the page layout
4. Introduction to lightning components

MODULE NO.05	Security and Access Control	4 HOURS

1. Define Organization Wide Defaults
2. Record sharing concepts and pyramid of access control
3. Role hierarchy, Public groups, Queues and Permission Set
4. Sharing rules

MODULE NO.06	Business Process Automation Tools	4 HOURS

1. Define Workflow
2. Set up workflow rules, Create workflow approvals
3. Setup workflow tasks & Email Alerts & Field Updates
4. Time-dependent workflows, Plan Approaches using workflow
5. Use the approval wizard standard vs. jump start

MODULE NO.07	Data Handling and Processing in Salesforce.com Cloud	4 HOURS

1. Define Workflow
2. Identify the considerations for Data Processing
3. Analyze tools and use cases for managing data
4. Exporting data and Regular Backup
5. External ID and Unique Fields
6. Import Data
7. Apex Data loader
8. Import Wizard and Data Loader and compare the features, Update, Upset operations, Delete and Hard Delete records
9. Transfer record ownership

MODULE NO.08	Reports and Dashboards	4 HOURS

1. Create a report
2. Customize a report
3. Identify the impacts of Sharing Model on Reports
4. Create and Modify dashboards
5. Analyze the capabilities of Custom Report Types

MODULE NO.09	Declarative Vs Programmatic Approach in Salesforce.com	4 HOURS

1. Introduction to Programmatic customization in Salesforce.com
2. Overview of Apex Programming
3. Overview of Apex Triggers
4. Lightning Component Bundle
5. Introduction to Lightning Design System

MODULE NO.10	Application Lifecycle and Project Management in Salesforce.com	4 HOURS

1. Know Milestones in application life cycle
2. Sandbox strategy and type of sandboxes
3. Preparing the change sets
4. Deployment using change set
5. Managed package Vs Un-managed package

MODULE NO.11	Introduction to AppExchange and Trailhead	4 HOURS

1. AppExchange Overview
2. Finding and Selecting an App
3. Installing an App
4. Trailhead overview
5. Enrolling for training module
6. Getting Certified industry demands and certification path for beginner

MODULE NO.12	Final Assignment and Project Prototype	4 HOURS

1. Final Assignment
2. Project Prototyping
3. Discussion and Query resolution

REFERENCE BOOK

1. www.salesforce.com (https://mitaoe5-dev-ed.my.salesforce.com)
2. Thomas Erl, Zaigham Mahmood, Ricardo Puttini, Cloud Computing Concepts, Technology & Architecture; Prentice Hall
3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Mastering Cloud Computing Foundations and Applications Programming; Elsevier, 1st Edition.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABUS**	
SCHOOL OF ———————- ————————————	**W.E.F**	**AY:** 2022 - 2023 (R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN ————————————-	**COURSE NAME**	Project Evaluation
	COURSE CODE	XX470
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	8	NIL	NIL	NIL	NIL	150	150

COURSE OBJECTIVES :

XX470.CEO.1: To understand how to carry out performance evaluation and comparative analysis in appropriate form.

XX470.CEO.2: To know about standard industry practices.

XX470.CEO.3: To become familiar with the steps involved in identifying and selecting a good platform to present the work done.

COURSE OUTCOMES :

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

XX360.CO.1: Interpret findings, compare them with results in the literature, identify weaknesses and limitations, and propose improvements.

XX360.CO.2: Make use of standard industry practices.

XX360.CO.3: Decide appropriate platform for presenting the work done.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop an alytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project implementation (Sem VI), next step is project evaluation (Sem VII). The goal of this phase of the project is to draw Inferences and Detail Analysis/Final Testing/Re-development/etc. Showcasing the work - Technical documentation in Conferences/Journal/Patent/Product/Working model.

GUIDELINES

1. Project group students of Sem VI would be continued in this semester VII.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Projects should preferably have a national/international, industry/academic/research collaboration.
4. Students should do extended implementation of their project in consultation with their advisor.
5. For extended implementation, objectives of Sem V and Sem VI should be achieved.
6. Every project should follow at least one standard industry practice while implementing. For example, below are some of the standard industry practices followed by Electrical engineers:
   (a) If writing a Matlab code, follow **MathWorks Advisory Board (MAB)** Guidelines
   (b) For embedded c coding, **Motor Industry Software Reliability Association (MISRA)** standards can be used
   (c) If antenna is manufactured, then get **EMI/EMC** testing certificate from National Accreditation Board for Testing and Calibration Laboratories.
7. Performance evaluation and Comparative analysis of results should be carried out and presented in appropriate form.
8. Carry out detail analysis to improve performance w.r.t Final Testing/Re-development/etc.
9. Showcase the work in Conferences/Journal/Patent/Product/Working model.

Note: *For guideline 6, every school should identify standard industry practices and try to incorporate in the projects.*

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I (Internal): (20 Marks)
2. Activity (Standard industry practices): (20 Marks)
3. Project Review II (External): (20 Marks)
4. Project Report: (20 Marks)
5. Every project group should publish paper in National conference / International conference / Participate in technical project competition (with achievement) / File a patent/etc.: (20 Marks)
6. Project: Final Presentation and Demonstration (External) (50 Marks)

Note:

- Report should be prepared in LaTeX.
- External examiner for Review 2 and Final Demo should be allocated same group.
- Report will be jointly evaluated by External examiner and Internal examiner.

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
3. Leslie Lamport, "A Document Preparation System LaTeX: User's Guide and Reference Manual", Pearson, 2011.

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GUIDELINES

For

SUMMER INTERNSHIP PROGRAM (SIP)

2022 MAY

(For Academic Year: 2022-2023)

Prepared by

Coordinator – National and International Relations

Verified and Released by

Dean – Corporate Relations

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Introduction:

The Maharashtra Academy of Engineering & Education Research (MAEER) established in 1983 is a renowned educational trust having its registered office in Pune. It has sixty-five institutions imparting quality education up to the doctoral level in various disciplines.

MIT Academy of Engineering (MIT AOE) was established in the year 1999 under the MAEER. Today, it is an autonomous institute affiliated to the Savitribai Phule Pune University (SPPU), and is approved by the All India Council for Technical Education (AICTE) and accredited by the National Accreditation and Assessment Council (NAAC) with 'A' grade. MIT AOE offers undergraduate and post-graduate programs in diverse engineering disciplines. The National Board of Accreditation (NBA) had accredited all undergraduate programs offered by MIT AOE. .

MIT AOE recognizes the academic and professional value of student engagement outside the traditional classroom. In order to provide the students a platform to obtain hands-on industrial experience that would help them improve their career trajectory, MIT AOE offers a Student Internship Program (SIP).

The main aim of SIP is to assist all B.TECH students to obtain internships at various centers of excellence in the academia and the industry or to promote them for life skills internship as applicable. The ultimate goal is to imbue students with professionalism and networking capabilities using internships as a tool for providing comprehensive practical experience. Using SIP, MIT AOE students will enhance their academic and professional skills, making themselves more marketable in today's competitive world. The students can harness this lucrative opportunity to apply the knowledge they acquired all through the academic career in the professional realm.

Key objectives of SIP:

- To help students gain hands-on professional work experience prior to their graduation.
- To provide students possible opportunities to learn, understand and sharpen the real-time technical, managerial and life skills required at the job.
- To instill qualities like confidence, maturity, responsibility, and social skills necessary for personal and professional growth.
- To familiarize students to the business environment, which cannot be simulated in the classroom; thus creating competent professionals for the industry.
- To expose students to state-of-the-art facilities, equipment and professional practices in their respective trades.
- To help students develop their own job search tools, networking capacities, and interview skills.
- To expose them to the current technological developments relevant to the subject area of training.
- To create conditions conducive to quest for knowledge and its applicability on the job.
- To provide the experience in writing Technical reports/projects.
- To expose students to the engineer's responsibilities and ethics.

Scope and Structure of SIP:

SIP is offered to *entrants* of SY B.TECH (after semester II), TY B.TECH (after semester IV) and final year B.TECH (after semester VI) that meet the eligibility criteria stated below:

- SY B.TECH and TY B.TECH *entrants* should apply for 3 to 4 weeks' duration internships during June-July of every academic year. For these internships, *REGULAR* credits will not be awarded (non-Credit Based Internship). Although *REGULAR* credits are not awarded, but the internship is *compulsory* for all the

students. After successful completion of the internship, a student will be awarded with 3 *EXTRA* credits and it will be incorporated / reflected in *Additional Grade Card (AGC).* Student has to work for 120 hours minimum as an Intern during the said period. ***(Compulsory Internship)***

- Final year B.TECH *entrants* should apply for 4 to 6 weeks' duration internships during June-July of every academic year. For this internship, *REGULAR* credits will be awarded. (Credit Based Internship - 4 Credits). This internship is compulsory for all the entrants of final year B.TECH. Awarded credits will be considered for the calculation of final year CGPA and will be reflected in *Regular Grade Card*. Student has to work for 160 hours minimum as an Intern during the said period. ***(Compulsory Internship)***
- Final year B.TECH students may apply for 5-6 months (18 – 26 weeks) semester-long Industry Internship under SIP in their VIII semester for Project Work. Equivalent credits will be awarded for the semester long internship. ***(Optional Internship)***

The scope of SIP is limited to identifying internship opportunities and assisting MIT AOE students to apply for such positions. However, any financial liability, including but not limited to, travel, accommodation, insurance etc. incurred as direct or indirect consequence of such a position is the sole responsibility of the student and his/her guardians.

Student eligibility criteria:

Students applying for internships must meet the following criteria:

- After completion of second academic semester, FY B.TECH students (SY B.TECH entrants) of all schools are eligible to apply for 3 to 4 weeks' duration internships under SIP. Those students involved in / appearing for remedial term will be waived-off from internship. All other eligible students have to complete the internship as stated in the scope of SIP.
- After completion of fourth academic semester, SY B.TECH students (TY B.TECH entrants) of all schools are eligible to apply for 3 to 4 weeks' duration internships under SIP. Those students involved in / appearing for remedial term will be

waived-off from internship. All other eligible students have to complete the internship as stated in the scope of SIP.

- After completion of sixth academic semester, TY B.TECH students (final year B.TECH entrants) of all schools are eligible to apply for 4 to 6 weeks' duration internships under SIP. All students have to complete the internship successfully as stated in the scope of SIP. ***However, students who fail to earn the 4 credits for any reason, shall be required to earn the same at a later instant of time to be eligible for the award of degree.***
- Final Year B.TECH students with no live backlog and having a CGPA of 6.75 and above are eligible to apply for semester-long internships in Industry with credit transfer scheme as stated in scope of the SIP. However, final decision shall be taken based on the merit of the case, approved by the selected panel.
- The student is expected to be in good physical and mental health.

Rules for application to SIP:

Students applying to the SIP are required to adhere the following rules:

- Students must complete an undertaking (Annexure – I) to abide by the rules and regulations of the institution / industry they are applying to.
- Students must obtain academic and school clearances to ensure completion of prerequisite courses or other requirements as a part of their application to SIP.
- Students must submit a well formatted CV, requisite form (Annexure – II), financial declaration, if any, along with the undertaking stated above to the Internship Coordinator through Faculty Mentor before April 30 of every year.
- Last date for completing all relevant formalities pertaining to SIP is 15 days prior to the start of the internship.
- Within the first week of the internship, students are required to submit their supervisor's contact information (email address and phone number) to the Faculty Mentor and Internship Coordinator.
- **During the internship, students must submit brief fortnightly report duly signed by their supervisor (scanned soft copy) to the Faculty Mentor.**

- **Annexure IV is the final approval for the SIP and without which no internship is approved and no queries will be entertained at a later stage.**

Role of the Faculty Mentor and Internship Coordinator / Director – T&P:

The Faculty Mentor and Internship Coordinator / Director-T&P will:

- Ensure compliance of all SIP policies and procedures and strive to maintain the integrity of SIP.
- Assist students in securing internship positions and documenting potential opportunities for future use.
- Evaluate and approve student goals, objectives and expected learning outcomes for the internship.
- Monitor the student progress by contacting the student and his/her supervisor a minimum of two times during the internship period. The first contact should be initiated during the first week of the internship. The second contact should take place during last week of the internship.
- **Contacting with the students every alternate week through Google meet / MS Teams and maintaining the reports of the activity done by the students.**
- At the conclusion of the internship, the student has to submit a detailed report based on his/her internship experience and present the work in front of the panel formed at school level.

Role of student during internship:

- Actively participate in the internship process by utilizing appropriate resources and maintaining regular contact with the faculty mentor and Internship Coordinator / Director – T &P.
- Develop learning objectives consistent with their interests, skills, and goals, both academic and career related.

- Follow all policies and procedures described in this document, including timely submission of application and evaluation material to the faculty mentor and Internship Coordinator / Director – T &P.
- Conduct themselves in a professional manner as representatives of MIT AOE.
- Provide feedback and suggestions about internship program policies and procedures.
- The internship is to be physical and in extremely special cases, a virtual / Work from Home type internships can be taken with prior approval.
- The students will be informed about the various opportunities that come from various sources such as AICTE, Intern Shala, any other sources identified by Director / Dean – CR / Team of CR / School Deans / FTPO coordinators.
- If students are not able to get such opportunities, then they can be given specific work by their Mini Project guides / Minor Project guides through work from home concept. But the assigned work must be equivalent to the minimum duration as specified above. In such cases, the school Deans must form a team to identify the specific works that can be assigned to the students.
- The Institute coordinator can provide any support through email for the organizations, in case they need official communication from the Institute.
- All assessment for the summer internships can be done during the Sep 2022 by the team of members formed by the school deans along with the FTPO and CR team.

DEADLINES:

The last date to get the internships will be 31 May 2022 and the Internship period is from 15 May 2022 to 31 July 2022.

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ANNEXURE – I

UNDERTAKING FORMAT

I, Mr. /Ms……..,
Programme:……, School : ……, student of **MIT Academy of Engineering (MIT AOE),** permanent resident of ……..……..
.....
.....
Phone No: ..... (Give permanent home address with telephone no.), do hereby undertake on this the…… (Day), of..... (Month)..... (Year), the following

1. I, hereby, declare that, the entries made by me in the Application Form are complete and true to the best of my knowledge and based on valid records.
2. I, hereby, promise to abide by the admissible rules and regulations, concerning discipline, attendance, etc. of the Institute (MIT AOE), and also to follow the Code of Conduct prescribed by the Institute / Industry in which I am going to take the internship.
3. I, hereby undertake to maintain the name of the Institute in high levels during my period as intern in whichever Institute / Industry I am given an opportunity to undergo technical training.
4. I, hereby declare that I will maintain confidentiality and not disseminate / share any information related to the Institute / Industry to third parties.
5. I, hereby undertake to be responsible for maintaining the security of properties belonging to the Institute / Industry.

Date: _____ **Place:** _____

Signature of Student: _____

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ANNEXURE – II

Application for Internship Program

Sr. No.	Particulars		
1	Name of the applicant (in bold letters)		
2	Gender		
3	Class & 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	3-6 weeks	18-26 weeks
11	Total number of credits proposed to internship (if applicable)		

Signatures

Student	School Internship Coordinator
Approved by:	
Dean – School of _____ Engineering	MIT AOE Seal
Date:	

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ANNEXURE – III

REQUEST LETTER FROM INSTITUTE TO INTERNSHIP PROVIDER

To

.....
.....

Subject: Request for 03/04/06 weeks' industrial training for B.TECH degree program

Dear Sir,
Our students have undergone internship training in your esteemed organization in the previous years. I acknowledge the help and the support extended to our students during the training.

OR

(For first time industry) As per AICTE mandates, internship is now a compulsory competent of education for all technical education students.

In view of the above, I request your good self to allow our following _____students for undertaking practical training in your esteemed organization. Kindly accord your permission and give at least one-week time for students to join training after confirmation.

Roll No.	Name	PRN	Year	Discipline

A positive communication will be highly appreciated.
With warm regards,
Yours sincerely,

Coordinator – SIP

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ANNEXURE IV

REPORTING LETTER OF STUDENT

To

.....

.....

Subject: Reporting letter of student to Institute / Industry

Dear Sir,
Kindly refer your letter / e-mail dated. on the above cited subject. As permitted by your good self, the following students will undergo Institute / Industrial Internship in your esteemed organization under your guidance.

Roll. No.	Name of Students	PRN	Year & Discipline

You are requested to evaluate the student's performance on the basis of grading i.e. Excellent, Very Good, Satisfactory and Non-Satisfactory on the below mentioned factors. The performance report may please be forwarded to the undersigned on completion of training in a sealed envelope.

Sr. No.	Name of Students	Evaluation Ranking
1	Attendance and general behavior	
2	Relation with workers and supervisors	
3	Initiative and efforts in learning	
4	Knowledge and skills improvement	
5	Contribution to the organization	

Your efforts in this regard will positively enhance knowledge and practical skills of the students and your cooperation will be highly appreciated. The students will abide by the rules and regulation of the organization and will maintain a proper discipline with keen interest during their Internship. The students will report to you on along with a copy of this letter.

Yours sincerely,
Coordinator – SIP

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ANNEXURE – V

SUPERVISOR EVALUATION OF INTERN

Student Name:_____ Date:_____

Work Supervisor:_____ Title:_____

Institute/Industry:_____

Dates of Internship: From_____To_____

Please evaluate your intern on following factors: (Tick √)

Parameters	Needs improvement	Satisfactory	Good	Excellent
Professionalism and Behavior				
Cooperation with co-workers and supervisors				
Interest in work				
Learning ability				
Emphasis on high-quality work				
Readiness to take responsibility				
Use of technical knowledge and expertise				
Display of creativity/originality				
Problem Analysis				
Communication				
Punctuality				
Time Management Skills				

Overall performance of student intern (circle one):

(Needs improvement / Satisfactory / Good / Excellent)

Signature of Institute / Industry supervisor

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ANNEXURE VI : RUBRICS FOR THE EVALUATION OF SIP

Item	Mark for item					
	2-3	**4-5**	**6**	**7**	**8**	**9-10**
A. Professional skills 30%						
1.1. Initiative and creativity	Student shows no initiative or new ideas at all.	Student picks up some initiatives and/or new ideas suggested by others (e.g. supervisor), but the selection is not motivated.	Student shows some initiative and/or together with the supervisor develops one or two new ideas on minor parts of the project.	Student initiates discussions on new ideas with supervisor and develops one or two own ideas on minor parts of the project.	Student has his own creative ideas.	Innovative methods and analysis of information/data. Possibly the idea for the project has been formulated by the student.
1.2 Insight in functioning of another organization	Student shows no insight in functioning of the organization.	Student shows no insight in functioning of the organization.	Student is able to draw an organization chart of the organization.	Student is able to indicate the position of the team within the organization as a whole.	Student is able to indicate the responsibilities of the different units within the organization.	Student knows how changes are realized in the organization.
	Student doesn't ask for help from the internship provider in case it is necessary.	Student doesn't ask for help from the internship provider in case it is necessary.	Student gets things (e.g. receiving information, organizing material facilities, etc.) done within the team only via internship supervisor.	Student is able to get some things (e.g. receiving information, organizing material facilities, etc.) done within the team. If necessary, the student asks for help of the supervisor to get things done within the team.	Student is able to get things (e.g. receiving information, organizing material facilities, etc.) done within the team independently.	Student is able to independently implement changes that affect the whole team.
1.3 Adaptation capacity	Student doesn't adapt and gives an impression of apathy or is often involved in disputes or arguments.	Student doesn't adapt and gives an impression of apathy or is often involved in disputes or arguments.	Student knows the do's and don't in the new work environment.	Student accepts how thing go within the new work environment.	Student is able to adapt to the new work environment.	Student adapts easily to the work environment within the limits of his personal values.
1.4 Commitment and perseverance	Student is not motivated. Student escapes work and gives up regularly	Student has little motivation. Tends to be distracted easily. Has given up once or twice	Student is motivated at times, but often, sees the work as a compulsory task. Is distracted from work now and then.	The student is motivated. Overcomes an occasional setback with help of the supervisor.	The student is motivated and/or overcomes an occasional setback on his own and considers the work as his "own" project.	The student is very motivated, goes at length to get the most out of the project.
1.5 Independence	The student can only perform the work properly after repeated detailed instructions and with direct help from the supervisor.	The student needs frequent instructions and well-defined tasks from the supervisor and the supervisor needs careful checks to see if all tasks have been performed.	The supervisor is the main responsible for setting out the tasks, but the student is able to perform them mostly independently	Student selects and plans the tasks together with the supervisor and performs these tasks on his own	Student plans and performs tasks mostly independently, asks for help from the supervisor when needed.	Student plans and performs tasks independently and organizes his sources of help independently.

1.6 Handling supervisor's comments and development skills	Student does not pick up suggestions and ideas of the supervisor	The supervisor needs to act as an instructor and/or supervisor needs to suggest solutions for problems	Student incorporates some of the comments of the supervisor, but ignores others without arguments	Student incorporates most or all of the supervisor's comments.	Supervisor's comments are weighed by the student and asked for when needed.	Supervisor's comments are critically weighed by the student and asked for when needed, also from other staff members or students.
	Knowledge and insight of the student (in relation to the prerequisites) is insufficient and the student is not able to take appropriate action to remedy this	There is some progress in the professional skills of the student, but suggestions of the supervisor are also ignored occasionally.	The student is able to adopt some skills as they are presented during supervision	The student is able to adopt skills as they are presented during supervision and develops some skills independently as well.	The student is able to adopt new skills mostly independently, and asks for assistance from the supervisor if needed.	The student has knowledge and insight on a academic level, i.e. he explores solutions on his own, increases skills and knowledge where necessary.
	No learning outcomes formulated.	Learning outcomes formulated, but no progress in any of them.	On some of the personal learning outcomes the student shows some progress.	On all of the personal learning outcomes the student shows some progress.	On some of the personal the student shows major progress and on others some progress is shown.	On all personal learning outcomes the student has shown major progress.
1.7. Time management	No time schedule made.	No realistic time schedule.	Mostly realistic time schedule, but no timely adjustment of time schedule if necessary.	Realistic time schedule, with some adjustments if necessary (but not enough or not all in time) in times only.	Realistic time schedule, with if necessary timely adjustments of times only.	Realistic time schedule, with if necessary timely adjustments of both time and tasks.
	Final version of internship report or presentation more than 50% of the nominal period overdue without a valid reason (force majeure)	Final version of internship report or oral presentation at most 50% of the nominal period overdue (without a valid reason).	Final version of internship report or oral presentation at most 25% of nominal period overdue (without valid reason)	Final version of internship report or oral presentation at most 10% of nominal period overdue (without valid reasons)	Final version of internship report or oral presentation at most 5% of nominal period overdue (without good reasons)	Final version of internship report or oral presentation finished within planned period (or overdue but with good reason and finished within reasonable time).
B. Report internship 30%						
2.1 Formulation goals, framework project	No goals and framework of project.	Formulation of goals and framework of project is not clear.	Formulation of goals and framework of project is clear, but link between tasks and goals is not clear. Framework of project does not fit with the object of the internship project.	Formulation of goals and framework of project is clear, but link between tasks and goals is not always clear.. Framework of project does not fit with all aspects of the internship project.	Formulation of goals and framework of project is clear.	Clear formulation of goals and framework of project. Both are well linked with all aspects of the internship project.
2.2. Theoretical underpinning, use of	No discussion of underlying theories.	There is some discussion of underlying theories, but the description shows serious errors.	Student has found the relevant theories, but the description has not been tailored to the project at	Student has found the relevant theories, and has been partially successful in tailoring	Student has found the relevant theories, makes a synthesis of those, and has been	Clear, complete and coherent overview of relevant theories. Exactly tailored to the project at hand.

literature			hand or shows occasional errors.	the description to the project at hand. Few errors occur.	successful in tailoring the description to the project at hand.	

	No relevant literature in reference list except for those already suggested by the supervisor	Only a couple of relevant literature references in the reference list.	Some relevant literature in reference list but also significant body of irrelevant literature.	Relevant literature in reference list but some references are less relevant.	Used literature is relevant for the goal of the project. An occasional reference may be less relevant.	Used literature is relevant for the goal of the project.
2.3. Use of methods and processing data	No description of methods and analysis of the information/data.	Insufficient information on methods and insufficient analysis of the information.	Some aspects of the project regarding methods and analysis of information are described insufficiently. Used methods and analysis of data/information are not always appropriate.	Description of methods and analysis of information/data is lacking in a number of placed. Used methods and analysis of data/information mostly appropriate.	Description of methods and analysis of information/data is mostly complete, but there are lacking some details. Used methods and analysis of data/information are appropriate.	Description of methods used and analysis of the information is appropriate, complete and clear.
2.4. Reflection on results	No reflection on the results of internship project. Discussion only touches trivial or very general points of criticism.	Student identifies only some possible weaknesses and/or points at weaknesses which are in reality irrelevant or non-existent.	Student indicates most weaknesses in the results, but does not weigh their impact on the main results relative to each other.	Student indicates most weaknesses in the results and is able to weigh their impact on the main results relative to each other.	Student indicates all weaknesses in the results and weighs them relative to each other. Furthermore, (better) alternatives for the methods used are indicated.	Student is not only able to identify all possible weaknesses in the results, but is also able to indicate which weaknesses affect the outcome of the internship project most.
2.5. Conclusions and discussion	No link between goals, results and conclusions.	Conclusions are drawn, but in many cases only address part of the goals. Conclusions merely repeat results or conclusions are not substantiated by results.	Conclusions are linked to the goals, but not all goals are addressed. Some conclusions are not substantiated by results or merely repeat results.	Most conclusions well-linked to goals and substantiated by results. Conclusions mostly formulated clearly but some vagueness in wording.	Clear link between goals and conclusions. All conclusions substantiated by results. Conclusions are formulated exact.	Clear link between goals and conclusions. Conclusions substantiated by results. Conclusions are formulated exact and concise. Conclusions are grouped/ordered in a logical way.
	No discussion about the added value of the project for the organization.	Student assigns irrelevant aspects of the project as added value for the project for the organization.	Student only reflects on trivial aspects of his project for the organization and does not relate this to the goals of the organization.	Student is able to identify the added value of his project for the organization, but does not relate this to the goals of the organization.	Student is able to identify the added value of his project for the organization and relates this to the goals of the organization.	Student is able to identify the added value of his project and relates this to the goals of the organization. In addition, the student is able to indicate the added value of his project for the society as a whole.
2.6. Fluency of language and writing skills	Internship report is badly structured. In many cases information appears in wrong locations. Level of detail is inappropriate	Main structure incorrect in some places, and placement of material in different chapters illogical in many places. Level of detail varies	Main structure is correct, but lower level hierarchy of sections is not logical in places. Some sections have overlapping functions	Main structure correct, but placement of material in different chapters illogical in places. Level of detail inappropriate in a number of	Most sections have a clear and unique function. Hierarchy of sections is mostly correct. Ordering of sections is mostly logical.	Well-structured: each section has a clear and unique function. Hierarchy of sections is correct. Ordering of sections is logical. All

	throughout.	widely (information missing, or irrelevant information given).	leading to ambiguity in placement of information. Level of detail varies widely (information missing, or irrelevant information given).	places (irrelevant information given).	All information occurs at the correct place, with few exceptions. In most places level of detail is appropriate.	information occurs at the correct place. Level of detail is appropriate throughout.
	Formulations in the text are often incorrect/inexact inhibiting a correct interpretation of the text.	Vagueness and/or inexactness in wording occurs regularly and it affects the interpretation of the text.	The text is ambiguous in some places but this does not always inhibit a correct interpretation of the text.	Formulations in text are predominantly clear and exact. Internship report could have been written more concisely.	Formulations in text are clear and exact, as well as concise.	Textual quality of the internship report is such that it could be acceptable for a peer-reviewed journal.
2.7 Defense of the report	Student is not able to defend/discuss his internship reports. He does not master the contents.	The student has difficulty to explain the subject matter of the internship project.	Student is able to defend his internship project. He mostly masters the contents of what he wrote, but for a limited number of items he is not able to explain what he did, or why.	Student is able to defend his internship project. He masters the contents of what he wrote, but not beyond that. Is not able to place thesis in scientific or practical context.	Student is able to defend his internship project, including indications how the work could have been done better. Student is able to place thesis in either scientific or practical context.	Student is able to freely discuss the contents of the internship project and to place the internship project in the context of current scientific literature and practical contexts.

C. Self reflection on internship 10%						
3.1 Report on self-reflection	Is not able to describe an event or situation in which he was involved and that relates to a formulated learning outcome.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome but unable to distinguish between the event description and the description of the personal emotions involved.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, but unable to formulate personal points of improvement and related actions in a future situation	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, and able to formulate personal points of improvement and related actions in a future situation	Is able to analyze objectively most events or situations in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate plan for improved functioning in a new situation. Shows the ability in at least one case to implement the formulated plan for improved functioning	Is able to analyze objectively any event or situation in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate and implement a plan for improved functioning in a new situation.
3.2 Reflection on the internship	Is not able to describe an event or situation in which he was involved and that relates to a formulated learning outcome.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome but unable to distinguish between the event description and the description of the personal emotions involved.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, but unable to formulate personal points of	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, and able to formulate personal points of	Is able to analyze objectively most events or situations in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate plan for improved functioning in a new	Is able to analyze objectively any event or situation in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate and implement a plan for improved functioning in a new situation.

			improvement and related actions in a future situation	improvement and related actions in a future situation	situation. Shows the ability in at least one case to implement the formulated plan for improved functioning	

D. Presentation (30%)						
4.1. Presentation: Graphs, PowerPoint	Presentation has no structure.	Presentation has unclear structure.	Presentation is structured, though the audience gets lost in some places.	Presentation has a clear structure with only few exceptions.	Presentation has a clear structure. Mostly a good separation between the main message and side-steps.	Presentation clearly structured, concise and to-the-point. Good separation between the main message and side-steps.
	Unclear lay-out. Unbalanced use of text, graphs, tables or graphics throughout. Too small font size, too many slides.	Lay-out in many places insufficient: too much text and too few graphics (or graphs, tables) or vice verse.	Quality of the layout of the slides is mixed. Inappropriate use of text, tables, graphs and graphics in some places.	Lay-out is mostly clear, with unbalanced use of text, tables, graphs and graphics in few places only.	Lay-out is clear. Appropriate use of text, tables, graphs and graphics.	Lay-out is functional and clear. Clever use of graphs and graphics.
4.2. Oral presentation and defense	Spoken in such a way that majority of audience could not follow the presentation.	Presentation is uninspired and/or monotonous and/or student reads from slides: attention of audience not captured	Quality of presentation is mixed: sometimes clear, sometimes hard to follow.	Mostly clearly spoken. Sometimes monotonous in some places.	Clearly spoken in such a way that I keeps audience's attention.	Relaxed and lively though concentrated presentation. Clearly spoken in such a way that I keeps audience's attention.
	Language and interest of audience not taken intro consideration at all.	Language and interest of audience hardly taken intro consideration.	Language and interest of presentation at a couple of points not appropriately targeted at audience.	Language and interest of presentation mostly targeted at audience.	Language and interest of presentation well-targeted at audience. Student is able to adjust to some extent to signals from audience that certain parts are not understood.	Take-home message is clear to the audience. Language and interest of presentation well-targeted at audience. Student is able to adjust to signals from audience that certain parts are not understood.
	Bad timing (way too short or too long).	Timing not well kept (at most 30% deviation from planned time).	Timing not well kept (at most 20% deviation from planned time).	Timing is OK (at most 10% deviation from planned time).	Presentation finished well in time.	Presentation finished well in time.
	Student is not able to answer questions.	Student is able to answer only the simplest questions	Student answers at least half of the questions appropriately..	Student is able to answer nearly all questions in an appropriate way.	Student is able to answer all questions in an appropriate way, although not to-the-point in some cases.	Student is able to give appropriate, clear and to-the-point answers to all questions.

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ANNEXURE VII : REPORT OF EVALUATION

to be submitted by School Deans to CoE

MIT Academy of Engineering

School of _____

Class : FY / SY / TY

Date of Evaluation : _____

Roll No	Name of student	PRN	Criteria A 30%	Criteria B 30%	Criteria C 10%	Criteria D 30%	TOTAL MARKS

Dean

School of _____

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ANNEXURE – VIII

INTERNSHIP REPORT FORMAT

STUDENT INTERNSHIP PROGRAM (SIP)

REPORT

Name of the Institute / Industry
(Where you have completed your Internship Training)

(Bold, 16 font, Times New Roman style)

Submitted By

Name of the student

Exam Seat No.

PRN No.

SCHOOL OF _____

MIT ACADEMY OF ENGINEERING

ALANDI (D), PUNE

CERTIFICATE

This is to certify that the "**Student Internship Program (SIP)" report** submitted by _____ **PRN** _____ is work done by him/her and is submitted during _____ academic year.

Faculty Mentor

(Name)

School - Internship Coordinator

(Name)

School Dean

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(Name)

Internship certificate provided by the internship institution

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ACKNOWLEDGEMENT

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(Name of student)

Table of Contents

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1) **Introduction** includes brief description of the Organization/ Institute. The starting and ending dates of your internship. The scope of the work completed during the internship. It may include background information necessary to understand the work completed during the internship.

2) **Internship discussion** should include report of the work carried out in Organization / Institute. It may contain:

- **Problem / Project / Opportunity** the student got in the Institute/ Organization.
- **Learning Experience** should include:
    a) **Knowledge acquired:** Briefly describe the knowledge you gained through your training experience and relate this knowledge to what you learned in specific courses.
    b) **Skills learned:** Describe the skills and any career-specific abilities that you gained during your internship.
    c) **Observed attitudes and gained values:** Describe the manners, mindsets or values that you found and you perceive as important, in your training program, for a successful career (e.g. hard work, dependability, honesty, etc.)

d) **The most challenging task performed:** Describe the best and the most challenging mission that was assigned to you during your internship, how you performed it, and how you overcame challenges while performing it.

3) **Conclusion**: Summarize your overall experience in the internship keeping in mind the tasks performed and your learning experience.

4) **Bibliography:** Provide all the sources that you have used for data collection /project execution/ report preparation (books, articles, reports).

5) **Plagiarism Report**: Attach a plagiarism report at the end of the report. (Acceptable range: 1-20%)

1. **Paper Size:** A- 4 size paper. Each page should be numbered.

2. **Margins:**
    1. **Top** : 1” (1 inch=2.54cm)
    2. **Bottom** : 1.15” (2.86cm)
    3. **Left** : 1.4”
    4. **Right** : 0.6”

3. **Line Spacing:** 1.5 line
4. The report should be between 15-20 pages (exclusive of references, title pages, table of contents) and spiral bonded with one side printing.
5. Use single in-space in footnotes (if required).
6. Standard formal level of English should be used.
7. Deadline for Final Submission of the report must be strictly adhered to.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Process Automation
	COURSE CODE	ET462
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET462.CEO.1: To give the students a comprehension of Process Control Instrumentation Design.
ET462.CEO.2: To give the students a comprehension of the relation between Instrumentation and controller design in industrial applications.
ET462.CEO.3: To make the students able to analyze the control loops and to achieve the control actions with different Controllers
ET462.CEO.4: To impart the role of PLC in industry automation.
ET462.CEO.5: To expose various control techniques employed in process automation.

COURSE OUTCOMES :

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

ET461.CO.1: Describe process control principles
ET461.CO.2: Solve issues related to efficient controller design.
ET461.CO.3: Explore Advance Process Automation Techniques.
ET461.CO.4: Utilize knowledge of PLC programming for Process Automation.
ET461.CO.5: Design GUI for process industry using LABVIEW Software.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**7 HOURS**
Basic Principle of Process Automation, Block Diagram of process control. Process characteristics, Control system Parameters, Control system Evaluation, Evaluation Criteria, Analog and Digital Processing, Process Control Drawings, Comparison of Pneumatic & Electro pneumatic control system.		
UNIT 2	**Process Controllers**	**8 HOURS**
Controller modes, Electronic controllers, Pneumatic controllers, Hydraulic controllers, Realization of controllers using Operational amplifier circuits. Feed forward controller, Tuning of PID controllers: Ziegler Nichols Method, Frequency Response Method		
UNIT 3	**Final Control Operation**	**7 HOURS**
Signal conversion: Analog signals, Digital signals, Pneumatic signal, Actuators: Electrical actuators, Pneumatic actuators, Hydraulic actuators, Control element: Mechanical, Electrical, Fluid Valves, Principle of control valve, Characteristics of Valve, selection of control valve, Different types of control valves and their applications		
UNIT 4	**Discrete state process control**	**8 HOURS**
Definition, Characteristics of the system, Relay controllers and Ladder Diagram Elements & Examples, Programmable Logic controllers (PLCs): Functions of PLC, Advantages, Architecture, PLC Operation, Scan time, Types, selection of PLC, Interfacing Input and Output devices with PLC, Ladder Programming, and PLC based automated systems.		
UNIT 5	**Computers in Instrumentation**	**10 HOURS**
Direct digital control systems, Distributed control systems (DCS): Introduction, DCS flow sheet symbols, architecture of DCS controller, DCS communication, DCS supervisory computer tasks, Features and advantages of DCS. Supervisory control and Data acquisition (SCADA): SCADA introduction, elements of SCADA, Features of SCADA, and MTU- functions of MTU, RTU Functions of RTU, and Applications of SCADA. Types of Recorders and their working, Introduction to Virtual Instrumentation (LABVIEW).		

PRACTICAL:		
MODULE NO.01		**6 HOURS**

1. Study of Differential Pressure Transmitter and its application for flow measurement.
2. Measurement of level using DPT.
3. Study and Calibration of I/P converter, P/I converter
4. Study of Control valve & plot installed characteristics of Control valve

MODULE NO.02		6 HOURS

1. Study & verification of different control actions (P, I, D, PI, PD, PID) for step input.
2. Tuning of PID controller for temperature/pressure control loop.

MODULE NO.03		6 HOURS

LabVIEW based practical

1. Study of ON-OFF control mode for temperature control process.
2. Tuning of PID controller for level/flow control loop.

MODULE NO.04		6 HOURS

RS Logix based PLC practical's

1. PCL based case studies

TEXT BOOK

1. Curtis Johnson, Process Control Instrumentation Technology; 8th Edition, Pearson Education, 2013,
2. S.K Singh, Industrial Instrumentation and Control, Third Edition, McGraw Hill companies.2009, ISBN: 9780070262225
3. N.A. Anderson, Boca Ratan, Instrumentation for Process measurement and control, Radnor Pennsylvania, CRC Press, 03rd Edition,1998, ISBN :9780849398711

REFERENCE BOOK

1. K. Krishna Swamy, Process Control; New Age International Publishers,2005,ISBN: 9788122416695
2. K. Astram, T Haggland, PID Controllers, Theory, Design and Tuning;2nd Edition
3. Bela G. Liptak , Instrument and Automation Engineers' Handbook: Process Measurement and Analysis, Fifth Edition - Two Volume Set Hardcover 4 October 2016 , ISBN :9781466559325

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	ASIC Design
	COURSE CODE	ET491
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET491.CEO.1: To introduce the concepts of application specific IC design
ET491.CEO.2: To provide exposure to the power and design considerations
ET491.CEO.3: To introduce static timing analysis at various stages of system design

COURSE OUTCOMES :

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

ET491.CO.1: Describe the design methodology for an ASIC and recall the design considerations
ET491.CO.2: Perform preliminary power computations for basic cells
ET491.CO.3: Construct timing models for a standard combinational cell
ET491.CO.4: Correlate the design flow for physical design and synthesis

THEORY COURSE CONTENT		
UNIT 1	**Introduction to ASIC Design**	**6 HOURS**
Types of ASIC, abstraction levels, ASIC design flow logic design and physical design, FPGA design flow, Combinational logic design elements, RTL design examples		
UNIT 2	**Design considerations**	**8 HOURS**
Timing parameters, metastability, clock skew, slack, clock latency, area for the design, speed requirements, power requirements, design constraints, synchronous design considerations, on-chip variations.		
UNIT 3	**Power considerations**	**10 HOURS**
Power analysis in ASICs: Power Dissipation in Digital Designs, The switching activity, Power Computation for Basic Cells and Macros, power analysis **Low power implementation:** Technology Node and Library Trade-Off, Library Selection, Clock Gating, Gate-Level Power Optimization Techniques		
UNIT 4	**Introduction to static timing analysis**	**10 HOURS**
STA at different phases, CMOS logic gates, Standard cells, modelling of CMOS cells, switching waveform, propagation delay, Min and Max Timing Paths, Clock Domains, operating conditions, timing models - standard cell library, timing models - Combinational Cells, **STA-Case study**		
UNIT 5	**Physical design**	**6 HOURS**
Physical Design Flow, Floor Planning and Power Planning, Clock Tree Synthesis, Place and Route, Back Annotation, Signoff STA and Layout, Case study		

TEXT BOOK

1. Vaibbhav Taraate, ASIC Design and Synthesis -RTL Design Using Verilog, Springer, ISBN 978-981-33-4641-3, 2021.
2. Rakesh Chadha and J. Bhasker, An ASIC Low Power Primer Analysis, Techniques and Specification, Springer, ISBN 978-1-4614-4270-7 ISBN 978-1-4614-4271-4 (eBook) DOI 10.1007/978-1-4614-4271-4, 2013.
3. J. Bhasker and Rakesh Chadha, Static Timing Analysis for Nanometer Designs A Practical Approach, springer, ISBN 978-0-387-93819-6, e-ISBN 978-0-387-93820-2, 2009.

REFERENCE BOOK

1. Vikram Arkalgud Chandrasetty, VLSI Design A Practical Guide for FPGA and ASIC Implementations, Springer, ISSN 2191-8112, e-ISSN 2191-8120, ISBN 978-1-4614-1119-2, e-ISBN 978-1-4614-1120-8 DOI 10.1007/978-1-4614-1120-8, 2011.
2. Michael John Sebastian Smith, Application Specific Integrated circuits, ISBN 0-201-50022-1, Addison Wesley Longman, Inc. Text copyright, 1997.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Network Security
	COURSE CODE	ET492
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET492.CEO.1: To acquaint the students with taxonomy and terminology of the Computer Networking area

ET492.CEO.2: To Articulate the cryptography techniques used in network security

ET492.CEO.3: To Understand Various Encryption mechanisms for secure data transmission and management of key required for encryption

ET492.CEO.4: To Understand authentication requirements and study various authentication mechanisms.

ET492.CEO.5: Discuss various security parameters related to network.

COURSE OUTCOMES :

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

ET492.CO.1: Interpret basics of computer network technology.

ET492.CO.2: Articulate the cryptography techniques used in network security.

ET492.CO.3: Understand Various Encryption mechanisms for secure data transmission.

ET492.CO.4: Understand authentication requirements and mechanisms.

ET492.CO.5: Explain various security parameters related to network.

THEORY COURSE CONTENT		
UNIT 1	**Basics of Computer Network**	**6 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). Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.		
UNIT 2	**Introduction to Cryptography**	**8 HOURS**
Threats in Networks, Introduction to the Concept of Security, Cryptographic Techniques- Symmetric and Asymmetric Key, Cryptographic Algorithms-One-Time Pads, The Vernam Cipher, Data Encryption Standard (DES) Algorithm, Advanced Encryption Standard (AES) Algorithm		
UNIT 3	**Introduction to Public key Cryptography**	**8 HOURS**
Public Key Infrastructure (PKI): Digital Signature Properties of Digital Signature, Public Key Protocol; Need and Principles of Public Key Cryptosystems, RSA algorithm and Diffie-Hellman key exchange algorithm. Certificates: Certificate Authorities, Secure Socket Layer (SSL) SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) Features, Components.		
UNIT 4	**Introduction to Authentication**	**6 HOURS**
Authentication Requirements, Message Authentication Codes, Hashes, MD5 & SHA, User Authentication: Password, Certificate based & Biometric Authentication, Kerberos.		
UNIT 5	**Network Security**	**6 HOURS**
Introduction: Need for Security, Security Attacks, Services and Mechanisms, Network Security. Firewalls, IP Security, VPN, Intrusion Detection, Web Security.		
UNIT 6	**Web security**	**8 HOURS**
Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction. Introduction to OWASP & Guidelines to address OWASP in any Web application. E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management. Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls.		

TEXT BOOK

1. Andrew S. Tenenbaum, Computer Networks, PHI, ISBN 81-203-2175-8.2.
2. Kurose & Ross, Computer Networking: A top Down Approach featuring the Internet. 3rd edition, Pearson Education,ISBN-9788131790540
3. Behrouz A. Forouzan, Cryptography & Network Security, PHI 4th Edition
4. Cryptography and Network Security: Principles and Practice, 6th Edition, William Stallings, 2014, Pearson, ISBN13:9780133354690.

REFERENCE BOOK

1. Stallings Williams, Cryptography and Network Security: Principles and Practice, 3rd edition, Prentice Hall PTR.,2003.
2. Behrouz A. Forouzan, "Data Communications and etworking",5thEdition,TataMcGraw-Hill, Publications, ISBN: 0 07 058408 7.
3. Holger Karl and Andreas Willing, Protocols and Architectures for Wireless Sensor Networks, Wiley India , ISBN:9788126533695
4. Wenbo Mao, "Modern Cryptography, Theory & Practice", Pearson Education.
5. Christof Paar, Jan Pelzl, Understanding Cryptography, Springer-Verlag Berlin Heidelberg
6. Matt Bishop, "Computer Security", Pearson Education.
7. Atul Kahate, Cryptography and Network Security, McGraw Hill.
8. Kizza, J. M. (2013). Guide to computer network security. London: Springer.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Signal Detection and Estimation Techniques
	COURSE CODE	ET493
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET493.CEO.1: To understand the mathematics and physics of Information Theory
ET493.CEO.2: To understand various channel coding techniques
ET493.CEO.3: To study the features of various error control codes
ET493.CEO.4: To design encoder and decoder for different codes

COURSE OUTCOMES :

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

ET493.CO.1: Analyze the relation between information theory and channel coding
ET493.CO.2: Describe real life applications based on fundamental theory
ET493.CO.3: Design encoder and decoder for linear, cyclic codes
ET493.CO.4: Design encoder and decoder for convolution codes
ET493.CO.5: Analyze the performance coding and error control techniques

THEORY COURSE CONTENT		
UNIT 1	**Information Measures**	**8 HOURS**
Discrete Source models Memoryless and Stationary, Mutual Information, Self-Information, Conditional Information, Average Mutual Information, Entropy, Entropy of the block, Conditional Entropy, Information Measures for Analog Sources, Coding Techniques		
UNIT 2	**Linear Block Codes for Error Correction**	**8 HOURS**
Introduction to Error Correcting Codes, Basic Definitions, Matrix Description of Linear Block Codes, Equivalent Codes, Parity Check Matrix, Decoding of a Linear Block Code, Syndrome Decoding, Error Probability after Coding (Probability of Error Correction), Perfect Codes, Hamming Codes, Optimal Linear Codes		
UNIT 3	**Cyclic Codes**	**8 HOURS**
Introduction to Cyclic Codes, Polynomials The Division Algorithm for Polynomials, A Method for Generating Cyclic Codes, Matrix Description of Cyclic Codes, Fire Code, Golay Codes, Cyclic Redundancy Check (CRC) Codes		
UNIT 4	**BCH Codes**	**8 HOURS**
Introduction to BCH Codes, Primitive Elements, Minimal Polynomials, Generator Polynomials in Terms of Minimal Polynomials, Some Examples of BCH Codes, Decoding of BCH Codes, Reed-Solomon Codes, Implementation of Reed-Solomon Encoders and Decoders Nested Code		
UNIT 5	**Convolutional Codes**	**6 HOURS**
Introduction to Convolutional Codes, Tree Codes and Trellis Codes, Polynomial Description of Convolutional Codes (Analytical Representation), Notions for Convolutional Codes, The Generating Function, Matrix Description of Convolutional Codes, Veterbi Decoding of Convolutional Codes, Distance Bounds for Convolutional Codes, Performance Bounds, Known Good Convolutional Codes, Turbo Codes, Turbo Decoding 792.14 C		

TEXT BOOK

1. Ranjan Bose, Information Theory, Coding and Cryptography, 2nd Edition, TMH, 2008 (ISBN: 9780070669017)
2. H. V. Poor, An Introduction to Signal Detection and Estimation, 2nd edition, Springer, 1994.
3. S. M. Kay, Fundamentals of Statistical Signal Processing: Detection Theory, Prentice Hall PTR, 1998.
4. S. M. Kay, Fundamentals of Statistical Signal Processing: Estimation Theory, Prentice Hall PTR, 1993.
5. H. L. Van Trees, Detection, Estimation and Modulation Theory, Part I, John Wiley, 1968.
6. D. L. Melsa and J. L. Cohn, Detection and Estimation Theory, McGraw Hill, 1978.
7. L. L. Scharf, Statistical Signal Processing: Detection, Estimation, and Time Series Analysis, Addison-Wesley, 1990.
8. V. K. Rohatgi and A. K. M. E. Saleh, An Introduction to Probability and Statistics, 2nd edition, Wiley, 2000.

REFERENCE BOOK

1. J. H. van Lint, Introduction to Coding Theory, Springer, 2008, (ISBN: 9788181288400)
2. Shu Lin and Daniel J. Costello, Error Control Coding, 2nd Edition, Pearson, 2004 (ISBN: 9788131734407)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Biomedical Engineering
	COURSE CODE	ET494
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET494.CEO.1: To study the anatomy and bio-signals related to various human body systems.

ET494.CEO.2: To explain the working of Biomedical measuring, Life-saving, and Diagnostic Instruments.

ET494.CEO.3: To study the significance and details of Electric Safety, Ethics, and Standards while designing Biomedical instruments.

ET494.CEO.4: To get the overview and applications of Smart Instrumentation and E-connected Healthcare systems.

COURSE OUTCOMES :

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

ET494.CO.1: Elaborate the origin of various bio-signals and the electrodes used to measure them.

ET494.CO.2: Illustrate the working of various biomedical measurements, Life savings, and Diagnostic Instruments.

ET494.CO.3: Relate the necessity of Electric Safety, Ethics, and Standards while designing Biomedical instruments.

ET494.CO.4: Correlate the need for Smart medical devices with the current requirements.

ET494.CO.5: Discover the opportunities for the development of E-connected Healthcare Systems.

THEORY COURSE CONTENT		
UNIT 1	**Human Anatomy & Bio-signals**	**6 HOURS**

Structure of cells, Physiological systems of the Body, Anatomy of the Nervous System, Anatomy of the Cardiovascular System. Bio-signals: Action & Resting potential, Propagation of action potential, Bioelectric Potentials / Bio-signals - ECG, EEG, EMG. Electrode Theory.

Self-Study: ERG, EOG, EGG, Types of Electrodes.

Case Study: Integration and interaction between different human body systems such as Respiration-Circulatory-Digestive-Urinary systems interaction

Charts, anatomical and working models for better understanding of anatomy and functioning of the Human body system.

UNIT 2	**Biomedical Instruments and measurements**	**10 HOURS**

Introduction of Biomedical Instrumentation, Biometrics, Components of Man-Instruments System, ECG: Amplifiers, Electrodes & Leads, Einthoven Triangle, ECG Block diagram. Correlation of heart disorders with ECG. Angioplasty. EEG: Measurement, 10-20 Electrode System. Correlation of brain disorders with ECG. Blood Pressure: indirect methods and direct methods. Respiration Rate measurement.

Self-Study: Body Temperature measurement Digital thermometer and IR Thermometer.

Case Study: Camera Pill The latest technique of endoscopy

ECG, EEG, EMG Electrodes, measurement, and interpretation.

Measurement of Blood Pressure using sphygmomanometer/ Digital BP Instrument.

UNIT 3	**Life savings and diagnostic instruments**	**7 HOURS**

Life-Saving devices/ methods - Pacemakers, Defibrillators, Ventilators, CPR (Cardio-Pulmonary Resuscitation). Medical imaging modalities Ultrasound, X-ray, CT-scan, MRI, Angiography

Self-Study: ICU monitoring instruments, Kidney Dialysis

Case study: fMRI

To measure the drip rate using an IR sensor detector while giving Saline / IV (Intravenous Therapy) fluids.

Lifesaving first-aid procedure - Cardiopulmonary resuscitation (CPR)

Demonstration of working of Defibrillator machine on dummy object.

UNIT 4	**Electric Safety, Ethics, and Standards**	**5 HOURS**

Physiological effects of Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention. Grounding and Shielding. Calibration of Biomedical instruments. Biomedical Ethics. Medical Standards - OHSAS 18001 / ISO 45001, ISO 13485,

Self-study: ISO 14001, ISO 50001: ISO 14001

Case study: Cases of Medical Ethics

UNIT 5	Smart Instrumentation	5 HOURS

Healthcare 4.0 in line with Industry 4.0 Overview, necessity, technologies Smart and wearable medical devices IoMT (overview, architecture, and application)
Robotic surgery Overview and applications
Self-Study: Nanorobotics - Overview and applications in the medical field.
Case study: Smart Prosthetics

UNIT 6	E-connected Healthcare System	5 HOURS

IT Healthcare, Biotelemetry system, Telemedicine system, M-healthcare system
Self-Study: e-Pharmacy
Case Study: Tele-ambulance, eICU

Industrial Visit:
Visit a Healthcare organization or Biomedical Industry to get real-world exposure to Biomedical instruments.

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

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.
3. Markkula Center for Applied Ethics, Cases in Medical ethics, at Santa Clara University, Mar 1, 2005. Available online at: https://www.scu.edu/ethics/focus-areas/bioethics/resources/cases-in-medical-ethics-student-led-discussions/ [Accessed on 1st Nov. 2022]
4. D. Jude Hemanth (Editor), J. Anitha (Editor), George A. Tsihrintzis (Editor), Internet of Medical Things: Remote Healthcare Systems and Applications (Internet of Things)
5. Joel Rodrigues, Sandra Sendra Compte and Isabel Dez, e-Health Systems- Theory and Technical Applications, 1st Edition
6. Jingshan Li & Pascale Carayon (2021) Health Care 4.0: A vision for smart and connected health care, IISE Transactions on Healthcare Systems Engineering, 11:3, 171-180, DOI: 10.1080/24725579.2021.1884627

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Capstone Portfolio
	COURSE CODE	ME480
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
NIL	8	NIL	NIL	NIL	NIL	150	150

COURSE OBJECTIVES :

Students should understand to:

ME408.CEO.1: Improve and profuse individual perspectives on problems at different scales. .

ME408.CEO.2: Identify and select the capstone work, formulate the methodology along with a significant collection of artifacts and outcomes.

ME408.CEO.3: Synthesize a reflective report to effectively communicate and explore findings. s.

ME408.CEO.4: Create a professional portfolio that technically, graphically and verbally describes pertinent achievements and the progressive growth during the program.

COURSE OUTCOMES :

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

ME408.CO.1: Portray individual skill for solving the problem. (L4)

ME408.CO.2: Showcase and exhibit the best techniques and suitable methodology. (L5)

ME408.CO.3: Cognize the significance of report and comprehend its reflections. (L4)

ME408.CO.4: Assimilate digital and visual literacies. (L5)

COURSE ABSTRACT :

Capstone work is an individual, self-identified project that focuses on technical/non-technical issues. Capstone work requires taking risks, high productivity, strong design research, quick turnaround times, creating an advanced design. A Digital portfolio is an integrative collection of work that draws together skills gained from across the taught phase of the program. It comprises a structured set of papers that enabled application and critical reflection. It is an amalgamation of both written and visual content that draws out the evolution of thinking around the ways in which design, social constructs, and emerging technologies intercept. It exposed process, critical thinking, as well as final artifacts, concepts, and its contents articulated in depth. The student enables to learn powerful new methods to promote his online self-design profile. It will help to established a professional voice by writing a personal design philosophy and a reflective article for the Linked In profile page. The opportunity to choose the project,formulate solution, negotiate deliverable, work individually, and present digitally is what makes the Capstone portfolio unique.

Capstone portfolio is divided into two section a) Capstone work b) Digital Portfolio

CAPSTONE WORK :

Individual student can choose the topic from one of the below capstones to carry out the work during the entire semester

1. Technical Capstone
    - Industry identified problem
    - Institute identified problem
    - Urban city identified problems
    - Rural Development
    - Environmental related problems
    - Student Conceived problems
    - Satisfactory solution to Open ended problems
    - Innovative Design stemming from Student/Faculty
    - Product Development
    - App/ Software Development
    - Multidisciplinary approach to existing problem
    - Modeling/Optimization/Analysis study
2. Writing Intensive Capstone
    - Design
    - Literature Survey
    - Commercial Survey
    - Social media Survey
    - Idea/ Design Philosophy
    - Research Methodology
    - Consultancy Project work
    - Collaborative Project work
    - Laboratory/Digital classroom
    - Manage/lead any Event/activity
3. General Capstone
    - State of art
    - Creating YouTube channel
    - Design Blog/Forum
    - Challenges and Prospect of Technology (Engineering) Education in Primary and Secondary Schools
    - Market Statistics

DIGITAL PORTFOLIO :

Individual student should create there own digital portfolio by using the standard professional platforms/blogs based on the record during their entire Under Graduate program. Digital portfolio should be professional, amalgamation of technical, written, graphical/Visual content and Verbal culmination of the skills and knowledge that students have developed over their under graduate program.

1. Process Portfolio
2. Show case Portfolio
3. Hybrid Portfolio

GUIDELINES :

1. Individual student will work for Capstone work for entire semester.
2. Individual student will create their own digital portfolio.
3. Individual student should choose the title of the capstone work with approval from the Supervisor and School Dean
4. Student should work on the topic approved with all necessary information, evidences and the measurable outcomes.
5. Student will have to write the report on the capstone work.
6. Students have to follow the guidelines of plagiarism for capstone report.
7. Student can skip the report if they are attempting Exemplary Capstone i.e. any one of the following. This will ensure the competency of students which they have learn during their undergraduate program. However supervisor can take stand if the capstone work is remarkable, he/she may ask to write a small report for the record.However supervisor can take stand if the capstone work is good, he/she may ask to write one small report.
    - Published Article in Scopus Index Journal
    - Approved Research Proposal
    - Winner for Design Competitions/Tech fest/ Workshop
    - Winner for State/National/International Event (Technical/Non-technical)
    - Valid score in Competitive exams (GATE/CAT/GRE-TOEFL/IELTS)
8. Capstone work and Digital portfolio need to be reviewed by supervisor and one faculty of same department to ensure whether student have followed all the guideline and work is appropriate and worth for evaluation.
9. Final examination will be conducted in the presence of Jury.

ASSESSMENT and EVALUATION :

The two member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the Capstone work supervisor. Assessment shall be done jointly by the guide and jury members.

1. Capstone work Review 1 (25 Marks)
2. Capstone work Review 2 (25 Marks)
3. Creating Digital Portfolio (50 Marks)
4. Report (25 Marks)
5. Final Demonstration (25 Marks)

REFERENCES

1. https://design.berkeley.edu/ Berkeley M.Des. University of California, U.S. . ://design.gatech.edu/ Georgia Institute of Technology, College of Design Atlanta, U.S.
2. https://www.apus.edu/ American Public University
3. https://msu.edu/ Michigan State University's US
4. https://www.cranfield.ac.uk Cranfield University, Shrivenham Swindon UK
5. https://my.bulbapp.com/personalized-learning/assessment-infographic-blog/
6. https://edtechjeffco.weebly.com
7. https://www.invisionapp.com/inside-design/10-portfolio-websites-to-show-off-your-design-work/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2022 - 2023 (R 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP405
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP405.CEO.1: To study the basic concepts of economics
HP405.CEO.2: To use the practical applications of economic feasibility
HP405.CEO.3: To understand the concept of banking and features
HP405.CEO.4: To illustrate the financial planning and saving options

COURSE OUTCOMES :

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

HP405.CO.1: Relate the basic concepts of engineering economics
HP405.CO.2: Apply the economic viability of firm/organization under different market conditions
HP405.CO.3: Explain the bank structures and its schemes
HP405.CO.4: Execute the effective way of financial budget and skills

THEORY		
UNIT 1	**Introduction to Economics**	**6 HOURS**
Economic issues and concepts; How economist work, Theory of demand and supply; meaning, Determinants, Equilibrium between demand and supply; Elasticity of demand; Price elasticity; Income elasticity; Cross elasticity, Characteristics of an Indian economy, Concepts of foreign trade, Goods and Services Tax (GST), Globalization, Liberalization, Privatization, Global market indices, Foreign Direct Investment (FDI). **Case studies:** Housing market, General raw products/fuel market, Electronic devices, Startups, etc. **Further readings:** Introduction to Crypto-currency, Impact and analysis in the foreign market.		
UNIT 2	**Micro Economics and Macro Economy**	**6 HOURS**
Revenue concepts, Cost concepts, Short run and long run cost concepts and curves, Opportunity cost. Markets; meaning, types of markets and their characteristics, National Income (NI); meaning, stock and flow concept, NI at current price, NI at constant price, Gross National Product (GNP), Gross Domestic Product (GDP), Net National Product (NNP), Net Domestic Product (NDP), Personal income, Disposal income, Inflation: meaning, types, causes, measures to control. **Case studies:** Economics network, Economic influences of COVID-19 pandemic, etc.		
UNIT 3	**Capital Cost Estimation and Economic Viability Study**	**5 HOURS**
Typical capital cost component, Cost Index (CI), Typical operating cost components, Classes of cost estimates, Cost estimation by applying factors, Detailed cost estimation method, Financial viability calculation (Payback period, Break-even point, Internal rate of return (IRR) and Net present value (NPV); numerical), Cash flow diagrams, Profitability criteria – Project evaluation and index. **Case studies:** Detailed spreadsheet of product cost, Determination of project cost, Net profit/loss, etc.		
UNIT 4	**Introduction to Banking & Money Market**	**5 HOURS**
Banking; meaning, types, functions, Commercial banks- Instruments in operation of an account, Central bank- Reserve Bank of India (RBI); its functions, Concepts and influences- Cash Reserve Ratio (CRR), Bank rate, Repo rate, Reverse repo rate, Statutory Liquidity Ratio (SLR), Introduction to money and capital market, Introduction to fiscal policy- meaning and tools. **Further readings:** Retail banking, Demonetization, Banking management, etc.		
UNIT 5	**Financial Literacy and Planning**	**6 HOURS**
Importance of financial planning, literacy and budgeting, Savings related products, Insurance related products, Pension, Retirement and estate planning, Borrowing related products, Basic and advanced investing, Government schemes for various savings and investment options, Tax savings options. **Case studies:** Shore Financial, Real life examples, Goal-Planning, etc. **Self studies:** Protect your family financial and retirement planning.		

REFERENCE BOOKS

1. N G. Mankiw: Economics: Principles of Economics, Cengage Learning (2003), ISBN: 1305585127.
2. J. Bradfield, Introduction to the Economics of Financial Markets, Oxford University Press, New York (2007), ISBN: 9780195310634.
3. F. Vega-Redondo, Economics and the theory of games, Cambridge University Press (2003), ISBN: 9780521775908.
4. C. S. Park, Fundamentals of Engineering Economics, Prentice Hall (2003), ISBN: 9780130307910.
5. D. E. O'Connor, The Basics of Economics, Greenwood Publisher (2004), ISBN: 9780313325205.
6. V. V. Mahajani, S. M. Mokashi, Chemical Project Economics, Macmillan India Ltd. (2005), ISBN: 1403928142.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2022 - 2023 (R 2019)
FOURTH YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Psychology
	COURSE CODE	HP406
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	-	-	50	25	NIL	NIL	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP405.CEO.1: To introduce the basic concept of Psychology.
HP405.CEO.2: To explain how learning and conditioning occurs in everyday life through both nature and nurture factors.
HP405.CEO.3: To know the main schools of thought and prime contributors to the theory of workplace motivation.
HP405.CEO.4: To develop insight into one's own and others behavior and underlying mental processes.
HP405.CEO.5: To develop Positive Psychology interventions to increase personal well-being.

COURSE OUTCOMES :

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

HP405.CO.1: Explain the basic concepts of Psychology.
HP405.CO.2: Apply the concept of conditioning in day to day life.
HP405.CO.3: Explain the main schools of thought and prime contributors to the theory of workplace motivation.
HP405.CO.4: Demonstrate effetely the personality traits in regular life.
HP405.CO.5: Employ Positive Psychology interventions to increase personal well-being.

THEORY

UNIT 1	Basics of Psychology	6 HOURS

Meaning, Nature, Objective of Psychology, Learning: meaning, classical conditioning, operant conditioning; Attention and Perception: definition, types of attention, determinants of attention.

UNIT 2	Social Interactions	6 HOURS

Conformity, Compliance, Obedience, Stereotypes, Attitudes: nature, characteristics, attitude formation and attitude change; Prejudice and Discrimination- characteristics and types of prejudice, development and maintenance of prejudice and discrimination, manifestation of prejudice, methods of reducing prejudice and discrimination.

UNIT 3	Need and Motivation	6 HOURS

Meaning; extrinsic and intrinsic motivation, Vroom's Expectancy Theory of Motivation, Herzberg's Motivators and Hygiene Factors, Maslow's Hierarchy of Needs.

UNIT 4	Self and Identity	6 HOURS

Meaning and Need, Erik Erikson's Stages of Psychosocial Development, Carl Rogers' Theory of Personality, Thomas Harris's Transactional Analysis, Johari Window, SWOT .

UNIT 5	Positive Psychology	4 HOURS

Introduction to Positive Psychology; From Learned Helplessness to Learned Optimism, 'Building the Skill of Gratitude, VIA Classification of Character Strengths and Virtues, Identifying and Using Your Signature Strengths, Resilience and Optimism, Cognitive Strategies to Increase Optimism and Resilient Thinking, Managing Anxiety and Increasing Positive Emotions .

TEXT BOOK

1. S. Cicearelli, J. Noland White, Psychology 4th Edition, Pearson Publisher, ISBN-13:9780208972241.
2. Robert A. Baron, Introduction to Psychology 3rd Edition, Pearson Education Company, ISBN-10:0536813906.
3. Stephen P. Robbins, Timothy. A. Judge, Organizational Behavior 15th Edition, Pearson Education Inc., ISBN-10:0-13-283487-1.
4. Robert. A. Baron, Nyla. R. Branscombe, Social Psychology 13th Edition, Pearson Education India, ISBN-13:978-9332569911.

REFERENCE BOOK

1. Kathleen M. Galotti, Cognitive Psychology 2nd Edition, SAGE Publications India Pvt. Ltd. ISBN:978-93-515-0277-7.
2. Robert S. Feldman, Understanding Psychology 10th Edition, McGraw Hill Education (India) ISBN:10: 1-25-900305-1.
3. Elliot Aronson, Timothy D. Wilson, Robin M. Akert, Social Psychology 8th Edition, Pearson Education, ISBN:9788131730898.
4. Calvin S. Hall, Gardner Lindzey, John B. Campbell, Theories of Personality 4th Edition Choudhary Press, Delhi, ISBN: 978-81-265-1092-4.

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

Savitribai Phule Pune University

Curriculum for

Bachelor of Technology in

Electronics & Telecommunication Engineering

(Choice Based Credit System)

2019-2023

MIT ACADEMY OF ENGINEERING School of Electrical Engineering

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Dean, School of
Electrical Engineering

Member Secretary
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CURRICULUM FRAMEWORK (REVISION 2019)

ELECTRONICS & TELECOMMUNICATION ENGINEERING

The Bachelor of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION : SEMESTER WISE									
S.N.	TYPE OF COURSE	NO. OF COURSES/SEMESTER							TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science (NSC)	2	2	1						**5**
2.	Engineering Science (ESC)	4	3		1					**8**
3.	Discipline Core (DC)			3	3	3	3	1	1	**14**
4.	Discipline Elective (DE)							1	1	**2**
5.	Open Elective (OE)					1	1	1		**3**
6.	Humanities and Social Science (HSS)		1		1	1	1		2	**6**
7.	Skill Development and Project (SDP)			3	2	2	2	3	1	**13**
TOTAL		**6**	**6**	**7**	**7**	**7**	**7**	**6**	**5**	**51**
AUDIT COURSE			**1**	**2**	**1**	**1**				**5**

CREDIT DISTRIBUTION : SEMESTER WISE											
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit											
S.N.	TYPE OF COURSE	NO. OF CREDITS/SEMESTER								TOTAL	%
		1	2	3	4	5	6	7	8		
1.	Natural Science (NSC)	8	8	4						**20**	**12.5**
2.	Engineering Science (ESC)	13	9		4					**26**	**16.25**
3.	Discipline Core (DC)			12	12	11	11	4	4	**54**	**33.75**
4.	Discipline Elective (DE)							3	3	**6**	**3.75**
5.	Open Elective (OE)					4	4	4		**12**	**7.5**
6.	Humanities and Social Science (HSS)	0	2		2	2	2		4	**12**	**7.5**
7.	Skill Development and Project (SDP)			5	3	4	4	10	4	**30**	**18.75**
TOTAL		**21**	**19**	**21**	**21**	**21**	**21**	**21**	**15**	**160**	**100**

CREDITS				
1Lecture Hour = 1 Credit, 2 Lab Hours = 1 Credit, 1 Tutorial Hour = 1 Credit				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	21/19	19/21	**40**
2.	Second Year	21	20	**41**
3.	Third Year	22	22	**44**
4.	Final Year	21	15	**36**
TOTAL				**161**

CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	29/27	28/30	**57**
2.	Second Year	31	29	**60**
3.	Third Year	30	32	**62**
4.	Final Year	25	20	**45**
TOTAL				**224**

ABBREVATIONS		
1.	MSE	Mid Semester Exam
2.	ESE	End Semester Exam
3.	IA	Internal Assessment
4.	T/P	Term Work / Practical
5.	DM	Demonstration
6.	L	Lecture
7.	P	Practical
8.	T	Tutorial
9.	Lab	Laboratory

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)												
INDUCTION PROGRAM: 3 WEEKS												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			12	16	1	60	220	160	390	60	890	21

SEMESTER: II (Version I)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC6	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
ESC7	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			11	16	1	60	160	120	390	60	790	19

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
ESC7	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
PE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	**Audit**	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III												
SUMMER INTERNSHIP												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC01	ET221	Electronic Devices and Circuits	3	2	-	35	35	30	50	0	150	4
DC02	ET222	Digital Systems and Applications	3	2	-	35	35	30	50	0	150	4
DC03	ET223	Signals & Systems	3	2	-	35	35	30	50	0	150	4
SDP1	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP2	ET230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP3	ET225	Skill Development Course-Data Structures & Algorithms	0	4	-	0	0	25	0	50	75	2
ESC9	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	18	0	140	140	170	200	150	800	21

SEMESTER: IV												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC8	IT221	Engineering Informatics	3	2	-	35	35	30	50	0	150	4
DC04	ET231	Electromagnetic Theory	3	0	-	35	35	30	0	0	100	3
DC05	ET232	Network Analysis Techniques	3	2	-	35	35	30	50	0	150	4
DC06	ET233	Microcontroller & Interfacing	3	2	-	35	35	30	50	0	150	4
SDP4	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP5	ET240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	16	0	140	140	170	150	150	750	20

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V												
SUMMER INTERNSHIP												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	ET341	Control Systems	3	2	-	35	35	30	50	0	150	4
DC08	ET342	Digital Signal Processing	3	2	-	35	35	30	50	0	150	4
DC09	ET343	Embedded Systems Design	3	2	-	35	35	30	50	0	150	4
OE01	ET35# / EX35#	Open Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP6	ET34#	Skill Development - Data Science	0	4	-	0	0	25	50	0	75	2
SDP7	ET350	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			**14**	**16**	**0**	**140**	**190**	**195**	**200**	**50**	**825**	**22**

SEMESTER: VI												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	ET361	Power Electronics	3	2	-	35	35	30	50	0	150	4
DC11	ET362	Principles of Communication Systems	3	2	-	35	35	30	50	0	150	4
DC12	ET363	Soft Computing	3	2	-	35	35	30	50	0	150	4
OE02	ET37# / EX37#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP8	ET36#	Skill Development course	0	4	-	0	0	25	50	0	75	2
SDP9	ET360	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability Skills	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**20**	**0**	**140**	**140**	**195**	**250**	**100**	**825**	**22**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: VII												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC13	ET461	HDL-Digital Circuit Design	3	2	-	35	35	30	50	0	150	4
DE01	ET48# / EX48#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	ET47# / EX47#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	ET46#	Skill Development Course	0	4	-	0	0	25	50	0	75	2
SDP11	ET470	Project Evaluation	0	8	-	0	0	50	0	100	150	4
SDP12	ET400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	ET462	Process Automation	3	2	-	35	35	30	50	0	150	4
DE01	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	-	-	0	50	25	0	0	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**185**	**50**	**75**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DE02	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
SDP14	ET467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP15	ET468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**70**	**70**	**60**	**50**	**300**	**550**	**15**

Natural Science (NSC) : 5 Courses and 20 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	AS105	Calculus and Differential Equations	4
2.	AS106	Engineering Physics	4
3.	CH101	Science of Nature	4
4.	AS107	Statistics and Integral Calculus	4
5.	AS204	Applied Mathematics	4

Engineering Science (ESC) : 8 Courses and 26 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	EX102	Electrical and Electronics Engineering	4
2.	CV102	Applied Mechanics	4
3.	ME104	Engineering Graphics	4
4.	CS101	Logic Development	3
5.	CS102	Application Programming	3
6.	ME221	Material Engineering	4
7.	CV203	Environmental Sciences	Audit
8.	IT221	Engineering Informatics	4

Humanities and Social Science (HSS) : 10 Courses			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	HP103	English for Engineers	2
	HP104	German	
	HP105	Japanese	
Audit	HP106	Indian Constitution	Audit
2.	HP202	Professional Skill	2
Audit	HP203	Liberal Learning	Audit
3.	CS361	Project Management	2
4.	HP305	Professional Skills	2
5.	HP405	Engineering Economics	2
6..	HP406	Psychology	2

Discipline Core (DC) : 14 Courses and 55 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ET221	Electronic Devices and Circuits	4
2.	ET222	Digital Systems and Applications	4
3.	ET223	Signals & Systems	4
4.	ET231	Electromagnetic Theory	3
5.	ET232	Network Analysis Techniques	4
6.	ET233	Microcontroller & Interfacing	4
7.	ET341	Control Systems	4
8.	ET342	Digital Signal Processing	4
9.	ET343	Embedded Systems Design	4
10.	ET361	Power Electronics	4
11.	ET362	Principles of Communication Systems	4
12.	ET363	Soft Computing	4
13.	ET461	HDL-Digital Circuit Design	4
14.	ET462	Process Automation	4

Discipline Elective (DE) : 2 Courses AND 6 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ET481	Deep Learning	3
	ET482	Digital Image Processing	
	ET483	Electric Vehicles	
	ET484	RTOS	
2.	ET491	ASIC Design	3
	ET492	Network Security	
	ET493	Signal Detection and Estimation Techniques	
	ET494	Biomedical Engineering	
	ETSWAYAM01	Discipline Elective Swayam MOOC Course	
	ETSWAYAM02	Discipline Elective Swayam MOOC Course	
	ETSWAYAM03	Discipline Elective Swayam MOOC Course	

Skill Development and Project (SDP) : 13 Courses and 30 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ET224	Digital Prototyping	2
2.	ET230	Minor Project Design	1
3.	ET225	Skill Development Course - Data Structures & Algorithms	2
4.	ET235	Rapid Prototyping	2
5	ET240	Minor Project Implementation	1
6. A	ET344	Skill Development course – Data Science	2
6. B	ET345	Skill Development - Infosys Springboard : Foundation in Data Science	2
7	ET350	Project Design	2
8. A	ET364	Skill Development Course - Networking	2
8. B	ET365	Skill Development Course – MATLAB Based System Modeling	2
9	ET360	Project Implementation	2
10. A	ET463	Skill Development Course – Embedded Linux	2
10. B	ET464	Skill Development Course – Cloud Computing	2
10. C	ET465	Skill Development Course – System Verilog	2
11	ET470	Project Evaluation	4
12	ET400	B Tech Summer Internship	4
12	ET480	Capstone Work	4
14	ET467	Semester Long Internship Design (Elective)	4
15	ET468	Semester Long Internship Implementation (Elective)	4
Audit	ET200	SY Summer Internship	Audit
Audit	ET300	TY Summer Internship	Audit

Open / Minor Elective School Wise : Electronics & Telecommunication Engineering				
Minor Track	**Semester**	**Course Code**	**Course Name**	**Course Credits**
IoT	V	ET352	IoT Architecture & Sensors	4
	VI	ET372	IoT Network & Protocols	4
	VII	ET472	Data Management & Analytics	4
Robotics	V	ME352	Robot fundamentals and Kinematics	4
	VI	EX371	Robot Dynamics and Control	4
	VII	EX471	AI in Robotics	4
Healthcare Technology	V	ET351	Fundamentals of Healthcare Technology	4
	VI	ET371	Healthcare Informatics	4
	VII	ET471	AI in Healthcare	4

Honors Elective Tracks : 4 Courses					
Sl. No.	**Minor Track**	**Semester**	**Course Code**	**Course Name**	**Course Credits**
1	Entrepreneurship	V	HP311	Foundation Course in Entrepreneurship	4
2		VI	HP312	Advanced Course in Entrepreneurship	4
3		VII	HP411	Startup and Incubation	4
4		VIII	HP412	Project: Startup/Venture Development	4
1	Product Design	V	PD301	Fundamental of Design Elements	4
2		VI	PD302	Packaging Design	4
3		VII	PD401	Ergonomics & Human - Product Interface	4
4		VIII	PD402	Product / Systems Design Project	4

List of Skill Development Courses				
Programme Name	**Skill Development Course 1**	**Skill Development Course 2**	**Skill Development Course 3**	**Skill Development Course 4**
Chemical	CFD	ASPEN ONE	Aspen EDR	Plant Design Piping
Civil	REVIT/ MS EXCEL	ETABS	Open Road Designer / WaterGEMs	CFD / QGIS
Computer and Information Technology	CPP / Core Java	RHA I / Web Technology	Adv. Java/ .Net Core/RHA II	AWS cloud services / Android App Development
Mechanical	Industrial Measurements & Instrumentation	Computer Aided Product Design	Mechanical Simulations	Object Oriented Programing with Python
Electronics Engineering and ENTC	Data Structures and Algorithms	OOP JAVA / C++	Networking Data Science	EMB Linux / Cloud Computing / System Verilog

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP) NPTEL / SWAYAM COURSES RECOMMENDED BY SEE					
Sl. No.	**Course Code**	**Course Name**	**Credits**	**Duration in Week**	**Offering Institute**
1	ETSW01	Deep Learning for Computer Vision	3	12	IIT Hyderabad
2	ETSW02	Natural Language Processing	3	12	IIT Kharagpur
3	ETSW03	Modern Digital communication Techniques	3	12	IIT Kharagpur
4	ETSW04	Digital Speech Processing	3	12	IIT Kharagpur
5	ETSW05	Introduction To Industry 4.0 And Industrial Internet of Things	3	12	IIT Kharagpur
6	ETSW06	Introduction To Cloud Computing	3	12	IIT KGP
7	ETSW07	Introduction To Biomedical Imaging System	3	12	IIT Madras
8	EXSW01	Introduction to Robotics	3	12	IIT Madras
9	ETSW08	Data Analytics with Python	3	12	IIT Roorkee
10	ETSW09	Artificial Intelligence: Knowledge Representation And Reasoning	3	12	IIT Madras

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP) NPTEL / SWAYAM COURSES RECOMMENDED BY SEE					
Sl. No.	**Course Code**	**Course Name**	**Credits**	**Duration in Week**	**Offering Institute**
11	ETSW10	Computer Networks and Internet Protocol	3	12	IIT Kharagpur
12	ETSW11	Programming in Java	3	12	IIT Kharagpur
13	ETSW12	Introduction To Internet of Things	3	12	IIT Kharagpur
14	ETSW13	Microprocessors and Interfacing	3	12	IIT Guwahati
15	ETSW14	Digital System Design	3	12	IIT Ropar
16	ETSW15	Computer Vision and Image Processing - Fundamentals and Applications	3	12	IIT Guwahati

Open Electives (OE): 03 Courses and 12 Credits							
Programme Name	**Minor Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Chemical Engineering	Process Engineering	CH351	Process Engineering	CH371	Process Modeling and Simulation	CH471	Process Intensification and Integration
	Piping Design and engineering	CH352	Piping Engineering	CH372	Piping Layout	CH472	Piping Design & Engineering
Civil Engineering	Construction Project Management	CV325	Construction Planning and Management	CV332	Operation Research	CV422	Financial Management
	Environmental Engineering	CV326	Solid Waste Management	CV333	Unit Operations for Liquid Waste / Effluent Treatment	CV423	Environmental Impact assessment and Climate Change
	Structural Engineering	CV327	Advanced mechanics of Solids	CV334	Advanced Structural Analysis	CV424	Advanced RC design
Computer Engineering	Data science	CS351	Descriptive Analytics	CS353	Predictive Analysis	CS461	Big Data Analytics
	Machine Learning	CS352	Artificial Intelligence	CS354	Machine Learning	CS462	Deep Learning
Electronics Engineering	Robotics	ME352	Robot fundamentals and Kinematics	EX371	Robot Dynamics and Control	EX471	AI in Robotics

Open Electives (OE): 03 Courses and 12 Credits							
Programe Name	**Minor Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Electronics & Telecommunication Engineering	Internet of Things	ET352	IoT Architecture and Sensors	ET372	IoT Network & Protocols	ET472	Data Management and Analytics
	Healthcare Technology	ET351	Fundamentals of Healthcare Technology	ET371	Healthcare Informatics	E471	AI in Healthcare
Information Technology	Computer Security	ET471	Cryptography and System Security	ET471	Cyber Security and Forensics	IT461	Ethical Hacking & Cyber Laws
Mechanical Engineering	Computer Aided Engineering	ME351	Finite Element Analysis	ME361	Computational Fluid Dynamics	ME491	Advanced Analysis
	Robotics and Automation	ME352	Fundamentals of Robotics	ME362	Kinematics & Dynamics of Robots	ME492	Electrical and Electronics Systems of Robots
	Industrial Engineering & Management	ME353	Industrial Engineering	ME363	Operations Management	ME493	Supply Chain Management
	Automobile Engineering	ME354	Automobile System Design	ME364	Vehicle Dynamics	ME494	Autotronics and e-Vehicles
Entrepreneurship Cell	Innovation, Entrepreneurship & Venture Development	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation

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2019-2023

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF ENGINEERING SCIENCES AND HUMANITIES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (Version I)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
PE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**11**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF ENGINEERING SCIENCES AND HUMANITIES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
PE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
SS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Calculus and Differential Equations
	COURSE CODE	AS105
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS105.CEO.1: Classify and solve first order and first degree ordinary differential equations.
AS105.CEO.2: Categorize and inspect the applications of first order differential equations.
AS105.CEO.3: Inspect and solve linear differential equations of second and higher order.
AS105.CEO.4: Apply the concepts of partial differentiation.
AS105.CEO.5: Demonstrate an understanding towards the applications of partial differentiation.
AS105.CEO.6: Identify and classify first order linear and nonlinear partial differential equations.

COURSE OUTCOMES :

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

AS105.CO.1: Solve first order and first degree ordinary differential equations.
AS105.CO.2: Analyze and solve real world phenomenon governed by first order ordinary differential equations.
AS105.CO.3: Apply concepts of linear differential equations of second and higher order to solve different systems in engineering world.
AS105.CO.4: Infer the problems based on properties of partial differentiation.
AS105.CO.5: Examine the applications of partial differentiation.
AS105.CO.6: Solve and examine the solution of partial differential equations by theoretical methods.

THEORY COURSE CONTENT		
UNIT 1	**Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors, Linear differential equations, Differential equations reducible to linear form.		
UNIT 2	**Applications of Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Orthogonal Trajectories, Newtons law of cooling, Growth & Decay, Electric circuits, Chemical applications- Mixing problems.		
UNIT 3	**Linear Differential Equation of Second Order and Higher Order**	**7 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters, Equations reducible to linear differential equations with constant coefficients: Cauchy and Legendres linear differential equation, Simultaneous linear differential equations, Applications.		
UNIT 4	**Partial Differentiation**	**7 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 5	**Applications of Partial Differentiation**	**6 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function using Jacobians, Functional dependence, Maxima and Minima of functions of two variables.		
UNIT 6	**Partial Differential Equations**	**7 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration, Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors.		
TUTORIAL NO.02		**1 HOURS**
Linear differential equations, Differential equations reducible to linear form.		
TUTORIAL NO.03		**1 HOURS**
Orthogonal Trajectories, Newtons law of cooling, Growth & Decay		
TUTORIAL NO.04		**1 HOURS**
Electric circuits, Chemical applications- Mixing problems.		

TUTORIAL NO.05		**1 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		
TUTORIAL NO.06		**1 HOURS**
Cauchy and Legendres linear differential equation, Simultaneous linear differential equations, Applications.		
TUTORIAL NO.07		**1 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables.		
TUTORIAL NO.08		**1 HOURS**
Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
TUTORIAL NO.09		**1 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function.		
TUTORIAL NO.10		**1 HOURS**
Functional dependence, Maxima and Minima of functions of two variables.		
TUTORIAL NO.11		**1 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration.		
TUTORIAL NO.12		**1 HOURS**
Linear differential equations of first order, Non-linear differential equations of first order, Charpits method.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1

REFERENCE BOOK

1. G.B. Thomas, Maurice D. Weir, Joel R. Hass, Thomas Calculus, 12 th edition, Pearson Education, 2002, ISBN: 9789332519091
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house , 2010, ISBN: 8173194203.
4. Peter V. ONeil, Advanced Engineering Mathematics, 7 th edition, Cenage Learning, 2012, ISBN: 13: 9788131503102.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Physics
	COURSE CODE	AS106
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS106.CEO.1: Make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.

AS106.CEO.2: Analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.

AS106.CEO.3: Apply the concept of behavior of light and understand the polarization phenomena.

AS106.CEO.4: Classify and understand the difference of classical mechanics and quantum mechanics.

AS106.CEO.5: Derive the basic laws governing the motion of quantum particles.

AS106.CEO.6: Apply the concept of quantum mechanics to different applications and supplement the reasoning.

COURSE OUTCOMES :

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

AS106.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.

AS106.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.

AS106.CO.3: Apply that light is transverse in nature.

AS106.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.

AS106.CO.5:	Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.
AS106.CO.6:	Apply the concepts of Quantum Physics in different branches of engineering.

THEORY COURSE CONTENT		
UNIT 1	**Measurement and importance of span (order) of physical quantities**	**6 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. 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 Electromagnetic wave**	**6 HOURS**
Polarization of electromagnetic wave, Production and analysis of polarized electromagnetic wave, Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.		
UNIT 4	**Quantum Mechanics-I**	**7 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, 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	**LASER and Optical Fiber**	**5 HOURS**
Stimulated Absorption, 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 (Ruby Laser), Application of LASER in optical fiber communication.		

PRACTICAL		
PRACTICAL NO.01	**Significant Figures**	**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02	**Interference of Light Waves**	**2 HOURS**
Calculate the refractive index of a given liquid using Newton Rings' Experiment.		
PRACTICAL NO.03	**Diffraction of Light Waves**	**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04	**Interference of Light Waves**	**2 HOURS**
Calculate the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05	**Phase and Phase Difference**	**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06	**Bohr's Atomic Model**	**2 HOURS**
Verification of Bohr's atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07	**Polarization**	**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08	**Stoke's Law**	**2 HOURS**
Calculation of wavelength of a laser beam using Lloyds mirror arrangement.		
PRACTICAL NO.09	**Division of Amplitude of Light Waves**	**2 HOURS**
Determination of Radius of Curvature of a given planoconvex lens using Newton's Rings apparatus.		
PRACTICAL NO.10	**Diffraction as a Particular Case of Interference**	**2 HOURS**
Calculation of wavelength of different colors present in a white light.		

TEXT BOOK

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

REFERENCE BOOK

1. Alan S Morris, Butterworth Heinemann, Measurement and Instrumentation Principles,3rd Edition, Butterworth-heinmann,2001, ISBN 0750650818
2. Ajoy Ghatak ,Optics, 6th Edition Tata Mc Graw Hill Publishing Company. Ltd., 2016, ISBN-10-9339220900

3. Jenkins & White, Fundamentals of Optics, 4th Edition,Mc Graw Hill Science,2016, ISBN-0070853460.

4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-,6th Edition, Mc Graw Hill Education (India) Pvt. Ltd., 2009, ISBN-10- 0070151555.

5. L I Schiff ,Quantum Mechanics,3rd Edition, Tata Mc Graw Hill Education (India) Pvt. Ltd.,ISBN-10- 0070856435, ISBN- 13- 9780070856431.

6. PAM Dirac,Principles of Quantum Mechanics,4th Edition, CBS publishers and Distributors,2004, ISBN-10- 0195671074, ISBN- 13- 978019567107

7. D J Griffiths, Introduction to Quantum Mechanics,2nd Edition,Cambridge India ,2016,ISBN-9781316646513.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Science of Nature
	COURSE CODE	CH101
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH101.CEO.1: Make students conversant with basic Biology regarding the life processes.
CH101.CEO.2: Study biology and engineering as biologically inspired technologies like designs in nature, bioenergetics, bioprocesses, biomaterials, biomechanics, bioinstrumentation.
CH101.CEO.3: Outline the technology involved in improving quality of water for its industrial use.
CH101.CEO.4: Illustrate the basic principles, instrumentation & applications of analytical techniques.
CH101.CEO.5: Get familiarize with the new concepts of Nano Science and Technology.
CH101.CEO.6: Define the basic aspects and applications of polymers, biomaterials & composites.

COURSE OUTCOMES :

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

CH101.CO.1: Explain natural biological processes and their technical aspects in view of optimizing Engineering solutions.
CH101.CO.2: Explain important biological inventions that changed the human life and their impact on engineering.
CH101.CO.3: Identify different methodologies for water quality analysis for industrial application.
CH101.CO.4: Apply basic concepts of analytical techniques for analysis of various chemical compounds.
CH101.CO.5: Apply the knowledge of nano science for betterment of the society.
CH101.CO.6: Categorize the different engineering materials and to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Science of Nature**	**7 HOURS**
The basics of science of nature. Exploring science in nature, specially symmetry, spiral, golden ratio, pattern and fractal. The phenomenon observed in nature viz., Physical, Chemical and Biological. Case studies and Applications. The diversity and commonality of cells, protein structure and function, basic molecular genetic mechanisms, bio membranes and cell architecture, transport of ions and small molecules across Cell membranes, cellular energetics, cell birth, lineage and death.		
UNIT 2	**Applications of Biology**	**6 HOURS**
Physiologic Systems - An Outline of Cardiovascular Structure and Function, Endocrine System, Nervous System, Vision System, Defense mechanisms in plants and animals. Introduction to Bio Sensors, Performance Factors, Factors Affecting the Performance of Sensors, Areas of Application. Biological Sensing Elements, Biological transducers. Discovery and Innovations in applications of Biology.		
UNIT 3	**The Role of Chemistry for Engineers**	**7 HOURS**
(A) **Introduction:** This section is an introduction to chemistry and chemical methods for engineering students. It describes how chemistry is used in engineering and how chemical principles aid engineers in the choice of materials for a particular application. Principles of Green chemistry are reviewed. The classification of separation methods used for mixtures. (B) **Periodic Table:** This section covers the names and symbols of the elements. The basic structure of the atom is reviewed including an explanation of isotopes. A discussion of the atomic structure describes electronic shells, subshells, their quantum numbers, orbital shapes, electron filling order, and the determination of the complete electron configuration of the elements. General description of the modern periodic table. Correlation between the valence electron configurations and the chemical properties of the elements. The periodic trends according to the position of the elements in the periodic table.		
UNIT 4	**Chemical Bonding - The Formation of Materials**	**8 HOURS**
(A) **The Formation of Materials:** This section covers chemical bonding and its effect on the chemical properties of the elements. Ionic bonding & covalent bonding are compared in terms of the octet rule and valence bond theory. Polar and non-polar covalent bonds. Molecular orbital theory is introduced to explain magnetism, bond order and hybridization helpful in Carbon chemistry. Intermolecular forces, including hydrogen bonding, are discussed with a special Case Study focusing on the special properties of water. (B) **Engineering Materials:** This section covers the Resources of Natural Materials, Introduction to Material Sciences viz. Polymers, Specialty polymers, Biomaterials, Nano materials and Smart materials with their examples and applications.		
UNIT 5	**Chemical Analysis and Instrumentation**	**6 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	Water Treatment and Effluent Management	5 HOURS
This chapter covers types of impurities in water & the conventional water treatment methods. Hardness, Alkalinity and Chloride content of water, its causes, types and volumetric methods for their determinations are reviewed along with numerical. Various water softening & treatment methods which includes filtration methods by Carbon adsorption, ion-exchange methods and membrane techniques are explained		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Distillation**	**2 HOURS**
Separation of two miscible liquids using distillation process		
PRACTICAL NO.02	**Polymerization**	**2 HOURS**
Synthesis by condensation polymerization reaction		
PRACTICAL NO.03	**Nano Particle**	**2 HOURS**
Synthesis of nano particles using reduction method		
PRACTICAL NO.04	**pH Metry**	**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.05	**Paper Chromatography**	**2 HOURS**
Separation of inorganic cations by paper chromatography		
PRACTICAL NO.06	**TLC**	**2 HOURS**
Separation of organic compounds by TLC		
PRACTICAL NO.07	**Conductometry**	**2 HOURS**
Conductometric titration for mixture of acids.		
PRACTICAL NO.08	**Colorimetry / Spectrophotometry**	**2 HOURS**
Absorption studies		
PRACTICAL NO.09	**Hardness of Water**	**2 HOURS**
Determination of Hardness of water by EDTA method		
PRACTICAL NO.10	**Alkalinity**	**2 HOURS**
Determination of alkalinity of water by neutralization titration		
PRACTICAL NO.11	**Adsorption Studies**	**2 HOURS**
Water purification by activated charcoal		

PRACTICAL NO.12	Physical Phenomenon	2 HOURS
Case Studies of Physical Phenomenon		
PRACTICAL NO.13	**Chemical Phenomenon**	**2 HOURS**
Case Studies of Chemical Phenomenon		
PRACTICAL NO.14	**Biological Phenomenon**	**2 HOURS**
Case Studies of Biological Phenomenon		

TEXT BOOK

1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai Publications company,2015, ISBN: 978-93-5216-000-6
2. S.M. Khopkar , Basic Concept of Analytical Chemistry,3rd edition, New Age International (P) Ltd., 2008, ISBN-10: 81-224-2092-3; ISBN-13: 978- 81-224-2092-0
3. Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, University Science Press (Laxmi Publications Pvt. Ltd).,2009, ISBN: 978-81-318-0579-4.
4. Lodish H, Berk A, Zipursky SL, et al., Molecular Cell Biology, 5th Ed., W. H. Freeman publications, 2000.
5. Palsson B.O. and Bhatia S.N., Tissue Engineering, Pearson, 2009,
6. Brian R. Eggins, "CHEMICAL SENSORS AND BIOSENSORS", JOHN WILEY & SONS, LTD, 2004.

REFERENCE BOOK

1. Jeffrey S. Gaffney and Nancy A. Marley General Chemistry for Engineers, Elsevier, 2018, ISBN: 978- 0-12-810425-5
2. Skoog, West, Holler, Crouch, Fundamentals of Analytical Chemistry, 8th Edition Cengage Learning, 2009, ISBN-13: 97881-315-0051-4, ISBN-10: 81-315-0051-9
3. Willard, Merritt, Dean and Settle, Instrumental Methods of analysis (Chemistry), 6th edition, Wadsworth Publishing Co., 1988, 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, ISBN: 0495668028.
5. O. G. Palanna, Engineering Chemistry, 1st Edition, Tata McGraw Hill education Pvt. Ltd., 2009, ISBN-13: 978-0-07-014610-5, ISBN (10): 0-07-014610-1.
6. Pradeep T., A Text Book of Nanoscience and Nanotechnology, Tata McGraw Hill, New Delhi, 2012.
7. Reece, J. B., Taylor, M. R., Simon, E. J. and Dickey, J. L. (2013) Campbell Biology: Concepts and Connections (Seventh Edition) (Pearson) ISBN 1292026359

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical and Electronics Engineering
	COURSE CODE	EX102
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX102.CEO.1: Impart knowledge of single-phase AC circuit and use of renewable energy systems.
EX102.CEO.2: Explain relations in three-phase systems and study power measurement methods.
EX102.CEO.3: Explain power supply components, electronic devices.
EX102.CEO.4: Summarize various Digital systems and application.
EX102.CEO.5: Build the knowledge of measuring system and signal conditioning circuits.
EX102.CEO.6: Get acquainted with different electrical machines.

COURSE OUTCOMES :

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

EX102.CO.1: Develop Renewable energy system (PV) & power factor improvement circuits.
EX102.CO.2: Distinguish behavior of three phase circuits & power measurement methods.
EX102.CO.3: Analyze analog circuits.
EX102.CO.4: Design Digital circuits.
EX102.CO.5: Demonstrate the use of Instrumentation system in various fields.
EX102.CO.6: Identify electrical machines used in typical domestic and industrial sector Application.

THEORY COURSE CONTENT		
UNIT 1	**AC Circuits**	**7 HOURS**
Energy Scenario, General structure of electrical power systems, A.C. fundamentals, RMS and average value, R-L,R-C,RLC series and parallel circuits, phasor diagram, power triangle and power factor, measures to improve power factor and its effects on Power system and consumer. Work, Power & Energy, costing of electricity, Application of Renewable Energy Systems, Design of PV system (offgrid), Battery selection and its series parallel connections		
UNIT 2	**Three Phase Circuit and Power Measurement**	**7 HOURS**
Three phase voltage generation and its waveform, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, three phase 4 wire system, Difference between neutral and ground conductors, Safety measures in electrical system, types of wiring, Active and Reactive Power measurement in single and three phase balanced system.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply, Clipper, Clamper. BJT - Structure and operation, CE, CB, CC configurations, biasing methods, DC Load Line, Transistor as a switch and Amplifier. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Logic gates, Boolean algebra, KMap, SOP representation. Combinational circuit Design: Adder, Subtractor, MUX, DMUX, Comparator, Code converter Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor and Microcontroller based systems.		
UNIT 5	**Measuring System**	**7 HOURS**
Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, Level, 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, VA Rating, Efficiency and Voltage regulation, OC/SC Test on Transformer. Construction, principle of operation and types of DC motor, Speed Control, characteristics equation, PMDC, BLDC, Universal motor, Single phase Induction Motor, Stepper motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICAL:		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test both theorems.		
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 variations in X_L and X_C (3 cases) To justify the lagging and Leading nature for the three cases. To find power losses in total R, L and C and verify with total power consumed.		
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 between Line and Phase Quantities. To connect Bulb load in Delta connection and verify the relation between Line and Phase Quantities.		
PRACTICAL NO.05	**Power Measurement in Three Phase Balanced Circuit and Single Phase Circuit.**	**2 HOURS**
To measure active and reactive power by Two wattmeter method in three phase circuit. To measure reactive power by One wattmeter method in three phase circuit.		
PRACTICAL NO.06	**Open Circuit & Short Circuit Test on a Single Phase Transformer**	**2 HOURS**
To find iron losses and no load circuit parameters To find full load copper losses and Equivalent circuit parameters To determine efficiency and regulation of transformer at various different loading conditions.		
PRACTICAL NO.07	**Speed Control of D.C. Shunt Motor**	**2 HOURS**
To vary field current and measure speed To vary armature voltage and measure speed Draw conclusion from both the methods through graphs.		
PRACTICAL NO.08	**Step Angle Measurement of Stepper Motor.**	**2 HOURS**
To become familiar with the properties of Stepper Motor. To calculate the step angle of motor.		
PRACTICAL NO.09	**Electronics Components and Measuring Instruments**	**2 HOURS**
To study Passive components - Resistors, Capacitors & Inductor. To test semi-conducting components - Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		

PRACTICAL NO.10	D.C. Regulated Power Supply	2 HOURS
To design 12V/ 9V/ 5V 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 OP-AMP as summing and difference amplifier. To verify the application of OP-AMP 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 (Min.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.		

In addition to total 8 Experiments, two case study reports must be attached with Laboratory Course Record.

TEXT BOOK

1. Edward Hughes, Electrical and Electronic Technology 10th Edition, Pearson India, 2011, ISBN-13: 978-8131733660
2. Thomas L. Floyd, Electronics Devices & Circuits, 5th Edition, Pearson Education India, 1998, ISBN-13: 978-0136491385.
3. A. Anand Kumar, Fundamentals of Digital Circuits, 4th Edition, Prentice Hall of India, 2016, ISBN-13: 978-8120352681

REFERENCE BOOK

1. V. N. Mittle and Arvind Mittal, Basic Electrical Engineering, 2nd Edition, McGraw Hill Education, 2005, ISBN-13: 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, 4th Edition, McGraw Hill, 2010, 978-0070699670.
3. Paul Horowitz, Winfield Hill, The Art of Electronics, 3rd Edition, Cambridge University press, ISBN-13: 978-0521809269.
4. Thomas E. Kissell, Industrial Electronics, 3rd Edition, Prentice Hall of India, 2003, ISBN-13:9788120322608
5. B. H. Khan, Non-Conventional Energy Resources, 2nd Edition, Tata McGraw Hill, 2009, ISBN-13: 978-0070142763.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV102
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV102.CEO.1: Classify force systems and explain the conditions of equilibrium.
CV102.CEO.2: Illustrate laws of friction.
CV102.CEO.3: Demonstrate the concepts of Centroid and moment of inertia.
CV102.CEO.4: Describe kinematic parameters of motion.
CV102.CEO.5: Make use of laws of motion for kinetics.
CV102.CEO.6: Explain energy and momentum methods.

COURSE OUTCOMES:

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

CV102.CO.1: Determine the resultant and support reactions.
CV102.CO.2: Equilibrium Analysis of bodies involving frictional forces.
CV102.CO.3: Evaluate Centroid of bodies and moment of inertia of sections.
CV102.CO.4: Identify the type of motion and its kinematic parameters.
CV102.CO.5: Analyze the motion under action of constant and variable forces.
CV102.CO.6: Apply energy and momentum methods for kinetics problems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Statics**	**8 HOURS**
Basic concepts in mechanics, Fundamental principles/laws of mechanics, Force, moment of a force and couple, Resolution and composition of forces, Resultant of coplanar forces, Free body diagrams, Equilibrium of coplanar forces, Applications to simple beams and cables. **Further Reading:** *Self study-Application to jib crane.		
UNIT 2	**Friction**	**6 HOURS**
Introduction to friction, Types of friction, Laws of friction- coefficient of friction, Theory of friction- angle of friction, angle of repose, cone of friction, Engineering applications - Block and wedge friction, ladder friction, Belt Friction. **Further Reading:** *Self study-Screw friction.		
UNIT 3	**Properties of Surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity. Centroid of standard objects, Centroid of composite 1D and 2D objects, Concept of area moment of inertia, Radius of gyration and its significance, Parallel and perpendicular axis theorems, Moment of inertia of standard and composite 2D figures. **Further Reading:** *Self study- Mass moment of Inertia.		
UNIT 4	**Kinematics of Planar Motions**	**7 HOURS**
Basic concepts in kinematics, Rectilinear motion with uniform and variable acceleration, Motion under Gravity, Motion curves, Curvilinear Motion in Rectangular and path coordinates, Projectile motion. **Further Reading:** *Self study- Curvilinear motion in polar coordinates.		
UNIT 5	**Kinetics- Force and Acceleration**	**6 HOURS**
Newton's second laws of Motion, Free body diagram equation- Rectilinear motion, Concept of dynamic equilibrium. Motion of connected bodies, Equations of motion in rectangular and path coordinates for curvilinear motion. **Further Reading:** *Self study- Free Vibrations.		
UNIT 6	**Kinetics Energy and Momentum**	**6 HOURS**
Concepts of Work, power and energy, Work done by gravity, spring and frictional forces, Principle of work and Energy, Conservation of mechanical energy, Concept of Impulse and linear momentum, Impulse-momentum theorem, Conservation of linear momentum, Collisions- Types of collisions, Coefficient of restitution, Applications to vehicles and sports. **Further Reading:** *Self study- Space mechanics.		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Basic Principles/Laws**	**2 HOURS**
To verify basic laws of mechanics.		
ACTIVITY NO.01	**Exploring Scientific Calculator**	**2 HOURS**
To complete the given task of calculations in a stipulated time with desired accuracy using a scientific calculator.		
PRACTICAL NO.02	**Friction**	**2 HOURS**
To determine coefficient of friction for a given surfaces		
ACTIVITY NO.02	**Presentations**	**2 HOURS**
To prepare and deliver a PPT presentation on engineering application of friction.		
PRACTICAL NO.03	**Centroid**	**2 HOURS**
To determine Centroid of a given 1D object		
ACTIVITY NO.03	**Act of Balancing**	**2 HOURS**
To cut a 2D figure precisely and locate a balancing point on it.		
PRACTICAL NO.04	**Motions**	**2 HOURS**
To study and analyze a given set of motion.		
ACTIVITY NO.04	**Graphing the Motion**	**2 HOURS**
To draw x-t, v-t, a-t graphs for given description of motion in stipulated time.		
PROJECT		**10 HOURS**
To fabricate a model of simple structure or mechanism from low cost materials.		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", 1st edition ,Tata McGraw-Hill Education, 2009, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics: Statics and Dynamics ",12th edition, Pearson Education, 2010, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II",10th edition, Tata Mc-Graw-Hill Education, 2012, ISBN: 978-0077402327
2. Ferdinand Singer, "Engineering Mechanics Statics and Dynamics", 3rd edition Harper and Row, 1994 ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics",1st edition, Cengage Learning, 2009, ISBN:8131509907

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME104
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	NIL	60	40	60	40	200

PRE-REQUISITE : NIL

COURSE OBJECTIVES:

ME104.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME104.CEO.2: To develop & apply visualization skills to simple Objects.
ME104.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES:

The students after completion of the course will be able,

ME104.CO.1: Develop and/or comprehend a simple engineering drawing in both First and Third angle orthographic projections.
ME104.CO.2: Interpret engineering drawings.
ME104.CO.3: Apply visualization skills to development of surfaces.
ME104.CO.4: Analyze engineering drawings.
ME104.CO.5: Decide annotations for two dimensional drawings.
ME104.CO.6: Create manual drawing & CAD data using SP46 standards.

THEORY COURSE CONTENT		
UNIT 1	**Visual Thinking and Solid Geometry**	**12 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections and Sectional Views**	**4 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views, Missing views.		
UNIT 3	**Isometric Projections**	**4 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	**Development of Surfaces**	**2 HOURS**
Development of lateral surfaces of simple and sectioned solids Prisms, pyramids cylinders and cones.		
UNIT 5	**Auxiliary Projections**	**2 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View		
UNIT 6	**Freehand Sketching and 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.		

PRACTICAL: **Each Assignment carries 2 questions to be draws on A2 Size Drawing Sheet**		
ASSIGNMENT NO.1	Projection of Lines	**4 HOURS**
Two Questions on line inclined to both planes		
ASSIGNMENT NO.2	Projection of Planes	**2 HOURS**
Two Questions on plane inclined to both planes		
ASSIGNMENT NO.3	Projection of Solids	**2 HOURS**
Two Questions on solid inclined to both planes		
ASSIGNMENT NO.4	Orthographic Projections	**4 HOURS**
Two Questions on Orthographic Projection of Simple Mechanical Element		
ASSIGNMENT NO.5	Development of surface	**4 HOURS**
Two Questions on Development of regular Solids		
ASSIGNMENT NO.6	Isometric View	**6 HOURS**
Two Questions on Isometric view of Mechanical Element		

ASSIGNMENT NO.7	Auxiliary View	**4 HOURS**
Two Questions on auxiliary view of Mechanical Element		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 2D CAD software package**		
PRACTICAL NO. 1	Absolute & incremental drafting	**4 HOURS**
Drawing of two sketches using absolute and incremental commands		
PRACTICAL NO. 2	Draw commands, Modify commands, Array, fillet, offset commands	**6 HOURS**
Drawing of four sketches using draw & modify commands		
PRACTICAL NO. 3	Project Drafting	**2 HOURS**
Drafting of a small project using all drafting standards		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 3D CAD software package**		
PRACTICAL NO. 4	Sketching, Solid Modeling, Assembly	**12 HOURS**
Modeling of five Mechanical models using 3D Software package		
PRACTICAL NO. 5	Project Modeling	**4 HOURS**
Modeling of small Mechanical Project of Minimum three components		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to AutoCAD, 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 TextBook of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	English for Engineers
	COURSE CODE	HP103
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	CA	
NIL	4	NIL	NIL	NIL	NIL	60	40	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP103.CEO.1: Introduce a variety of English texts to the students.
HP103.CEO.2: Teach basic English grammar.
HP103.CEO.3: Enrich the vocabulary of the students with AWL and NAWL
HP103.CEO.4: Guide the students to write in English coherently and formally.
HP103.CEO.5: Improve the students overall communicative competence in English through activities like group discussions and debates.
HP103.CEO.6: 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,

HP103.CO.1: Interpret texts written in English.
HP103.CO.2: Apply English grammar rules correctly.
HP103.CO.3: Choose and employ appropriate words from AWL and NAWL in communication.
HP103.CO.4: Develop sentence and text in English coherently and formally.
HP103.CO.5: Demonstrate overall improvement in communication skills.
HP103.CO.6: Analyze and infer from written, audio and video texts.

PRACTICAL:		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**4 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Parts of Speech**	**3 HOURS**
Use of parts of speech in a sentence composition		
PRACTICAL NO.03	**Tenses**	**5 HOURS**
Use of tenses in day to day communication and academic writing		
PRACTICAL NO.04	**Vocabulary Enrichment and Common Errors**	**8 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills and Common errors in grammar while speaking and writing English		
PRACTICAL NO.05	**Letter and Email Writing**	**4 HOURS**
How to write an email, characteristics and essentials of a good email, formal letter writing and layout of business letters		
PRACTICAL NO.06	**Essay Writing**	**4 HOURS**
What is an essay? Tips to write a good essay, Types of essays		
PRACTICAL NO.07	**Report Writing and Summarizing**	**4 HOURS**
Types of reports, format and writing a report, what is summarizing? Rules of summarizing		
PRACTICAL NO.08	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos and Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.09	**Presentation Skills**	**4 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.10	**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.11	**Debate**	**4 HOURS**
Concept, Dos and Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.12	**Listening Skills**	**4 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		

PRACTICAL NO.13	Reading Comprehension	4 HOURS
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Ashok Thorat and Munira Lokhandwala: Enriching Oral and Written Communication in English, ISBN 9788125037446
2. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
3. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
4. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
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 (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	German Language
	COURSE CODE	HP104
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP104.CEO.1: To introduce German as a foreign language and enhance knowledge, communication and intellectual capabilities which helps to improve cognitive skills and creativity vital for problem solving and innovation.

HP104.CEO.2: To develop an awareness of German culture along with providing better career opportunities later in life.

COURSE OUTCOMES:

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

HP104.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics

HP104.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively

HP104.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Germany

HP104.CO.4: Enhance their knowledge of German culture and society

THEORY COURSE CONTENT		
UNIT 1		**2 HOURS**
Introduction- Alphabets, Numbers 0-20, Self Introduction and Introducing third person. Grammar- wh Questions(w-frage), pronouns.		
UNIT 2		**4 HOURS**
Greetings, Speaking about different Languages and Countries, numbers above 20, seasons Grammar- Yes or no Questions, Sentence Construction verbs and conjugations of regular verbs		
UNIT 3		**4 HOURS**
Speaking about hobbies and interests, different professions, weekdays, months Grammar- Nouns, Articles, conjugations of irregular verbs		
UNIT 4		**6 HOURS**
Vocabulary related to food, different places in the city, transport Grammar- Imperative sentence		
UNIT 5		**4 HOURS**
Relations, understanding clock timings Grammar- Cases, Nominative case, nominative verbs pronouns and articles		
UNIT 6		**6 HOURS**
Body parts, directions, asking for the address email address and telephone number Grammar- Accusative case, accusative verbs pronouns and articles		

TEXT BOOK

1. Netzwerk Deutsch als Fremdsprache- Kursbuch A1(Stefanie Dengler), Goyal Publications.

REFERENCE BOOK

1. https://www.klett-sprachen.de , https://www.duolingo.com/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Japanese Language
	COURSE CODE	HP105
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP105.CEO.1: To perform daily basic activities including below mentioned.
HP105.CEO.2: Self Introduction, Greetings in Japanese.
HP105.CEO.3: Introduction to Japanese scripts- Hiragana, Katakana, Kanji.
HP105.CEO.4: Develop basic vocabulary throughgroup activities, videos.
HP105.CEO.5: Develop an understanding business etiquette.
HP105.CEO.6: Introduce topics related daily conversation, listening skills, cultural awareness.

COURSE OUTCOMES:

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

HP105.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics.
HP105.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively.
HP105.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Japan.
HP105.CO.4: Enhance their knowledge of Japanese culture and society.

THEORY COURSE CONTENT		
UNIT 1		**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 2	**Hiragana, vocabulary and listening.**	**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 3		**4 HOURS**
Hiragana and Katakana, and Japanese games.		
UNIT 4		**4 HOURS**
Family Members understanding in Japanese. and Vocab.		
UNIT 5		**5 HOURS**
Japanese cultures study, and business etiquette.		
UNIT 6		**5 HOURS**
Daily conversation and cultural study.		

TEXT BOOK

1. Minna Na Nihongo, Goyal Publications.

REFERENCE BOOK

1. Nil

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Logic Development-C Programming
	COURSE CODE	CS101
	COURSE CREDITS	3
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME & MARKS**						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS101.CEO.1: Develop programming skills using the fundamentals and basics of C Language.

CS101.CEO.2: Enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

CS101.CEO.3: Teach the issues in file organization and the usage of file systems.

COURSE OUTCOMES:

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

CS101.CO.1: List the various data types, control structures and looping structures supported by C language.

CS101.CO.2: Differentiate between various data types supported by C language.

CS101.CO.3: Implement the solutions for various algorithms in C language.

CS101.CO.4: Analyze various parameter passing methods to functions in C language.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of C Language**	**2 HOURS**
Overview of C, Character set, Constants, Variables and Keywords, Data types (Primitive and Derived), Operators (arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators) and Expressions (Type Conversion, precedence and order of evaluation), C Storage Classes, Managing Input and Output Operations, A structure of C Program, C Preprocessor, C Macro, Compilation, Execution, Debugging and Testing of C program.		
UNIT 2	**Control Structures**	**2 HOURS**
Decision Control Structure-If statement, if-else statement, Nested if-else statement, Ternary operator, Case Control structure- Switch Case Statements, GOTO statement, Loop Control Structure- while statement, do while statement, for statement, odd loop, nesting of loops, break and continue statement, finite & infinite Loop.		
UNIT 3	**Arrays and Functions**	**3 HOURS**
Arrays: Array Declaration and Initialization, Bounds Checking, Array arithmetic, One dimensional arrays and multi-dimensional Arrays, Strings - Standard Library String Functions, Array of strings. **Functions:** Function definition and prototype, Scope Rule of Functions, Calling Conventions, Passing Values between Functions - Call by Values and Call by References, Recursive functions, Passing Array Elements to a Function.		
UNIT 4	**Pointers**	**3 HOURS**
Pointers and Addresses, Pointer Notation & Arithmetic, Pointer to array, Array of pointers, Pointer to a function, Passing pointers as function arguments, Strings and Pointers, Structures and Pointers.		
UNIT 5	**User Defined Data Types**	**1 HOURS**
Structures & Union: Declaration of Structure and Union, Difference between Structure and Union, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures.		
UNIT 6	**File Handling**	**2 HOURS**
File Operations-open, read, write, append, delete, Error Handling, File Opening Modes Using command line argument(argc and argv), line input and output operations, Miscellaneous Functions.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
• Write a program in C to display "Hello World" • Write a menu driven program in C to display addition, subtraction, multiplication, division of two numbers		
PRACTICAL NO.02		**2 HOURS**
• Write a program in C to display the quotient and remainder after the division of two numbers • Write a menu driven program in C to demonstrate the use of left shift, right shift, and, or, xor operators		
PRACTICAL NO.03		**2 HOURS**
• Write a menu driven program in C to demonstrate the use of mathematical functions supported by math.h library • Write a program in C to display the grade obtained by the student in a course. The input will be the marks obtained and the output will be the grade obtained		
PRACTICAL NO.04		**2 HOURS**
• Write a program in C to display first N numbers on the screen using while, do while and for loop • Write a program in C to display first N number in reverse order on the screen using while, do while and for loop		
PRACTICAL NO.05		**2 HOURS**
Write a program in C display various patterns using *		
PRACTICAL NO.06		**2 HOURS**
• Write a program in C to display the addition of N numbers stored in an array • Write a program in C to copy the array of N numbers into another array in reverse order • Write a program in C to display the minimum and maximum element in an array		
PRACTICAL NO.07		**2 HOURS**
• Write a program in C to display the prime numbers within a given range • Write a program in C to display the fibonacci series within a given range		
PRACTICAL NO.08		**2 HOURS**
Write a menu driven program in C to perform addition, subtraction, division and transpose of matrices		

PRACTICAL NO.09		**2 HOURS**
• Write a program in C to convert every lowercase letter to uppercase letter and vice versa in a given string • Write a program in C to implement the string functions using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, sub string		
PRACTICAL NO.10		**2 HOURS**
• Write a program in C using functions to display addition, subtraction, multiplication, division of two numbers • Write a program in C using functions to display the minimum and maximum element in an array		
PRACTICAL NO.11		**2 HOURS**
Write a program in C using functions to implement the string functions without using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, string palindrome		
PRACTICAL NO.12		**2 HOURS**
• Write a program in C using functions and pointers to display addition, subtraction, multiplication, division of two numbers • Write a program in C using function and pointers to swap two numbers		
PRACTICAL NO.13		**2 HOURS**
Write a program in C using function and pointers to demonstrate the use of pointer arithmetic by taking input in an array		
PRACTICAL NO.14		**2 HOURS**
• Write a program in C using recursion to display the factorial of a number • Write a program in C using recursion to display fibonacci series within a given range		
PRACTICAL NO.15		**2 HOURS**
• Write a program in C to accept the information of single student and store it in structure and display the same • Write a program in C to accept the information of students and store it in array of structure and display the same		

PRACTICAL NO.16		2 HOURS
• Write a program in C to display Semester Grade Point Average (SGPA). Input will be stored in array of structure • Write a program in C to demonstrate the concept of union		
PRACTICAL NO.17		**2 HOURS**
Write a program in C to read a single line from the file using functions like fgetc, fgets, fscanf, and fread		
PRACTICAL NO.18		**2 HOURS**
Write a program in C to write a single string in a file using functions like fputc, fputs, fprintf and fwrite		
PRACTICAL NO.19		**2 HOURS**
Write a program in C to display contents of whole file on the screen		
PRACTICAL NO.20		**2 HOURS**
Write a program in C to read and write the record stored in structure from file		
PRACTICAL NO.21		**2 HOURS**
Write a program in C to implement student information system using array of structures		
PRACTICAL NO.22		**2 HOURS**
Write a program in C to implement Linear Search and Binary Search		
PRACTICAL NO.23		**2 HOURS**
Write a program in C to check whether a given matrix contains a saddle point		
PRACTICAL NO.24		**2 HOURS**
Write a program in C to implement union and intersection of two sets		

TEXT BOOK

1. E. Balguruswamy , "Programming in ANSI C" , Tata Mc-Graw Hill
2. Yashvant Kanitkar, "Let Us C" BPB Publication
3. "Programming With C", Schaum Series

REFERENCE BOOK

1. Kernighan and Ritchie , "The 'C' programming language" , Prentice Hall
2. V. Rajaraman , "Computer Programming in 'C' " , Prentice Hall
3. R.G. Dromey , "How to solve it by Computer", Pearson Education

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques
	COURSE CODE	ME105
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	60	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME105.CEO.1: Introduce different tools and study various measurement techniques.
ME105.CEO.2: Study different parts of the system along with its functions and applications.
ME105.CEO.3: List various tools used for the said application.
ME105.CEO.4: Identify the function of various parts of the system.
ME105.CEO.5: Impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME105.CEO.6: Apply the knowledge to find the solution for basic engineering problems.

COURSE OUTCOMES :

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

ME105.CO.1: Recall the tools required for the measurements.
ME105.CO.2: Summarize the application of various engineering tools used.
ME105.CO.3: Identify the right tools for selected purpose.
ME105.CO.4: Inspect various parts of the system.
ME105.CO.5: Justify the most appropriate technique which can be compatible with the existing environment.
ME105.CO.6: Develop the system which will give appropriate solution to the identified problem.

PRACTICAL:		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Any 6 Practicals from the following list)**	**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
16. Creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Any 06 practicals from the following list)**	**12 HOURS**

1. Study of basic electronics component and Switches.
2. PCB and Soldering Tools and Technique.
3. Relay and application.
4. Domestic wiring for Extension Board and Inverter.*
5. Load test of D.C. series motor.*
6. Brake test on D.C. Shunt motor.*
7. Load test on 3-phase induction motor.
8. V-I Characteristics of Thyristor & measurement of holding & latching current
9. V-I Characteristics of MOSFET.
10. V-I Characteristics of IGBT.
11. V-I Characteristics of TRIAC.
12. Solar cell and application (Generation of Energy).
13. Speed control of DC Motor (Toy Motor)
14. Actuators and application (Electrical and Mechanical).

15 Study of Virtual Instrumentation.

16 Open IT : Optical Mouse, Cathode Ray Oscilloscope, Study of Power Supply PA System, CD Player, TV, Microwave oven (Any Two)

PRACTICAL NO.03	**Mechanical Engineering (Any 6 practicals from the following list)**	**12 HOURS**

1. Linear and angular measurements.
2. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
3. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
4. Types of mechanism and making any one mechanism containing four links using cardboard.
5. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
6. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
7. Measurement of Relative humidity of air in the lab.
8. Measurement of hardness of Steel and Aluminum.
9. Measurement of stiffness of helical spring (compression or tension)
10. Servicing of 2 wheeler and 4 wheeler system.
11. Study of various components of automobile system.
12. Open IT: Mixer or kitchen machine, Refrigerator, Boiler and accessories thermal power plant (Mini), Two stroke and four stroke engine, Introduction to threaded fasteners and joints using threaded fasteners. Bearing and its lubrication, Bicycle /Two wheeler/ 4 wheeler(Any Two)

PRACTICAL NO.04	**Chemical Engineering (Any 3 practicals from the following)**	**6 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. Plate type heat exchanger
9. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Any 3 Practicals from the following)	6 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 parcel of land 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 life saving do s and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

Assessment	Common to all branches	4 HOURS

TEXT BOOK

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

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME106
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	NIL	60	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME106.CEO.1: Disseminate the philosophy of design thinking.
ME106.CEO.2: Impart the information regarding User centric approach.
ME106.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME106.CEO.4: Enhance thinking in order to inspect diverse solutions.
ME106.CEO.5: Sensitize about the feasibility, desirability and viability criterias for selection of Appropriate solution.
ME106.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES:

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

ME106.CO.1: Recall fundamental principles of design thinking.
ME106.CO.2: Explain all the dimensions of user and his needs using design thinking approach.
ME106.CO.3: Outline user centric problem by using information gathering techniques.
ME106.CO.4: Compare multiple solutions through ideation process.
ME106.CO.5: Interpret most appropriate solution for defined user centric problem.
ME106.CO.6: Develop the most optimum solution.

PRACTICAL:		
PRACTICAL NO.01	**Human Centred Design**	**2 HOURS**
Introduction to Human Centred Design, Human Centred Design Phases, Human Centred Design Process, Human Centred Design case study		
PRACTICAL NO.02	**Research Methodology (Problem Definition, Information Gathering)**	**4 HOURS**
Design thinking Models & Methodology - General Problem Statement, Random check list, mind mapping Categorization of random check list. Brainstorming of problem areas, Research Methodology - Information gathering - Primary, Secondary Sources, data presentation, Preparation of survey forms, Survey Analysis, Drawing Inference.		
PRACTICAL NO.03	**Ideation**	**4 HOURS**
SWOT analysis, Vein Diagram (User Desirability, Feasibility, Viability check) Drawing inferences, Translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of simple form of products (Isometric views, layout, circuit diagram, Ideation sketches), Ergonomic and aesthetic consideration in design.		
PRACTICAL NO.04	**Prototyping**	**2 HOURS**
Concept validation, evaluation and detailing, Different methods of Prototyping, selection of right method of prototyping.		
PROJECT		**40 HOURS**
PRACTICAL NO.05	**Phase 1 : General Problem Statement and problem background**	**4 HOURS**
PRACTICAL NO.06	**Phase 2 : Research methodology**	**4 HOURS**
PRACTICAL NO.07	**Phase 3 : Product Specification**	**4 HOURS**
PRACTICAL NO.08	**Phase 4 : Ideation**	**6 HOURS**
PRACTICAL NO.09	**Phase 5 : Concept Evaluation, Validation and Concept detailing**	**8 HOURS**
PRACTICAL NO.10	**Phase 6 : Prototyping**	**10 HOURS**
PRACTICAL NO.11	**Phase 7 : Documentation**	**4 HOURS**

TEXT BOOK

1. Emrah Yayici, Design Thinking Methodology Book, Amazon Digital Services LLC - Kdp Print Us, 2016, ISBN: 6058603757, 9786058603752
2. Idris Mootee, Design Thinking for Strategic Innovation, Wiley (2017), ISBN-13: 978-8126572694
3. Thomas Lockwood, Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Allworth Press; Original edition (10 November 2009), ISBN-13: 978-1581156683

REFERENCE BOOK

1. Harper Perennial, Lateral Thinking: Creativity Step by Step; Reissue edition, 2015 (Perennial Library).
2. John Chris Jones, Design Methods, John Wiley & Sons, David Fulton Publishers, London, 1980, ISBN 0-471-28496-3.
3. Nigel Cross, Design Thinking: Understanding How Designers Think and Work, Berg Publishers (May 15, 2011), ISBN-13: 978-1847886361
4. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Published September 29th 2009 by Harper Business, ISBN 0061766089

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Statistics and Integral Calculus
	COURSE CODE	AS107
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS107.CEO.1: Study different statistical methods for solving problems.
AS107.CEO.2: Analyze different probability distribution functions.
AS107.CEO.3: Extend the basic concepts of integration for evaluation of complex integration problems.
AS107.CEO.4: Categorize and use equation of curves to trace the given curve.
AS107.CEO.5: Demonstrate an understanding towards evaluating multiple integrals.
AS107.CEO.6: Relate and examine the applications of multiple integrals.

COURSE OUTCOMES:

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

AS107.CO.1: Assess statistical problems.
AS107.CO.2: Solve the probability distribution problems.
AS107.CO.3: Evaluate complex integrals.
AS107.CO.4: Sketch curves by analyzing the given equation of curves.
AS107.CO.5: Evaluate the multiple integrals.
AS107.CO.6: Apply the knowledge of multiple integrals to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Statistics**	**6 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression		
UNIT 2	**Probability**	**6 HOURS**
Probability, probability density function, probability distribution: Binomial, Poisson, Normal		
UNIT 3	**Integral Calculus**	**7 HOURS**
Reduction formulae, Gamma function, Beta function, Differentiation under integral sign.		
UNIT 4	**Curve Tracing and Rectification**	**7 HOURS**
Tracing of Curves: Cartesian curves, Parametric curves, Polar curves. Rectification: Rectification of Cartesian, Parametric and Polar curves		
UNIT 5	**Multiple Integrals**	**7 HOURS**
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 6	**Applications of Multiple Integrals**	**6 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		

TUTORIAL: Problem solving session		
TUTORIAL NO.01		**1 HOURS**
Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.02		**1 HOURS**
Moments, skewness and kurtosis		
TUTORIAL NO.03		**1 HOURS**
Correlation and regression		
TUTORIAL NO.04		**1 HOURS**
Probability, probability density function, Probability distribution: Binomial		
TUTORIAL NO.05		**1 HOURS**
Probability distribution: Poisson, Normal. Reduction formulae, Gamma function		
TUTORIAL NO.06		**1 HOURS**
Beta function, DUIS Rule1 & 2.		

TUTORIAL NO.07		**1 HOURS**
Tracing of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.08		**1 HOURS**
Rectification of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.09		**1 HOURS**
Double Integration, Evaluation of Double Integration, Change the order of integration, Integration by transforming Cartesian to Polar Coordinate system		
TUTORIAL NO.10		**1 HOURS**
Triple integration, Integration by transforming to spherical and cylindrical polar coordinates. Applications of multiple integrals: To find Area, Volume		
TUTORIAL NO.11		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.12		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		

TEXT BOOK

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd, 2015, ISBN: 9788126554232, 8126554231,
2. B.S. Grewal ,Higher Engineering Mathematics ,39th edition, Khanna Publications,2005 , ISBN: 81-7409- 195-5

REFERENCE BOOK

1. G.B. Thomas & R.L.Finney, Calculus, 9th edition, Pearson Education, 2002, ISBN: 81-7758-325-5.
2. Dr. B.V. Ramana ,Higher Engineering Mathematics,4 th edition, Tata McGraw Hill,2016, ISBN: 978-0-07-063419-
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house,2002,ISBN No.0849324173
4. Peter V. ONeil , Advanced Engineering Mathematics,7th Edition , Cenage Learning ,2012, ISBN-13: 9788131503102.
5. Dennis G. Zill & Warren S. Wright ,Advanced Engineering Mathematics ,4th edition ,Jones and Bartlett Publishers, 2011, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.
6. Douglas C. montgomery , George C runger ,Applied statistics and probability for engineers, 5 th edition, wiley ,2012, ISBN No: 9788126537198, 8126537191 .
7. Richard A Johnson, Irwin Miller,John freund ,Miller & Freunds Probability and statistics for engineers 8th edition, Pearson, 2011,ISBN no:978-93325-5041-4.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applications Programming-Python
	COURSE CODE	CS102
	COURSE CREDITS	3
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS102.CEO.1: Get familiar with basics of Python programming.
CS102.CEO.2: Understand usage of conditional and looping statements in Python.
CS102.CEO.3: Learn different simple data structure supported in Python.
CS102.CEO.4: Acquire knowledge and skills of strings and dictionary.
CS102.CEO.5: Implement Object Oriented Programming concepts using Python.
CS102.CEO.6: Introduce the concepts of Pandas & NumPy.

COURSE OUTCOMES :

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

CS102.CO.1: Debug syntax and semantics in Python programs.
CS102.CO.2: Demonstrate proficiency in handling strings and file system.
CS102.CO.3: Implement the programs using core data structures like Lists and Dictionaries.
CS102.CO.4: Interpret the concepts of Object Oriented Programming in Python
CS102.CO.5: Develop solution for real life problems using Python.

THEORY COURSE CONTENT		
UNIT 1	**Python Fundamentals and Data Handling**	**2 HOURS**
Introduction, Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types ,Mutable and immutable types, Input output operation , Comments, Reserved words, Indentation, Operators and expressions.		
UNIT 2	**Decision and Iterative Statements**	**2 HOURS**
Introduction to Decision Statements: Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. **Introduction to Iterative Statements:** Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, break, continue, pass, else statement used with loops.		
UNIT 3	**List manipulation, Tuples and Python Function**	**2 HOURS**
List: Introduction, creating & accessing lists, list operations, working with lists, list functions & methods. **Tuples:** Introduction, creating & accessing tuples, tuples operations, tuples functions & methods. **Functions:** Need for functions, definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.		
UNIT 4	**Strings and Dictionary**	**3 HOURS**
Strings: Introduction, string operations- concatenation, appending, multiplication and slicing. Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, Iterating strings, the string module. **Dictionary:** Introduction, working with dictionaries, dictionary functions and methods		
UNIT 5	**Object Oriented Programming**	**2 HOURS**
Programming Paradigms-monolithic, procedural, structured and object oriented, Features of Object oriented programming-classes, objects, methods and message passing, inheritance, polymorphism, containership, reusability, delegation, data abstraction and encapsulation. Classes and Objects: classes and objects, class method and self-object, class variables and object variables, public and private members, class methods		
UNIT 6	**Data Structure and Libraries in Python**	**2 HOURS**
Introduction to data structure, pandas, NumPy.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mc2 where m is the mass of the object and c is its velocity.		
PRACTICAL NO.02		**2 HOURS**
Write a Python program for following conditions. • If n is single digit print square of it. • If n is two digit print square root of it. • If n is three digit print cube root of it.		
PRACTICAL NO.03		**4 HOURS**
Solve the Fibonacci sequence using recursive function in Python.		
PRACTICAL NO.04		**4 HOURS**
Write a Python program to print different patterns.		
PRACTICAL NO.05		**2 HOURS**
To accept students five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade if first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division.		
PRACTICAL NO.06		**4 HOURS**
To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.		
PRACTICAL NO.07		**2 HOURS**
Write a program in Python to enter two unequal nos. if first no. is greater than display square of the smaller no. and cube of the greater no. otherwise vice-versa. If no. are equal display the message both no. are equal find square, square root and cube root of a number.		
PRACTICAL NO.08		**4 HOURS**
Write a Python program to perform following string operations. a) String concatenation b) String Reverse c) String compare d) String length e) Palindrome f) Case change.		
PRACTICAL NO.09		**2 HOURS**
Select the number from the entered list and find its position in Python (use Linear Search).		
PRACTICAL NO.10		**4 HOURS**
Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain) using dictionary.		

PRACTICAL NO.11		6 HOURS

1. Write Python class for bank customer with withdraw and deposit operations (use inheritance) (Introduce class, object concepts).
2. Using concepts of polymorphism write Python application program.

Write a Python program to perform addition and multiplication of 2 matrices.

PRACTICAL NO.12		4 HOURS

Write a Python program to convert a Panda module Series to Python list and it's type.

PRACTICAL NO.13		4 HOURS

Write a NumPy program for Plotting and analyzing data.

Mini Project:

1. Project is for a period of 2 weeks.
2. Group of two or three has to choose project topic from the list designed by concerned faculty of particular division.
3. Each group has to collect requirements for project and get approved by concerned teachers in first weeks.
4. implementation and testing need to be performed in second week.
5. Demonstration along with presentation need to be given as final project submission.
6. Project carries 20 Marks.

TEXT BOOK

1. Charles R. Severance, Python for Everybody: Exploring Data Using Python 3, 1st Edition, Create Space Independent Publishing Platform, 2016. (http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf) (Chapters 1 13, 15)
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist, 2ndEdition, Green Tea Press, 2015. http://greenteapress.com/thinkpython2/thinkpython2.pdf) (Chapters 15, 16, 17) (Download pdf files from the above links)

REFERENCE BOOK

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014.
2. Mark Lutz, Programming Python, 4th Edition, OReilly Media, 2011.ISBN-13: 978-9350232873
3. Wesley J Chun, Core Python Applications Programming, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, Data Structures and Algorithms in Python, 1stEdition, Wiley India Pvt Ltd, 2016. ISBN-13: 978- 8126562176.

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Second Year

Bachelor of Technology in Electronics & Telecommunication Engineering

2019-2023

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III												
SUMMER INTERNSHIP												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC01	ET221	Electronic Devices and Circuits	3	2	-	35	35	30	50	0	150	4
DC02	ET222	Digital Systems and Applications	3	2	-	35	35	30	50	0	150	4
DC03	ET223	Signals & Systems	3	2	-	35	35	30	50	0	150	4
SDP1	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP2	ET230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP3	ET225	Skill Development Course-Data Structures & Algorithms	0	4	-	0	0	25	0	50	75	2
ESC9	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	18	0	140	140	170	200	150	800	21

SEMESTER: IV												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC8	IT221	Engineering Informatics	3	2	-	35	35	30	50	0	150	4
DC04	ET231	Electromagnetic Theory	3	0	-	35	35	30	0	0	100	3
DC05	ET232	Network Analysis Techniques	3	2	-	35	35	30	50	0	150	4
DC06	ET233	Microcontroller & Interfacing	3	2	-	35	35	30	50	0	150	4
SDP4	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP5	ET240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	16	0	140	140	170	150	150	750	20

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY IT/COMP/ETX AND E&TC ENGINEERING	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS204
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS204.CEO.1: To evaluate the rank of a matrix and solve the system of equations.
AS204.CEO.2: To compute the eigenvalues and eigenvectors of a matrix and diagonalize a matrix.
AS204.CEO.3: To evaluate the derivative of vector-valued functions.
AS204.CEO.4: To evaluate the area and the surface integrals of the vector functions.
AS204.CEO.5: To evaluate the derivative and line integral of complex valued functions.
AS204.CEO.6: To execute the program on problems of numerical methods using MATLAB.

COURSE OUTCOMES :

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

AS204.CO.1: Evaluate the rank of a matrix and solve the system of equations.
AS204.CO.2: Determine the eigenvalues and eigenvectors of a matrix.
AS204.CO.3: Differentiate a vector valued function in plane or space.
AS204.CO.4: Compute the area and volume of the objects.
AS204.CO.5: Apply the Cauchy's Integral Theorem and evaluate the integrations.
AS204.CO.6: Execute the program codes using MATLAB.

THEORY		
UNIT 1	**Linear Algebra I**	**9 HOURS**
Basic Concepts, Matrix Addition, Scalar Multiplication, Matrix Multiplication, Linear Systems of Equations, Gauss Elimination Method, Rank of a Matrix, Linear Independence, Vector Spaces, Inner Product Spaces.		
UNIT 2	**Linear Algebra II**	**9 HOURS**
Eigenvalues, Eigenvectors, Symmetric Matrices, Skew-Symmetric Matrices, Orthogonal Matrices, Similarity of Matrices, Basis of Eigenvectors, Digonalization.		
UNIT 3	**Functions of Complex Variables**	**6 HOURS**
Complex Numbers, Complex Plane, Polar Form, Powers, Derivative, Analytic Functions, Cauchy-Riemann Equations, Line Integrals in the Complex Plane, Cauchy's Integral Theorem, Cauchy's Integral Formula.		
UNIT 4	**Vector Differentiation**	**6 HOURS**
Vectors in 2-D and 3-D, Scalar Product, Vector Product, Vector/scalar functions and fields, Derivative of vectors, Velocity and Acceleration, Gradient of a Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field.		
UNIT 5	**Vector Integration**	**6 HOURS**
Line Integration, Line Integrals Independent of Path, Double Integrals Green's Theorem in the Plane, Surfaces for Surface Integrals. Surface Integrals, Volume Integrals, Divergence Theorem, Stoke's Theorem.		
UNIT 6	**Numerical Methods**	**6 HOURS**
Numerical Differentiation and Integration, Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method, LU-Decomposition method.		

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 / Row Spaces.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms/Null Spaces.		
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. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232.
2. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0.
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2003, ISBN-13: 9788126537204, 8126537205.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electronic Devices and Circuits
	COURSE CODE	ET221
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

COURSE OBJECTIVES :

ET221.CEO.1: To realize some of the basic electronic components diodes, transistors, OP-AMP

ET221.CEO.2: To analyze the analog electronic circuits, both discrete and integrated, required of an electronics engineer

ET221.CEO.3: To familiarize with the circuit design techniques involving discrete devices as well as the integrated circuits.

ET221.CEO.4: To comprehend frequency response, feedback and stability of an amplifier

ET221.CEO.5: To analyze and model the transistors at low and high frequencies

COURSE OUTCOMES :

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

ET221.CO.1: Identify and correctly utilize the external lead structure and basic electrical characteristics of common semiconductor devices (PN junctions, MOSFETs, and BJTs)

ET221.CO.2: Illustrate the feedback mechanism in the design of electronic circuits

ET221.CO.3: Scrutinize and project electronic circuits for various signals at low and high frequencies

ET221.CO.4: Analyze performance parameters of various electronics circuits

ET221.CO.5: Compile component ideas into electronic circuits

THEORY COURSE CONTENT		
UNIT 1	**Semiconductor Devices**	**6 HOURS**
Diode circuits - Clipper and Clamper, BJT-Types, Construction, Operation, Input and Output Characteristics. Introduction to MOSFETs, operation, Construction of n-channel E-MOSFET, E-MOSFET characteristics & Non ideal voltage current characteristics of EMOS, Introduction to BICMOS technology, **Protection circuits**.		
UNIT 2	**BJT - DC and AC Analysis**	**6 HOURS**
Biasing circuits of BJT-Fix Bias & Self Bias, DC load line, Bias stability, Thermal runway, Thermal stability BJT. Small signal amplifier, Two port system approach ,Hybrid model of BJT, Approximate and exact analysis of BJT, Hybrid Model, Frequency response of amplifiers, **Multistage amplifiers**.		
UNIT 3	**MOSFET - DC and AC Analysis**	**8 HOURS**
Common source circuit, Load Line & Modes of operation, common MOSFET configurations: DC Analysis, constant current source biasing. The MOSFET CS small signal amplifier, Small signal parameters, small signal equivalent circuit, Modeling, Body effect, Analysis of CS amplifier. The MOSFET internal capacitances and high frequency model. Introduction to MOSFET as basic element in VLSI, V-I characteristic equation in terms of W/L ratio, **MOSFET scaling and small geometry effects, MOSFET capacitances**.		
UNIT 4	**Feedback Amplifiers and Oscillators**	**8 HOURS**
Concept of negative feedback, Effects of negative feedback on gain, bandwidth & 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 in FM transmitter circuit**.		
UNIT 5	**Linear Applications of OP-AMP**	**8 HOURS**
Inverting and Non-inverting amplifier, voltage follower, 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	**Non-linear Applications of OP-AMP**	**6 HOURS**
Comparators, Applications of Comparator, Schmitt Trigger(symmetrical/asymmetrical), Need of precision rectifier, Half wave , Full wave precision rectifiers, Square wave & Triangular wave generator, Sample and hold circuit, peak detectors , **Converters using OP-AMP**.		

PRACTICAL: Perform following experiments using MULTISIM or PROTEUS		
PRACTICAL NO.01		**2 HOURS**
Limiter circuits in FM transmitter circuit		
PRACTICAL NO.02		**2 HOURS**
Small signal amplifier for Public Address (PA) system		
PRACTICAL NO.03		**2 HOURS**
Frequency response of the amplifier		
PRACTICAL NO.04		**2 HOURS**
Tuned circuit in FM transceiver		
PRACTICAL NO.05		**4 HOURS**
OP-AMP parameters		
PRACTICAL NO.06		**4 HOURS**
Low Pass and High Pass filter using OP-AMP		
PRACTICAL NO.07		**4 HOURS**
Precision rectification in peak detector circuit		
PRACTICAL NO.08		**4 HOURS**
Level detector using OPAMP.		

TEXT BOOK

1. Millman and Halkias, Integrated Electronics, Tata McGraw-Hill (TMH) Education, 2001, ISBN: 9780074622452
2. Donald A. Neamen, Electronic Circuit Analysis and Design, TMH Publishing Company Limited, 3^{rd} Edition, ISBN:9780070634336
3. Boylestad & Louis Nashelsky, Electronic Devices & Circuit theory, Pearson New International Edition, 11^{th} Edition, ISBN: 9780133109047

REFERENCE BOOK

1. Millman and Halkias, Microelectronics, Tata McGraw-Hill (TMH) Education, 2001,ISBN: 9780074637364
2. Thomas L. Floyd, David L. Buchla, Electronics Fundamentals: Circuits, Devices and Applications, 8^{th} Edition, Pearson Education Limited 2014, ISBN: 978-1292025681
3. David A. Bell, Operational Amplifiers and Linear ICs, Prentice Hall of India, 2^{nd} Edition ISBN: 8120323599 4. Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits , TMH, 2002,3^{rd} Edition, ISBN: 9780070530447

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Systems & Applications
	COURSE CODE	ET222
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

COURSE OBJECTIVES :

ET222.CEO.1: To design various combinational and sequential logic circuits
ET222.CEO.2: To analyze sequential circuits using state machines
ET222.CEO.3: To design digital circuits using semiconductor memories
ET222.CEO.4: To model digital circuits using hardware description language

COURSE OUTCOMES :

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

ET222.CO.1: Design combinational circuits and its applications
ET222.CO.2: Design various sequential circuits
ET222.CO.3: Construct state diagrams for various sequential circuits
ET222.CO.4: Identify various logic families and semiconductor memories
ET222.CO.5: Develop VHDL code for various combinational and sequential digital circuits

THEORY COURSE CONTENT		
UNIT 1	**Combinational Logic Design**	**8 HOURS**
BCD Arithmetic operations, Digital Codes and Parity, Applications of data selector and distributers, Applications of Multi I/O combinational circuits, Parity generators / checkers. Applications: Adder / Subtraction System, Process controller using comparator. **Further Reading:** Data transmission system with error detection		
UNIT 2	**Sequential Circuits**	**8 HOURS**
Latches, applications of Flip Flops, Shift Registers, Universal shift register and its applications (Ring, twisted ring counters and pulse train generators), counters and its design, counters as a frequency dividers. Applications: Counting Real world events, Experimental tachometer . **Further Reading:** Digital clock		
UNIT 3	**State Machines**	**8 HOURS**
Mealy and Moore models, state machine notations, synchronous circuit analysis, Clocked synchronous state machine design, design of state diagram for Up-Down decade counter, Sequence detector, Algorithmic state machines Applications: Traffic Light Controller. **Further Reading:** ATM Machine		
UNIT 4	**Digital Logic Families and Semiconductor Memories**	**8 HOURS**
Classification of Logic families, Characteristics of TTL and CMOS, TTL to CMOS interface, CMOS to TTL interface, Design and functioning of ROM, PAL and PLA, Comparison between ROM, PAL and PLA, Introduction to CPLD and FPGA.		
UNIT 5	**Introduction to HDL**	**10 HOURS**
Introduction to hardware description languages, Modeling and signal assignments in VHDL, Basic constructs and Programming using VHDL. **Further Reading:** Application for VHDL: Design of combinational circuits		

PRACTICAL: Practicals will be performed either using Digital Works software or kit.		
PRACTICAL NO.01		**4 HOURS**
Design and implementation of Code Converter using IC 74HC154.		
PRACTICAL NO.02		**4 HOURS**
Design and implementation of Parity Generators and Checkers.		
PRACTICAL NO.03		**4 HOURS**
Design & implementation of BCD Adders and Subtractors		
PRACTICAL NO.04		**4 HOURS**
Design & implementation of Synchronous Counters.		
PRACTICAL NO.05		**2 HOURS**
Design & implementation of Asynchronous Counters.		
PRACTICAL NO.06		**2 HOURS**
Design & implementation of 8- Bit Universal Shift Register		
PRACTICAL NO.07		**2 HOURS**
Design & implementation of Sequence detector.		
PRACTICAL NO.08		**4 HOURS**
Study of Traffic Light controller design using logic gates and digital IC.		

TEXT BOOK

1. Floyd, Digital Fundamentals, Pearson Education India, 10^{th} edition (2011) (ISBN-10: 813173448X,ISBN-13: 978-8131734483).
2. Tokheim, Digital Electronics Principles and Applications, McGraw Hill Education, 6^{th} edition (20 May 2004) (ISBN-10: 0070587906,ISBN-13: 978-0070587908).
3. J. Bhasker, VHDL Primer, Pearson India, 3^{rd} edition (ISBN: 978-9332557161).

REFERENCE BOOK

1. M. Morris Mano, Digital Design, PHI, 8^{th} Edition, 2006 (ISBN: 9780131989245).
2. D. P Leach, A. P. Malvino and G. Saha, Digital Principles and Applications, Tata McGraw-Hill, 3^{rd} Edition, 2006 (ISBN-: 978-0028018218).
3. S. Salivahanan, S. Pravin Kumar, Digital Circuits and Design, Vikas Publishing House,4^{th} edition (2012) (ISBN-10: 9325960419, ISBN-13: 978-9325960411).
4. John F. Wakerly, Digital Design: Principles and Practices, Pearson, 4^{th} Edition, 2008(ISBN: 9788131713662).
5. A. Anandkumar, Fundamental of Digital Circuits, PHI, 2^{nd} Edition, 2009 (ISBN: 9788120336797).

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Signals and Systems
	COURSE CODE	ET223
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

COURSE OBJECTIVES :

ET223.CEO.1: To classify signals and systems and describe their properties on continuous and discrete domains.

ET223.CEO.2: To describe linear time invariant (LTI) systems.

ET223.CEO.3: To describe and perform different time and frequency domain transformations.

ET223.CEO.4: To explore the concept of correlation, energy spectral density (ESD), power spectral density (PSD).

ET223.CEO.5: To illustrate sampling and reconstruction theorem.

ET223.CEO.6: To understand Laplace and z-Transform

COURSE OUTCOMES :

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

ET223.CO.1: Classify various types of signals and systems.

ET223.CO.2: Classify systems based on their properties and determine the response of LTI system using convolution.

ET223.CO.3: Analyze the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis.

ET223.CO.4: Describe sampling theorem and reconstruction of signal.

ET223.CO.5: Apply the Laplace transform and Z- transform for analyze of continuous-time and discrete-time signals and systems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Signals and Systems**	**8 HOURS**
Definition of signals, Elementary signals, Basic operation on signals, Classification of signals, Study basic of speech signal, image signal, medical signals, Vector and orthogonal vector space, Definition of systems, Classification of systems, Examples of systems.		
UNIT 2	**Time-Domain Representation for Linear Time-Invariant (LTI) Systems**	**8 HOURS**
Representation of LTI systems, Convolution sum, Convolution integral, Properties of the impulse response representation of LTI system, System interconnection.		
UNIT 3	**Fourier Representation for Signals**	**8 HOURS**
Fourier series, Fourier Transform and Fourier Transform properties on signal, Discrete Time Fourier Transform, Correlation, Autocorrelation, Energy spectral density (ESD) and Power spectral density (PSD), Application to communication systems.		
UNIT 4	**Continuous-Time System Analysis Using the Laplace Transform**	**8 HOURS**
The Laplace Transform, Properties of Laplace Transform, Solution of differential equations, Analysis of electrical networks using Laplace Transform.		
UNIT 5	**Sampling Theorem**	**6 HOURS**
Sampling, Reconstruction, Sampling theorem, Nyquist Rate, Aliasing, Mapping between analog frequency and digital frequency.		
UNIT 6	**Discrete Time System Analysis Using the Z-Transform**	**8 HOURS**
The z-Transform, Region of convergence for z-Transform, Properties of z-Transform, z-Transform Solution of linear difference equations, System realization, Pole-Zero stability consideration in z domain, Connection between the Laplace Transform and the z-Transform.		

PRACTICAL		
PRACTICAL NO.01	**Generation of elementary signals**	**2 HOURS**

a. To generate standard elementary signals in continuous and discrete time domain.

b. To study behavior of plots of elementary signals.

PRACTICAL NO.02	Dependent and independent operations on signals	2 HOURS

a. To perform signal addition and multiplication in continuous and discrete time domain.

b. To perform time shifting, scaling operations in continuous and discrete time domain.

c. To observe the effect of change of parameter on signal like speech/image signal.

PRACTICAL NO.03	Response of Linear Time Invariant (LTI) system	2 HOURS

a. To observe responses of LTI system whose impulse response is known

b. To observe responses of LTI system for various impulse responses.

PRACTICAL NO.04	Fourier analysis of on a speech signal	2 HOURS

a. Applying Fourier and Inverse Fourier transform on speech signal.

b. To observe spectra and calculate ESD of speech signal.

PRACTICAL NO.05	Correlation of a signal	4 HOURS

a. To correlate speech signals.

b. To comment on results of autocorrelation and cross correlation.

PRACTICAL NO.06	Solving differential equation using Laplace Transform	2 HOURS

a. To formulate differential Equation using Laplace Transform.

b. To solve differential equation using inverse Laplace transform.

PRACTICAL NO.07	Sampling Theorem	2 HOURS

a. To analyze under sampled and oversampled signals.

b. To comment on reconstructed signal while observing sampling signal.

c. To observe the effect of changing sampling rate on reconstructed audio signal.

PRACTICAL NO.08	LTI system using z Transform	2 HOURS

a. To study the transfer function of the system.

b. To check if the given system is stable and causal.

PRACTICAL NO.09	Audio signal processing	2 HOURS

a. To read .wav file and plot audio input signal.

b. To implement sampling and reconstruction of audio/music signals.

c. To perform filtering audio/music signals.

PRACTICAL NO.10	Image analysis	2 HOURS

a. To show image information.

b. To perform image filtering

TEXT BOOK

1. Signals and Systems, Alan V. Oppenheim, Alan S. Willsky and Ian T. Young, 2^{nd} Edition, Pearson, 2015 (ISBN: 978-9332550230)
2. Principles of Linear Systems and Signals, B. P. Lathi, 2^{nd} Edition, Oxford Press, 2009 (ISBN: 978-0198062271)
3. Fundamentals of Signals and Systems, Michael Robert and Govind Sharma, 2^{nd} Edition, McGraw Hill Education, 2010 (ISBN: 978-0070702219)

REFERENCE BOOK

1. Signals and Systems, Simon Haykin,Barry Van Veen, 2^{nd} Edition, John Wiley & Sons, 2007 (ISBN: 978-8126512652)
2. An Introduction to Analog and Digital Communications, Simon Haykins, ,2^{nd} Edition Wiley India, 2006 (ISBN: 978-0471432227)
3. Signals and Systems - principles and applications, Shaila Dinkar Apte, 1^{st} Edition, Cambridge University press, 2016. (ISBN: 978-1107146242)
4. Signals and Systems with MATLAB, Won Young Yang, 1^{st} Edition, Springer, 2011 (ISBN: 978-8132203957)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Prototyping
	COURSE CODE	ET224
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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 : NIL

COURSE OBJECTIVES :

ET224.CEO.1: To learn about materiality and techniques.
ET224.CEO.2: To justify the product development cycle through prototype project.
ET224.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET224.CEO.4: To 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,

ET224.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET224.CO.2: Apply acquired skills to the construction of a prototype project.
ET224.CO.3: Develop a prototype project by performing tasks in team.
ET224.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. Hardware Prototyping (HP)
2. Software Prototyping(SP)

In the module hardware prototyping students will develop a prototype of electronic product. Student will be acquiring different skills in electronics like Soldering, Wiring and PCB Design using Electronic Design Automated tools, Assembly of electronic product, Testing and troubleshooting, requirement Analysis , Product concept development in electronic product design.

On the other hand in software prototyping students will learn Software development life cycle (SDLC) concepts, AEIOU framework, UML diagrams, Requirement analysis, data flow diagrams, creating high fidelity prototypes, Testing and Analysis etc.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Digital Prototyping, Semester - III

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Software Prototyping (SP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Software Prototyping (SP)	

MODULE: 1/2	Hardware Prototyping (HP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to design and construction of electronic prototyping	02 HOURS

1. Gain familiarity with basic product design stages; Conceptualization, Detailed Design and Implementation. Form a group of students. (04 max)
2. Acquire concepts of basic processes in electronic prototyping. Develop Concept Description Sheet (CDS) for product to be designed.
3. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span. Hence draw Physical and Mechanical Drawing.
4. Perform Customer Survey and Competitor Analysis
5. Develop Specifications and Make requirement analysis. Hence develop Bill of Material.
6. 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.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	06 HOURS

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

PRACTICAL NO. 04	PCB fabrication	06 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
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.
8. Develop Customer feedback sheet and Take feedback from Customers.
9. Make Customer feedback Analysis based on ratings.

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.
6. Present Customer feedback analysis.

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: 2/2	**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	**Requirement analysis**	**04 HOURS**
Find the requirement specification of given problem statement and formulate the feasible solution.		
PRACTICAL NO. 03	**Design UML Diagrams for given problem statement**	**06 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. 04	Design analysis	02 HOURS
Create High Fidelity Prototype		
PRACTICAL NO. 05	**Prototype Implementation**	**06 HOURS**
Use of prototype development tools such as Proto.io, Invision		
PRACTICAL NO. 06	**Presentation**	**04 HOURS**
Each group will be given 10 min to present their work.		

REFERENCE BOOK

1. Software Engineering A practitioners Approach, Roger S, Pressman, 7th Edition, ISBN: 9780073375977
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Minor Project Design
	COURSE CODE	ET230
	COURSE CREDITS	1
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET230.CEO.1: To categorize and define a problem to be solved.
ET230.CEO.2: To realize the ethical principles in general and its importance.
ET230.CEO.3: To make the students aware of project requirement analysis, design and planning.
ET230.CEO.4: To appreciate the importance of documenting and ethics of writing.

COURSE OUTCOMES :

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

ET230.CO.1: Delineate the problem to be solved.
ET230.CO.2: Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession.
ET230.CO.3: Embark project planning and design.
ET230.CO.4: Inculcate problem solving skills and critically analyze the options available to solve the problem.
ET230.CO.5: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

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. This will help students to understand the process of product/project development, best practices and encourage their creativity to solve real life problems. The students will learn effective team building, designing, budgeting, planning, engineering skills and processes, safety norms and standards while developing the application/ product. The students will be able to understand importance of documentation and professional ethics.

Guidelines

1. Every student shall undertake the Minor Project in semester III and IV.
2. Every student shall work on an approved project, a group of 03/04 students (maximum) shall be allotted for each minor project.
3. The group members may be from different programme to support the interdisciplinary functioning.
4. The students have to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
5. Collect the sufficient data and survey to establish the criticality of the problem to be solved.
6. Apply various tools for project planning and design.
7. Critically analyze various solutions/techniques to solve real world problems.
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use.
9. Learn and apply standards of engineering ethics and professional behavior.
10. Adherence to the highest principles of ethics, conduct and practices.

TIMELINE

The four member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Formation of Project Group: 2 Weeks (1^{st} week and 2^{nd} week)
2. Finalizing title, feasibility study and approval: 3 Weeks (3^{th} week to 5^{th} week)
3. Engineering Ethics: 3^{rd} week
4. Project Review 1 Presentation: 6^{th} week
5. Analysis and Design of the Project: 3 Weeks (7^{th} week to 9^{th} week)
6. Project Review 2 Presentation: 10^{th} week
7. Report Writing, Documentation and Presentation: 2 Weeks (11^{th} week and 12^{th} week)
8. Project Review 3 Presentation: 13^{th} week (Assessment by Guide)
9. Final Evaluation/Examination Presentation: 14^{th} week

Project Demonstration (50 Marks)

1. **Review 1 (Problem Statement and Literature Survey) (10 marks)**
2. **Review 2 (Project Modeling and Designing) (10 marks)**
3. **Project Activities (10 Marks)**
    - Quiz on Ethics
    - Drafting of Literature Review and Synopsis
    - Project Planning and Design
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration & Presentation (10 marks)**

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 1	Introduction to different forefront areas available within the School. Discussion on innovative application in domain area and resources such as Books, Blog, Publication Houses	To search the domain area of interest	At least 4 subtopics in area of interest (Template I)
Week 2	To brief at least two Innovative products with complete details and their Evolution	To search the domain area/innovative products of interest	Search in area of interest (Template II)
Week 3	Ethics, Morals, Values and Integrity, Work Ethic, Civic Virtue, Senses of Engineering Ethics, Business Ethics, Media Ethics, Environmental Ethics, Bio Ethics, Computer Ethics, Research Ethics	Graded Activity Quiz on Engineering Ethics	Understand the Ethics of an Engineer (Template III)
Week 4	Introduction to Research publication, its type, science citation index, methods to search Journals. Introduction to Ethics of writing(Plagiarism)	Search domain related five papers (from Journal Paper, Conference paper, Technical report, Manual, Thesis)	Student will learn searching SCI journal and understand Ethics of writing
Week 5	Presentation on how to make Project Presentation. Title, problem statement, objective, Scope etc (Select suitable topic of domain and explain it as per the template-IV)	Graded Activity on background study (market survey, customer survey, literature Survey) of domain area of interest	Drafting literature review and Synopsis (Template IV)
Week 6	NIL	Project Review 1 Presentation	Problem Definition and Objectives

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 7	Guidelines and tools for Analysis and Design of the Project and problem solving sessions	Analysis and Design of the Project	Best practices for Analysis and Design
Week 8	Guidelines and tools for the Project Planning, Introduction to Block Diagram, System Architecture	Make use of Project Planning Tools and Design Tools	Best practices for Project Planning and Design
Week 9	Presentation, discussion and doubt clearing based on • Working on Algorithms • Working on Design/ System Architecture • Working on Analysis/ CAD modeling	Graded Activity on Project Design and Planning	Best practices of Project Planning and Design
Week 10	NIL	Project Review 2 Presentation	Project Planning, Design of a solution
Week 11	Guidelines and tools for report writing	Project Report Writing	Effective Report Writing Practices
Week 12	How to give effective presentation on project	Report Writing and Presentation	Effective Documentation of the Project
Week 13	NIL	Project Review 3 Presentation	Final Report and Presentation
Week 14	NIL	Examination: Final Demonstration and Presentation	Problem Statement, Objectives, Design and Planning

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Data Structures and Algorithms
	COURSE CODE	ET225
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

COURSE OBJECTIVES :

ET225.CEO.1: To explore the basic concepts of data structures and algorithms.
ET225.CEO.2: To understand the different ways of data representation.
ET225.CEO.3: To study the representation, implementation and applications of linear data structures.

COURSE OUTCOMES :

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

ET225.CO.1: Summarize the searching and sorting techniques.
ET225.CO.2: Develop and implement code for linked list , stack and Queue data structures.
ET225.CO.3: Design code for various real time application.

Data Structure is the mechanism by which you can store data in a computer system. It allows an application to fetch and store data in the computers memory in an efficient manner. It is very important to identify and select the correct type of data structure for particular application. We are exploring the different types of data structures and learn how to implement them to solve real world problems.

PRACTICAL		
PRACTICAL NO.01	**Array and Structure with Functions**	**2 HOURS**

- Introduction to Data Structures
- Array and Structure in C and basic operations on it .
- Function implementation by passing array and structure as an argument.
- Assignment No.1.1
- Assignment No.1.2

PRACTICAL NO.02	**Searching and Sorting Techniques**	**4 HOURS**

- Sequential Searching and Binary Searching
- Bubble , Selection and Insertion sorting .
- Assignment No.2.1
- Assignment No.2.2

PRACTICAL NO.03	**Database Management**	**4 HOURS**

- Array of Structures.
- Create, display, search and delete operations on Database.
- Assignment No. 3.1

PRACTICAL NO.04	**Dynamic Memory Management**	**4 HOURS**

- Need of Memory Handling Technique
- Dynamic Memory Allocation Function
- Linked List and its Types
- Assignment No.4.1

PRACTICAL NO.05	Stack (LIFO Structure)	4 HOURS

- Concept of Stack LIFO Principle.
- Various Operations on the Stack Data Structure
- Implementation using Array and Linked List
- Assignment No. 5.1.

PRACTICAL NO.06	Queue (FIFO Structure)	4 HOURS

- Concept of Stack FIFO Principle.
- Various Operations on the Stack Data Structure
- Implementation using Array and Linked List
- Assignment No. 6.1

PRACTICAL NO.07	Project	4 HOURS
Capstone Project.		

TEXT BOOK

1. Seymour Lipschutz, Data Structure with C, Schaums Outlines, Tata McGrawHill , 4^{th} Edition , (ISBN 13 : 978-1259029967).
2. Yashavant Kanetkar, Data Structures Through C, BPB Publication, 2^{nd} Edition (ISBN-13: 978-8176567060).
3. E. Horowitz , S.Sahani, S.Anderson-Freed , Fundamentals of Data Structures in C, Universities Press , 2008 , (ISBN-10 : 8173716056)

REFERENCE BOOK

1. E Balguruswamy, Data Structure using C, Tata Magrawhill, 3^{rd} Edition, 2010 (ISBN: 9781259029547).
2. D. P Yedidyah Langsam, Moshe J Augenstein, Aaron M Tenenbaum, Data structures using C, Pearson India , 2^{nd} Edition (ISBN-: 978-8131702291).
3. S.K. Srivastav, Deepali Srivastav, Data Structure Through C, BPB Publication , 2^{nd} Edition, (ISBN-13: 978-8176567411).
4. A. Aho, J. Hopcroft, J. Ulman, Data Structures and Algorithms, Pearson Education, 1998,(ISBN- 10 : 0-201-43578-0)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Environmental Science
	COURSE CODE	CV203
	COURSE CREDITS	AUDIT
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
0	2	NIL	NIL	NIL	NIL	NIL	NIL

PRE-REQUISITE :

COURSE OBJECTIVES :

CV203.CEO.1: Create awareness about environmental problems among future citizens.
CV203.CEO.2: Interpret basic knowledge about the environment and its allied problems.
CV203.CEO.3: Develop an attitude of responsibility for the environment and society.
CV203.CEO.4: Acquire skills to identify and solve environmental problems.
CV203.CEO.5: Perceive the importance of sustainable development
CV203.CEO.6: Strive to attain harmony with nature.

COURSE OUTCOMES :

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

CV203.CO.1: summarize the importance of ecosystem and biodiversity for maintaining ecological balance.
CV203.CO.2: identify environmental problems arising due to engineering and technological activities and the science behind those problems
CV203.CO.3: categorize the major pollutants along with sources and abatement devices for the environmental management.
CV203.CO.4: analyze material balance for different environmental systems.
CV203.CO.5: perceive the social and professional responsibility towards the environment.
CV203.CO.6: appraise the environmental factors so as to ensure sustainable development

Activity Based Learning and Evaluation		
Activity No. 1	**Any of the following activity can be selected by students**	**2 HOURS**
Students have to select any one of the following activities and prepare the detailed report on it along with the statistics or photos. This could be completed individually or in group of students: 1. Calculate individual (per capita) use of water for a day and find ways to reduce that use. 2. Make presentations for awareness regarding water resources among students, villagers and local people (at least 10 households). 3. Find out individual activities which lead to various types of pollution and suggest possible preventive measures for it. 4. Explore and register varieties of plants in the institute campus or Alandi city or its surroundings and prepare the biodiversity register. 5. Study any threatened bird or animal.		
Activity No. 2	**Site Visit**	**2 HOURS**
Students have to visit any one non hazardous polluted site for finding the various reasons of its pollution and suggest preventive measures for it. Prepare the detailed report on it along with the photos. This could be completed in a group.		
Activity No. 3	**Any of the following activity can be organized by students**	**4 HOURS**
Students have to organize any one of the following activities in the institute and prepare a detailed report on their experience of organizing the activity, its possible benefits to the environment along with the photos. This could be completed in group of students: 1. No Car and Bike Day 2. Shutting down the fans and air conditioning systems of the campus for an hour. 3. Environmental awareness programs like organizing essay competition, poster competition, slogan making competition or any other related to it. 4. Celebrating various environmental days. 5. Any other similar activity related to the environment.		
Activity No. 4	**Expert Lecture**	**2 HOURS**
Instructor has to plan an expert lecture on use of recent technologies for environmental monitoring. Students have to prepare a detailed report on it.		
Activity No. 5	**Project Work**	**10 HOURS**
Students have to identify the real life environmental problems from their daily observations and try to find out the various feasible solutions for it as their project work. They are supposed to prepare the prototype or poster, detailed report and present it to the evaluators. The project should be related to the below mentioned heads: 1. Reuse, Recycle and Reduce 2. Environmental Pollution Monitoring and Control 3. Material Balance Concept 4. Sustainable Development 5. Environmental Innovations The evaluation is based on at least two number of project presentation reviews apart from the final project presentation.		

TEXT BOOK

1. R. J. Ranjit Daniels and Jagdish Krishnaswamy, Environmental Studies, Wiley India Publications, ISBN: 9788126519439.
2. Rao C.S. Environmental Pollution Control Engineering, Wiley Eastern Publications, ISBN: 9780470217634.
3. Cunningham W.P. and Cunningham M.A., Principles of Environmental Science, Tata McGraw-Hill Publishing Company, New Delhi, 2002.
4. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co., ISBN-10: 1111988935 ISBN: 9781111988937.

REFERENCE BOOK

1. H. S. Peavy, D. R. Rowe and G. Tchobanoglous, Environmental Engineering, McGraw Hill, ISBN: 84-282-0447-0.
2. Helen Kavitha Principles of Environmental Science, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
3. Henry J.G. and Heinke G.W., Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
4. Metcalf Eddy Wastewater engineering: Treatment and reuse, McGraw Hill, ISBN: 007041878.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT221
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	2	35	35	30	NIL	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

IT221.CEO.1: To introduce facts, concept and theory of an information system for decision making.
IT221.CEO.2: To understand information evolution using data processing cycle.
IT221.CEO.3: To explain information transmission for its visualization and interpretation.
IT221.CEO.4: To design digital data acquisition system for information generation.

COURSE OUTCOMES :

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

IT221.CO.1: Interpret Data, Information and Knowledge.
IT221.CO.2: Make use of data acquisition techniques for an information system.
IT221.CO.3: Categories different storage techniques.
IT221.CO.4: Develop dashboard for effective communication of information.
IT221.CO.5: Determine components of Human computer interface interaction.
IT221.CO.6: Design digital information acquisition system.

THEORY :

UNIT 1	Fundamentals of Informatics	6 HOURS

Data, Types of Data: Primary data, Secondary data, Operational data, Derived data, Structured, Semi-Structured, Unstructured
Meta data : Administrative and Descriptive
Data forms: Analog and Digital (Telephone and Stenography) ADC and DAC.
Information, Information Life Cycle
Knowledge, Types of Knowledge: Procedural, Declarative, Tacit and Explicit etc.
Self-Study: Grade Sheet Generation system
Further Reading: Customer Relationship Management (CRM)

UNIT 2	Data Acquisition and Information generation	6 HOURS

Data Collection Methods:
Human Interface Interview, Interrogation, Survey and Observation
Hardware and Software Interface Digital Data Acquisition System: Introduction to Microprocessor and Micro-controller
Web Interface: Web scrapper
Data Processing Cycle, Data Processing Stages Activities, Business Pyramid Model, Information System.
Self-Study: Weather forecasting System
Further Reading: Trivago, Spot Code, QR Code

UNIT 3	Information Storage and Transmission	6 HOURS

Need of data storage, Types of storage: stand alone, centralized, distributed
Cloud: Deployment Model, Services, Advantages and Disadvantages
Transmission Modes : Simplex, Half Duplex and Full Duplex
Transmission Types :- Serial (Synchronous and Asynchronous) and Parallel, Satellite Transmission : Features and Types (GEO,MEO and LEO)
Wireless Communication : Bluetooth, Zigbee and RFID
Encryption and Decryption.
Self-Study: Evolution of Storage
Further Reading: LoRa and Sigfox

UNIT 4	Information Visualization	6 HOURS

Dashboard: Definition, Components: Pivot Table, Pivot Chart, Slicer and General Charts
Types: Operational, Strategic and Tactical, Advantages
KPI / Grains: Definition, Design Rules, Assessing Quality of Dashboard
Dashboard Vs Scoreboard.
Self-Study: Dashboard Vs. Scoreboard
Further Reading: Information Dashboard Design

UNIT 5	Interactive Interface attributes	6 HOURS

Human interaction interface
User specific goals, Interface design life cycle, Neilsons Attributes
Interaction Evaluation and Guidelines: Normans Principles, Shneidermans Rules
Compliance of interaction goals : Neilsons and Normans 10 Heuristics.
Self-Study: Web based systems interactivity
Further Reading:GUI Design

UNIT 6	Acquisition system and IoT	6 HOURS

Machine to Machine interaction, IoT: Overview, Characteristics and Architecture
Componants: Sensors, Actuators, Controller and Processor
Basic elements / building blocks of IOT
Applications: Asset management, Industrial automation, Smart cities.
Self-Study: IoT Essentials
Further Reading:IOT and big Data

PRACTICAL :

PRACTICAL NO.01		8 HOURS

In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow:

- Identification of an interdependent elementary data items which have facts and figures
- Data collection through sensors
- Processing using Arduino
- Data Storage using MySQL in an accessible form
- Data visualization using graphs

PRACTICAL NO.02		8 HOURS

Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system.

- Create a graph showing how revenue evolves throughout the year for each of the sales channels
- Create an interactive chart that can be used to switch between different sales channels.
- Create three different views of the data: monthly sales revenue, sales revenue by category, and revenue by the top five distributors.

PRACTICAL NO.03		8 HOURS

Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi.

- Identify the home appliances that require human interaction for its operations and state the need of automation.
- Identify system component
- Design circuit diagram
- Assemble system components
- Program the interface
- System Testing
- System Deployment

TEXT BOOK

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

REFERENCE BOOK

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

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electromagnetic Theory
	COURSE CODE	ET231
	COURSE CREDITS	3
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
3	0	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET231.CEO.1: To understand the basic laws governing electrostatics and magnetostatics

ET231.CEO.2: To understand application of Maxwell's equations in antenna systems and wireless communication

ET231.CEO.3: To understand fundamentals of propagation through transmission line and waveguides

ET231.CEO.4: To explore and apply the concept of Smith chart

ET231.CEO.5: To understand the radio wave propagation through the atmosphere

COURSE OUTCOMES :

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

ET231.CO.1: Apply appropriate coordinate system and transformations to describe spatial variation of EM quantities.

ET231.CO.2: Explain laws governing electrostatics and magnetostatics for wireless communication and antenna systems.

ET231.CO.3: Analyze basic electromagnetic problems using Maxwell's equation to demonstrate propagation of fluctuating electric and magnetic fields.

ET231.CO.4: Appreciate the working of transmission line, waveguides and impedance calculations using Smith chart.

ET231.CO.5: Explain different modes of wave propagations for terrestrial, satellite and 5G communication.

THEORY COURSE CONTENT		
UNIT 1	**Electrostatic Fields**	**10 HOURS**

Coordinate Systems and Transformation, Electrostatic field: Introduction, Coulomb's law & Field Intensity, Field due to continuous charge distribution, Electric flux density, Gauss Law, Electric Potential, Electric Dipole and Flux Lines, Energy Density in Electrostatic Field.

Self-Study: Review of Vector Algebra & Vector Calculus

Application: Electrostatic Discharge & Cathode Ray Oscilloscope

Book: R Shevgaonkar, Electromagnetic Waves & Matthew N. O. Sadiku, Elements of Electromagnetics

UNIT 2	**Magnetostatic Fields**	**8 HOURS**

Steady magnetic field, Biot-Savarts Law, Amperes Circuit Law, Magnetic Flux Density, Scalar and Vector Potentials, Magnetic Forces, Magnetic Torque & Moment, Magnetic Dipole.

Self-Study: Applications of ACL

Application: Lightning & Polywell

Book: E. C Jordan, K. G Balmain, Electromagnetic Waves & Radiating Systems, Matthew N. O. Sadiku, Elements of Electromagnetics

UNIT 3	**Maxwell's Equations**	**8 HOURS**

Faraday's law, Transformer and Motional EMFs, Displacement current, Maxwell's Equations: Point Form, Integral Form for Steady Fields, Time Varying Fields and Harmonically Varying Fields. Poynting Vector & Poynting Theorem.

Application Note: Memristor

Case Study: EMI/EMC Testing Labs

Demonstration: Maxwells Equation using MATLAB

Book: Matthew N. O. Sadiku, Elements of Electromagnetics

UNIT 4	**Electromagnetic Waves**	**10 HOURS**

Waves in General, Wave Propagation in Lossy Dielectrics, Plane waves in dielectric media, conducting media, Skin Effect & Surface Impedance. Reflection of Plane Waves.
Transmission Lines: Distributed Parameters, Transmission Line Equations, Standing Waves, Impedance Matching, Smith chart, Scattering Parameter, Microstrip Transmission Line. Introduction to waveguides.

Self Study: Applications of Transmission Line Quarter Wave Transformer, Single Stub Tuner

Application: Microwave Oven The Cheese Experiment

Case Study: Analysis of RMSA using HFSS

Book: R Shevgaonkar, Electromagnetic Waves & Matthew N. O. Sadiku, Elements of Electromagnetics

UNIT 5	Radio Wave Propagation	6 HOURS

Fundamental Equations for Free Space Propagation, Ground Wave, Sky Wave, Space Wave, Structure of atmosphere, Characteristics of Ionized Regions, Virtual Height, MUF, Skip Distance, Effect of Earths Magnetic Field, Space Link Geometry.

Self Study: Radar Range Equation, Phase & Group Velocity, Ionospheric Abnormalities.

Application Note: Block diagram of Satellite and Radar Communication

Book: Matthew N. O. Sadiku, Elements of Electromagnetics & William H. Hayt Jr., Engineering Electromagnetics

TEXT BOOK

1. Matthew N. O. Sadiku, Elements of Electromagnetics, Oxford Univ Press (Sd); 6^{th} edition, 2014, ISBN-13: 978-019974300.
2. R Shevgaonkar, Electromagnetic Waves, McGraw Hill Education, 1^{st} Edition, 2017, ISBN-13: 978-0070591165.

REFERENCE BOOK

1. William H.Hayt, Jr., Engineering Electromagnetics, McGraw Hill Education (India) Private Limited; 8^{th} edition, 2011, ISBN-13: 978-0073380667.
2. E. C Jordan, K. G Balmain, Electromagnetic Waves & Radiating Systems, PHI Learning Pvt Ltd.; 2^{nd} edition, 1964, ISBN-13: 978-8120300545.
3. Karl E. Lonngren, Sava Savov, Randy J. Jost, Fundamentals of Electromagnetics with MATLAB, SciTech Publishing Inc; 3^{rd} edition, 2012, ISBN-13: 978-8120337374.
4. Joseph Edminister, Electromagnetics (Schaum's Outline Series), McGraw Hill Education (India) Private Limited; 2^{nd} edition, 2010, ISBN-13: 978-0070681958.

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Network Analysis Techniques
	COURSE CODE	ET232
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET232.CEO.1: To learn the analysis of AC and DC circuits using various techniques.
ET232.CEO.2: To study time-domain and frequency-domain analysis of RL, RC and RLC circuits.
ET232.CEO.3: To learn resonance and filter circuits.
ET232.CEO.4: To study the two port networks parameters and relationship.
ET232.CEO.5: To understand transmission line fundamentals and applications there-of.

COURSE OUTCOMES :

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

ET232.CO.1: Analyze complex linear circuits analytically and graphically. [L4]
ET232.CO.2: Examine the performance of first and second order circuits in time and frequency domain. [L4]
ET232.CO.3: Design and analyze the response of resonance circuits. [L4]
ET232.CO.4: Analyze different filter configurations and applications there-of. [L4]
ET232.CO.5: Inspect two port network of a given electronic circuit. [L4]
ET232.CO.6: Derive general solution of a transmission line and extend the concept to distortion-less line. [L3]

THEORY COURSE CONTENT		
UNIT 1	**Circuit Analysis and Graph Theory**	**8 HOURS**
Circuit analysis: mesh and nodal analysis techniques, Network theorems and applications, Network graphs and its matrices, Equilibrium equations.		
UNIT 2	**Time and Frequency Domain Analysis**	**8 HOURS**
Response of RL and RC circuits for source free and source driven circuits, Concept of Natural and forced response, Natural and forced response of RLC circuits, Analysis of RL, RC and RLC circuits in 's' domain.		
UNIT 3	**Resonance Circuits**	**6 HOURS**
Series Resonance: Impedance, Phase angle variations with frequency, Voltage and current variation with frequency, Bandwidth, Selectivity, Effect of generator resistance on Bandwidth and Selectivity, Magnification factor. Parallel resonance: Resonant frequency and admittance variation with frequency, bandwidth and selectivity, MRI (Case Study).		
UNIT 4	**Filters and Applications**	**7 HOURS**
Properties of symmetrical and asymmetrical networks, Filter fundamentals, Constant k-filters and m-derived filters, terminating half sections, and composite filters, Design of attenuators, study of AM/FM radio (Case study).		
UNIT 5	**Two Port Networks**	**6 HOURS**
Two port networks: Z, Y, h, g, ABCD and abcd parameters along with condition of reciprocity and symmetry, Relation between two port network parameters, Equivalent networks.		
UNIT 6	**Network Transmission Line**	**7 HOURS**
Lines and line parameters, Line of cascaded T section, General solution of transmission line, wave-length, velocity of propagation in transmission line. Distortion-less line, Application to telephone and strip line, Introduction to impedance matching techniques (Self Study).		

PRACTICAL		
PRACTICAL NO.01	**Verification of network theorems**	**4 HOURS**

1. Solve the circuit mathematically to find voltage and current across load
2. Convert given circuit to equivalent circuit using theorems
3. Design and validate above circuits on bread-board

PRACTICAL NO.02	Analysis of RL, RC and RLC circuits	2 HOURS
1. Measure and interpret the transient response of a first-order and second-order circuit 2. Simulate the frequency response of a tuned circuit using circuit simulation software		
PRACTICAL NO.03	**Analysis of series resonance circuits**	**2 HOURS**
To observe the resonance and calculate resonant frequency, band width, quality factor in series resonance circuit		
PRACTICAL NO.04	**Analysis of parallel resonance circuits**	**2 HOURS**
To observe the resonance and calculate resonant frequency, band width, quality factor in Parallel resonance circuit		
PRACTICAL NO.05	**Analysis of Filters**	**4 HOURS**
1. Reactance vs attenuation constant and characteristic of a low pass filter and its impedance 2. Attenuation vs frequency, phase shift vs frequency characteristics		
PRACTICAL NO.06	**Design of symmetrical type attenuator**	**2 HOURS**
1. Design & measure attenuation of symmetrical T attenuator 2. Design & measure attenuation of symmetrical Pi attenuator		
PRACTICAL NO.07	**Calculation of Z and Y parameters**	**2 HOURS**
To find Z and Y parameters of two port network (T and Pi)		
PRACTICAL NO.08	**Design of two port network**	**4 HOURS**
1. Interconnection of two ports (series connection, parallel connection) 2. Design Equivalent networks		
PRACTICAL NO.09	**Measurement of transmission line parameters**	**2 HOURS**
1. Measurement of characteristics impedance, propagation constant. 2. Measurement of VSWR for a given transmission line.		

TEXT BOOK

1. Robert L. Boylestad, Introductory Circuit Analysis , 12^{th} edition, Pearson Education, ISBN-978-0137146666.
2. Ravish R. Singh, Electrical Network, 1^{st} Edition, McGraw Hill Education ISBN-13: 978-0070260962
3. John Douglas Ryder, Networks Lines and Fields, 2^{nd} Edition, PHI, 1949, ISBN: 9788120302990

REFERENCE BOOK

1. D. Roy Choudhary, Network and Systems, 2^{nd} Edition, New Age International, 2010 ISBN: 9788122427677
2. William Hayt, Jack Kemmerly and Steven Durbin, Engineering Circuit Analysis, 8^{th} Edition, Mcgrawhill, 2013, ISBN: 9781259098635
3. Franklin F. Kuo, Network Analysis and Synthesis, 2^{nd} Edition, Wiley, 2010 (ISBN: 9788126510016).
4. M. E. Van Valkenburg, Network Analysis, 3^{rd} Edition, Pearson Education India, 2015 (ISBN: 978-9332550131).
5. S. P.Ghosh and A. K. Chakraborty, Network Analysis and Synthesis, 1^{st} edition, 2009, McGraw Hill Education, ISBN-9780070144781
6. William D. Stanley, Network Analysis with Applications, 4^{th}, 2003, Pearson Education India, ISBN-978-8131703182.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Microcontroller and Interfacing
	COURSE CODE	ET233
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

COURSE OBJECTIVES :

ET233.CEO.1: To get acquainted with the role of microcontroller in embedded system.
ET233.CEO.2: To understand architecture and features of typical microcontroller.
ET233.CEO.3: To study various hardware and software tools for developing applications.
ET233.CEO.4: To learn interfacing of various peripherals with microcontrollers.

COURSE OUTCOMES :

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

ET233.CO.1: Compare the features of different families of the microcontrollers. (L2)
ET233.CO.2: Explain the architecture and features of the 8 bit microcontroller. (L2)
ET233.CO.3: Categorize the software and hardware tools for embedded system development. (L2)
ET233.CO.4: Apply the interfacing techniques for various peripherals with the microcontroller. (L3)

THEORY COURSE CONTENT		
UNIT 1	**Overview of Microcontroller & Microprocessor**	**8 HOURS**
CICS vs RISC architecture, Harvard & Von neumann architecture, Microcontroller vs Microprocessor, Survey on 8/16 bit microprocessor (8085/8086), Inside the microcontroller, Pin diagram, Port Structure, Register Bank, Special Function Registers, Concept of reset, Oscillator, Concept of interrupt, Survey of different families of microcontrollers, Selection Criteria for choosing microcontroller, Instruction Set (Ex. 8051)		
UNIT 2	**Software and Hardware Tools**	**6 HOURS**
Introduction to ALP, Introduction to Embedded-C, Assembler, Compiler, Integrated Development Environment (IDE), Development board, Programmer, Test and Measuring instruments etc.		
UNIT 3	**Microcontroller - Advanced 8 bit**	**6 HOURS**
Architecture [Block Diagram and Pin Diagram], Memory organization, Port Structure, Hardware Stack, Configuration bits (Ex. PIC18Fxxx) .		
UNIT 4	**GPIO Interface**	**8 HOURS**
Interfacing with LEDs, Push Buttons/switch, Buzzer, Relay, 7-segment display, LCD, Matrix Keypad, Digital sensor interface, Analog to Digital Converter (ADC)/Analog sensor, Digital to Analog Converter (DAC), Stepper motor and DC motor		
UNIT 5	**On-chip modules Interface**	**8 HOURS**
Interface of Timers, UART/USART module, Software and hardware interrupts, External interrupt interface		
UNIT 6	**Special Feature Interface**	**6 HOURS**
Master Slave Serial Protocol (MSSP) Communication, Capture-Compare-PWM (CCP) module		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Study of Integrated Development Environment (IDE)		
PRACTICAL NO.02		**4 HOURS**
Perform the interfacing of LEDs, buzzer, relay, push button		
PRACTICAL NO.03		**4 HOURS**
Perform the interfacing of 16 $\times$ 2 LCD display		
PRACTICAL NO.04		**4 HOURS**
Perform the interfacing of ADC module		

PRACTICAL NO.05		**2 HOURS**
Generate a delay using timer module		
PRACTICAL NO.06		**2 HOURS**
Generate Pulse Width Modulation (PWM) of a duty cycle		
PRACTICAL NO.07		**2 HOURS**
Program UART for serial communication		
PRACTICAL NO.08		**4 HOURS**
Perform the interfacing of matrix keypad		

TEXT BOOK

1. Muhammad Ali Mazidi, Rolin McKinlay and Danny Causey, PIC Microcontroller and Embedded Systems Using Assembly and C for PIC18, 1st Edition, Pearson, 2007 (ISBN: 9780131194045)
2. Muhammad Ali Mazidi, Rolin McKinlay and Danny Causey, The 8051 Microcontroller and Embedded Systems: Using Assembly and C 2nd Edition, Pearson Education India, (ISBN: 9788131710265)

REFERENCE BOOK

1. Ramesh Gaonkar, Fundamentals of Microcontrollers and Applications in Embedded Systems with PIC18 Microcontroller Family, 1st Edition, Thomson and Delmar, 2007 (ISBN: 9781401879143)
2. Myke Predko, Programming and Customizing The PIC Microcontroller, 3rd Edition, TMH, 2007 (ISBN: 9780070223509)
3. Douglas V Hall, Microprocessors and Interfacing, 3rd edition, McGraw, (ISBN: 9781259006159)
4. Manuals and Datasheets of PIC Series Microcontroller and Peripherals and 8051
5. Application Notes PIC Series Microcontroller

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Rapid Prototyping
	COURSE CODE	ET235
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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 : NIL

COURSE OBJECTIVES :

ET235.CEO.1: To learn about materiality and techniques.
ET235.CEO.2: To justify the product development cycle through prototype project.
ET235.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET235.CEO.4: To 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,

ET235.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET235.CO.2: Apply acquired skills to the construction of a prototype project.
ET235.CO.3: Develop a prototype project by performing tasks in team.
ET235.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. Civil Prototyping (CP)

In Mechanical prototyping, students will learn rapid prototyping skills. Students will focus on basics of CAD modeling, hands on practice on CAD software, 3D Modeling , 3D Printing, Fabrication of prototype and testing etc.

On the contrary in civil prototyping students will learn developing bamboo structures by testing and analyzing bamboo, designing bamboo joinery, and testing of bamboo structures.

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 two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Rapid Prototyping, Semester - III

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Civil Prototyping (CP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Civil Prototyping (CP)	

MODULE: 1/2	Mechanical Prototyping (MP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to prototyping	04 HOURS

1. Introduction to different prototyping, traditional prototyping vs. advance rapid prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Different types of materials used in prototyping model.
3. Introduction of multi axis (4D and 5D) machines used in prototyping and machining.
4. Making of paper prototyping (virtual or physical).
5. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.

PRACTICAL NO. 2a	Basics of CAD modeling	04 HOURS

1. Introduction of CAD software.
2. Introduction of 2D, 3D Modeling using CAD software package.
3. Hands on practice of CATIA or any other CAD software.
4. Formation of students group per project team.

PRACTICAL NO. 2b	3D Modeling for prototyping	04 HOURS

1. Introduction of 3D modelling and its interaction with prototype machine
2. Identify physical constraints of prototyping.
3. Sketcher-workbench and its applications
4. Part design workbench.
5. Preparation of 3D prototyping model by CAD software for final project

PRACTICAL NO. 03	Preprocessing of 3D printing slicing	03 HOURS

1. Generating STL files of 3D models from CAD software & working on STL files.
2. Pre-Processing the 3D Model in Cuba software / kisslicer - repeater for slicing.
3. Selection of orientation of model, support generation, skin and wall thickness- depth setting.
4. Setting of printing speed, flow rate, volume, mass and time require for printing or manufacturing.
5. Practice of slicing on 3D Cad model and decide optimize parameters.

PRACTICAL NO. 04	Orientation and support generation, manufacturing planning	03 HOURS

1. Suitable filament material for 3D printing and selection and its properties.
2. Selection of material and process for making physical models by other tradition methods (machining, wood, clay, paper, polymer, etc).
3. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Manufacturing and fabrication of model	06 HOURS

1. Introduction 3D printer machines, and other machines used for prototyping.
2. Demonstration of 3D printing machine pre-setting and filament material loading.
3. Hands on experience of rapid prototype machine for part/object/model, manufacturing of conventional prototype model if any, assembly if required.
4. Calculation of cost of product, financial aspect, Bill of material (BOM), testing for prototyping, Plan to promote product/model in market, etc.

PRACTICAL NO. 06	Project presentation	02 HOURS

1. Final Presentation and demonstration of models.
2. 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: 2/2	Civil Prototyping (CP))	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**02 HOURS**
Introduction of bamboo, its physical, mechanical properties, selection, seasoning and treatment, case studies of bamboo structures.		
PRACTICAL NO. 02	**Testing & Analysis of Bamboo**	**04 HOURS**
Study of different test on Bamboo & Analysis of structures made by bamboo.		
PRACTICAL NO. 03	**Design of bamboo Joinery**	**04 HOURS**
Study of different bamboo structures, Hands on different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo structures**	**08 HOURS**
Making of bamboo structures		
PRACTICAL NO. 05	**Testing on bamboo structure (Post Testing)**	**04 HOURS**
Testing of different bamboo structures		
PRACTICAL NO. 06	**Final project presentation**	**04 HOURS**
Comparative study of analytical and test results of the bamboo Structure, 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.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Minor Project Implementation
	COURSE CODE	ET240
	COURSE CREDITS	1
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET240.CEO.1: To disseminate different methodical approaches to make solution.
ET240.CEO.2: To explain different conventional and modern engineering tools/techniques.
ET240.CEO.3: To engage them in creative thinking to improve the project performance using recent trends.
ET240.CEO.4: To educate about different types of prototyping.
ET240.CEO.5: To be more self efficient to solve problem in real time design environment.
ET240.CEO.6: To create awareness about Intellectual Property Rights(IPR).

COURSE OUTCOMES :

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

ET240.CO.1: Select appropriate method for making of solution.
ET240.CO.2: Compare various engineering tools/technique to develop solution.
ET240.CO.3: Justify the selected method/tools opted for making of solution.
ET240.CO.4: Develop tangible solution to defined problem.
ET240.CO.5: Test the developed solution.
ET240.CO.6: Document solution in the form of Project report / IPR drafts.

COURSE ABSTRACT

Project is an avenue to cater Societal and Industrial needs. Minor project is one of the platform which students will use to solve real time problems. This course focuses on Selection of Methods/Engineering tools/Analytical techniques for making of solution.Further it emphasizes on importance of testing of solution by various stake holders.Through this course student learns to comprehensively understand engineering fundamentals and concepts, gets practical experience, chance to showcase skills, learns about team work, communication skills and responsibilities. It also imparts knowledge of Intellectual Property Rights.

Guidelines

1. Group members should deliberate upon different methodical approaches and finalize the appropriate method.
2. Students group should explore different Engineering tools/techniques for making of solution.
3. Justify the selected method/Engineering tools/analytical techniques identified based on the feasibility, affordability and ease of use.
4. While making the solution ,its imperative to take inputs/suggestions from various stake holders.
5. Solution must be critically analyzed from aspects.
6. Completed solution must be tested by target user/stake holders.
7. Students must protect their innovation,proof of concept through IPR .
8. While working in team, individual student should contribute and communicate effectively to maintain team balance.

TIMELINE

1. IPR Activity on Earlier allocated Group : 2 Weeks (1^{st} ,2^{nd} week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (4^{th}, 5^{th} week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (9^{th}, 10^{th} week)
4. Preparation of Project Progress Report I (week 11^{th} and 12^{th}) Project Phase-II
5. Project Review III (10 marks) (11^{th} week)
6. Evaluation by external examiner (End Semester by 12^{th}, 13^{th} week)

Demonstration and Presentation (50 Marks)

1. **Review 1 (Project Implementation) (10 marks)**
2. **Review 2 (Project Demostration) (10 marks)**
3. **Project Activities (10 Marks)**
   - Quiz on IPR (5 marks)
   - Patent Drafting (5 marks)
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration and Presentation (10 marks)**

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Introduction to IPR (Patent & Right) (30 min) Videos on Patent: (30 min)	Student will attempt Quiz-I IPR after the lecture (10 Questions) Graded Activity 5marks Template I	Student will learn the patents and how to search patent
Week 2	How to check patent through CDAC online portal.	Student will do prior art search for their project, and try to generate patent Abstract as per the (Template- II)	Submission of Patent Abstract as per the prescribed Template.
Week-3	Design, Architectural overview /feasibility analysis of the project, Recent trends available to improve the performance.	Discussion on system architecture/ design method/ feasibility of project idea.	Student will implement the best feasible method to generate prototype
Week-4	NIL	Review I (10 Marks) - Presentation	Student will present progress done in project prototype building.
Week-5	Searching of Patents, Drafting of Patents , Filing of Patents , types of patent Application, Patent Documents. Expert lecture on above topic.	Final Drafting of complete patent document (5 marks) Graded Activity	Student will understand the basics of drafting patents, important of filling patent Submission in LMS
Week-6	Presentation, discussion and doubt clearing based on • Working on Algorithms / Design • Working on Analysis • Developing Prototype / Programming/ Circuits etc	As per department / school	Student will learn to prevent design flaws.

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week-7	Presentation, discussion and doubt clearing based on • Working on Algorithms/Design • Working on Analysis • Testing of Prototype/ Code/ Circuits of project	As per department / school	Student will analyze for project outcome
Week-8	NIL	Review-II (10 Marks) - Presentation	Student will work for performance improvement if project not working satisfactorily.
Week-9	Regarding Final PPT For Project Faculty himself gives a presentation based on how to make effective presentation on research topics.	Student will submit the Draft PPT through LMS at the end of Week-10	Student will learn to generate PPT covering all final outcomes of the project.
Week-10	Regarding Final report Generation For Project Faculty himself gives a presentation based on how to make effective project report should explain all guidelines to be followed while preparing report	Student will submit the Draft Project report through LMS at the end of Week-10	Student report are expected to have design Analysis, and the project should be expected to one year with the same guide
Week-11	NIL	Review-III (10 Marks)-Presentation	Students are expected to prepare a detailed project report and Project PPT , they should also check for plagiarism.
Week-12	Final Project presentation and project report submission to the project coordinator. Faculty will review the student projects with external examiner	Presentation and demonstration of project.	Prototypes/Software and Final Project report

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP202
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP202.CEO.1: To increase students confidence during everyday communication.

HP202.CEO.2: To increase impact of students communication during presentations and public speaking.

HP202.CEO.3: To develop Leadership qualities among students.

COURSE OUTCOMES :

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

HP202.CO.1: Express themselves effectively in routine and real-world interactions through verbal and written communication.

HP202.CO.2: Show Confident Public Speaking skills.

HP202.CO.3: To showcase leadership qualities during tough tasks, make decisions and actions effectively within time.

TUTORIALS: (SECTION A)		
TUTORIAL NO.01	**Role Plays and Picture Description**	**4 HOURS**
It helps students to sharpen their extempore skills with effective articulation and logical sequencing of content.		
TUTORIAL NO.02	**Creative Writing Skills and Presentation Skills**	**8 HOURS**
It aims at evolving effective writing skills and presentation skills.		
TUTORIAL NO.03	**Voice Modulation and Audio - Video Listening and Debate**	**8 HOURS**
To enhance listening skills and to teach the students the basic components of voice modulations and helping them practice it. It helps overcome stage fear and learn audience engagement		
TUTORIAL NO.04	**Leadership**	**6 HOURS**
Leadership qualities helps person to lead a team in achieving the set vision. It helps in planning to execute it, utilizing resources and motivating people involved in it.		
TUTORIAL NO.05	**Decision Making**	**4 HOURS**
It helps to make necessary courageous and difficult decisions and carry them into action.		
TUTORIAL NO.06	**Time Management**	**6 HOURS**
It helps organizing and planning how to divide valuable time between specific activities and prioritizing activities.		
SECTION B:	**Verbal, Reasoning and Aptitude Training through BtechGuru**	**12 HOURS**

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Simon Wootton and Terry Horney, Strategic Thinking A Nine Step Approach to Strategy and Leadership for Managers and Marketer, ISBN13: 9780749460778.
5. Lorin Woolfe, The Bible on Leadership: From Moses to Matthew – Management Lessons for Contemporary Leaders, ISBN-10 : 0814439438; ISBN-13 : 978-0814439432.

REFERENCE BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Garr Reynolds, Presentation Zen: Simple Ideas on Presentation Design and Delivery (Voices That Matter) , New Riders; 2 edition (8 December 2011), ISBN-10: 0321811984.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Liberal Learning
	COURSE CODE	HP203
	COURSE CREDITS	AUDIT
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP203.CEO.1: To create awareness about joy of learning among students
HP203.CEO.2: To teach the skills necessary to be a lifelong learner
HP203.CEO.3: To provide students with broad knowledge of the wider worlds.
HP203.CEO.4: To develop a sense of social responsibility as well as strong and transferable intellectual and practical skills.
HP203.CEO.5: To inculcate intellectual, civic, and practical capacities in students.

COURSE OUTCOMES :

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

HP203.CO.1: Develop a skill in the domain of their interest.
HP203.CO.2: Demonstrate the skills learnt in the course.
HP203.CO.3: Apply the concepts learnt in real-life situations.

NOTE : Students may select any one of the following tracks

COURSE CONTENTS

Track 1	**Introduction to photography**	**12 HOURS**

Types of camera, Basic camera controls. Light & Lenses, Understanding the Exposure Triangle. Aperture, Shutter Speed, and ISO. Auto and manual focus, Depth of field Landscape & nature photography, Creative aspects.

Track 2	**Dance**	**12 HOURS**

Study and demonstration of various dance forms such as classical, Bollywood, street dance, ballroom dance and Contemporary.

Track 3	**Creative Writing**	**12 HOURS**

Introduction to Creative Writing-How, literary aspects, different genres, forms of writing and script writing, Short Story Writing. Blog Writing.

Track 4	**Guitar**	**12 HOURS**

Parts of guitar, Names of strings, Proper right hand techniques, Proper left hand techniques, Tuning Guitar, Tuning by Ear, Tuning to a keyboard

Introduction to guitar fret board & The Chromatic Scale- The Chromatic Scale, Fret board, How to read Guitar Tablature, Finger exercises, how to read Chord Blocks.

Track 5	**Art and Craft**	**12 HOURS**

Sketching & Drawing, Elements of Art, types of art forms, types of Painting, Craft, Wrap in scrap, Best out of waste, Paper craft, Cloth craft & Rangoli.

Track 6	**Robotics**	**12 HOURS**

Introduction to Robotics, Robotics Links and joints, Selection & types of sensors, Actuators.

Track 7	**Drama**	**12 HOURS**

Learning & practicing narrations, craft and art conceptualization as an effective presentation, Survey for identification of social and global issues as a concept in script writing, Sound and illumination measures.

Understanding the audition for various sections like drama & film.

Illustrating the dialog delivery, expressions, volume, pitch in the dialog, Expression through photography and editing skill with an expertise in handling cameras, microphone, effective management skill enabling the justification through foundation till representation.

Track 8	**Yoga and Meditation**	**12 HOURS**

Concept of mind, Consciousness. Concentration techniques, Breathing exercises, Visualizations, Walking meditations. Simple yoga, Meditation and prayer, Asana and its types , Pranayama, its types and principles.

Track 9	**Automotive Skills**	**12 HOURS**

Introduction to Automotive system, Brake system, Power train of automotive, Suspension system, Computer Aided Engineering, Manufacturing and safety, Assembly and finishing.

Track 10	**Empathy & Compassion**	**12 HOURS**

Importance of Empathy, Role of empathy and compassion for engineers, Empathy activities, Skepticism About the Self, Free Will and the Situation, Recognizing emotions reading body language, improving listening skills, mindful self compassion, Compassionate Leadership,Origins of Morality, joy of giving, social responsibility, exercising social services.

Track 11	**Singing**	**12 HOURS**

Vocal cords, Voice types, Female: Soprano or alto, Male: Tenor, baritone or bass, Breathing Techniques, Role of breathing in singing, types of scales and pitches, Musical notes foundation of any song, warm-up exercises: Humming exercise, tongue twisters, vowels, Tempo of song, Tempo Markings, Practicing all octaves, analysis of songs, practicing songs.

Track 12	**Chess**	**12 HOURS**

Introduction to game of Chess. Rules, movement of pieces, strengths and weaknesses of all pieces. Stalemate, touch move, etiquette, pawn promotion and zugzwang, square of the pawn. Fundamental checkmate patterns, basic rules, special moves and rules such as castling, promotion, EnPassant, good moves for the opening.

Track 13	**RC Plane**	**12 HOURS**

Introduction to RC planes, study with categorization of planes and study of control forces on RC plane. Study of control surfaces. Study of airfoil, Studying the concepts of take-off, cruising, landing and motions during flight. Study of graphs. Study on factors affecting the flight of plane. Control and propulsion system of RC aircraft. Introduction and making of Electrical glider.

Track 14	Drone Making	12 HOURS

Three thumb rules, Basic of FAA, Combination of electronics, Frame design , Motor stator reading and dimension, Basic of electronics, Introduction to Drones, Fundamental of Flight, Airframes and Electric Motors, ESC and flight controller, Receivers And Transmitter, Battery and chargers, Basic building Tutorial with working on software(Betaflight), FPV and LOS Simulations, Working on development of Betaflight.

NOTE : More tracks will be added as per demand of the students

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Third Year

Bachelor of Technology in Electronics & Telecommunication Engineering

2019-2023

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V

SUMMER INTERNSHIP

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	ET341	Control Systems	3	2	-	35	35	30	50	0	150	4
DC08	ET342	Digital Signal Processing	3	2	-	35	35	30	50	0	150	4
DC09	ET343	Embedded Systems Design	3	2	-	35	35	30	50	0	150	4
OE01	ET35# / EX35#	Open Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP6	ET34#	Skill Development - Data Science	0	4	-	0	0	25	50	0	75	2
SDP7	ET350	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			**14**	**16**	**0**	**140**	**190**	**195**	**200**	**50**	**825**	**22**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	ET361	Power Electronics	3	2	-	35	35	30	50	0	150	4
DC11	ET362	Principles of Communication Systems	3	2	-	35	35	30	50	0	150	4
DC12	ET363	Soft Computing	3	2	-	35	35	30	50	0	150	4
OE02	ET37# / EX37#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP8	ET36#	Skill Development course	0	4	-	0	0	25	50	0	75	2
SDP9	ET360	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability Skills	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**20**	**0**	**140**	**140**	**195**	**250**	**100**	**825**	**22**

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Control Systems
	COURSE CODE	ET341
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET341.CEO.1: Learn the mathematical model and transfer function of LTI systems.
ET341.CEO.2: Study time-domain and frequency-domain analysis of LTI systems.
ET341.CEO.3: Understand concept of stability and methods for inferring stability of a systems.
ET341.CEO.4: Study state variable modeling and its analysis for SISO and MIMO systems.
ET341.CEO.5: Understand the concept of motion control using PID.

COURSE OUTCOMES :

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

ET341.CO.1: Develop the mathematical model of the physical systems.
ET341.CO.2: Develop and analyze state space models.
ET341.CO.3: Analyze the response of the closed and open loop systems.
ET341.CO.4: Analyze the stability of the closed and open loop systems.
ET341.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. **Further Reading:** MAAB & MISRA modelling guidelines		
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. **Case Study:** Developing mathematical model of Battery		
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, Introduction to Model-In-Loop, Software-In-Loop and Processor-In-Loop Testing. **Case Study:** Model Based Design for Embedded Control Systems		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Analysis of Systems.		
PRACTICAL NO.02		**2 HOURS**
Performance Analysis of Closed Loop Systems.		
PRACTICAL NO.03		**2 HOURS**
Analysis of a system using Root Locus.		
PRACTICAL NO.04		**2 HOURS**
Design using Root Locus Method.		

PRACTICAL NO.05		**2 HOURS**
Frequency Response Analysis.		
PRACTICAL NO.06		**2 HOURS**
Design using Frequency Response Method.		
PRACTICAL NO.07		**4 HOURS**
State feedback control of a System.		
PRACTICAL NO.08		**4 HOURS**
PID control of a System.		

TEXT BOOK

1. Katsuhiko Ogata, Modern Control Engineering, 5 th edition, PHI, 2010, ISBN: 978-0136156734.
2. Norman S. Nise, Control Systems Engineering, 8 th edition, Wiley India Edition, 2018, ISBN: 978-8126571833.

REFERENCE BOOK

1. R. C. Dorf and R. H. Bishop, Modern Control Systems, 13 th Edition, Pearson, 2017, ISBN: 978-0134408323.
2. Benjamin C. Kuo and Farid Golnaraghi, Automatic Control Systems, 9 th edition, Wiley-India, 2018, ISBN: 978-8126513710.
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 (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Signal Processing
	COURSE CODE	ET342
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET342.CEO.1: To understand the concept of digital signal processing and its implications
ET342.CEO.2: To explore different transforms & their use in design and analysis of LTI systems
ET342.CEO.3: To explore the design techniques of IIR and FIR filters by different methods
ET342.CEO.4: To analyze concept of multi-rate signal processing & its applications
ET342.CEO.5: To introduce architecture of DSP processor TMS320C5xxx

COURSE OUTCOMES :

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

ET342.CO.1: Analyze LTI systems using DFT
ET342.CO.2: Model & Synthesize IIR and FIR filters
ET342.CO.3: Develop single stage and multi-stage sampling rate converters
ET342.CO.4: Build practical applications using DSP processor in the context of architecture and programming

THEORY COURSE CONTENT		
UNIT 1	**Discrete Fourier Transform**	**9 HOURS**
Introduction to DSP, Basic Elements, Requirements, Advantages and Features Review, Discrete Fourier Transform (DFT): Concept, Properties, Circular and Linear Convolution, FFT Algorithms: Decimation in Time (DIT) and Decimation in Frequency (DIF), Linear Filtering: Overlap-Add and Overlap-Save method **Applications:** Spectral Analysis, JPEG Image compression using DCT & Video Compression using MPEG		
UNIT 2	**IIR Filter Design**	**9 HOURS**
Concept of IIR, Design methods Impulse Invariance, Bi-linear Transformation, Butterworth, Chebychev, Frequency transformations, Filter Structures, Finite word length effect in IIR filter design **Applications:** IIR filter design for real time Applications		
UNIT 3	**FIR Filter Design**	**8 HOURS**
Concept of FIR, Need of Linear Phase, Concept of Group Delay and Phase Delay, Linear phase constraint: Symmetric and Anti-symmetric response, Types of linear phase filter, Design using Window Method and Frequency Sampling Method, Basics of Adaptive Filters. Filter Structures **Applications:** Removal of ECG Signal noise using FIR filter		
UNIT 4	**Multirate Signal Processing**	**8 HOURS**
Concept, Decimation by factor D, Interpolation by factor I, Sampling rate conversion by a rational factor I/D, Filter Design for sampling rate conversion, Multistage approach to sampling rate conversion. Wavelet transform and its relation to multi-rate filter banks **Applications:** Speech & audio coding using Multirate Signal Processing		
UNIT 5	**DSP Processors**	**8 HOURS**
Architecture, Hardware Units, Fixed-Point and Floating-Point Formats Finite Word Length Effects, Programming Issues, Real-Time Implementation. Case Study of Digital Signal Processor TMS320C5xxx: Architecture **Applications:** Implementation of IIR and FIR Filters, FFT Algorithm, Fast Convolution		

PRACTICAL:

The labs 1 to 5 are to be performed using software like C/ MATLAB/ SCILAB etc.

The labs 6 to 7 are to be performed using DSP Processor

PRACTICAL NO.01	**Discrete Fourier Transform (DFT) - Properties and Applications**	**4 HOURS**

1. To implement properties of DFT
2. To find the frequency response from the impulse response using DFT
3. To implement Spectral Analysis Using the DFT

PRACTICAL NO.02	**Spectral Analysis and Leakage Effect**	**4 HOURS**

1. To implement DIT & DIF FFT algorithm
2. To implement Spectral Analysis Using the FFT
3. To find the Spectral Leakage Effect using FFT algorithm
4. To implement DCT using FFT

PRACTICAL NO.03	**IIR Filter Design**	**4 HOURS**

1. To design and implement Butterworth IIR filter using FDA tool and Simulink
2. To design and implement Chebychev IIR filter using FDA tool and Simulink

PRACTICAL NO.04	**FIR Filter Design**	**4 HOURS**

1. To design and implement FIR filter using windowing method
2. To design and implement Low Pass FIR Filtering for high frequency noise removal
3. FIR filter to remove 50/60Hz from an ECG signal

PRACTICAL NO.05	**Multirate Filter Design**	**2 HOURS**

1. Design and Simulate Multirate Filter
2. To design and implement speech signal using Multirate Filter

PRACTICAL NO.06	**DSP Processor**	**2 HOURS**

DSP Starter Kit - Signal Generation, Convolution, I/O Interface

PRACTICAL NO.07	Case Study	2 HOURS
Course project based on society, science and technology problem clubbed with paper implementation (MATLAB or Scilab or Simulink or combination of these) and presentation (Define problem, data collection, requirement analysis, functional analysis. Design solution, progressive presentation of solution and final presentation)		
PRACTICAL NO.08	**DSP Processor Implementation**	**4 HOURS**

1. Implementation of Filter IIR, FIR
2. Implementation of FFT Algorithm

TEXT BOOK

1. John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 4^{th} Ed., Pearson, 2007, ISBN: 9788131710005
2. S. K. Mitra, Digital Signal Processing - A Computer Based approach, 3^{rd} Ed., McGraw Hill Education, 2007, ISBN: 978-007066756
3. Emmanuel C. IFaeachor and Barrie W. Jervis, Digital Signal Processing: A Practical Approach, 2^{nd} Edition, Pearson, 2008, ISBN: 9788131708248

REFERENCE BOOK

1. Alan V. Oppenheim and Ronald W. Schafer, Discrete Time Signal Processing, 3^{rd} Edition, Pearson, 2013, ISBN: 9789332505742
2. Sen M. Kuo and Woon-Seng S. Gan, Digital Signal Processors: Architectures, Implementations and Applications, 1^{st} Ed., Pearson, 2010, ISBN: 9788131717936
3. Li Tan, Digital Signal Processing: Fundamentals and Applications, 1^{st} Edition, Elsevier-Academic Press, 2008, ISBN: 9780123740908
4. P. P. Vaidyanathan, Multirate Systems And Filter Banks, 1^{st} Edition, Pearson, 2008, ISBN: 978-0136057185
5. Wills Tompkins, Biomedical Digital Signal Processing, Prentice Hall, 1999, ISBN: 9780130672162
6. TMS320C5XXX CPU and Instruction Set Reference guide, Texas Instruments, 2000 (www.ti.com)
7. V.K Ingle and J. G. Proakis, Digital Signal Processing using MATLAB, Thompson Brooks / Cole Singapore, 2007

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Embedded System Design
	COURSE CODE	ET343
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET343.CEO.1: To Introduce Hardware/ Software co-design in embedded system
ET343.CEO.2: To Illustrate ARM Cortex processor & its features
ET343.CEO.3: To discuss ARM Cortex based microcontroller & its applications in embedded system
ET343.CEO.4: To explain real world interfacing & programming with ARM

COURSE OUTCOMES :

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

ET343.CO.1: Interpret H/W & S/W co-design.
ET343.CO.2: Explain architecture of ARM processor
ET343.CO.3: Analyze ARM cortex microcontroller with its applications in embedded system.
ET343.CO.4: Develop applications using ARM Cortex based microcontroller.

THEORY COURSE CONTENT		
UNIT 1	**Hardware/ Software Co-design**	**6 HOURS**
Introduction to embedded systems, Characteristics of embedded system, hardware software partitioning techniques, Components & categories of co-design, Hardware / Software system model, Embedded system design and development cycle		
UNIT 2	**Introduction to ARM**	**4 HOURS**
Design approaches - RISC design philosophy, ARMs approach towards RISC, ARM processors and its versions, ARM7, ARM9 & ARM11 features, advantages , Embedded system Hardware & Software, Memory , AMBA bus, Pipeline in ARM		
UNIT 3	**ARM Cortex Processor**	**8 HOURS**
Introduction to ARM CORTEX series processors, Features & Applications, Improvement of CORTEX over classical series, block diagram, Register set and operating modes, Bit banding, Tail Chaining, Thumb & Thumb2 instructions, Mixing ARM and Thumb instructions, Interrupts & Exceptions, Memory Mapping, CMSIS standard for ARM Cortex		
UNIT 4	**ARM Cortex based Microcontroller**	**8 HOURS**
Survey on ARM Cortex based microcontrollers, its features and comparison, ARM CORTEX based controller architecture, Memory mapping, System Control, Clocking & Power control, NVIC, GPIO, Pin connect block.		
UNIT 5	**Real World Interfacing**	**6 HOURS**
Interfacing of LED , GLCD, Keypad, Programming of on chip peripherals ADC, UART, Timer, PWM Case Studies- Home Automation, Patient monitoring system , Smart precision irrigation system		
UNIT 6	**Configuring Communication Protocols**	**8 HOURS**
Programming of I2C, SPI, CAN , ETHERNET, USB, Wi-Fi Case Studies- ECU & ABS control using CAN, Ethernet for IoT, SD card using SPI		

PRACTICAL		
PRACTICAL NO 01		**2 HOURS**
Interfacing & Programming of LED with different patterns		
PRACTICAL NO 02		**4 HOURS**
Interfacing & Programming of Graphical LCD with different patterns		
PRACTICAL NO 03		**2 HOURS**
Programming of on chip UART		

PRACTICAL NO 04		**2 HOURS**
Implementation of on-chip 10-bit ADC (4 / 8 channels)		
PRACTICAL NO 05		**2 HOURS**
Programming on chip PWM for motor control		
PRACTICAL NO 06		**4 HOURS**
Interfacing of EEPROM using in-built I2C Protocol		
PRACTICAL NO 07		**4 HOURS**
Implementation and programming of CAN bus protocol		
PRACTICAL NO 08		**4 HOURS**
Implementation and programming of Ethernet bus protocol		
PRACTICAL NO 09		**4 HOURS**
Implementation and programming of SPI protocol		
PRACTICAL NO 10		**2 HOURS**
Programming of on chip Timer		

TEXT BOOK

1. Andrew N. Sloss, Dominic Symes and Chris Wright, ARM System Developers Guide Designing and Optimizing System Software, 1st Edition, 2014, Morgan Kaufmann Publishers, ISBN:1-55860-874-5
2. Joseph Yiu, The Denitive Guide to ARM Cortex-M3 and Cortex-M4 Processors, 3rd Edition, Elsevier, ISBN: 978-0-12-382090-7
3. Arnold S Berger, Embedded System Design, 1st edition, CMP books, ISBN:1-57820-073-3

REFERENCE BOOK

1. Trevor Martin, The Designers Guide to the Cortex-M Processor Family, 2nd Edition, 2013, Elsevier, ISBN: 9780080982991
2. Steve Furber, ARM System on Chip Architecture, 2nd Edition, 2001, Pearson, ISBN: 9788131708408.
3. Daniel Gajski, Frank Vahid, Sanjiv Narayan, Jie Gong, Specification & Design of embedded system, 2nd edition, 2008, Pearson, ISBN: 978-81-317-1612-0.
4. Technical references and user manuals on www.arm.com

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	IoT Architecture & Sensors
	COURSE CODE	ET352
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET352.CEO.1: Understand the fundamental basics of the Internet of Things
ET352.CEO.2: Explain IoT reference model and its architecture
ET352.CEO.3: Identify sensors, actuators used for IoT applications
ET352.CEO.4: Explain the basic architecture of cloud computing
ET352.CEO.5: Analyze the real world IoT design constraints in IoT application

COURSE OUTCOMES :

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

ET352.CO.1: Apply the basic fundamental to build an IoT application
ET352.CO.2: Analyze various M2M and IoT architectures
ET352.CO.3: Create IoT solutions using sensors, actuators and Devices
ET352.CO.4: Analyze the IoT data with the help of Cloud Computing
ET352.CO.5: Analyze IoT platform design methodology and its constraints

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Internet of Things**	**8 HOURS**
Introduction : History and Evolution of IoT , Definition and Characteristics of IoT, Physical and logical Design of IoT, Communication models APIs, IoT enabling Technologies : WSN, 5G, RFID, Introduction to M2M, Difference between IoT and M2M		
UNIT 2	**IoT Architecture-state of the art**	**10 HOURS**
IoT Architecture: Building architecture, Main design principles and needed capabilities, An IoT architectural overview. **IoT Reference Model:** IoT domain model, Information model, Functional model, Communication Model, Security Model. **IoT Reference Architecture:** Deployment and Operational view.		
UNIT 3	**Sensors and Actuators**	**6 HOURS**
Introduction to Sensors, Classification, Different Types, Properties and Working Principles of Sensors, Introduction to Actuators and its Types		
UNIT 4	**Cloud Computing**	**6 HOURS**
Introduction to Cloud Computing, Cloud Service Models , Cloud Computing Architecture, Management and Security in Cloud Computing		
UNIT 5	**IOT Platform Design Methodology**	**6 HOURS**
Purpose and Requirements specification for IoT, IoT level Specification, Operational view specification, application development **Case studies:** Home automation, Cities: Smart parking, Environment: Whether monitoring system, Air pollution monitoring, Forest fire detection, Agriculture: Smart irrigation		

PRACTICAL		
MODULE 01	**Introduction to IoT Programming**	**2 HOURS**
To implement the Queue using array.		
MODULE 02	**CISCO Packet Tracer** (Any 3)	**6 HOURS**

- To introduce a Blockly Programming
- To use Blockly Programming for interfacing of sensors and actuators with SBC Board
- To build an alarm system with the help of motion sensor and MCU board
- To build an Home automation system using Home Gateway
- To configure various end devices in Packet tracer.

MODULE 03	ESP 8266	12 HOURS

- To build real-time Environment Monitoring System using ESP8266 and ThingSpeak
- To build an Home Automation System using Thinger.io Platform
- To build an Automatic Smart Street Light by Intensity Controller Using Blynk
- To control the LED by ESP8266 as Web Server–IoT

MODULE 04	Raspberry pi	4 HOURS

- Raspberry Pi OS Installation
- Introduction of basic Linux commands

TEXT BOOK

1. Arshdeep Bahga and Vijay Madisetti, Internet of Things, A Hands-on Approach, 1^{st} Edition 2015, University Press, ISBN: 978-81-7371- 954-7
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand and David Boyle, From Machine-to-Machine to the Internet of Things, Academic Press, Elsevier, 2014, ISBN: 978-0-12-407684-6

REFERENCE BOOK

1. Adrian McEwen and Hakim Cassimally, Designing the Internet of Things, Wiley, 2014, ISBN: 978-1-118-43062-0
2. Parikshit N. Mahalle and Poonam N. Railkar, Identity Management for Internet of Things, River Publishers, ISBN: 978-87-93102-90-3
3. Rajkumar Buyya and Amir Vahid Dastjerdi, Internet of Things Principles and Paradigms, Elsevier, 2016, ISBN: 978-0-12-805395-9
4. H. S. Kalsi, Electronic Instrumentation, 3^{rd} Edition 2010, Mcgraw Higher Ed, ISBN: 9780070702066
5. Ramon Pallas-Areny and John G. Webster, Sensors and Signal Conditioning, 2^{nd} Edition 2012, Wiley, ISBN: 9780470054574
6. Reese, G., Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, Sebastopol, CA: O' Reilly Media, Inc., ISBN: 9780596157647, 2009.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Robot Fundamentals and Kinematics
	COURSE CODE	ME352
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME352.CEO.1: To understand the basics of robotics and various robot structures.
ME352.CEO.2: To describe different types of sensors and actuators
ME352.CEO.3: To discuss forward kinematics and Inverse kinematics of robots
ME352.CEO.4: To analyze different transmission system used in robot.
ME352.CEO.5: To evaluate the Trajectory planning techniques used for robots
ME352.CEO.6: To apply the concepts of balancing the robots

COURSE OUTCOMES :

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

ME352.CO.1: List the key components of Industrial robot. [L1]
ME352.CO.2: Classify, sensors and actuators of industrial robots. [L2]
ME352.CO.3: Select transmission system for robots. [L4]
ME352.CO.4: Apply the kinematics and Inverse kinematics principles to robot. [L3]
ME352.CO.5: Determine Trajectory for given robot. [L5]
ME352.CO.6: Build the task based robot by applying knowledge of sensors, actuators. [L6]

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**
Introduction and History, Specifications of Robots, Law of robots, Links and Joints, robot mechanisms ,Classifications of robot, Different configuration of robot, Work envelope ,Degree of freedom of robot , Performance of Robot ,Flexible automation versus Robotic technology Applications of robots. **Self Learning topics:** Recent advancement in Robotics.		
UNIT 2	**Sensor and Actuators**	**8 HOURS**
Sensors: Sensor classification, Internal Sensors, External Sensors, Sensor Selection Criteria, Interfacing with microcontrollers. **Actuators:** Pneumatic, hydraulic, electric (DC, servomotor, stepper motor), Selection of motors, Interfacing with microcontrollers. **Self Learning topics:** Remote Center Compliance Device (RCC)		
UNIT 3	**Power Transmission System & Robot End Effectors**	**6 HOURS**
Power transmitting elements, Transmission system for Industrial Robots and non Industrial Robots, Classification of End effectors, Introduction to robotics grippers, Active and passive grippers. Drive system for grippers. Gripper force analysis and gripper design. **Self Learning topics:** Harmonic Drive and its construction		
UNIT 4	**Kinematics of Robot**	**8 HOURS**
Translational Matrix, Rotation Matrix, Homogenous transformation, Euler's Angle, Denavit Hardenberg parameters, Direct kinematics of a manipulator, Inverse kinematics by Geometric approach and Algebraic approach. Velocity and Static forces in Manipulators **Self Learning topics:** Kinematics model of Industrial Robot		
UNIT 5	**Trajectory Planning and Manipulator Control**	**6 HOURS**
Introduction to trajectory planning, Trajectory generation, Steps in Trajectory planning, Cartesian space & Joint Space Technique, Manipulator control Linear, 2nd order, force control, modeling and control of a single joint. **Self Learning topics:** Potential field method for motion planning		
UNIT 6	**Balancing of Robots**	**6 HOURS**
Centre of Gravity, Static balancing, Dynamic balancing, Balancing of revolving masses and Balancing of reciprocating masses, Critical speed. **Self Learning topics:** Balancing machines. Vibration Isolators		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Topic Selection and component requirement analysis of particular robot.		
PRACTICAL NO.02		**4 HOURS**
Interfacing and programming of different types of sensors with Microcontroller using Electronics Trainer Kit.		
PRACTICAL NO.03		**4 HOURS**
Interfacing and programming DC, Servo motors using Microcontroller with and without Joystick.		
PRACTICAL NO.04		**2 HOURS**
Performance on Pneumatic Actuators using trainer kit.		
PRACTICAL NO.05		**2 HOURS**
Build and simulate the kinematic model of a given robot using a suitable software		
PRACTICAL NO.06		**4 HOURS**
To determine trajectory for a given robot using trajectory planning technique		
PRACTICAL NO.07		**2 HOURS**
Study of Robot operating System (ROS).		
PRACTICAL NO.08		**6 HOURS**
Capstone Project - Build a task based Robot with sensors and Actuators		

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, 2^{nd} edition, ISBN: 978-0201543612
4. Reza Jazar, Theory of Applied Robotics, 2010, Springer US, ISBN: 978-0-387-68964

REFERENCE BOOK

1. Richard Klafter, Robotic Engineering: An Integrated Approach, Prentice Hall, ISBN: 978-8121926164.
2. R K Mittal and I J Nagrath, Robotics and Control, McGraw Hill Publication, 2015, ISBN: 9780070482937
3. Fu K S, Gonzalez R C and Lee C.S.G, Robotics: Control, Sensing, Vision and Intelligence, McGraw Hill, 1987, ISBN: 9780070226258
4. S. K. Saha, Introduction to Robotics, Tata McGraw Hill Publication, ISBN: 978-0070140011

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Fundamentals of Healthcare Technology
	COURSE CODE	ET351
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET351.CEO.1: To acquire the concepts of engineering principles in anatomy and physiology of human body.
ET351.CEO.2: To study sensors, electrodes, basic and latest technological development in Healthcare related to human systems
ET351.CEO.3: To discern the role of engineers in Healthcare sector and e-health services.
ET351.CEO.4: To learn the necessity and applications of Healthcare 4.0
ET351.CEO.5: To get the concepts of smart healthcare instrumentation.
ET351.CEO.6: To study technical aspects of E-healthcare System

COURSE OUTCOMES :

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

ET351.CO.1: Connect the concepts of engineering principles with anatomy, physiology, bio-signals and disorders of the human system.
ET351.CO.2: Explore the sensors, electrodes, basic and latest technological development in Healthcare related to human systems.
ET351.CO.3: Relate the role of engineers in Healthcare sector and tele- health services.
ET351.CO.4: Intricate the Healthcare 4.0
ET351.CO.5: Correlate the necessity of Smart and 3D printing medical devices with the current health-care requirements.
ET351.CO.6: Discover the opportunities of development in e-healthcare System

THEORY COURSE CONTENT		
UNIT 1	**Human Physiology and Bio signal**	**3 HOURS**
Human Anatomy, Physiology, Pathology. Cellular, extra cellular matrix, tissues, organs and systems as integrated system. Bio signal Generation and propagation Action and Resting potential **Self-Study:** Physiological systems of Human body and their Interrelation with each other.		
UNIT 2	**Human Body Systems**	**9 HOURS**
Basic Anatomy, Physiology, deceases / disorders, Bio-signals, Sensors and Electrodes, Basic Technologies, latest technological development in Healthcare for following Human body systems: Cardiovascular System, Nervous System, Respiratory system. **Self-Study:** Special senses (vision, hearing, equilibrium, smell, taste).		
UNIT 3	**Management of Healthcare systems**	**4 HOURS**
Healthcare System/ Hospital: Structure and organization, Management and IT Healthcare. Fostering relation among medical sciences and Engineering - Psychology, Logic interfaces, Social role and Application. Role of Engineer, Equipment and Technologies in every department of a Healthcare System. Biomedical Ethics. Hazards safety.		
UNIT 4	**Healthcare 4.0**	**4 HOURS**
Healthcare 4.0: Overview, necessity and requirements, Management and Technologies, Applications		
UNIT 5	**Smart Healthcare Instrumentation system**	**10 HOURS**
Healthcare Instrumentation system: Smart Medical devices - Internet of Medical Things (IoMT), Affordable medical devices, 3-D Printing Medical devices		
UNIT 6	**e-connected Healthcare system**	**6 HOURS**
E-Healthcare System IT Healthcare, Biotelemetry System, Telemedicine System, M-Healthcare System, E-Pharmacy **Case study:** Tele-ambulance, eICU		

PRACTICAL		
PRACTICAL NO.01	**Charts and Models Home Assignment**	**2 HOURS**
Identification of various organs and skeletal parts from charts and models.		
PRACTICAL NO.02	**Modeling Resting and Action Potential**	**2 HOURS**
Simulate and understand the different stages of action potential and the biophysical explanation behind the generation of action potential.		

PRACTICAL NO.03	ECG measurement and analysis	4 HOURS

- ECG Electrodes, ECG extraction and ECG Analysis.
- Design and Simulate to count pulse rate from ECG.
- Measure pulse rate using finger plethesmography

PRACTICAL NO.04	EEG measurement and analysis	2 HOURS
EEG Electrodes, EEG extraction and EEG Analysis.		

PRACTICAL NO.05	Spirometry	2 HOURS
Recording respiratory parameters through spirometry		

PRACTICAL NO.06	BP Measurement and Analysis	2 HOURS
To study, measure and analyze Blood Pressure using sphygmomanometer / Digital BP Instrument		

SHORT TERM INTERNSHIP (STI):

The main objective of keeping Internship in the course is to give exposure of real world problems in healthcare industry through interaction with medical experts and technician, operating procedure and manufacturing of medical equipment and their limitations.
It will be in two parts: one in healthcare organization and second in healthcare industry.

STI 01	Healthcare organization	8 HOURS
In any hospitals / diagnostic center / Blood bank / pathology labs		

STI 02	Healthcare Industry	8 HOURS
In any Biomedical equipment manufacturing industry		

Outcome of STI:

- Need to present the exposure of work experience gained.
- Identify the problems or requirements in the existing healthcare system / instrument
- Propose the possible solution for identified problem / requirements.
- Work on the proposed solution as a project in next two semesters.

TEXT BOOK

1. K. Saladin, Anatomy & Physiology: The Unity of Form and Function, McGraw-Hill College, 7th edition, 2014.
2. L. Cromwell, F. J. Weibell and E. A. Pfeiffer, "Biomedical Instrumentation and Measurements", Pearson Education, 2nd edition, ISBN: 81-317-0315-0.
3. D. Jude Hemanth, J. Anitha, George A. Tsihrintzis, Internet of Medical Things: Remote Healthcare Systems and Applications (Internet of Things)

REFERENCE BOOK

1. Shalini Suri, Hospital Management and Hospital Operations, APH
2. Gupta Joydeep Das, Hospital Administration And Management: A Comprehensive Guide, Jaypee
3. Joel Rodrigues, Sandra Sendra Compte and Isabel Dez, e-Health Systems- Theory and Technical Applications, 1st Edition

FURTHER READINGS

1. S Ramakrishnan, Manual of Medical Laboratory Techniques, Jaypee Brothers Medical Publishers , First edition, 2012
2. VirtualLabs-NPTELLabsforBiotechnologyandBiomedicalEngineering(vlab.co.in)
3. NeuronSimulationVirtualLab(pilot):BiotechnologyandBiomedicalEngineering: AmritaVishwaVidyapeethamVirtualLab
4. VirtualLabs(vlabs.ac.in)
5. https://www.ncbi.nlm.nih.gov/books/NBK44714/
6. https://www.ncbi.nlm.nih.gov/books/NBK221803/

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Management
	COURSE CODE	CS361
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	NA	NA	50	25	NA	NA	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS361.CEO.1: To create awareness of organizational strategy for project implementation.
CS361.CEO.2: To understand the rules for creating a Work Breakdown Structure for a Project. .
CS361.CEO.3: To illustrate approaches for risk identification, analysis, and assessment.
CS361.CEO.4: To identify key characteristics of a high-performance project team.
CS361.CEO.5: understand the critical success factors in project management.

COURSE OUTCOMES :

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

CS361.CO.1: Identify the Project Management Knowledge Areas and Processes.
CS361.CO.2: Classify the responsibilities while designing the Project Master Plan.
CS361.CO.3: Outline the Cost Estimating and Cost Escalation Process.
CS361.CO.4: Demonstrate and highlight The Processes of Project Quality Management.
CS361.CO.5: Analyze Management of a Project and Maturity Models.

THEORY :		
UNIT 1	**Basics of Project Management**	**6 HOURS**
Contents: Introduction, Need for Project Management, SMART Project, Knowledge Areas and Processes, The Project Manager and Project Management Office, Phases of Project Management Life Cycle, Project environments, Impact of Delays in Project Completions **Case Study:**		
UNIT 2	**Systems and Procedures for Planning and Control**	**5 HOURS**
Contents: Type of Projects, The Project Master Plan, The Project Charter, Project Organization and Responsibilities, Work Breakdown Structure (WBS), Networks Diagrams, The Critical Path, Gantt Charts and Calendar Schedules, CPM, PERT (Project Management Tools: GanttProject, OpenProj) **Case Study:**		
UNIT 3	**Cost Estimating, Budgeting and Risk Management**	**5 HOURS**
Contents: Cost Estimating and Cost Escalation, Cost Estimating Process, Elements of Budgets and Estimates, Risk Management process, Project Risk by Phases, Risk Assessment, Risk Response Planning, Risk Tracking and Response **Case Study:**		
UNIT 4	**Project Quality Management and Organization Behavior**	**5 HOURS**
Contents: The Concept of Quality, The Processes of Project Quality Management, Techniques for Quality Assurance during System Development, Stakeholders, Managing Participation, Teamwork and Conflict. **Case Study:**		
UNIT 5	**The Corporate Context**	**5 HOURS**
Contents: Project Management Maturity and Maturity Models, Knowledge and Time Management, International Projects and associated problems, Entrepreneurs and Startup. **Case Study:**		

TEXT BOOK

1. Project Management for Business, Engineering, and Technology, 3rd Edition, John M. Nicholas and Herman Steyn ELSEVIER ISBN: 978-0-7506-8399-9.
2. Project Management Planning and Control, Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards, Seventh Edition, Eur Ing Albert Lester, B H Copyright 2017 Elsevier Ltd, ISBN: 978-0-08-102020-3.
3. Project Management in Product Development, George Ellis, Copyright 2016 Elsevier Inc, ISBN: 978-0-12-802322-8.
4. Project Management best Practices, 4th Edition, HAROLD KERZNER, Wiley Copyright 2018, ISBN 978-111-9-46885-1.

REFERENCES

1. Project Management Toolbox, Second Edition, Russ J. Martinelli, Dragan Z. Milosevic, Wiley Copyright 2018, ISBN 978-1-118-97312-7.
2. Project Management Essentials You Always Wanted To Know, Kalpesh Ashar, VIBRANT PUBLISHERS
3. The Practical guide to Project Management, 1st Edition, Christine Petersen, ISBN 978-87-403-0524-1
4. Beginning Project Management (e book), John M. Preston
5. Project Management from Simple to Complex, Russell W. Darnall, John M. Preston, The Open University of Hong Kong

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course: Data Science
	COURSE CODE	ET344
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET344.CEO.1: Familiarize basic concepts of python programming
ET344.CEO.2: Summarize the concepts of algebra, calculus and statistics
ET344.CEO.3: Make use of data visualization libraries and feature engineering techniques

COURSE OUTCOMES :

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

ET344.CO.1: Apply python programming concepts
ET344.CO.2: Relate basic concepts of algebra, calculus and statistics
ET344.CO.3: Apply different data visualization libraries and feature engineering techniques

MODULES		
MODULE NO.01	**Python Programming**	**12 HOURS**

1. Basic Python Programming (Syntax, Comments, Variables, Data types, Operations)
2. Data Structures (List, Dictionary, Set, Tuple and operations)
3. Loops and statements (if-else, for, while, continue, break)
4. In-built functions, User defined functions, Lambda function
5. Handling dates
6. Some useful libraries/packages
7. Numpy package
8. Pandas package

MODULE NO.02	Algebra & Calculus	04 HOURS

1. Matrix Algebra
   - Types of matrices
   - Algebraic Operations on matrices
   - Transpose, Determinant, Inverse of matrix
   - Solving System of Linear Equations
   - Eigen values Eigen vectors
   - G-inverse
   - Singular Value Decomposition
   - Applications of Matrix algebra in Business cases
2. Calculus
   - Mathematical Functions
   - Derivatives
   - Integration
   - Gradient Descent Algorithm
   - Applications of Calculus algebra in Business cases

MODULE NO.03	Statistics	18 HOURS

1. Introduction, Visualizing and Summarize different types of data
2. Random variable, Probability and Probability distributions
3. Bernoulli, Binomial, Poisson
4. Normal
5. Population and Sample
6. Sampling Distributions
7. Tests of hypothesis (t-test, Chi-square test, F-test for mean, variance, proportion, attribute dependency)
8. Correlation and Simple Linear Regression

MODULE NO.04	Data Visualization	04 HOURS

1. Data Visualization Libraries in Python
2. Pandas, Matplotlib, Seanborn
3. Data Visualization for different types of data
4. Bar chart, Pie chart, Histogram, Density plot, scatter-plot, scatter-matrix

MODULE NO.05	Feature Engineering	02 HOURS

1. Transformations on data
2. Min-max, Binary, Discrete, Standardize, Log and Power transformations, One-hot-encoding, Zero-One.

REFERENCE BOOK

1. Samir Madhavan, "Mastering Python for Data Science", Packt Publishing; 1^{st} edition, ISBN-13: 978-1784390150, August 2015.
2. Allen B. Downey, "Think Stats: Probability and Statistics for Programmers", O'Reilly Media, Inc., ISBN: 9781449307110, July 2011.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly Media, 1^{st} edition, ISBN-13: 978-1491912058, December 2016.
4. Peter Bruce and Andrew Bruce, "Practical Statistics for Data Scientists", OReilly; 1^{st} edition, ISBN-13:978-1491952962, June 2017.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Design
	COURSE CODE	ET350
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET350.CEO.1: To embrace innovation and creativity in project design while empathizing real world needs.

ET350.CEO.2: To acquaint with requirement analysis process and techniques.

ET350.CEO.3: To inculcate the agile project management tools for project design and planning.

ET350.CEO.4: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

ET350.CO.1: Delineate the problem to be solved.

ET350.CO.2: Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges.

ET350.CO.3: Carry out systematic literature review, planning and project design.

ET350.CO.4: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation. To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation. The first phase of Project Design mainly focuses on formulating systems requirement, background/literature review, and defining scope, objective and apply project management/modeling tools to design proposed solution. This enables students to apply their technical acumen and innovativeness in proposing methodology, milestones, and expected outcome.

GUIDELINES

1. Every project group should consist of minimum 03 and maximum of 04 students.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Project group members and title of the project need to be approved by Project Guide and School.
4. Projects should preferably have a national/international industry/academic/research collaboration.
5. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
6. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
7. Define proposed solution and apply project management/modeling tools for project planning and design.
8. Critically analyze various solutions/techniques to solve real world problems and perform feasibility study to select and justify proposed solution.
9. Define outcome, milestones, definite roadmap for project design, implementation, evaluation and documentation.

COLLABORATIVE/SPONSORED PROJECT

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for final project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization, anytime before the commencement of the sixth semester.
3. Proposed Collaborative Project work need to reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of minimum 12 months to 18 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Exploration of fore front research/specialization areas and opportunities in the various fields.
2. Formation of Project Group. Finalization of area of work/title as per forefront areas.
3. Exploration of abridged courses, valid resources, challenges, relevance with current opportunities.
4. Background study Systematic literature review.
5. Literature review documentation for Project Report and Research Article.
6. Project Review I Presentation.
7. Define problem statement and objectives.
8. Define scope of the work and Outline of the work.
9. Project Design, Modelling, Simulation etc.
10. Proposed Methodology of the solution and its documentation.
11. Project Review II Presentation.
12. Project Documentation: Ethics in Writing
13. Project Documentation: Final Synopsis
14. Project Documentation: Project Report Writing

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Background Study and Literature Review (10 Marks)
2. Synopsis (5 Marks)
3. Project Review I: Problem Identification, Motivation, Relevance, Background Study, Literature Review (10 Marks)
4. Project Review II: Literature Review, Problem Definition, Project Planning, Analysis and Design (10 Marks)
5. Project Report (10 Marks)
6. Final Presentation and Demonstration (30 Marks)

REFERENCES

1. Nicholas John M.,"Project Management for Engineering, Business and Technology", Butterworth Heinemann, ISBN: 9780080967042
2. Michelle Reid, "Report Writing (Pocket Study Skills)"', Second Edition, Macmillan Eduation.
3. Sara Efrat Efron, Ruth David, "Writing the Literature Review : A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
4. Leslie Lamport,"LaTeX: A document preparation system, Users guide and reference manual", Second Edition 1994, Addison Wesley, ISBN: 978-0201529838.
5. Michel Goossens, Frank Mittelbach, Sebastian Rahtz, Denis Roegel and Herbert Voss,"The LaTeX Graphics Companion", Second Edition 2007, Addison-Wesley Professional, ISBN: 078-5342508925.

WEEK WISE ACTIVITIES : PROJECT DESIGN

SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	AY: 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Project Design
	COURSE CODE	ET350
	COURSE CREDITS	2

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Exploration of fore front research/specialization areas and opportunities in the various fields.(School Level Awareness Session)	Students may introspect within themselves to think about their choice of domain areas	Students should be clear about subjects which would lead towards research or towards product related jobs
Week 2	Students are briefed about Specialization open electives tracks and interdisciplinary project available in the institute.(School Level Awareness Session)	Students start deliberating on project ideas by referring to various sources linked directly or indirectly to their minor track.	Open electives and project domain are chosen with close connectivity.
Week 3	Mentor guidelines for abridged courses, valid resources, challenges, relevance with current opportunities	Finalization of area of work/title as per fore front area of the project work, objectives and feasibility study	Greater understanding of the project work and requirement. Synopsis of the Project
Week 4	Guideline to define outcome and roadmap of the project progress for three semester	Define Roadmap of the Project.	Project Synopsis and Review Presentation I
Week 5	Guide introduces a fundamental / recent paper / reports / manuals / book / book-chapter / moocs selective lectures / case study to provide the initial platform of the proposed project. Guideline to identify valid resources and properly read the contents of article.	Valid resources are identified by group. Every student study these resources and articles in detail. Presentation by each student on their understanding about all referred resources.	Collection of state of the art work documents / research papers / research material / industry report / books / blogs / Websites / manuals etc. for the decided topic.

Week 6	Guideline to perform background study /Literature Review and various ways of documenting literature review.(School Level Awareness Session)	Documentation of referred resources, publication details, contribution and identification of opportunities/gap in the field.	Systematic literature review, background study, and its documentation.
Week 7 and 8	Guidelines for defining problem statement, objectives, and scope of the work.	Explore related work and define problem statement, objectives etc.	Refinement in proposed work /synopsis if any.
Week 9	Verification and Validation of Project Proposal created by students.	Refinement in the proposal as per suggestion by guide and review members.	Review Presentation II.
Week 10 and 11	Introduction of tools for Project Design, Modelling, Simulation and planning etc. Verification of the Proposed Methodology of the solution.	Use various software/hardware tools for Project Management, Project Design, and Simulation. Description of methodology. Algorithm Steps, Process, Modules, milestones. System Architecture, Modeling diagrams etc.	Design Documentation, Graphical Presentation of proposed solution and entire planning of project implementation and evaluation.
Week 12 and 13	Introduction to Project Report Writing tools and plagiarism checking. Guidelines for Project Documentation and Ethics in Writing. (School Level Awareness Session)	Prepare the Project Report as per format shared by Project Coordinator.	Project Documentation: Project Report Writing, Final Synopsis.
Week 14	Verification of Project Report, Final Synopsis prepared by Students	Refinement in the project report as per suggestion by guide and review members.	Review Presentation III.
Final End Semester Examination: Project Design: Report, Presentation and Demonstration.			

NOTE:

1. *School should organize awareness sessions on topics highlighted in RED.*
2. *Suggested to provide templates for project documents at the starting of the semester such as Synopsis, Literature Review, Report, Review Presentation I, II, III and Final Presentation*

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Power Electronics
	COURSE CODE	ET361
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET361.CEO.1: Understand working & analysis of controlled converters.
ET361.CEO.2: understand the working of 1 φ and 3 φ inverters.
ET361.CEO.3: Study and analyze applications like UPS, electronic ballast, HVDC transmission.
ET361.CEO.4: Study use of power electronics for renewable energy sources.

COURSE OUTCOMES :

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

ET361.CO.1: Design and implement a triggering / gate drive circuit for power converters.
ET361.CO.2: Design and analyze different power electronic converters.
ET361.CO.3: Analyze various power quality issues and their remedies.
ET361.CO.4: Analyze applications of power electronics.

THEORY COURSE CONTENT		
UNIT 1	**Power Semiconducting Devices**	**6 HOURS**
Construction, Principle of operation : Power diodes, SCR, TRIAC, MOSFET, IGBT; Methods of turning ON SCR, Methods of Driving/Firing circuits, SCR commutation circuit, series and parallel connections, Study of datasheet, Protection of SCR.		
UNIT 2	**Converters : Rectifiers**	**8 HOURS**
Introduction to Uncontrolled Rectifier, Single phase Semi & Full wave rectifiers with R and RL load and effect of freewheeling diode, Three phase controlled Semi & Full wave rectifiers with R and RL load and effect of freewheeling diode and effect of source inductance. Input and output performance parameters like power factor. **Application:** Triggering circuit for mobile charger, Control circuit for Household UPS.		
UNIT 3	**Converters : Inverters**	**8 HOURS**
Operation of Single phase half / full bridge voltage source inverter with R and RL load and performance parameters. Voltage control of single phase PWM inverter, harmonic neutralization technique. Three phase voltage source inverter with balanced R star load with 120and 180 mode of operation.		
UNIT 4	**DC-DC converters & AC Voltage Controller**	**6 HOURS**
Working principle of step down chopper, step up chopper, Control strategies, Classification of Chopper, Online and Offline UPS. Single-phase AC voltage controller with R load, Cyclo-converters, types of cyclo-converter. **Application:** Control circuit for SMPS of a desktop.		
UNIT 5	**Power Electronics Applications - Electric Vehicle - I**	**6 HOURS**
Overview, Components of electric vehicles, General Layout of EV, EV Classification, Comparison with Internal combustion Engine and hybrid electric vehicle : Technology, Advantages and Disadvantages of EV. Energy Sources Techniques; Introduction to EV charging strategies, EV charging options and infrastructure. Overview of Tesla car.		
UNIT 6	**Power Electronics Applications - Electric Vehicle - II**	**6 HOURS**
Introduction and operation of brushless DC motor, Commutation of brushless motor, Speed change of brushless motor using PWM technique. PI control of brushless motor with electric vehicle as load and calculation of performance parameters overshoot, rise time, settling time and stability.		

PRACTICAL: Perform following experiments using PSIM, MATLAB or Open source software		
PRACTICAL NO.01		**2 HOURS**
Design and Implement Triggering circuit for Thyristor (Using R or RC or UJT or IC-785)		
PRACTICAL NO.02		**2 HOURS**
VI Characteristics of SCR, IGBT, MOSFET / Study of datasheets.		

PRACTICAL NO.03		**2 HOURS**
Simulation of AC-DC conversion		
PRACTICAL NO.04		**2 HOURS**
Simulation of DC-AC conversion		
PRACTICAL NO.05		**2 HOURS**
Simulation of DC-DC conversion		
PRACTICAL NO.06		**2 HOURS**
Simulation of AC-AC conversion		
PRACTICAL NO.07		**2 HOURS**
Study of various elements of the transmission system (clutch, differentials, gearbox, etc.)		
PRACTICAL NO.08		**2 HOURS**
Speed control of DC motor using IGBT		
PRACTICAL NO.09		**2 HOURS**
Speed Control of BLDC Motor		
PRACTICAL NO.10		**2 HOURS**
Case study of Tesla car/ Toyota prius.		

TEXT BOOK

1. M. H. Rashid, "Power Electronics circuits, devices and applications", 3^{rd} edition, Pearson Education, 2014, ISBN-13: 978-93325357704.
2. Robert W. Erickson, "Fundamentals of Power Electronics", 2^{nd} Edition, Kluwer Academic Publishers, 2001, ISBN-13: 978-0792372707.
3. James Larminie and John Lowry, "Electric Vehicle Technology Explained", 2^{nd} Edition, Wiley Publication, 2012, ISBN: 978-1-119-94273-3.

REFERENCE BOOK

1. U. R. Moorthi, "Power Electronics, Devices, Circuits & Industrial Applications", Oxford University Press India; 1^{st} Edition, 2005, ISBN: 978-0195670929.
2. M. S. Jamil Asgar, "Power Electronics", PHI Learning Private Limited-New Delhi; 1^{st} Edition, 2004, ISBN: 978-8120323964.
3. D. P. Kothari, "Renewable Energy Sources and Emerging Technologies", PHI Learning Private Limited-New Delhi; 2^{nd} edition, 2011, ISBN: 978-8120344709.
4. Mehrdad Ehsani, Yimin Gao and Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Standards media", 2009, ISBN: 978-1420053982.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Principles of Communication Systems
	COURSE CODE	ET362
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET362.CEO.1: Study the fundamental concepts of communication engineering
ET362.CEO.2: Scrutinize various modulation and demodulation techniques
ET362.CEO.3: Understand the concept of random variables and processes as applied to communication engineering
ET362.CEO.4: Learn transmitter and receiver techniques
ET362.CEO.5: Examine error performance in digital communication system
ET362.CEO.6: Understand information theoretic behavior in communication system, several source and channel coding techniques

COURSE OUTCOMES :

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

ET362.CO.1: Illustrate the fundamental concepts and terminologies of communication systems
ET362.CO.2: Inspect different analog modulation, demodulation schemes along with transmitter and receiver circuitry
ET362.CO.3: Explain the concept of random variables and processes with statistical parameters
ET362.CO.4: Analyze various source and channel coding methods
ET362.CO.5: Examine optimum receiving techniques and error performances of digital modulation schemes

THEORY COURSE CONTENT		
UNIT 1	**Communications Systems**	**6 HOURS**
Elements of communication Systems, Terminologies in communication, Modulation and Demodulation, Noise analysis		
UNIT 2	**Analog Modulation**	**8 HOURS**
Principles and types of analog modulation, Types of Amplitude and Angle modulation, Spectra of AM and FM, AM and FM transmitter and receiver		
UNIT 3	**Random Variables and Processes**	**8 HOURS**
Random Variables, Probability density function, Cumulative distribution function, marginal and conditional distributions, mean, variance, correlation, covariance, Gaussian distribution, Random process, Types of random processes		
UNIT 4	**Digital Modulation Techniques**	**8 HOURS**
Signal space representation, Orthogonal expansion of signals, Gram Schmidt process, Digital modulation techniques: Amplitude, phase and frequency shift keying, Pulse Code Modulation, Delta Modulation, Continuous phase modulation		
UNIT 5	**Optimum Receivers**	**8 HOURS**
Channel model, Maximum Aposteriori Probability and Maximum Likelihood receiver, Error probability, Correlation and Matched filter receiver, Optimal Detection and Error Probability for ASK, PSK and QAM		
UNIT 6	**Information Theory, Capacity and Coding**	**8 HOURS**
Introduction to information theory, Mutual Information, Source encoding and decoding, Channel capacity, Channel encoding and decoding, Hamming codes, Error correction and detection capability		

PRACTICAL: Perform following experiments using MATLAB and LabVIEW - USRP 2901		
PRACTICAL NO.01	**Amplitude Modulation**	**2 HOURS**
Investigate classical analog amplitude modulation and the envelope detector (Hardware and/or Software experiment)		
PRACTICAL NO.02	**Double Sideband Suppressed Carrier**	**2 HOURS**
Generate Double Sideband Suppressed Carrier (Hardware and/or Software experiment)		
PRACTICAL NO.03	**Frequency Modulation**	**2 HOURS**
Generate and demodulate Frequency Modulated waveform (Hardware and/or Software experiment)		
PRACTICAL NO.04	**Amplitude Shift Keying**	**2 HOURS**
Transmit and receive ASK signal (Hardware and/or Software experiment)		

PRACTICAL NO.05	**Frequency Shift Keying**	**2 HOURS**
Transmit and receive FSK signal (Hardware and/or Software experiment)		
PRACTICAL NO.06	**Binary Phase Shift Keying**	**2 HOURS**
Perform BPSK modulation technique (Hardware and/or Software experiment)		
PRACTICAL NO.07	**Quadrature Phase Shift Keying**	**2 HOURS**
Perform QPSK modulation technique (Hardware and/or Software experiment)		
PRACTICAL NO.08	**Equalization**	**2 HOURS**
Study of equalization technique to deal with inter symbol interference (Software experiment)		
PRACTICAL NO.09	**Error Performance of any Digital Modulation Scheme**	**2 HOURS**
Simulate any digital modulation scheme and analyze its error performance (Software experiment)		
PRACTICAL NO.10	**Any Source code/Channel Code implementation**	**2 HOURS**
Write a code to implement any one source code or channel code (Software experiment)		

TEXT BOOK

1. Wayne Tomasi, "Electronic Communications Systems: Fundamentals through Advanced", Pearson-Always Learning, 5^{th} edition ISBN : 987-8131719534
2. George Kennedy, Bernard Davis and S R M Prasanna, "Electronic Communication Systems", McGraw Hill Education Pvt. Ltd. 5^{th} Edition, ISBN (13) : 978-0-07-107782-8
3. John G. Prokis and Masoud Salehi, "Communication Systems Engineering", Pearson-Always learning, 2^{nd} edition ISBN-13: 9787040169058

REFERENCE BOOK

1. Simon Haykin, "Communication System", 4^{th} Edition, Wiley publications, ISBN 0471178691
2. Amitabha Bhattacharya, "Digital Communication", TMH, ISBN 9780070591172
3. Bernard Sklar, "Digital Communication" , Pearson, 2^{nd} Edition, ISBN: 9788131720929
4. P. Ramkrishna Rao, "Digital Communication", TMH, ISBN: 9780070707764
5. Peyton Z. Peebles Jr., "Probability, Random Variables and Random Signal Principles", 4^{th} Edition, Tata McGraw-Hill, New Delhi, 2002, ISBN: 978-0071127820
6. H. Stark and J. W. Woods, "Probability and Random Processes with Applications to Signal Processing", Pearson, 2003, ISBN: 978-0130200716

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Soft Computing
	COURSE CODE	ET363
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	NIL	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET363.CEO.1: Illustrate the basic concepts and techniques of machine learning.

ET363.CEO.2: Explore supervised and unsupervised learning paradigms of machine learning for regression and classification

ET363.CEO.3: Develop a deeper understanding of several algorithms in machine learning.

ET363.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,

ET363.CO.1: Explain fundamentals of machine learning.

ET363.CO.2: Describe supervised and unsupervised learning.

ET363.CO.3: Analyze mathematically various machine learning approaches and paradigms.

ET363.CO.4: Implement machine learning solutions for classification, regression, and clustering problems.

ET363.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**	**6 HOURS**
Introduction to Machine Learning, Types of Learning, Linear Regression, Logistic Regression, Concept of Underfitting and Overfitting, Bias-Variance Tradeoff, Model assessment, Cross Validations, Accuracy and Error measures, Confusion metric, Precision, Recall, F1 Score, Analysis of ROC, AUC.		
UNIT 2	**Statistics and Probabilistic Learning**	**8 HOURS**
Probability Concept, Decision Trees, Random Forest, Nave Bayes, Introduction to Ensemble Methods		
UNIT 3	**Supervised Machine Learning Algorithm**	**6 HOURS**
K Nearest Neighbors (KNN.) Support Vector Machine, Optimization Objective of SVM, Maximum Margin Principle, Lagrangian Multipliers for SVM and Kernel Function.		
UNIT 4	**Artificial Neural Network**	**8 HOURS**
Neural Network Representation, Perceptron, Activation Function and Types, Multilayer Network and Backpropagation Algorithm.		
UNIT 5	**Unsupervised Learning**	**8 HOURS**
Feature Space, Dimensionality Reduction, Principal Components Analysis (PCA), Principal of Clustering, K-Means, Hierarchical Agglomerative clustering, Case Study Using Clustering Algorithm.		
UNIT 6	**Open CV for Computer Vision**	**8 HOURS**
Introduction to OpenCV, Installation, Image Operations eg. read, display, writing, reading and setting image properties. opening video, Capture Video/Frame from Camera, applying functions on frame, Drawing geometric shapes on frame eg. line, rectangle, circle, ellipse, polygon, text. Arithmetic Operations on Image, ROI, RBG and HSV Color Space. Case Study on Computer Vision using Machine Learning Algorithm		

PRACTICAL		
PRACTICAL NO.01	**Experimental Data Analysis: Perform following operations on any open dataset available in Python/Kaggle**	**2 HOURS**

- Load data into a data frame from a csv or any other file format.
- Identification of variables and data types.
- Find Missing Values. Replace/eliminate missing values
- Drop unessential columns.
- Find average/min/max of numeric columns. Display summary of data frame.
- Bivariate analysis using plots through seaborn functions, cleaning the data, plotting graphs.

PRACTICAL NO.02	Liner Regression and Logistic Regression Model Implementation on Given Dataset	4 HOURS
• Build a Linear Regression Model using Real estate price prediction dataset. • Developed a Logistic regression model for classification.		
PRACTICAL NO.03	**Implementation of Decision Tree, Random Forest, KNN, Nave Bayes with hyperparameter tunning**	**4 HOURS**
Developed Supervised Learning Model on selected Dataset.		
PRACTICAL NO.04	**Machine Learning for Image Classification**	**2 HOURS**
• Use of SVM for Image Classification. • Implementation of PCA		
PRACTICAL NO.02	**Implementation of Unsupervised Machine Learning**	**2 HOURS**
Implement both the k-means algorithm and the Hierarchical Agglomerative Clustering (HAC) algorithm		
PRACTICAL NO.06	**Implementation of IOT Solution using Machine Learning**	**4 HOURS**
• Data Collection. • Data Cleaning, Filtering and Feature Extraction • Evaluation and Identification of ML Model • Training the ML Model • Outcome Predication • ML Model Deployment.		
PRACTICAL NO.07	**ANN for Computer Vision**	**2 HOURS**
• Creating Simple Neural Network. • Implement ANN for Image Classification.		
PRACTICAL NO.08	**Open CV for Computer Vision**	**2 HOURS**
Use Open CV Library for Image Processing		

TEXT BOOK

1. Ethem Alpaydin, "Introduction to Machine Learning", 2^{nd} Edition, MIT Press, ISBN: 978-0-262-01243-0
2. Christopher Bishop, "Pattern Recognition and Machine Learning", 2^{nd} Edition, Springer. 2006, ISBN-13: 978-0387310732
3. Andreas C. Mller and Sarah Guido, "Introduction to Machine Learning with Python: A Guide for Data Scientists", 1^{st} Edition, O'Reilly Media, ISBN 978-14-4936-941-5
4. Tom Mitchell, "Machine Learning", 1^{st} Edition, McGraw-Hill Science/Engineering/Math, 1997, ISBN: 0070428077

REFERENCE BOOK

1. Trevor Hastie, Robert Tibshirani and Jerome Friedman, "The Elements of Statistical Learning", 2^{nd} Edition, Springer-Verlag,2009, ISBN: 978-0-387-84857-0
2. Kevin Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012, ISBN: 9780262018029
3. Simon Haykin, "Neural Networks: A comprehensive foundation", Prentice Hall International Inc. 1999, ISBN: 0132733501

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	IoT Network and Protocols
	COURSE CODE	ET372
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

ET372.CEO.1: Categorize the basic taxonomy and terminology of networking.
ET372.CEO.2: Correlate the functioning of various protocol as per communication layer.
ET372.CEO.3: Appraise the importance of computer network in IoT applications.
ET372.CEO.4: Illustrate the cryptography and network security techniques.

COURSE OUTCOMES:

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

ET372.CO.1: Interpret fundamentals underlying principles of networking
ET372.CO.2: Prioritize networking protocol as per the real time applications
ET372.CO.3: Articulate the cryptography techniques used in network security
ET372.CO.4: Defend various security parameters related to network

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Networking**	**8 HOURS**
Layered Architecture, Design Issues for layers, Introduction to OSI and TCP/IP model, Addressing Types, Switching Systems: Circuit and Packet Switching, Error Detecting Techniques, Error Correction, Data Link Controls		
UNIT 2	**Networks Protocols**	**6 HOURS**
Routing Algorithm: Distance Vector Routing Algorithm, Link State Routing, Network Addressing : IPv4 and IPv6, RPL, TCP, UDP, HTTP, DHCP, CAN Protocol		
UNIT 3	**Communications Protocols**	**10 HOURS**
IEEE 802.11 : CSMA/CA, IEEE 802.15: Bluetooth and ZigBee, Z- Wave, BLE, Wireless HART, CoAP, AMQP, MQTT, NFC, LoRa, RFID		
UNIT 4	**Introduction to Cryptography**	**8 HOURS**
Threats in Networks, Introduction to the Concept of Security, Cryptographic Techniques, Symmetric and Asymmetric Key Cryptographic Algorithms, One-Time Pads, The Vernam Cipher, Data Encryption Standard (DES) Algorithm, Advanced Encryption Standard (AES) Algorithm, RSA algorithm and Diffle-Hellman key exchange algorithm		
UNIT 5	**Network Security**	**8 HOURS**
Public Key Infrastructure (PKI): Digital Signature Properties of Digital Signature, Public Key Protocol; Certificates; Certificate Authorities, Secure Socket Layer (SSL) SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) Features, Components, Dual Signature		

PRACTICAL		
PRACTICAL NO.01	**CISCO Packet Tracer (any 2)**	**4 HOURS**

1. Study of basic network command and Network configuration commands.
2. Configure a Network using Distance Vector Routing Protocol
3. Configure a Network using Link State Routing Protocols
4. Implementation of File Transfer Protocol
5. Half Duplex Chat Using UDP
6. Full Duplex Chat Using TCP/IP

PRACTICAL NO.02	IoT Programming (any 3)	6 HOURS

1. Implementation of Error Detection / Error Correction Techniques
   (a) Write a program for Error Detection using CRC-CCITT
2. Data Encryption and Decryption
   (a) Program to implement One Time Pad Cipher
   (b) Program to implement Data Encryption Standard (DES)
   (c) Program to implement RSA algorithm
   (d) Program to implement Diffle-Hellman key exchange algorithm

PRACTICAL NO.03	Raspberry pi / ESP 8266 (any 3)	6 HOURS

1. Build an Home Automation System using Google assistant, IFTTT, Adafruit. io and MQTT
2. Interfacing of Bluetooth HC-05 module
3. Interfacing of Bluetooth XBee module
4. Create a Z-Wave Smart Home hub
5. Interfacing of RFID Module

PRACTICAL NO.04	Cloud Computing AWS	8 HOURS

1. Introduction to AWS IoT Service
2. Use of IAM, SNS, SQS and AWS MQ service
3. Build an IoT application with AWS IoT

TEXT BOOK

1. Andrew S. Tenenbaum, "Computer Networks", PHI, ISBN 81-203-2175-8.2.
2. Fei Hu, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms and Implementations", ISBN 9781498723183, 2016

REFERENCE BOOK

1. Holger Karl and Andreas Willing, "Protocols and Architectures for Wireless Sensor Networks", Wiley India, ISBN:9788126533695
2. B. Fourauzan, "Data Communications and Networking", 5^{th} Edition, TataMcGraw-Hill Publications
3. Reese, G., "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud", Sebastopol, CA: O' Reilly Media, Inc., ISBN: 9780596157647, 2009.
4. Brian Russell and Drew Van Duren, "Practical Internet of Things Security", Packt Publishing Ltd. ISBN: 9781788625821, 2018.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Robot Dynamics and Control
	COURSE CODE	EX371
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

EX371.CEO.1: Introduce robotic control system and robotic control problem.
EX371.CEO.2: Understand the time domain modelling approach
EX371.CEO.3: Introduce various control techniques and methodologies applied to trajectory tracking problems in robotics.
EX371.CEO.4: Study the manipulator motion and statics
EX371.CEO.5: Explore the dynamic modeling of various types of robots

COURSE OUTCOMES:

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

EX371.CO.1: Explain block schematic of robotic control system
EX371.CO.2: Design of controller using state space.
EX371.CO.3: Develop control law for a given application
EX371.CO.4: Compute the manipulator motion and statics
EX371.CO.5: Apply knowledge of mathematics to obtain the dynamic model of robotic arm

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**6 HOURS**
Elements of Control system, Open and Closed loop Control, Transfer function of manipulator joint, Manipulator control problem, Stability and Analysis using Root Locus and Frequency Response. **Self-Study:** Characteristics of second order linear system, SISO tool for design of system		
UNIT 2	**Modeling via State Space**	**8 HOURS**
Mathematical modeling of electro-mechanical systems for position and Velocity control: State space approach, Controllability and Observability concepts, Introduction to Observer and Controller design (based on acceleration, velocity and position feedback). **Self-Study:** Modeling of DC Motor		
UNIT 3	**Stability and Control of Manipulators**	**8 HOURS**
Lyapunov Stability, Linear Control Methods, Single-axis PID control, PD-Gravity control, Computed torque control, Variable-structure control, Impedance control **Case Study:** Control system in Industrial Automation		
UNIT 4	**Manipulators Motion and Statics**	**8 HOURS**
Velocity of Rigid Body, Manipulator Jacobian, Analysis of - 2 Axis and 3 Axis Planar, Four axis SCARA Robot		
UNIT 5	**Robot Dynamic Modeling**	**10 HOURS**
Lagranges Method, Inertial properties of rigid bodies, Newton-Euler equations for a rigid body, Dynamics of a two-link planar robot, Lagrangian for an open-chain manipulator.		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
To Model and Analyze non-linear system		
PRACTICAL NO.02		**2 HOURS**
To design of compensator using Root locus/Frequency Response method/Pole placement		
PRACTICAL NO.03		**2 HOURS**
To study Lyapunov stability of given system		
PRACTICAL NO.04		**2 HOURS**
To study of PID tuning of a system		
PRACTICAL NO.05		**2 HOURS**
To study and program industrial Robot		
PRACTICAL NO.06		**2 HOURS**
To study collaborative Robot (Cobot)		

PRACTICAL NO.07		**2 HOURS**
To design line follower robot		
PRACTICAL NO.08		**2 HOURS**
To program PLC to implement control for robotic arm.		
PRACTICAL NO.09		**2 HOURS**
Project work and seminar		

TEXT BOOK

1. Richard Murray, Z Li and S Sastry, "A Mathematical Introduction to Robotic Manipulator", CRC Press, 1^{st} edition, ISBN-13: 978-0849379819
2. Katsuhiko Ogata, "Modern control engineering", Pearson, 5^{th} edition, ISBN-13 : 978-0136156734
3. R K Mittal and I J Nagrath, "Robotics and Control", McGraw Hill Publishing, 6^{th} edition, ISBN : 0-07-048293-4

REFERENCE BOOK

1. Mark Spong and M. Vidyasagar, "Robot Dynamics and Control", John Wiley & Sons, 1989, ISBN : 9812-53-078-9
2. Robert J. Schilling, "Fundamentals of Robotics-Analysis and Control", PHI, ISBN : 978-81-203-1047-6
3. Andrew J Kurdila, "Dynamics and Control of Robotic Systems", John Wiley and Sons Ltd, ISBN : 9781119524830

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Healthcare Informatics
	COURSE CODE	ET371
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET371.CEO.1: To introduce the basic concept of biomedical signal acquisition, preprocessing, and analysis

ET371.CEO.2: To study of biomedical signal preprocessing, processing, and analysis methods for various problem statements

ET371.CEO.3: To exposure of medical algorithms for diagnosis and detection

ET371.CEO.4: To introduce the advancement of technologies in healthcare

COURSE OUTCOMES :

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

ET371.CO.1: Illustrate the role of healthcare informatics and the significance of Electronics health records

ET371.CO.2: Transform biomedical signals

ET371.CO.3: Analyze biomedical signals

ET371.CO.4: Design medical algorithms for diagnosis and detection

ET371.CO.5: Elaborate the role of data visualization and analytics in healthcare

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**8 HOURS**
Introduction to Healthcare Informatics Triple aim of healthcare: Care, health and cost, Role of healthcare informatics in achieving the triple aim, Introduction to Electronics health records (EHR), EHR implementation challenges, Information Retrieval, Bioinformatics. **Case study:** Evidence-based medicine		
UNIT 2	**Biomedical signal acquisition and preprocessing**	**8 HOURS**
Acquisition of 1D, 2D, and 3D biomedical signals, Noise, Motion artifacts, Power-line interference, and other artifacts during acquisition, preprocessing, and artifact removal methods. **Self-learning:** Artifacts in various signals and image modalities		
UNIT 3	**Biomedical signal analysis**	**6 HOURS**
Statistical, Time, Frequency, and Time-Frequency analysis of the biomedical signal. **Case Study:** Feature extraction for the neurological and cardiovascular disorder **Self-learning:** Application of Transform		
UNIT 4	**Medical algorithms and Medical decision making**	**10 HOURS**
Machine Learning algorithms for healthcare data, Feature selection methods, thresholding-based detection methods, Calculation classification performance, and medical decision-making process (diagnosis, treatment, and monitoring). **Self-learning:** Study of various abnormal conditions and their correlation with the biomedical signal		
UNIT 5	**Data analytics and visualization in healthcare**	**8 HOURS**
Introduction: techniques and their applications, Data analytics life cycle, data visualization and analytical tools and their application in healthcare, Challenges and future of big data in healthcare, Introduction to Big data tools in healthcare **Case study:** Predicting onset (type-2) of diabetes from medical records using binary class classification **Self study:** Data visualization for COVID-19 data		

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Import different biomedical signals.		
PRACTICAL NO.02		**2 HOURS**
Implementation of noise and artifact removal for EEG or ECG signals (for given problem statements).		

PRACTICAL NO.03		**4 HOURS**
Time-frequency analysis of the biomedical signal (for given problem statements).		
PRACTICAL NO.04		**4 HOURS**
Healthcare data classification and regression (for given problem statements).		
PRACTICAL NO.05		**4 HOURS**
Visualizing and analysis of healthcare data with data visualizing and analysis tools (for given problem statements).		
PRACTICAL NO.06		**4 HOURS**
Implementation of machine learning model using spark (for given problem statements).		

TEXT BOOK

1. R M Rangayyan Biomedical Signal Analysis: A case Based Approach, IEEE Press, John Wiley & Sons. Inc, 2002
2. D C Reddy Biomedical Signal Processing: Principles and Techniques, Tata McGraw-Hill Publishing Co. Ltd, 2005
3. Wager, K. A., Lee, F. W., & Glaser, J. P. (2017). Health care information systems: A practical approach for health care management -4th Edition
4. Pantea Keikhosrokiani Big Data Analytics for Healthcare, Academic Press

REFERENCE BOOK

1. Stephan P. KudybaHealthcare Informatics: Improving Efficiency and Productivity, CRC press
2. Edward H. Shortliffe, James J. Cimino, Biomedical Informatics: Computer Applications in Health Care and Biomedicine (Health Informatics), Springer, 2006

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course - Networking
	COURSE CODE	ET364
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET364.CEO.1: Configure various networks

ET364.CEO.2: Analyze switching and routing of information

COURSE OUTCOMES :

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

ET364.CO.1: Assign various IP address in network

ET364.CO.2: Install and configure the web server

ET364.CO.3: Configure network for routing and switching

PRACTICAL: Perform following experiments using Open source software (Packet Tracer)		
PRACTICAL NO.01		**2 HOURS**
Network commands & IP address configurations.		
PRACTICAL NO.02		**2 HOURS**
Fault detection of Cable tester for of UTP-CAT5 Cross / 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		
PRACTICAL NO.10		**2 HOURS**

Mini Project

1. Connection and configuration of a basic switch.
2. Configuration of basic router.
3. Setup an email server.

TEXT BOOK

1. Behrouz A. Forouzan, "Data Communications and Networking", 4^{th} Edition, TATA McGraw Hill , ISBN - 9780070634145
2. Andrew Tanenbaum, "Computer Networks", 4^{th} Edition, Pearson Education.ISBN-9780130661029 3. Kurose and Ross, "Computer Networking: A top Down Approach featuring the Internet". 3^{rd} edition, Pearson Education,ISBN-9788131790540

REFERENCE BOOK

1. Behrouz A. Forouzan, "TCP/IP protocol Suit", 3^{rd} edition, TATA McGraw Hill, ISBN 9780070706522
2. Wayne Tomasi, "Introduction to Data Communication & Networking", 1^{st} edition, Pearson Education, ISBN - 9788131709306

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	MATLAB Based System Modeling
	COURSE CODE	ET365
	COURSE CREDITS	2
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

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 : NIL

COURSE OBJECTIVES :

ET365.CEO.1: To reduce computational complexity and improve efficiency
ET365.CEO.2: To utilize the concept of OOP in MATLAB environment
ET365.CEO.3: To get explore to app designing part in various domain
ET365.CEO.4: To build a model using Simulink and simscape environment

COURSE OUTCOMES :

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

ET365.CO.1: Implement methodology to improve efficiency of MATLAB programming code
ET365.CO.2: Exploit the concept of OOP in MATLAB
ET365.CO.3: Create an application using App Designer
ET365.CO.4: Build a system model in electrical, mechanical and power domain
ET365.CO.5: Design a user friendly application

PRACTICAL		
PRACTICAL NO.01	**Computational Complexity and Efficiency**	**6 HOURS**
• Algorithmic complexity • Vectorization • Efficiency in practice		
PRACTICAL NO.02	**Object Oriented Programming**	**10 HOURS**
• Introduction • Handle Classes • More on OOP • Trying it together		
PRACTICAL NO.03	**App Designing**	**10 HOURS**
• New version of GUI • General example of App Designing • App designing in Image Processing, Communication, Signal processing		
PRACTICAL NO.04	**Simulink and Simscape**	**8 HOURS**
• Electrical modelling • Mechanical modelling • Power modelling		
PRACTICAL NO.05	**Application**	**8 HOURS**
• Standalone application • Project		

TEXT BOOK

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
3. Harold Klee, Randal Allen Simulation of Dynamic Systems with MATLAB and Simulink CRC Press, 3rd edition, 2017, ISBN-13: 978-1498787772

REFERENCE BOOK

1. Ned Mohan, Advanced Electric Drives: Analysis, Control, and Modeling Using MATLAB / Simulink, Wiley Publication, 1st edition, 2014, ISBN-13: 978-1118485484
2. Dorothy C. Attaway, MATLAB: A Practical Introduction to Programming and Problem Solving, Butterworth-Heinemann Pub., 5th edition, 2018, ISBN-13: 978-0128154793

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Project Implementation
	COURSE CODE	ET360
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	4	NIL	NIL	NIL	NIL	75	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET360.CEO.1: Understand latest techniques, algorithms, models and design process in the field of project

ET360.CEO.2: Implement/develop/experiment/simulate techniques, algorithms and processes in software and real time

ET360.CEO.3: Upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

ET360.CO.1: Analyze techniques, algorithms and design process relate to the project

ET360.CO.2: Implement/develop/experiment/simulate/test techniques/process and infer conclusions from it.

ET360.CO.3: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project design phase in Sem V (project design), next step is project implementation (Sem VI). The goal of this phase of the project is to implement/develop/experiment/simulate/test the techniques/processes of the project and give a mature shape. The implementation can be a combination of algorithms, techniques, processes, testing etc. This will also include drawing inferences from the results and discussing them.

GUIDELINES

1. Preferably project group students of Sem V would be continued in this semester VI.
2. Every project group should consist of minimum 03 and maximum of 04 students.
3. The group members may be from different programs to support the interdisciplinary functioning.
4. Project group members and title of the project need to be approved by Project Guide and School.
5. Projects should preferably have a national/international, industry/academic/research collaboration.
6. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
7. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
8. Define proposed solution and apply project management/modeling tools for project planning and design.
9. Define outcome, milestones, definite roadmap for project design, implementation, tools, resources, performance evaluation and documentation.
10. Perform refinement of System architecture & methodology.
11. Students should give a mature shape to their idea in terms of implementation. This is expected in this semester. This may include one or many of these points. Implementation /development/experimentation/simulation/testing/building the techniques/processes

COLLABORATIVE/SPONSORED PROJECT

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization at the start of semester VI.
3. Proposed Collaborative Project work need to be reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of 12 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Freezing of project groups and titles. Refinement of title and objectives from Sem V should freezed by the time of first review.
2. Final Synopsis of the project. (To be done at guide level)
3. Methodology / System Design / Block Diagram should be properly explained by the student
4. Project Review I Presentation.
5. Project Implementation: Students should take the work in one and/more of the points. Like Implementation/development/experimentation/simulation/testing/experimental yield/building the techniques/processes etc
6. Based on the points discussed in 5, student would be able to get results and discuss them. Students should be able to draw inferences from results.
7. Project Review II Presentation.
8. Quality of Publication and Researchers: Students would be educated on different technical papers and their importance (article types, journal metrics etc) along with author/researcher credentials.
9. Project Documentation: Project Report Writing

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I: Problem Statement and objectives, Implementation plan & action (algorithms/techniques/models/mathematical understanding/implementation) (10 Marks)
2. An activity on illustrating methodology. This may inlcude paper reading activity: Read and Summarize a paper in 1 page (Individual to every student of the group). Any other activity can also be taken take would illustrate methodology (10 marks)
3. Project Review II: Results and Implementation, Observations, Inferences, Discussion on algorithms / techniques /models / testing) (10 Marks)
4. Article Quality and Author Credentials: Information about Research Article types, paper quality metrics (SCI/SCOPUS/WOS) and Author Credentials (Citation count, h-index, I10 index etc) (5 marks)
5. Project Report (10 Marks)
6. Project: Documentation Final Presentation and Demonstration (30 Marks)

(Parameters of evaluation: Final implemented work, report, presentation and paper drafted based on work)

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Larsen Samuel Bruning, "Doing Projects And Reports In Engineering", Macmillan Education UK, Bloomsbury Publishing PLC, 2019, ISBN: 9781352005639, 1352005638.
3. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
4. Sara Efrat Efron and Ruth David, "Writing the Literature Review: A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
5. Helmut Kopka and Patrick Daly, "A Guide to Latex: Document preparation for beginners and advanced users", Addison Wesley, 1999.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Employability and Career Development
	COURSE CODE	HP305
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EVALUATION SCHEME :					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	60	15	75

PRE-REQUISITE : Professional Skills :

COURSE OBJECTIVES :

HP305.CEO.1: To define the importance of Employability skills in students life.
HP305.CEO.2: To explain them necessary, specific Employability Career Development skills.
HP305.CEO.3: To appraise students for placements through acquisition of professional skills.
HP305.CEO.4: To support them detect their present level in respect of each Career Development skill and show direction for improvement.

COURSE OUTCOMES :

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

HP305.CO.1: Relate the importance of Employability Career Development (L2)
HP305.CO.2: Build necessary, specific professional skills (L3)
HP305.CO.3: Analyze the environment of employability (L4)
HP305.CO.4: Develop various techniques of effective team building in their professional life (L6)

SECTION A : Personal Development With Help of Professionals (30 MARKS)		
PRACTICAL NO.01	**Self-Management**	**2H**
Concept of Johari Window,Advantages and disadvantages of every quadrant,Identifying the proportion of each quadrant in respect of self, Using the tools of self-evaluation, self-development and Goal Setting, Stress management, Career anchor.		
PRACTICAL NO.02	**Personal Interviews**	**4H**
Preparing for Interviews, Typical expected questions suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions.		
PRACTICAL NO.03	**Group Discussion and Public Speaking**	**4H**
Parameters of assessment,Initiating the discussion,Effective listening,Own contribution,Paraphrasing,Arguing and counter-arguing, Giving direction to the discussion, Public Speaking skills.		
PRACTICAL NO.04	**Team building and Motivation**	**2H**
Hallmark of effective teams, Barriers to teamwork, Subjugation of Individual interests for achievement of teams goal, Leading motivating team members		
PRACTICAL NO.05	**Innovative Thinking**	**2H**
Relevance and importance of innovative thinking, Introduction to Brain Storming technique,Collective and individual Brain Storming.		
PRACTICAL NO.06	**Profile Development**	**4H**
Resume Writing: Introduction to the Resume, Key Components of a Resume and Cover Letter, Enhancing tips for Resume and Cover Letter. Letter of recommendation (LOR) preparation: Details on types, samples, structure, content tips format for letters of recommendation for student. Statement of Purpose (SOP) preparation: SOP Formats, Templates, and Guidelines for SOP Writing. Job application and professional email writing.		

Section B	Aptitude Training With Help of BtechGuru Platform	30 Marks

1. Number System
2. HCF LCM , Surds and Indices.
3. Percentages and Average.
4. Time and work.
5. Time, Speed and Distance.
6. Probability.
7. Quadratic Equations.
8. Profit and Loss.
9. Simple and Compound Interest.
10. Ratio and proportion.
11. Permutation and Combination.
12. Boats and Streams, Pipes and Cisterns.
13. Mixtures and Allegations, Mensuration.
14. Data Interpretation – Tables, Pie Charts, Bar Graphs, Line Graphs.

Section C	Final Assessment With Help of Career Assessment Test.	15 Marks

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGrawHill Education; 2 edition, ISBN-10: 1259643271.
3. R S Agrawal, Quantitative Aptitude, S. Chand Publishing (2020), ISBN: 9789352534029, 9789352534029.
4. Shakuntala Devi, Puzzles to Puzzle You, Orient Paperbacks, ISBN: 9788122200140, 9788122200140

REFERENCE BOOK

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

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Final Year

Bachelor of Technology in Electronics & Telecommunication Engineering

2019-2023

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: VII												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC13	ET461	HDL-Digital Circuit Design	3	2	-	35	35	30	50	0	150	4
DE01	ET48# / EX48#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	ET47# / EX47#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	ET46#	Skill Development Course	0	4	-	0	0	25	50	0	75	2
SDP11	ET470	Project Evaluation	0	8	-	0	0	50	0	100	150	4
SDP12	ET400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	ET462	Process Automation	3	2	-	35	35	30	50	0	150	4
DE01	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	-	-	0	50	25	0	0	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**185**	**50**	**75**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DE02	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
SDP14	ET467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP15	ET468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**70**	**70**	**60**	**50**	**300**	**550**	**15**

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	HDL - Digital Circuit Design
	COURSE CODE	ET461
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET461.CEO.1: Explore PLD applications in VLSI
ET461.CEO.2: Introduce Verilog HDL programming
ET461.CEO.3: Implement Digital Designs with Verilog
ET461.CEO.4: Give exposure of verification methodology with digital circuits

COURSE OUTCOMES :

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

ET461.CO.1: Analyse different architectures of PLDs
ET461.CO.2: Comprehend the basic concepts of Verilog
ET461.CO.3: Model digital circuits with Verilog, simulate, synthesis and prototype in PLDs
ET461.CO.4: Examine the verification process for given digital circuit

THEORY COURSE CONTENT		
UNIT 1	**VLSI Design Flow**	**8 HOURS**
Overview of the VLSI design flow, Hardware Description Language: History, Types, Brief comparison of Hardware Description Languages, Digital Logic Circuits and PLDs: PAL, PLA, CPLD-Features and Architecture, Applications; FPGA Features and Architecture, Applications **Case Study:** CPLD/FPGA Analysis with Xilinx/Altera Series		
UNIT 2	**Verilog HDL-I**	**6 HOURS**
Program Structure, Logic System, Nets, Variables, Constants, Vectors & Operators, Arrays, Logical Operators & Expressions. **Case Study:** Study and analysis of synthesis aspects with Verilog programming		
UNIT 3	**Verilog HDL-II**	**6 HOURS**
Hierarchical Modeling Concepts, data types, Modules and Ports, Gate-Level Modeling, Dataflow Modeling, Behavioral Modeling, Test Bench **Case Study:** Study and analysis of synthesis aspects with Verilog programming		
UNIT 4	**Digital circuits with Verilog**	**8 HOURS**
Verilog implementation of Digital Circuits: Combinational and Sequential circuits: Arithmetic circuit design, Multiplexers, FSM modeling, Data path, controller design, Memory modeling **Case Study:** Practical applications of FSM like traffic light/Coffee vending/ General Purpose Processor		
UNIT 5	**System Verification**	**8 HOURS**
Verification Process, Basic testbench functionality, Directed testing, Testbench components, Constrained-Random stimulus, Connecting the test bench and design, Functional coverage **Case Study:** Combinational Logic verification		
UNIT 6	**HDL Applications**	**6 HOURS**
HDL Application Study: Communication Applications, Processor Design, SoC Application, Image processing, Electric motor control, Memory Design		

PRACTICAL: Modeling and Functional Simulation, synthesis and implementation on PLDs of the following digital circuits (with Xilinx ISE/ Vivado tools/Mentor Graphics Tools) using Verilog Hardware Description Languages.		
PRACTICAL NO.01		**2 HOURS**
Design and implement Multiplexers in Verilog		
PRACTICAL NO.02		**2 HOURS**
HDL design for Arithmetic Logic Unit		
PRACTICAL NO.03		**2 HOURS**
Design and implementation of basic sequential circuits		

PRACTICAL NO.04		**4 HOURS**
Design of sequence detector (FSM)		
PRACTICAL NO.05		**4 HOURS**
Design and implement Counters in Verilog		
PRACTICAL NO.06		**2 HOURS**
Memory Design using Verilog HDL		
PRACTICAL NO.07		**2 HOURS**
Verification of Combinational Circuit		
PRACTICAL NO.08		**2 HOURS**
Verification of Sequential Circuit		

TEXT BOOK

1. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis,2nd Edition Publisher: Prentice Hall PTR Pub , February 21, 2003, ISBN: 978-0132599702.
2. Ashok B Mehta, "ASIC/SoC Functional Design Verification: A Comprehensive Guide to Technologies and Methodologies, Springer
3. Enoch O. Hwang, "Digital Logic and Microprocessor Design With VHDL, Thomson Engineering

REFERENCE BOOK

1. Wyane Wolf, "Modern VLSI Design (System on Chip), 4th Edition, Pearson Education,2008, ISBN: 9780137145003
2. Chris Spear, "System Verilog for Verification: A Guide to Learning the Testbench Language Features Springer
3. John F Wakerly, "Digital Design-Principles and Practices, 4th Edition Pearson education, ISBN : 9780131863897.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Deep Learning
	COURSE CODE	ET481
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET481.CEO.1: To illustrate the basic concepts and techniques of Deep Learning
ET481.CEO.2: To explore Convolution Neural Network and Sequence Model
ET481.CEO.3: To develop a deeper understanding of Deep Learning algorithms
ET481.CEO.4: To implement Deep Learning algorithms for solving practical problems

COURSE OUTCOMES :

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

ET481.CO.1: Explain fundamentals of Neural Network and Deep Learning
ET481.CO.2: Describe Convolution Neural Network
ET481.CO.3: Explain Sequence Model and Encoder Decoder Model
ET481.CO.4: Develop Deep Learning model for classification and object detection
ET481.CO.5: Evaluate the performance of Deep Learning models

THEORY COURSE CONTENT		
UNIT 1	**Deep Learning Basics**	**9 HOURS**
Introducing Neural Computation, Perceptron, Feedforward Neural Network, Gradient Descent, Backpropagation, Momentum, Stochastic GD, AdaGrad, RMSProp, Adam. Bias-Variance Tradeoff, Regularization, Early stopping, Dataset augmentation, Dropout. Better weight initialization methods, Batch Normalization. Difference between Classical Machine Learning and Deep Learning. Various activation functions, Deep Learning process. Deep Learning using Convolutional Neural Network (CNN). The importance of striding, dilation, pooling used in CNN **Case Study:** Image Classification using MLP and CNN		
UNIT 2	**Convolution Neural Networks and Transfer Learning**	**9 HOURS**
Convolution Neural Networks, LeNet, AlexNet, VGGNet, Inception-V3, ResNet, Mobilenet.Visualizing Convolution Neural Networks using Transfer Learning **Case Study:** Image Classification using Transfer Learning		
UNIT 3	**Object Detection**	**6 HOURS**
Object Detection Using Yolo, Object Detection Using Faster R-CNN, ROI-CNN, Mask R-CNN **Case Study:** Object Detection on Image using Yolo		
UNIT 4	**Sequence Model**	**8 HOURS**
Introduction to Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTMs), Gated Recurrent Units (GRUs), Vanishing and Exploding Gradients, Backpropagation through time (BPTT), Generative Adversarial Networks (GAN) **Case Study:** Text Analysis		
UNIT 5	**Encoder Decoder Models**	**8 HOURS**
Introduction to Encoder Decoder Models, Denoising Autoencoders, Sparse Autoencoders		

TEXT BOOK

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.10.
2. Daniel Graupe, Deep Learning Neural Networks: Design and Case Studies, WorldScientific Publishing Co., Inc., 2016.
3. Andreas C. Mller and Sarah Guido, Introduction to Machine Learning with Python: A Guide for Data Scientists, First Edition, O'Reilly Media, ISBN 978-14-4936-941-5

REFERENCE BOOK

1. Ral Rojas, Neural Networks: A Systematic Introduction, 1996
2. Christopher Bishop, Pattern Recognition and Machine Learning, 2007
3. Simon Haykin, Neural Networks: A comprehensive foundation, Prentice Hall International Inc., 1999, ISBN: 0132733501.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Image Processing
	COURSE CODE	ET482
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET482.CEO.1: To identify various basic operations on an image
ET482.CEO.2: To analyze spatial and frequency domain processing on an image
ET482.CEO.3: To design an algorithm for image compression and segmentation
ET482.CEO.4: To develop algorithms for features extraction and filtering
ET482.CEO.5: To get acquainted with basic possibilities and constraints of computer vision

COURSE OUTCOMES :

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

ET482.CO.1: Analyze fundamentals of image processing
ET482.CO.2: Develop an algorithm for spatial and frequency domain filtering
ET482.CO.3: Determine various image compression and segmentation techniques
ET482.CO.4: Design various applications based on image processing
ET482.CO.5: Solve the problems in the field of robotics and other vision based applications

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**	**10 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**	**6 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 **Case Study:** Real time application in Biomedical field		
UNIT 6	**Computer Vision in Image Processing**	**6 HOURS**
Introduction to OpenCV, Image formation and Image model, Radiometry, Representation of color, Filters and Convolution,Edge detection, Texture Representation, The Geometry of multiple views.Segmentation by fitting a model, Segmentation and fitting using probabilistic methods. Geometric methods, Data segmentation.		

TEXT BOOK

1. Rafael C Gonzalez and Richard E Woods, Digital Image Processing, 3rd Edition, Pearson, 2013 ISBN: 9789332518469.
2. S. Jayaraman, S Esakkirajan, T Veerakumar, Digital Image Processing, 3rd Edition, Tata McGraw Hill, 2011, ISBN: 9780070144798.

REFERENCE BOOK

1. S. Annadurai and R. Shammugalakshmi, Fundamentals of Digital Image Processing, 1st Edition, Pearson, 2007, ISBN : 8177584790
2. William K Pratt, Digital Image Processing, 4th Edition, Willey, 2010,ISBN: 9788126526840
3. Arthur Weeks Jr., Fundamentals of Digital Image Processing, 1st Edition, Wiley-IEEE, 1996,ISBN: 9780780334106.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electric Vehicle
	COURSE CODE	ET483
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET483.CEO.1: To understand the Vehicle Dynamics, Modelling and Simulation
ET483.CEO.2: To become familiar with Electric motor and their controller
ET483.CEO.3: To study the battery Modelling and its Parameters
ET483.CEO.4: To learn Model Based Development using MATLAB and SIMULINK
ET483.CEO.5: To become familiar with different Electric vehicle case studies

COURSE OUTCOMES :

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

ET483.CO.1: Model vehicle parameters
ET483.CO.2: Explore the EV motors and their controllers
ET483.CO.3: Develop the battery modelling and its parameters
ET483.CO.4: Illustrate the Model Based Development using MATLAB and SIMULINK
ET483.CO.5: Analyse different Electric vehicle case studies

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Vehicle Dynamics: Modelling and Simulation**	**10 HOURS**
Roadway Fundamentals, Laws of Motion, Tractive Effort,- Rolling Resistance Force, Aerodynamic Drag, Hill Climbing Force, Acceleration Force, Total Tractive Effort, Modelling Vehicle Acceleration- Acceleration Performance Parameters-Modelling the Acceleration of an Electric Scooter, Modelling Electric Vehicle Range- Driving Cycles- Range Modelling of Battery Electric Vehicles- Constant Velocity Range Modelling **Case study:** Dynamic Modelling of Three Wheeler		
UNIT 2	**Electric Motors and their Controllers**	**8 HOURS**
Electric Motors fundamentals and characteristics - Brushless Electric Motors- The Brushless DC Motor, Permanent magnet Synchronous Motors, Motor Cooling, Efficiency, Size and Mass, DC Regulation and Voltage Conversion.		
UNIT 3	**Battery Modelling**	**8 HOURS**
Battery basics, Battery Parameters- Battery Capacity, Discharge Rate, State of charge, state of discharge, Depth of discharge, Technical Characteristics- Practical Capacity, Capacity Redefined, Battery Energy, Constant Current Discharge, Specific Energy, Battery Power- Specific Power, Battery Pack Design, Ragone Plots, Battery modelling, Battery pack sizing and design issues **Electric Vehicle Case Study:** GM EV1,Nissan Leaf, Mitsubishi Miev, Design of a Battery Electric Vehicle (BEV).		
UNIT 4	**Model Based Development using MATLAB and SIMULINK**	**8 HOURS**
Overview of Automotive Industry, Software Development demands of Automotive Industry, Model Based Development in Automotive Industry & Model Based Development in MATLAB, Requirement Analysis in Model Based Development, Model Based Development Configuration Parameters Settings, Introduction to ADAS & Levels of Autonomous Driving, Overview to ADAS Features **Case study:** Vehicle Direction Detection, Adaptive Cruise Control		
UNIT 5	**Battery Charging**	**8 HOURS**
Battery Chargers: Conductive (Basic charger circuits, Microprocessor based charger circuit. Arrangement of an off-board conductive charger, Standard power levels of conductive chargers, Inductive (Principle of inductive charging, Soft-switching power converter for inductive charging), Battery indication methods Charging Infrastructure: Domestic Charging Infrastructure, Public Charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone.		

TEXT BOOK

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric,Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design,CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003

REFERENCE BOOK

1. Chris Mi, M. Abul Masrur, David Wen zhong Gao, Hybrid Electric Vehicles Principles and Applications with Practical Perspectives, 2011, Wiley publication.
2. Dharmeja Sandeep,(2000) Electric vehicle battery systems Newnes.
3. Pillai S.K., A first course on Electrical drives,New age International (P) Ltd.
4. M. H. Rashid, Power Electronics Devices, Circuits and Applications, 3rd ed., Pearson, 2004
5. C. C. Chan and K. T. Chau, Modern Electric Vehicle Technology, Oxford Science Publication, 2001

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	RTOS
	COURSE CODE	ET484
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET484.CEO.1: To Illustrate the characteristics of real-time embedded applications
ET484.CEO.2: To provide the knowledge of real time kernel
ET484.CEO.3: To make use of Scheduling and synchronization in RTX.
ET484.CEO.4: To elaborate the inter task communication in RTX
ET484.CEO.5: To study popular RTOS

COURSE OUTCOMES :

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

ET484.CO.1: Explain the characteristics of real-time embedded applications
ET484.CO.2: Interpret the RTX Kernel Structure
ET484.CO.3: Apply Scheduling and synchronization in RTX
ET484.CO.4: Utilize the inter task communication in RTX for an application
ET484.CO.5: Summarize popular RTOS

THEORY COURSE CONTENT		
UNIT 1	**Real-Time Software System Concepts**	**8 HOURS**
Foreground/ Background systems, Critical section of code, Resource, Shared resource, multitasking, Task, Context switch, Kernel, Scheduler, Non-Preemptive Kernel, Preemptive Kernel, Reentrancy, Round robin scheduling, Task Priorities, Static & Dynamic Priority, Priority Inversion, Assigning task priorities, Mutual Exclusion, Deadlock, Clock Tick, Memory requirements, Advantages & disadvantages of real time kernels		
UNIT 2	**RTOS Kernel Structure**	**8 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. **Application:** Identification of the services to lift management system **Self-Study:** RTLinux/Vxworks Kernel structure		
UNIT 3	**Scheduling in RTX**	**8 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 **Application:** Finalizing the task behavior and designing it for lift management system **Self-Study:** RTLinux/Vxworks Process states and data structures		
UNIT 4	**Synchronization in RTX**	**8 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 **Application:** Identify need of synchronization and imbibe in lift management system **Self-Study:** RTLinux/Vxworks Synchronization.		
UNIT 5	**Inter task Communication in RTX**	**8 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 **Application:** Software integration of lift management system **Self-Study:** RTLinux/Vxworks Inter task communication. Mechanism.		

TEXT BOOK

1. Rajib Mall, Real-Time Systems: Theory and Practice, Pearson Education, 2007, ISBN: 9788131700693
2. Getting Started for ARM Processor-Based Microcontrollers Building Applications with RL-ARM, by Keil Tools by ARM. (Keils Online support Document)

REFERENCE BOOK

1. Dr. K V K Prasad, "Embedded Real time Systems: Concept, design and programming, Dream tech press. New Edition (2003) ISBN-13: 978-8177224610.
2. Jonathan Valvano, "Embedded Systems: Real-Time Operating Systems for the Arm Cortex-M3, Create Space Independent Publishing Platform; Fourth edition (2012), ISBN-13: 978-1466468863
3. RL-ARM User's Guide, by Keil Tools by ARM. (Keils Online support Document)
4. Technical references and user manuals on www.arm.com

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Data Management & Analytics
	COURSE CODE	ET472
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET472.CEO.1: To identify the different types of data
ET472.CEO.2: To illustrate the basic concept of database management system
ET472.CEO.3: To demonstrate basic operations with DBMS
ET472.CEO.4: To outline the steps involved in carrying out routine data analysis tasks
ET472.CEO.5: To summarize the basic concepts of big data analytics

COURSE OUTCOMES :

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

ET472.CO.1: Demonstrate the data lifecycle
ET472.CO.2: Apply basic concepts of database management system
ET472.CO.3: Apply basic operations with DBMS
ET472.CO.4: Infer the importance of the domain context for data analytics
ET472.CO.5: Illustrate basic concepts of big data analytics and their components
ET472.CO.6: Analyze the database system design, implementation, and maintenance

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**7 HOURS**
Type of data, data classification, data lifecycle, purpose of database systems and applications, view of data, database languages, relational databases, database design, database architecture, introduction to data mining and data warehouse **Self-Study:** Data storage		
UNIT 2	**Introduction to Relational Database and SQL**	**8 HOURS**
Relational database structure, database schema, keys, relational query languages and operations, overview of the SQL query, SQL data definition language (DDL), normalization **Self-Study:** Schema diagrams		
UNIT 3	**Intermediate SQL**	**10 HOURS**
SQL data manipulation language (DML), data control language (DCL), transaction control language (TCL), basic operations, aggregate functions with grouping, sub-queries, join expressions, views, integrity constraints **Self-Study:** Date & Time types in SQL, Authorization		
UNIT 4	**Data Analytics**	**10 HOURS**
Requirements and importance of data analytics, quality issues for data analysis, data analysis task, EDA, types of data analytics, data analytics tools		
UNIT 5	**Big Data Analytics**	**7 HOURS**
Introduction to Big Data, Big Data Analytics: Hadoop, Introduction to Hadoop Distributed File System (HDFS), Introduction to Map Reduce, YARN **Self-Study:** Cloud Platform		

PRACTICAL		
MODULE 01	**SQL**	**7 HOURS**

On any relational database case study, perform and execute;

1. Data Definition Query Language (DDL)
2. Data Manipulation Query Language (DML)
3. Data Control Query Language (DCL)
4. Advance SQL features like sub-queries, view creation, indexing and different operations

Platforms: MySQL Workbench or any cloud platform, Python IDE's: Jupyter Notebook, Google Colab, Pycharm etc.

MODULE 02	NoSQL	8 HOURS

On any NoSQL database case study, perform and execute queries like;

1. Create
2. Insert
3. Update

Platforms: MongoDB Compass or any other platform, Python IDE's: Jupyter Notebook, Google Colab, Pycharm etc.

MODULE 03	Data Analytics Tool	7 HOURS

Perform data analysis using any data analytics tool
Platforms: Tableau, Power BI etc.

MODULE 04	Big Data Analytics	8 HOURS

1. Introduction to Hadoop system
2. Installation of Hadoop system
3. Connection of Hadoop-spark with python
4. Introduction and use of AWS cloud platform in big data analysis
5. Perform big data analysis using spark, AWS and python on any given case study

Platforms: AWS, Hadoop-Spark, Python IDE's: Jupyter Notebook, Google Colab, Pycharm

TEXT BOOK

1. Silberschatz A., Korth H. and Sudarshan S., "Database System Concepts", 7^{th} Edition, McGraw Hill Publishers, 2019, ISBN 9780078022159
2. Elmasri R. and Navathe S., "Fundamentals of Database Systems", 7^{th} Edition, Pearson, Education, 2017, ISBN 9789332582705
3. Radha Shankarmani and M. Vijayalakshmi, "Big Data and Analytics, 2^{nd} edition, Wiley, 2016, ISBN-13 : 978-8126565757
4. Subhashini Chellappan and Seema Acharya, "Big Data and Analytics, 2^{nd} edition, Wiley, 2019, ISBN-13 : 978-8126579518
5. Edward Mize, "Data Analytics: The Ultimate Beginner's Guide to Data Analytics, Venture Ink, 2019, ISBN-13 : 978-1925997576

REFERENCE BOOK

1. Coronel C., Steven Morris "Database Systems: Design, Implementation & Management", 13^{th} Edition, Course Technology, 2018, ISBN 1337627909
2. Date C., "An Introduction to Database Systems", 7^{th} Edition, Pearson Education, 2002,ISBN 81 -7808-23
3. DT Editorial Service, "Big Data, Black Book: Covers Hadoop 2, Map Reduce, Hive, YARN, Pig, R and Data Visualization, Dreamtech Press; 1^{st} edition, 2016, ISBN-13 : 978-8184891430
4. Venkat Ankam, "Big Data Analytics, Packt Publishing Limited, 2016, ISBN-13 : 978-1785884696
5. Oliver Theobald, "Data Analytics for Absolute Beginners, 2019, ISBN-13 : 978-1081762469

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	AI in Robotics
	COURSE CODE	EX471
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX471.CEO.1: Consolidate different techniques and algorithms for Search, Planning
EX471.CEO.2: Become familiar with Robotic vision algorithms for systems
EX471.CEO.3: Explore various algorithms in machine learning.
EX471.CEO.4: Explore various fields in robotic applications

COURSE OUTCOMES :

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

EX471.CO.1: Apply suitable algorithm for Search and Planning for AI robotics system.
EX471.CO.2: Apply Robotic vision algorithms for vision guided robotics.
EX471.CO.3: Apply suitable algorithm for machine learning algorithms for AI robotics systems.
EX471.CO.4: Analyze various applications in the field of AI Robotics & Vision guided Robotics.

THEORY COURSE CONTENT		
UNIT 1	**AI Search and Path Planning Techniques**	**8 HOURS**
Introduction to AI, Definition, Seven areas of AI for Robotics Search Techniques: Best first search, A* algorithm, Heuristics Search, Constraint Satisfaction Search Topological Path Planning: Relational Methods, Associative Methods Metric Path Planning: Configuration Space, Representations, Graph Based Planners **Case study:** Robot Global path planning using A* algorithm for maze with obstacles		
UNIT 2	**Robotic Vision-Set up and preprocessing**	**9 HOURS**
Robotic Vision System: Basic components Robotic Vision setup: Camera frame calibration, Fixed frame offset, Tool offset, Fixed camera, Robot mounted camera, Calibration grid Illumination Techniques: Structured lightening, Front/ back lightening, Beam splitter, Retro reflectors, Diffused lightening, Robotic Cell Layout: Robot Centered, Inline, Mobile, Safety Measures, Ethics considerations Image pre-processing: Geometric and Brightness transformations Image Segmentation: Thresholding, Edge detection, Region based segmentation **Case study:** FANUC (R-30iA), Kuka robot vision setup examples		
UNIT 3	**Object Recognition**	**6 HOURS**
Object Recognition: System components, Object centered representation and Viewer centered representation, Feature detection, Recognition strategies, Object Classification, Geometry & Appearance based recognition, Template matching, Texture recognition Pedestrian Detection: Dalal-Triggs pedestrian detector Face detection: Viola-Jones sliding window face detection		
UNIT 4	**Machine Learning for Robotics**	**7 HOURS**
Learning process, Machine learning system, Types of learning Clustering algorithm: Aspects of clustering, partitioning methods, k-means clustering algorithms. Inductive learning: Concept, Basic algorithm, IL by Curve fitting Learning by decision trees: Attribute based representations, Entropy approach, decision making by information gain Naive Bayes Learning: Probabilistic Models, MAP classification, NB Algorithm.		
UNIT 5	**Reinforcement Learning for Robotics**	**7 HOURS**
Reinforcement Learning: Markov Decision Process (MDP), Value function, Q function, Model based and model free approaches, Passive and Active RL Learning, Generalization, Convergence of results. **Case study:** Rover Navigation in Sand area using Reinforcement Learning		

UNIT 6	AI Robotics Real Life applications	7 HOURS
Robot Tele-operation: Environment properties, Organization of a Tele-system, Semi-autonomous and Autonomous control modes, Ethics in Deliberative Robots AI Robotics applications: Delivery Robots, Domestic Robots, Agriculture Robots, Ethics in social Robots Industrial Robotics applications: Material Handling Operations, Industry Process Operations		

PRACTICAL		
PRACTICAL NO.01	**A* Algorithm**	**4 HOURS**
Implementation of A* algorithm for path planning for an autonomous robot in a Maze with obstacles		
PRACTICAL NO.02	**Image Pre-processing**	**4 HOURS**
Implementation of image pre-processing algorithms in robotic vision system Like object detection, Face detection etc		
PRACTICAL NO.03	**Image Segmentation**	**4 HOURS**
Implement image segmentation algorithms for robot vision applications.		
PRACTICAL NO.04	**Object Defection**	**4 HOURS**
Application and development of object detection techniques in Vision guided robotic system		
PRACTICAL NO.05	**Machine Learning- Supervised (Decision Tree)**	**4 HOURS**
Implementation of Supervised classification Algorithm- Decision Tree on a suitable database		
PRACTICAL NO.06	**Machine Learning- Supervised (Nave Bayes)**	**4 HOURS**
Implementation of Supervised classification Algorithm- Nave Bayes on a suitable database		
PRACTICAL NO.07	**Machine Learning- Unsupervised (Clustering)**	**4 HOURS**
Implementation of Unsupervised machine learning Algorithm-K means clustering on a suitable database		
PRACTICAL NO.08	**Paper Critics (Lab Activity)**	**4 HOURS**
Paper critics based on a refereed research paper in the field of AI Robotics and Vision guided robotics		
PRACTICAL NO.09	**Laboratory Project and Demonstration**	**4 HOURS**
Demonstration of Laboratory project implementing AI Robotics algorithms on suitable robotic system. Presentation of implementation of results for Practical 1 to 7 for assigned problem statement		

TEXT BOOK

1. Murphy, Robin R. Introduction to AI robotics, MIT press, 2019 ISBN: 978-0262038485
2. Stuart Russell, Peter Norvig, Artificial Intelligence: A modern approach, Pearson Education, India 2003., ISBN: 978-0136042594.
3. Saeed B Niku, Introduction to Robotics: Analysis, Systems, applications, 2nd Ed New Delhi, Prentice Hall of India, 2009. 978-81-203-2379-7 Paperback
4. Fu K S, Gonzalez R C, Lee C S G, Robotics: Controls, Sensing, Vision and Intelligence, 2009, 00710990107, McGraw-Hill Education, 978-0071004213

REFERENCE BOOK

1. Roland Siegwart, Illah Reza Nourbakhsh, Davide Scaramuzza, Introduction to Autonomous Mobile Robots, Bradford Company Scituate, USA, 2011.
2. Mikell P Groover, "Automation, Production Systems, and Computer-Integrated Manufacturing", Pearson Education, 2015.
3. Hong Cheng, Autonomous Intelligent Vehicles: Theory, Algorithms and Implementation, Springer, 2011.
4. Richard D. Klafter, Robotics Engineering: An integrated approach, Prentice-Hall (4 April 1989), 978-0134687520
5. Rafael C. Gonzalez and Richard E. Woods. Digital Image Processing, Wesley, 2007. ISBN 13: 978813726952

REFERENCE PAPER

1. Qualitative vision-based mobile robot navigation, Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2006.
2. Qualitative vision-based path following, IEEE Transactions on Robotics, 25(3):749-754, June 2009.
3. Person Following with a Mobile Robot Using Binocular Feature-Based tracking, Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS), 2007
4. Visual detection of lintel-occluded doors from a single camera, IEEE Computer Society Workshop on Visual Localization for Mobile Platforms (in association with CVPR), 2008.
5. Histograms of Oriented Gradients for Human Detection, Navneet Dalal and Bill Triggs, CVPR05
6. Rapid Object Detection using a Boosted Cascade of Simple Features, Viola and Jones, 2001
7. Clustering-Based Robot Navigation and Control, Omur Arslan, Dan P. Guralnik, and Daniel E. Koditschek, 2016 IEEE International Conference on Robotics and Automation May 2016.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course: Embedded Linux Systems
	COURSE CODE	ET463
	COURSE CREDITS	2
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	30	45	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET463.CEO.1: To configure and implement Linux Kernel for embedded hardware.
ET463.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,

ET463.CO.1: Explore the features of Linux through command line and shell programming
ET463.CO.2: Demonstrate the usage of file system in Linux
ET463.CO.3: Apply toolchain in the embedded Linux environment
ET463.CO.4: Implement the various device drivers for embedded application
ET463.CO.5: Build a simple application on embedded board in Linux environment

PRACTICAL: Perform following Practical on any Linux Distribution		
PRACTICAL NO.01		**4 HOURS**
Practice of Linux Commands & Linux File System		
PRACTICAL NO.02		**4 HOURS**
Practice of C Programming in Linux using GCC		
PRACTICAL NO.03		**4 HOURS**
Create Makefile using GNU Make Utility for automatically building executable programs from the source code (in C)		
PRACTICAL NO.04		**4 HOURS**
Configure, Compile and deploy the Linux Kernel on ARM based Embedded Board		
PRACTICAL NO.05		**4 HOURS**
Write, build and execute simple applications of displaying a message in Embedded Linux Environment		
PRACTICAL NO.06		**4 HOURS**
Write, build and execute simple applications of a thread in Embedded Linux Environment		
PRACTICAL NO.07		**8 HOURS**
Implementation of Kernel Loadable Device Driver Module in Embedded Linux Environmen		
PRACTICAL NO.08		**8 HOURS**
Capstone Project		

TEXT BOOK

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

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course: Cloud Computing
	COURSE CODE	ET464
	COURSE CREDITS	2
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET464.CEO.1: To familiarize with the fundamental concept of cloud computing
ET464.CEO.2: To explain the concept of customer relationship management solutions
ET464.CEO.3: To familiarize with the ecosystem of salesforce.com and different solutions it offers
ET464.CEO.4: To make use of the model view controller architecture and its applications
ET464.CEO.5: To summarize the software delivery lifecycle and application prototype

COURSE OUTCOMES :

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

ET464.CO.1: Rewrite the core concepts of cloud computing embracing different services
ET464.CO.2: Illustrate fundamental concept of customer relationship management solutions across different business activities
ET464.CO.3: Explain the object relationship to develop user interface using model view controller
ET464.CO.4: Estimate the platform capabilities to develop custom applications
ET464.CO.5: Combine the application security concepts with the data security, data management, application security access

PRACTICAL:		
MODULE NO.01	**Cloud Computing and Salesforce.com**	**4 HOURS**

1. Introduction to Cloud Computing
2. Evolution of Cloud Computing
3. Characteristics of Cloud Services
4. Classifications of cloud services IaaS, PaaS, SaaS
5. What is CRM/Cloud CRM
6. SFDC as cloud computing technology
7. SFDC and its business offering
8. Evolution of Products
9. Different Editions of Salesforce.com
10. How to sign-up for the free developer edition

MODULE NO.02	**Introduction to the Cloud CRM**	**4 HOURS**

1. Understand SFDCs architecture
2. Technologies behind the SFDC
3. Salesforce.com cloud CRM application walkthrough
4. Understand the application/Object/Fields
5. Standard fields/Page Layouts/ Custom Fields
6. Understand the relational database
7. Master-Detail Relationship/ many to many
8. Look-up Relationship/ one to many
9. Self-Look-up /one to one

MODULE NO.03	Customization & Application setup (Part-1)	4 HOURS

- Setting up the company profile
- Setting up users /roles/ profiles
- Learn about the access control using profiles
- Custom objects/Custom fields and tabs
- Learn about business processes and record types
- Customize page layouts, related lists and fields
- Define dependent picklist
- Use field level security for access control
- Create Rollup summary fields

MODULE NO.04	Customization & Application setup (Part-2)	4 HOURS

1. Create formula fields
2. Create Validation Rules /Maintain data Quality
3. Create different types of fields and their arrangement on to the page layout
4. Introduction to lightning components

MODULE NO.05	Security and Access Control	4 HOURS

1. Define Organization Wide Defaults
2. Record sharing concepts and pyramid of access control
3. Role hierarchy, Public groups, Queues and Permission Set
4. Sharing rules

MODULE NO.06	Business Process Automation Tools	4 HOURS

1. Define Workflow
2. Set up workflow rules, Create workflow approvals
3. Setup workflow tasks & Email Alerts & Field Updates
4. Time-dependent workflows, Plan Approaches using workflow
5. Use the approval wizard standard vs. jump start

MODULE NO.07	Data Handling and Processing in Salesforce.com Cloud	4 HOURS

1. Define Workflow
2. Identify the considerations for Data Processing
3. Analyze tools and use cases for managing data
4. Exporting data and Regular Backup
5. External ID and Unique Fields
6. Import Data
7. Apex Data loader
8. Import Wizard and Data Loader and compare the features, Update, Upset operations, Delete and Hard Delete records
9. Transfer record ownership

MODULE NO.08	Reports and Dashboards	4 HOURS

1. Create a report
2. Customize a report
3. Identify the impacts of Sharing Model on Reports
4. Create and Modify dashboards
5. Analyze the capabilities of Custom Report Types

MODULE NO.09	Declarative Vs Programmatic Approach in Salesforce.com	4 HOURS

1. Introduction to Programmatic customization in Salesforce.com
2. Overview of Apex Programming
3. Overview of Apex Triggers
4. Lightning Component Bundle
5. Introduction to Lightning Design System

MODULE NO.10	Application Lifecycle and Project Management in Salesforce.com	4 HOURS

1. Know Milestones in application life cycle
2. Sandbox strategy and type of sandboxes
3. Preparing the change sets
4. Deployment using change set
5. Managed package Vs Un-managed package

MODULE NO.11	Introduction to AppExchange and Trailhead	4 HOURS

1. AppExchange Overview
2. Finding and Selecting an App
3. Installing an App
4. Trailhead overview
5. Enrolling for training module
6. Getting Certified industry demands and certification path for beginner

MODULE NO.12	Final Assignment and Project Prototype	4 HOURS

1. Final Assignment
2. Project Prototyping
3. Discussion and Query resolution

REFERENCE BOOK

1. www.salesforce.com (https://mitaoe5-dev-ed.my.salesforce.com)
2. Thomas Erl, Zaigham Mahmood, Ricardo Puttini, Cloud Computing Concepts, Technology & Architecture; Prentice Hall
3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Mastering Cloud Computing Foundations and Applications Programming; Elsevier, 1st Edition.

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABUS**	
SCHOOL OF ———————- ————————————	**W.E.F**	**AY:** 2022 - 2023 (R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY IN ————————————-	**COURSE NAME**	Project Evaluation
	COURSE CODE	XX470
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	8	NIL	NIL	NIL	NIL	150	150

COURSE OBJECTIVES :

XX470.CEO.1: To understand how to carry out performance evaluation and comparative analysis in appropriate form.

XX470.CEO.2: To know about standard industry practices.

XX470.CEO.3: To become familiar with the steps involved in identifying and selecting a good platform to present the work done.

COURSE OUTCOMES :

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

XX360.CO.1: Interpret findings, compare them with results in the literature, identify weaknesses and limitations, and propose improvements.

XX360.CO.2: Make use of standard industry practices.

XX360.CO.3: Decide appropriate platform for presenting the work done.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables students to develop an alytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation.

To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation.

After successful completion of project implementation (Sem VI), next step is project evaluation (Sem VII). The goal of this phase of the project is to draw Inferences and Detail Analysis/Final Testing/Re-development/etc. Showcasing the work - Technical documentation in Conferences/Journal/Patent/Product/Working model.

GUIDELINES

1. Project group students of Sem VI would be continued in this semester VII.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Projects should preferably have a national/international, industry/academic/research collaboration.
4. Students should do extended implementation of their project in consultation with their advisor.
5. For extended implementation, objectives of Sem V and Sem VI should be achieved.
6. Every project should follow at least one standard industry practice while implementing. For example, below are some of the standard industry practices followed by Electrical engineers:
   (a) If writing a Matlab code, follow **MathWorks Advisory Board (MAB)** Guidelines
   (b) For embedded c coding, **Motor Industry Software Reliability Association (MISRA)** standards can be used
   (c) If antenna is manufactured, then get **EMI/EMC** testing certificate from National Accreditation Board for Testing and Calibration Laboratories.
7. Performance evaluation and Comparative analysis of results should be carried out and presented in appropriate form.
8. Carry out detail analysis to improve performance w.r.t Final Testing/Re-development/etc.
9. Showcase the work in Conferences/Journal/Patent/Product/Working model.

Note: *For guideline 6, every school should identify standard industry practices and try to incorporate in the projects.*

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Project Review I (Internal): (20 Marks)
2. Activity (Standard industry practices): (20 Marks)
3. Project Review II (External): (20 Marks)
4. Project Report: (20 Marks)
5. Every project group should publish paper in National conference / International conference / Participate in technical project competition (with achievement) / File a patent/etc.: (20 Marks)
6. Project: Final Presentation and Demonstration (External) (50 Marks)

Note:

- Report should be prepared in LaTeX.
- External examiner for Review 2 and Final Demo should be allocated same group.
- Report will be jointly evaluated by External examiner and Internal examiner.

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
3. Leslie Lamport, "A Document Preparation System LaTeX: User's Guide and Reference Manual", Pearson, 2011.

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GUIDELINES

For

SUMMER INTERNSHIP PROGRAM (SIP)

2022 MAY

(For Academic Year: 2022-2023)

Prepared by

Coordinator – National and International Relations

Verified and Released by

Dean – Corporate Relations

MIT | Academy of Engineering
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Introduction:

The Maharashtra Academy of Engineering & Education Research (MAEER) established in 1983 is a renowned educational trust having its registered office in Pune. It has sixty-five institutions imparting quality education up to the doctoral level in various disciplines.

MIT Academy of Engineering (MIT AOE) was established in the year 1999 under the MAEER. Today, it is an autonomous institute affiliated to the Savitribai Phule Pune University (SPPU), and is approved by the All India Council for Technical Education (AICTE) and accredited by the National Accreditation and Assessment Council (NAAC) with 'A' grade. MIT AOE offers undergraduate and post-graduate programs in diverse engineering disciplines. The National Board of Accreditation (NBA) had accredited all undergraduate programs offered by MIT AOE. .

MIT AOE recognizes the academic and professional value of student engagement outside the traditional classroom. In order to provide the students a platform to obtain hands-on industrial experience that would help them improve their career trajectory, MIT AOE offers a Student Internship Program (SIP).

The main aim of SIP is to assist all B.TECH students to obtain internships at various centers of excellence in the academia and the industry or to promote them for life skills internship as applicable. The ultimate goal is to imbue students with professionalism and networking capabilities using internships as a tool for providing comprehensive practical experience. Using SIP, MIT AOE students will enhance their academic and professional skills, making themselves more marketable in today's competitive world. The students can harness this lucrative opportunity to apply the knowledge they acquired all through the academic career in the professional realm.

Key objectives of SIP:

- To help students gain hands-on professional work experience prior to their graduation.
- To provide students possible opportunities to learn, understand and sharpen the real-time technical, managerial and life skills required at the job.
- To instill qualities like confidence, maturity, responsibility, and social skills necessary for personal and professional growth.
- To familiarize students to the business environment, which cannot be simulated in the classroom; thus creating competent professionals for the industry.
- To expose students to state-of-the-art facilities, equipment and professional practices in their respective trades.
- To help students develop their own job search tools, networking capacities, and interview skills.
- To expose them to the current technological developments relevant to the subject area of training.
- To create conditions conducive to quest for knowledge and its applicability on the job.
- To provide the experience in writing Technical reports/projects.
- To expose students to the engineer's responsibilities and ethics.

Scope and Structure of SIP:

SIP is offered to *entrants* of SY B.TECH (after semester II), TY B.TECH (after semester IV) and final year B.TECH (after semester VI) that meet the eligibility criteria stated below:

- SY B.TECH and TY B.TECH *entrants* should apply for 3 to 4 weeks' duration internships during June-July of every academic year. For these internships, *REGULAR* credits will not be awarded (non-Credit Based Internship). Although *REGULAR* credits are not awarded, but the internship is *compulsory* for all the

students. After successful completion of the internship, a student will be awarded with 3 *EXTRA* credits and it will be incorporated / reflected in *Additional Grade Card (AGC).* Student has to work for 120 hours minimum as an Intern during the said period. ***(Compulsory Internship)***

- Final year B.TECH *entrants* should apply for 4 to 6 weeks' duration internships during June-July of every academic year. For this internship, *REGULAR* credits will be awarded. (Credit Based Internship - 4 Credits). This internship is compulsory for all the entrants of final year B.TECH. Awarded credits will be considered for the calculation of final year CGPA and will be reflected in *Regular Grade Card*. Student has to work for 160 hours minimum as an Intern during the said period. ***(Compulsory Internship)***
- Final year B.TECH students may apply for 5-6 months (18 – 26 weeks) semester-long Industry Internship under SIP in their VIII semester for Project Work. Equivalent credits will be awarded for the semester long internship. ***(Optional Internship)***

The scope of SIP is limited to identifying internship opportunities and assisting MIT AOE students to apply for such positions. However, any financial liability, including but not limited to, travel, accommodation, insurance etc. incurred as direct or indirect consequence of such a position is the sole responsibility of the student and his/her guardians.

Student eligibility criteria:

Students applying for internships must meet the following criteria:

- After completion of second academic semester, FY B.TECH students (SY B.TECH entrants) of all schools are eligible to apply for 3 to 4 weeks' duration internships under SIP. Those students involved in / appearing for remedial term will be waived-off from internship. All other eligible students have to complete the internship as stated in the scope of SIP.
- After completion of fourth academic semester, SY B.TECH students (TY B.TECH entrants) of all schools are eligible to apply for 3 to 4 weeks' duration internships under SIP. Those students involved in / appearing for remedial term will be

waived-off from internship. All other eligible students have to complete the internship as stated in the scope of SIP.

- After completion of sixth academic semester, TY B.TECH students (final year B.TECH entrants) of all schools are eligible to apply for 4 to 6 weeks' duration internships under SIP. All students have to complete the internship successfully as stated in the scope of SIP. ***However, students who fail to earn the 4 credits for any reason, shall be required to earn the same at a later instant of time to be eligible for the award of degree.***
- Final Year B.TECH students with no live backlog and having a CGPA of 6.75 and above are eligible to apply for semester-long internships in Industry with credit transfer scheme as stated in scope of the SIP. However, final decision shall be taken based on the merit of the case, approved by the selected panel.
- The student is expected to be in good physical and mental health.

Rules for application to SIP:

Students applying to the SIP are required to adhere the following rules:

- Students must complete an undertaking (Annexure – I) to abide by the rules and regulations of the institution / industry they are applying to.
- Students must obtain academic and school clearances to ensure completion of prerequisite courses or other requirements as a part of their application to SIP.
- Students must submit a well formatted CV, requisite form (Annexure – II), financial declaration, if any, along with the undertaking stated above to the Internship Coordinator through Faculty Mentor before April 30 of every year.
- Last date for completing all relevant formalities pertaining to SIP is 15 days prior to the start of the internship.
- Within the first week of the internship, students are required to submit their supervisor's contact information (email address and phone number) to the Faculty Mentor and Internship Coordinator.
- **During the internship, students must submit brief fortnightly report duly signed by their supervisor (scanned soft copy) to the Faculty Mentor.**

- **Annexure IV is the final approval for the SIP and without which no internship is approved and no queries will be entertained at a later stage.**

Role of the Faculty Mentor and Internship Coordinator / Director – T&P:

The Faculty Mentor and Internship Coordinator / Director-T&P will:

- Ensure compliance of all SIP policies and procedures and strive to maintain the integrity of SIP.
- Assist students in securing internship positions and documenting potential opportunities for future use.
- Evaluate and approve student goals, objectives and expected learning outcomes for the internship.
- Monitor the student progress by contacting the student and his/her supervisor a minimum of two times during the internship period. The first contact should be initiated during the first week of the internship. The second contact should take place during last week of the internship.
- **Contacting with the students every alternate week through Google meet / MS Teams and maintaining the reports of the activity done by the students.**
- At the conclusion of the internship, the student has to submit a detailed report based on his/her internship experience and present the work in front of the panel formed at school level.

Role of student during internship:

- Actively participate in the internship process by utilizing appropriate resources and maintaining regular contact with the faculty mentor and Internship Coordinator / Director – T &P.
- Develop learning objectives consistent with their interests, skills, and goals, both academic and career related.

- Follow all policies and procedures described in this document, including timely submission of application and evaluation material to the faculty mentor and Internship Coordinator / Director – T &P.
- Conduct themselves in a professional manner as representatives of MIT AOE.
- Provide feedback and suggestions about internship program policies and procedures.
- The internship is to be physical and in extremely special cases, a virtual / Work from Home type internships can be taken with prior approval.
- The students will be informed about the various opportunities that come from various sources such as AICTE, Intern Shala, any other sources identified by Director / Dean – CR / Team of CR / School Deans / FTPO coordinators.
- If students are not able to get such opportunities, then they can be given specific work by their Mini Project guides / Minor Project guides through work from home concept. But the assigned work must be equivalent to the minimum duration as specified above. In such cases, the school Deans must form a team to identify the specific works that can be assigned to the students.
- The Institute coordinator can provide any support through email for the organizations, in case they need official communication from the Institute.
- All assessment for the summer internships can be done during the Sep 2022 by the team of members formed by the school deans along with the FTPO and CR team.

DEADLINES:

The last date to get the internships will be 31 May 2022 and the Internship period is from 15 May 2022 to 31 July 2022.

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ANNEXURE – I

UNDERTAKING FORMAT

I, Mr. /Ms……..,
Programme:……, School : ……, student of **MIT Academy of Engineering (MIT AOE),** permanent resident of ……..……..
.....
.....
Phone No: ..... (Give permanent home address with telephone no.), do hereby undertake on this the…… (Day), of..... (Month)..... (Year), the following

1. I, hereby, declare that, the entries made by me in the Application Form are complete and true to the best of my knowledge and based on valid records.
2. I, hereby, promise to abide by the admissible rules and regulations, concerning discipline, attendance, etc. of the Institute (MIT AOE), and also to follow the Code of Conduct prescribed by the Institute / Industry in which I am going to take the internship.
3. I, hereby undertake to maintain the name of the Institute in high levels during my period as intern in whichever Institute / Industry I am given an opportunity to undergo technical training.
4. I, hereby declare that I will maintain confidentiality and not disseminate / share any information related to the Institute / Industry to third parties.
5. I, hereby undertake to be responsible for maintaining the security of properties belonging to the Institute / Industry.

Date: _____ **Place:** _____

Signature of Student: _____

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ANNEXURE – II

Application for Internship Program

Sr. No.	Particulars		
1	Name of the applicant (in bold letters)		
2	Gender		
3	Class & 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	3-6 weeks	18-26 weeks
11	Total number of credits proposed to internship (if applicable)		

Signatures

Student	School Internship Coordinator
Approved by:	
Dean – School of _____ Engineering	MIT AOE Seal
Date:	

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ANNEXURE – III

REQUEST LETTER FROM INSTITUTE TO INTERNSHIP PROVIDER

To

.....
.....

Subject: Request for 03/04/06 weeks' industrial training for B.TECH degree program

Dear Sir,
Our students have undergone internship training in your esteemed organization in the previous years. I acknowledge the help and the support extended to our students during the training.

OR

(For first time industry) As per AICTE mandates, internship is now a compulsory competent of education for all technical education students.

In view of the above, I request your good self to allow our following _____students for undertaking practical training in your esteemed organization. Kindly accord your permission and give at least one-week time for students to join training after confirmation.

Roll No.	Name	PRN	Year	Discipline

A positive communication will be highly appreciated.
With warm regards,
Yours sincerely,

Coordinator – SIP

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ANNEXURE IV

REPORTING LETTER OF STUDENT

To

.....

.....

Subject: Reporting letter of student to Institute / Industry

Dear Sir,
Kindly refer your letter / e-mail dated. on the above cited subject. As permitted by your good self, the following students will undergo Institute / Industrial Internship in your esteemed organization under your guidance.

Roll. No.	Name of Students	PRN	Year & Discipline

You are requested to evaluate the student's performance on the basis of grading i.e. Excellent, Very Good, Satisfactory and Non-Satisfactory on the below mentioned factors. The performance report may please be forwarded to the undersigned on completion of training in a sealed envelope.

Sr. No.	Name of Students	Evaluation Ranking
1	Attendance and general behavior	
2	Relation with workers and supervisors	
3	Initiative and efforts in learning	
4	Knowledge and skills improvement	
5	Contribution to the organization	

Your efforts in this regard will positively enhance knowledge and practical skills of the students and your cooperation will be highly appreciated. The students will abide by the rules and regulation of the organization and will maintain a proper discipline with keen interest during their Internship. The students will report to you on along with a copy of this letter.

Yours sincerely,
Coordinator – SIP

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ANNEXURE – V

SUPERVISOR EVALUATION OF INTERN

Student Name:_____ Date:_____

Work Supervisor:_____ Title:_____

Institute/Industry:_____

Dates of Internship: From_____To_____

Please evaluate your intern on following factors: (Tick √)

Parameters	Needs improvement	Satisfactory	Good	Excellent
Professionalism and Behavior				
Cooperation with co-workers and supervisors				
Interest in work				
Learning ability				
Emphasis on high-quality work				
Readiness to take responsibility				
Use of technical knowledge and expertise				
Display of creativity/originality				
Problem Analysis				
Communication				
Punctuality				
Time Management Skills				

Overall performance of student intern (circle one):

(Needs improvement / Satisfactory / Good / Excellent)

Signature of Institute / Industry supervisor

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ANNEXURE VI : RUBRICS FOR THE EVALUATION OF SIP

Item	Mark for item					
	2-3	**4-5**	**6**	**7**	**8**	**9-10**
A. Professional skills 30%						
1.1. Initiative and creativity	Student shows no initiative or new ideas at all.	Student picks up some initiatives and/or new ideas suggested by others (e.g. supervisor), but the selection is not motivated.	Student shows some initiative and/or together with the supervisor develops one or two new ideas on minor parts of the project.	Student initiates discussions on new ideas with supervisor and develops one or two own ideas on minor parts of the project.	Student has his own creative ideas.	Innovative methods and analysis of information/data. Possibly the idea for the project has been formulated by the student.
1.2 Insight in functioning of another organization	Student shows no insight in functioning of the organization.	Student shows no insight in functioning of the organization.	Student is able to draw an organization chart of the organization.	Student is able to indicate the position of the team within the organization as a whole.	Student is able to indicate the responsibilities of the different units within the organization.	Student knows how changes are realized in the organization.
	Student doesn't ask for help from the internship provider in case it is necessary.	Student doesn't ask for help from the internship provider in case it is necessary.	Student gets things (e.g. receiving information, organizing material facilities, etc.) done within the team only via internship supervisor.	Student is able to get some things (e.g. receiving information, organizing material facilities, etc.) done within the team. If necessary, the student asks for help of the supervisor to get things done within the team.	Student is able to get things (e.g. receiving information, organizing material facilities, etc.) done within the team independently.	Student is able to independently implement changes that affect the whole team.
1.3 Adaptation capacity	Student doesn't adapt and gives an impression of apathy or is often involved in disputes or arguments.	Student doesn't adapt and gives an impression of apathy or is often involved in disputes or arguments.	Student knows the do's and don't in the new work environment.	Student accepts how thing go within the new work environment.	Student is able to adapt to the new work environment.	Student adapts easily to the work environment within the limits of his personal values.
1.4 Commitment and perseverance	Student is not motivated. Student escapes work and gives up regularly	Student has little motivation. Tends to be distracted easily. Has given up once or twice	Student is motivated at times, but often, sees the work as a compulsory task. Is distracted from work now and then.	The student is motivated. Overcomes an occasional setback with help of the supervisor.	The student is motivated and/or overcomes an occasional setback on his own and considers the work as his "own" project.	The student is very motivated, goes at length to get the most out of the project.
1.5 Independence	The student can only perform the work properly after repeated detailed instructions and with direct help from the supervisor.	The student needs frequent instructions and well-defined tasks from the supervisor and the supervisor needs careful checks to see if all tasks have been performed.	The supervisor is the main responsible for setting out the tasks, but the student is able to perform them mostly independently	Student selects and plans the tasks together with the supervisor and performs these tasks on his own	Student plans and performs tasks mostly independently, asks for help from the supervisor when needed.	Student plans and performs tasks independently and organizes his sources of help independently.

1.6 Handling supervisor's comments and development skills	Student does not pick up suggestions and ideas of the supervisor	The supervisor needs to act as an instructor and/or supervisor needs to suggest solutions for problems	Student incorporates some of the comments of the supervisor, but ignores others without arguments	Student incorporates most or all of the supervisor's comments.	Supervisor's comments are weighed by the student and asked for when needed.	Supervisor's comments are critically weighed by the student and asked for when needed, also from other staff members or students.
	Knowledge and insight of the student (in relation to the prerequisites) is insufficient and the student is not able to take appropriate action to remedy this	There is some progress in the professional skills of the student, but suggestions of the supervisor are also ignored occasionally.	The student is able to adopt some skills as they are presented during supervision	The student is able to adopt skills as they are presented during supervision and develops some skills independently as well.	The student is able to adopt new skills mostly independently, and asks for assistance from the supervisor if needed.	The student has knowledge and insight on a academic level, i.e. he explores solutions on his own, increases skills and knowledge where necessary.
	No learning outcomes formulated.	Learning outcomes formulated, but no progress in any of them.	On some of the personal learning outcomes the student shows some progress.	On all of the personal learning outcomes the student shows some progress.	On some of the personal the student shows major progress and on others some progress is shown.	On all personal learning outcomes the student has shown major progress.
1.7. Time management	No time schedule made.	No realistic time schedule.	Mostly realistic time schedule, but no timely adjustment of time schedule if necessary.	Realistic time schedule, with some adjustments if necessary (but not enough or not all in time) in times only.	Realistic time schedule, with if necessary timely adjustments of times only.	Realistic time schedule, with if necessary timely adjustments of both time and tasks.
	Final version of internship report or presentation more than 50% of the nominal period overdue without a valid reason (force majeure)	Final version of internship report or oral presentation at most 50% of the nominal period overdue (without a valid reason).	Final version of internship report or oral presentation at most 25% of nominal period overdue (without valid reason)	Final version of internship report or oral presentation at most 10% of nominal period overdue (without valid reasons)	Final version of internship report or oral presentation at most 5% of nominal period overdue (without good reasons)	Final version of internship report or oral presentation finished within planned period (or overdue but with good reason and finished within reasonable time).
B. Report internship 30%						
2.1 Formulation goals, framework project	No goals and framework of project.	Formulation of goals and framework of project is not clear.	Formulation of goals and framework of project is clear, but link between tasks and goals is not clear. Framework of project does not fit with the object of the internship project.	Formulation of goals and framework of project is clear, but link between tasks and goals is not always clear.. Framework of project does not fit with all aspects of the internship project.	Formulation of goals and framework of project is clear.	Clear formulation of goals and framework of project. Both are well linked with all aspects of the internship project.
2.2. Theoretical underpinning, use of	No discussion of underlying theories.	There is some discussion of underlying theories, but the description shows serious errors.	Student has found the relevant theories, but the description has not been tailored to the project at	Student has found the relevant theories, and has been partially successful in tailoring	Student has found the relevant theories, makes a synthesis of those, and has been	Clear, complete and coherent overview of relevant theories. Exactly tailored to the project at hand.

literature			hand or shows occasional errors.	the description to the project at hand. Few errors occur.	successful in tailoring the description to the project at hand.	

	No relevant literature in reference list except for those already suggested by the supervisor	Only a couple of relevant literature references in the reference list.	Some relevant literature in reference list but also significant body of irrelevant literature.	Relevant literature in reference list but some references are less relevant.	Used literature is relevant for the goal of the project. An occasional reference may be less relevant.	Used literature is relevant for the goal of the project.
2.3. Use of methods and processing data	No description of methods and analysis of the information/data.	Insufficient information on methods and insufficient analysis of the information.	Some aspects of the project regarding methods and analysis of information are described insufficiently. Used methods and analysis of data/information are not always appropriate.	Description of methods and analysis of information/data is lacking in a number of placed. Used methods and analysis of data/information mostly appropriate.	Description of methods and analysis of information/data is mostly complete, but there are lacking some details. Used methods and analysis of data/information are appropriate.	Description of methods used and analysis of the information is appropriate, complete and clear.
2.4. Reflection on results	No reflection on the results of internship project. Discussion only touches trivial or very general points of criticism.	Student identifies only some possible weaknesses and/or points at weaknesses which are in reality irrelevant or non-existent.	Student indicates most weaknesses in the results, but does not weigh their impact on the main results relative to each other.	Student indicates most weaknesses in the results and is able to weigh their impact on the main results relative to each other.	Student indicates all weaknesses in the results and weighs them relative to each other. Furthermore, (better) alternatives for the methods used are indicated.	Student is not only able to identify all possible weaknesses in the results, but is also able to indicate which weaknesses affect the outcome of the internship project most.
2.5. Conclusions and discussion	No link between goals, results and conclusions.	Conclusions are drawn, but in many cases only address part of the goals. Conclusions merely repeat results or conclusions are not substantiated by results.	Conclusions are linked to the goals, but not all goals are addressed. Some conclusions are not substantiated by results or merely repeat results.	Most conclusions well-linked to goals and substantiated by results. Conclusions mostly formulated clearly but some vagueness in wording.	Clear link between goals and conclusions. All conclusions substantiated by results. Conclusions are formulated exact.	Clear link between goals and conclusions. Conclusions substantiated by results. Conclusions are formulated exact and concise. Conclusions are grouped/ordered in a logical way.
	No discussion about the added value of the project for the organization.	Student assigns irrelevant aspects of the project as added value for the project for the organization.	Student only reflects on trivial aspects of his project for the organization and does not relate this to the goals of the organization.	Student is able to identify the added value of his project for the organization, but does not relate this to the goals of the organization.	Student is able to identify the added value of his project for the organization and relates this to the goals of the organization.	Student is able to identify the added value of his project and relates this to the goals of the organization. In addition, the student is able to indicate the added value of his project for the society as a whole.
2.6. Fluency of language and writing skills	Internship report is badly structured. In many cases information appears in wrong locations. Level of detail is inappropriate	Main structure incorrect in some places, and placement of material in different chapters illogical in many places. Level of detail varies	Main structure is correct, but lower level hierarchy of sections is not logical in places. Some sections have overlapping functions	Main structure correct, but placement of material in different chapters illogical in places. Level of detail inappropriate in a number of	Most sections have a clear and unique function. Hierarchy of sections is mostly correct. Ordering of sections is mostly logical.	Well-structured: each section has a clear and unique function. Hierarchy of sections is correct. Ordering of sections is logical. All

	throughout.	widely (information missing, or irrelevant information given).	leading to ambiguity in placement of information. Level of detail varies widely (information missing, or irrelevant information given).	places (irrelevant information given).	All information occurs at the correct place, with few exceptions. In most places level of detail is appropriate.	information occurs at the correct place. Level of detail is appropriate throughout.
	Formulations in the text are often incorrect/inexact inhibiting a correct interpretation of the text.	Vagueness and/or inexactness in wording occurs regularly and it affects the interpretation of the text.	The text is ambiguous in some places but this does not always inhibit a correct interpretation of the text.	Formulations in text are predominantly clear and exact. Internship report could have been written more concisely.	Formulations in text are clear and exact, as well as concise.	Textual quality of the internship report is such that it could be acceptable for a peer-reviewed journal.
2.7 Defense of the report	Student is not able to defend/discuss his internship reports. He does not master the contents.	The student has difficulty to explain the subject matter of the internship project.	Student is able to defend his internship project. He mostly masters the contents of what he wrote, but for a limited number of items he is not able to explain what he did, or why.	Student is able to defend his internship project. He masters the contents of what he wrote, but not beyond that. Is not able to place thesis in scientific or practical context.	Student is able to defend his internship project, including indications how the work could have been done better. Student is able to place thesis in either scientific or practical context.	Student is able to freely discuss the contents of the internship project and to place the internship project in the context of current scientific literature and practical contexts.

C. Self reflection on internship 10%						
3.1 Report on self-reflection	Is not able to describe an event or situation in which he was involved and that relates to a formulated learning outcome.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome but unable to distinguish between the event description and the description of the personal emotions involved.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, but unable to formulate personal points of improvement and related actions in a future situation	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, and able to formulate personal points of improvement and related actions in a future situation	Is able to analyze objectively most events or situations in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate plan for improved functioning in a new situation. Shows the ability in at least one case to implement the formulated plan for improved functioning	Is able to analyze objectively any event or situation in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate and implement a plan for improved functioning in a new situation.
3.2 Reflection on the internship	Is not able to describe an event or situation in which he was involved and that relates to a formulated learning outcome.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome but unable to distinguish between the event description and the description of the personal emotions involved.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, but unable to formulate personal points of	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, and able to formulate personal points of	Is able to analyze objectively most events or situations in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate plan for improved functioning in a new	Is able to analyze objectively any event or situation in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate and implement a plan for improved functioning in a new situation.

			improvement and related actions in a future situation	improvement and related actions in a future situation	situation. Shows the ability in at least one case to implement the formulated plan for improved functioning	

D. Presentation (30%)						
4.1. Presentation: Graphs, PowerPoint	Presentation has no structure.	Presentation has unclear structure.	Presentation is structured, though the audience gets lost in some places.	Presentation has a clear structure with only few exceptions.	Presentation has a clear structure. Mostly a good separation between the main message and side-steps.	Presentation clearly structured, concise and to-the-point. Good separation between the main message and side-steps.
	Unclear lay-out. Unbalanced use of text, graphs, tables or graphics throughout. Too small font size, too many slides.	Lay-out in many places insufficient: too much text and too few graphics (or graphs, tables) or vice verse.	Quality of the layout of the slides is mixed. Inappropriate use of text, tables, graphs and graphics in some places.	Lay-out is mostly clear, with unbalanced use of text, tables, graphs and graphics in few places only.	Lay-out is clear. Appropriate use of text, tables, graphs and graphics.	Lay-out is functional and clear. Clever use of graphs and graphics.
4.2. Oral presentation and defense	Spoken in such a way that majority of audience could not follow the presentation.	Presentation is uninspired and/or monotonous and/or student reads from slides: attention of audience not captured	Quality of presentation is mixed: sometimes clear, sometimes hard to follow.	Mostly clearly spoken. Sometimes monotonous in some places.	Clearly spoken in such a way that I keeps audience's attention.	Relaxed and lively though concentrated presentation. Clearly spoken in such a way that I keeps audience's attention.
	Language and interest of audience not taken intro consideration at all.	Language and interest of audience hardly taken intro consideration.	Language and interest of presentation at a couple of points not appropriately targeted at audience.	Language and interest of presentation mostly targeted at audience.	Language and interest of presentation well-targeted at audience. Student is able to adjust to some extent to signals from audience that certain parts are not understood.	Take-home message is clear to the audience. Language and interest of presentation well-targeted at audience. Student is able to adjust to signals from audience that certain parts are not understood.
	Bad timing (way too short or too long).	Timing not well kept (at most 30% deviation from planned time).	Timing not well kept (at most 20% deviation from planned time).	Timing is OK (at most 10% deviation from planned time).	Presentation finished well in time.	Presentation finished well in time.
	Student is not able to answer questions.	Student is able to answer only the simplest questions	Student answers at least half of the questions appropriately..	Student is able to answer nearly all questions in an appropriate way.	Student is able to answer all questions in an appropriate way, although not to-the-point in some cases.	Student is able to give appropriate, clear and to-the-point answers to all questions.

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ANNEXURE VII : REPORT OF EVALUATION

to be submitted by School Deans to CoE

MIT Academy of Engineering

School of _____

Class : FY / SY / TY

Date of Evaluation : _____

Roll No	Name of student	PRN	Criteria A 30%	Criteria B 30%	Criteria C 10%	Criteria D 30%	TOTAL MARKS

Dean

School of _____

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ANNEXURE – VIII

INTERNSHIP REPORT FORMAT

STUDENT INTERNSHIP PROGRAM (SIP)

REPORT

Name of the Institute / Industry
(Where you have completed your Internship Training)

(Bold, 16 font, Times New Roman style)

Submitted By

Name of the student

Exam Seat No.

PRN No.

SCHOOL OF _____

MIT ACADEMY OF ENGINEERING

ALANDI (D), PUNE

CERTIFICATE

This is to certify that the "**Student Internship Program (SIP)" report** submitted by _____ **PRN** _____ is work done by him/her and is submitted during _____ academic year.

Faculty Mentor

(Name)

School - Internship Coordinator

(Name)

School Dean

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(Name)

Internship certificate provided by the internship institution

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ACKNOWLEDGEMENT

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(Name of student)

Table of Contents

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1) **Introduction** includes brief description of the Organization/ Institute. The starting and ending dates of your internship. The scope of the work completed during the internship. It may include background information necessary to understand the work completed during the internship.

2) **Internship discussion** should include report of the work carried out in Organization / Institute. It may contain:

- **Problem / Project / Opportunity** the student got in the Institute/ Organization.
- **Learning Experience** should include:
    a) **Knowledge acquired:** Briefly describe the knowledge you gained through your training experience and relate this knowledge to what you learned in specific courses.
    b) **Skills learned:** Describe the skills and any career-specific abilities that you gained during your internship.
    c) **Observed attitudes and gained values:** Describe the manners, mindsets or values that you found and you perceive as important, in your training program, for a successful career (e.g. hard work, dependability, honesty, etc.)

d) **The most challenging task performed:** Describe the best and the most challenging mission that was assigned to you during your internship, how you performed it, and how you overcame challenges while performing it.

3) **Conclusion**: Summarize your overall experience in the internship keeping in mind the tasks performed and your learning experience.

4) **Bibliography:** Provide all the sources that you have used for data collection /project execution/ report preparation (books, articles, reports).

5) **Plagiarism Report**: Attach a plagiarism report at the end of the report. (Acceptable range: 1-20%)

1. **Paper Size:** A- 4 size paper. Each page should be numbered.

2. **Margins:**
    1. **Top** : 1” (1 inch=2.54cm)
    2. **Bottom** : 1.15” (2.86cm)
    3. **Left** : 1.4”
    4. **Right** : 0.6”

3. **Line Spacing:** 1.5 line
4. The report should be between 15-20 pages (exclusive of references, title pages, table of contents) and spiral bonded with one side printing.
5. Use single in-space in footnotes (if required).
6. Standard formal level of English should be used.
7. Deadline for Final Submission of the report must be strictly adhered to.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Process Automation
	COURSE CODE	ET462
	COURSE CREDITS	4
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET462.CEO.1: To give the students a comprehension of Process Control Instrumentation Design.
ET462.CEO.2: To give the students a comprehension of the relation between Instrumentation and controller design in industrial applications.
ET462.CEO.3: To make the students able to analyze the control loops and to achieve the control actions with different Controllers
ET462.CEO.4: To impart the role of PLC in industry automation.
ET462.CEO.5: To expose various control techniques employed in process automation.

COURSE OUTCOMES :

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

ET461.CO.1: Describe process control principles
ET461.CO.2: Solve issues related to efficient controller design.
ET461.CO.3: Explore Advance Process Automation Techniques.
ET461.CO.4: Utilize knowledge of PLC programming for Process Automation.
ET461.CO.5: Design GUI for process industry using LABVIEW Software.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**7 HOURS**
Basic Principle of Process Automation, Block Diagram of process control. Process characteristics, Control system Parameters, Control system Evaluation, Evaluation Criteria, Analog and Digital Processing, Process Control Drawings, Comparison of Pneumatic & Electro pneumatic control system.		
UNIT 2	**Process Controllers**	**8 HOURS**
Controller modes, Electronic controllers, Pneumatic controllers, Hydraulic controllers, Realization of controllers using Operational amplifier circuits. Feed forward controller, Tuning of PID controllers: Ziegler Nichols Method, Frequency Response Method		
UNIT 3	**Final Control Operation**	**7 HOURS**
Signal conversion: Analog signals, Digital signals, Pneumatic signal, Actuators: Electrical actuators, Pneumatic actuators, Hydraulic actuators, Control element: Mechanical, Electrical, Fluid Valves, Principle of control valve, Characteristics of Valve, selection of control valve, Different types of control valves and their applications		
UNIT 4	**Discrete state process control**	**8 HOURS**
Definition, Characteristics of the system, Relay controllers and Ladder Diagram Elements & Examples, Programmable Logic controllers (PLCs): Functions of PLC, Advantages, Architecture, PLC Operation, Scan time, Types, selection of PLC, Interfacing Input and Output devices with PLC, Ladder Programming, and PLC based automated systems.		
UNIT 5	**Computers in Instrumentation**	**10 HOURS**
Direct digital control systems, Distributed control systems (DCS): Introduction, DCS flow sheet symbols, architecture of DCS controller, DCS communication, DCS supervisory computer tasks, Features and advantages of DCS. Supervisory control and Data acquisition (SCADA): SCADA introduction, elements of SCADA, Features of SCADA, and MTU- functions of MTU, RTU Functions of RTU, and Applications of SCADA. Types of Recorders and their working, Introduction to Virtual Instrumentation (LABVIEW).		

PRACTICAL:		
MODULE NO.01		**6 HOURS**

1. Study of Differential Pressure Transmitter and its application for flow measurement.
2. Measurement of level using DPT.
3. Study and Calibration of I/P converter, P/I converter
4. Study of Control valve & plot installed characteristics of Control valve

MODULE NO.02		6 HOURS

1. Study & verification of different control actions (P, I, D, PI, PD, PID) for step input.
2. Tuning of PID controller for temperature/pressure control loop.

MODULE NO.03		6 HOURS

LabVIEW based practical

1. Study of ON-OFF control mode for temperature control process.
2. Tuning of PID controller for level/flow control loop.

MODULE NO.04		6 HOURS

RS Logix based PLC practical's

1. PCL based case studies

TEXT BOOK

1. Curtis Johnson, Process Control Instrumentation Technology; 8th Edition, Pearson Education, 2013,
2. S.K Singh, Industrial Instrumentation and Control, Third Edition, McGraw Hill companies.2009, ISBN: 9780070262225
3. N.A. Anderson, Boca Ratan, Instrumentation for Process measurement and control, Radnor Pennsylvania, CRC Press, 03rd Edition,1998, ISBN :9780849398711

REFERENCE BOOK

1. K. Krishna Swamy, Process Control; New Age International Publishers,2005,ISBN: 9788122416695
2. K. Astram, T Haggland, PID Controllers, Theory, Design and Tuning;2nd Edition
3. Bela G. Liptak , Instrument and Automation Engineers' Handbook: Process Measurement and Analysis, Fifth Edition - Two Volume Set Hardcover 4 October 2016 , ISBN :9781466559325

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	ASIC Design
	COURSE CODE	ET491
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET491.CEO.1: To introduce the concepts of application specific IC design
ET491.CEO.2: To provide exposure to the power and design considerations
ET491.CEO.3: To introduce static timing analysis at various stages of system design

COURSE OUTCOMES :

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

ET491.CO.1: Describe the design methodology for an ASIC and recall the design considerations
ET491.CO.2: Perform preliminary power computations for basic cells
ET491.CO.3: Construct timing models for a standard combinational cell
ET491.CO.4: Correlate the design flow for physical design and synthesis

THEORY COURSE CONTENT		
UNIT 1	**Introduction to ASIC Design**	**6 HOURS**
Types of ASIC, abstraction levels, ASIC design flow logic design and physical design, FPGA design flow, Combinational logic design elements, RTL design examples		
UNIT 2	**Design considerations**	**8 HOURS**
Timing parameters, metastability, clock skew, slack, clock latency, area for the design, speed requirements, power requirements, design constraints, synchronous design considerations, on-chip variations.		
UNIT 3	**Power considerations**	**10 HOURS**
Power analysis in ASICs: Power Dissipation in Digital Designs, The switching activity, Power Computation for Basic Cells and Macros, power analysis **Low power implementation:** Technology Node and Library Trade-Off, Library Selection, Clock Gating, Gate-Level Power Optimization Techniques		
UNIT 4	**Introduction to static timing analysis**	**10 HOURS**
STA at different phases, CMOS logic gates, Standard cells, modelling of CMOS cells, switching waveform, propagation delay, Min and Max Timing Paths, Clock Domains, operating conditions, timing models - standard cell library, timing models - Combinational Cells, **STA-Case study**		
UNIT 5	**Physical design**	**6 HOURS**
Physical Design Flow, Floor Planning and Power Planning, Clock Tree Synthesis, Place and Route, Back Annotation, Signoff STA and Layout, Case study		

TEXT BOOK

1. Vaibbhav Taraate, ASIC Design and Synthesis -RTL Design Using Verilog, Springer, ISBN 978-981-33-4641-3, 2021.
2. Rakesh Chadha and J. Bhasker, An ASIC Low Power Primer Analysis, Techniques and Specification, Springer, ISBN 978-1-4614-4270-7 ISBN 978-1-4614-4271-4 (eBook) DOI 10.1007/978-1-4614-4271-4, 2013.
3. J. Bhasker and Rakesh Chadha, Static Timing Analysis for Nanometer Designs A Practical Approach, springer, ISBN 978-0-387-93819-6, e-ISBN 978-0-387-93820-2, 2009.

REFERENCE BOOK

1. Vikram Arkalgud Chandrasetty, VLSI Design A Practical Guide for FPGA and ASIC Implementations, Springer, ISSN 2191-8112, e-ISSN 2191-8120, ISBN 978-1-4614-1119-2, e-ISBN 978-1-4614-1120-8 DOI 10.1007/978-1-4614-1120-8, 2011.
2. Michael John Sebastian Smith, Application Specific Integrated circuits, ISBN 0-201-50022-1, Addison Wesley Longman, Inc. Text copyright, 1997.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Network Security
	COURSE CODE	ET492
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET492.CEO.1: To acquaint the students with taxonomy and terminology of the Computer Networking area

ET492.CEO.2: To Articulate the cryptography techniques used in network security

ET492.CEO.3: To Understand Various Encryption mechanisms for secure data transmission and management of key required for encryption

ET492.CEO.4: To Understand authentication requirements and study various authentication mechanisms.

ET492.CEO.5: Discuss various security parameters related to network.

COURSE OUTCOMES :

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

ET492.CO.1: Interpret basics of computer network technology.

ET492.CO.2: Articulate the cryptography techniques used in network security.

ET492.CO.3: Understand Various Encryption mechanisms for secure data transmission.

ET492.CO.4: Understand authentication requirements and mechanisms.

ET492.CO.5: Explain various security parameters related to network.

THEORY COURSE CONTENT		
UNIT 1	**Basics of Computer Network**	**6 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). Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.		
UNIT 2	**Introduction to Cryptography**	**8 HOURS**
Threats in Networks, Introduction to the Concept of Security, Cryptographic Techniques- Symmetric and Asymmetric Key, Cryptographic Algorithms-One-Time Pads, The Vernam Cipher, Data Encryption Standard (DES) Algorithm, Advanced Encryption Standard (AES) Algorithm		
UNIT 3	**Introduction to Public key Cryptography**	**8 HOURS**
Public Key Infrastructure (PKI): Digital Signature Properties of Digital Signature, Public Key Protocol; Need and Principles of Public Key Cryptosystems, RSA algorithm and Diffie-Hellman key exchange algorithm. Certificates: Certificate Authorities, Secure Socket Layer (SSL) SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) Features, Components.		
UNIT 4	**Introduction to Authentication**	**6 HOURS**
Authentication Requirements, Message Authentication Codes, Hashes, MD5 & SHA, User Authentication: Password, Certificate based & Biometric Authentication, Kerberos.		
UNIT 5	**Network Security**	**6 HOURS**
Introduction: Need for Security, Security Attacks, Services and Mechanisms, Network Security. Firewalls, IP Security, VPN, Intrusion Detection, Web Security.		
UNIT 6	**Web security**	**8 HOURS**
Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction. Introduction to OWASP & Guidelines to address OWASP in any Web application. E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management. Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls.		

TEXT BOOK

1. Andrew S. Tenenbaum, Computer Networks, PHI, ISBN 81-203-2175-8.2.
2. Kurose & Ross, Computer Networking: A top Down Approach featuring the Internet. 3rd edition, Pearson Education,ISBN-9788131790540
3. Behrouz A. Forouzan, Cryptography & Network Security, PHI 4th Edition
4. Cryptography and Network Security: Principles and Practice, 6th Edition, William Stallings, 2014, Pearson, ISBN13:9780133354690.

REFERENCE BOOK

1. Stallings Williams, Cryptography and Network Security: Principles and Practice, 3rd edition, Prentice Hall PTR.,2003.
2. Behrouz A. Forouzan, "Data Communications and etworking",5thEdition,TataMcGraw-Hill, Publications, ISBN: 0 07 058408 7.
3. Holger Karl and Andreas Willing, Protocols and Architectures for Wireless Sensor Networks, Wiley India , ISBN:9788126533695
4. Wenbo Mao, "Modern Cryptography, Theory & Practice", Pearson Education.
5. Christof Paar, Jan Pelzl, Understanding Cryptography, Springer-Verlag Berlin Heidelberg
6. Matt Bishop, "Computer Security", Pearson Education.
7. Atul Kahate, Cryptography and Network Security, McGraw Hill.
8. Kizza, J. M. (2013). Guide to computer network security. London: Springer.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Signal Detection and Estimation Techniques
	COURSE CODE	ET493
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET493.CEO.1: To understand the mathematics and physics of Information Theory
ET493.CEO.2: To understand various channel coding techniques
ET493.CEO.3: To study the features of various error control codes
ET493.CEO.4: To design encoder and decoder for different codes

COURSE OUTCOMES :

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

ET493.CO.1: Analyze the relation between information theory and channel coding
ET493.CO.2: Describe real life applications based on fundamental theory
ET493.CO.3: Design encoder and decoder for linear, cyclic codes
ET493.CO.4: Design encoder and decoder for convolution codes
ET493.CO.5: Analyze the performance coding and error control techniques

THEORY COURSE CONTENT		
UNIT 1	**Information Measures**	**8 HOURS**
Discrete Source models Memoryless and Stationary, Mutual Information, Self-Information, Conditional Information, Average Mutual Information, Entropy, Entropy of the block, Conditional Entropy, Information Measures for Analog Sources, Coding Techniques		
UNIT 2	**Linear Block Codes for Error Correction**	**8 HOURS**
Introduction to Error Correcting Codes, Basic Definitions, Matrix Description of Linear Block Codes, Equivalent Codes, Parity Check Matrix, Decoding of a Linear Block Code, Syndrome Decoding, Error Probability after Coding (Probability of Error Correction), Perfect Codes, Hamming Codes, Optimal Linear Codes		
UNIT 3	**Cyclic Codes**	**8 HOURS**
Introduction to Cyclic Codes, Polynomials The Division Algorithm for Polynomials, A Method for Generating Cyclic Codes, Matrix Description of Cyclic Codes, Fire Code, Golay Codes, Cyclic Redundancy Check (CRC) Codes		
UNIT 4	**BCH Codes**	**8 HOURS**
Introduction to BCH Codes, Primitive Elements, Minimal Polynomials, Generator Polynomials in Terms of Minimal Polynomials, Some Examples of BCH Codes, Decoding of BCH Codes, Reed-Solomon Codes, Implementation of Reed-Solomon Encoders and Decoders Nested Code		
UNIT 5	**Convolutional Codes**	**6 HOURS**
Introduction to Convolutional Codes, Tree Codes and Trellis Codes, Polynomial Description of Convolutional Codes (Analytical Representation), Notions for Convolutional Codes, The Generating Function, Matrix Description of Convolutional Codes, Veterbi Decoding of Convolutional Codes, Distance Bounds for Convolutional Codes, Performance Bounds, Known Good Convolutional Codes, Turbo Codes, Turbo Decoding 792.14 C		

TEXT BOOK

1. Ranjan Bose, Information Theory, Coding and Cryptography, 2nd Edition, TMH, 2008 (ISBN: 9780070669017)
2. H. V. Poor, An Introduction to Signal Detection and Estimation, 2nd edition, Springer, 1994.
3. S. M. Kay, Fundamentals of Statistical Signal Processing: Detection Theory, Prentice Hall PTR, 1998.
4. S. M. Kay, Fundamentals of Statistical Signal Processing: Estimation Theory, Prentice Hall PTR, 1993.
5. H. L. Van Trees, Detection, Estimation and Modulation Theory, Part I, John Wiley, 1968.
6. D. L. Melsa and J. L. Cohn, Detection and Estimation Theory, McGraw Hill, 1978.
7. L. L. Scharf, Statistical Signal Processing: Detection, Estimation, and Time Series Analysis, Addison-Wesley, 1990.
8. V. K. Rohatgi and A. K. M. E. Saleh, An Introduction to Probability and Statistics, 2nd edition, Wiley, 2000.

REFERENCE BOOK

1. J. H. van Lint, Introduction to Coding Theory, Springer, 2008, (ISBN: 9788181288400)
2. Shu Lin and Daniel J. Costello, Error Control Coding, 2nd Edition, Pearson, 2004 (ISBN: 9788131734407)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Biomedical Engineering
	COURSE CODE	ET494
	COURSE CREDITS	3
RELEASED DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET494.CEO.1: To study the anatomy and bio-signals related to various human body systems.

ET494.CEO.2: To explain the working of Biomedical measuring, Life-saving, and Diagnostic Instruments.

ET494.CEO.3: To study the significance and details of Electric Safety, Ethics, and Standards while designing Biomedical instruments.

ET494.CEO.4: To get the overview and applications of Smart Instrumentation and E-connected Healthcare systems.

COURSE OUTCOMES :

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

ET494.CO.1: Elaborate the origin of various bio-signals and the electrodes used to measure them.

ET494.CO.2: Illustrate the working of various biomedical measurements, Life savings, and Diagnostic Instruments.

ET494.CO.3: Relate the necessity of Electric Safety, Ethics, and Standards while designing Biomedical instruments.

ET494.CO.4: Correlate the need for Smart medical devices with the current requirements.

ET494.CO.5: Discover the opportunities for the development of E-connected Healthcare Systems.

THEORY COURSE CONTENT		
UNIT 1	**Human Anatomy & Bio-signals**	**6 HOURS**

Structure of cells, Physiological systems of the Body, Anatomy of the Nervous System, Anatomy of the Cardiovascular System. Bio-signals: Action & Resting potential, Propagation of action potential, Bioelectric Potentials / Bio-signals - ECG, EEG, EMG. Electrode Theory.

Self-Study: ERG, EOG, EGG, Types of Electrodes.

Case Study: Integration and interaction between different human body systems such as Respiration-Circulatory-Digestive-Urinary systems interaction

Charts, anatomical and working models for better understanding of anatomy and functioning of the Human body system.

UNIT 2	**Biomedical Instruments and measurements**	**10 HOURS**

Introduction of Biomedical Instrumentation, Biometrics, Components of Man-Instruments System, ECG: Amplifiers, Electrodes & Leads, Einthoven Triangle, ECG Block diagram. Correlation of heart disorders with ECG. Angioplasty. EEG: Measurement, 10-20 Electrode System. Correlation of brain disorders with ECG. Blood Pressure: indirect methods and direct methods. Respiration Rate measurement.

Self-Study: Body Temperature measurement Digital thermometer and IR Thermometer.

Case Study: Camera Pill The latest technique of endoscopy

ECG, EEG, EMG Electrodes, measurement, and interpretation.

Measurement of Blood Pressure using sphygmomanometer/ Digital BP Instrument.

UNIT 3	**Life savings and diagnostic instruments**	**7 HOURS**

Life-Saving devices/ methods - Pacemakers, Defibrillators, Ventilators, CPR (Cardio-Pulmonary Resuscitation). Medical imaging modalities Ultrasound, X-ray, CT-scan, MRI, Angiography

Self-Study: ICU monitoring instruments, Kidney Dialysis

Case study: fMRI

To measure the drip rate using an IR sensor detector while giving Saline / IV (Intravenous Therapy) fluids.

Lifesaving first-aid procedure - Cardiopulmonary resuscitation (CPR)

Demonstration of working of Defibrillator machine on dummy object.

UNIT 4	**Electric Safety, Ethics, and Standards**	**5 HOURS**

Physiological effects of Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention. Grounding and Shielding. Calibration of Biomedical instruments. Biomedical Ethics. Medical Standards - OHSAS 18001 / ISO 45001, ISO 13485,

Self-study: ISO 14001, ISO 50001: ISO 14001

Case study: Cases of Medical Ethics

UNIT 5	Smart Instrumentation	5 HOURS

Healthcare 4.0 in line with Industry 4.0 Overview, necessity, technologies Smart and wearable medical devices IoMT (overview, architecture, and application)
Robotic surgery Overview and applications
Self-Study: Nanorobotics - Overview and applications in the medical field.
Case study: Smart Prosthetics

UNIT 6	E-connected Healthcare System	5 HOURS

IT Healthcare, Biotelemetry system, Telemedicine system, M-healthcare system
Self-Study: e-Pharmacy
Case Study: Tele-ambulance, eICU

Industrial Visit:
Visit a Healthcare organization or Biomedical Industry to get real-world exposure to Biomedical instruments.

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

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.
3. Markkula Center for Applied Ethics, Cases in Medical ethics, at Santa Clara University, Mar 1, 2005. Available online at: https://www.scu.edu/ethics/focus-areas/bioethics/resources/cases-in-medical-ethics-student-led-discussions/ [Accessed on 1st Nov. 2022]
4. D. Jude Hemanth (Editor), J. Anitha (Editor), George A. Tsihrintzis (Editor), Internet of Medical Things: Remote Healthcare Systems and Applications (Internet of Things)
5. Joel Rodrigues, Sandra Sendra Compte and Isabel Dez, e-Health Systems- Theory and Technical Applications, 1st Edition
6. Jingshan Li & Pascale Carayon (2021) Health Care 4.0: A vision for smart and connected health care, IISE Transactions on Healthcare Systems Engineering, 11:3, 171-180, DOI: 10.1080/24725579.2021.1884627

MIT | Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023(R2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Capstone Portfolio
	COURSE CODE	ME480
	COURSE CREDITS	4
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
NIL	8	NIL	NIL	NIL	NIL	150	150

COURSE OBJECTIVES :

Students should understand to:

ME408.CEO.1: Improve and profuse individual perspectives on problems at different scales. .

ME408.CEO.2: Identify and select the capstone work, formulate the methodology along with a significant collection of artifacts and outcomes.

ME408.CEO.3: Synthesize a reflective report to effectively communicate and explore findings. s.

ME408.CEO.4: Create a professional portfolio that technically, graphically and verbally describes pertinent achievements and the progressive growth during the program.

COURSE OUTCOMES :

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

ME408.CO.1: Portray individual skill for solving the problem. (L4)

ME408.CO.2: Showcase and exhibit the best techniques and suitable methodology. (L5)

ME408.CO.3: Cognize the significance of report and comprehend its reflections. (L4)

ME408.CO.4: Assimilate digital and visual literacies. (L5)

COURSE ABSTRACT :

Capstone work is an individual, self-identified project that focuses on technical/non-technical issues. Capstone work requires taking risks, high productivity, strong design research, quick turnaround times, creating an advanced design. A Digital portfolio is an integrative collection of work that draws together skills gained from across the taught phase of the program. It comprises a structured set of papers that enabled application and critical reflection. It is an amalgamation of both written and visual content that draws out the evolution of thinking around the ways in which design, social constructs, and emerging technologies intercept. It exposed process, critical thinking, as well as final artifacts, concepts, and its contents articulated in depth. The student enables to learn powerful new methods to promote his online self-design profile. It will help to established a professional voice by writing a personal design philosophy and a reflective article for the Linked In profile page. The opportunity to choose the project,formulate solution, negotiate deliverable, work individually, and present digitally is what makes the Capstone portfolio unique.

Capstone portfolio is divided into two section a) Capstone work b) Digital Portfolio

CAPSTONE WORK :

Individual student can choose the topic from one of the below capstones to carry out the work during the entire semester

1. Technical Capstone
    - Industry identified problem
    - Institute identified problem
    - Urban city identified problems
    - Rural Development
    - Environmental related problems
    - Student Conceived problems
    - Satisfactory solution to Open ended problems
    - Innovative Design stemming from Student/Faculty
    - Product Development
    - App/ Software Development
    - Multidisciplinary approach to existing problem
    - Modeling/Optimization/Analysis study
2. Writing Intensive Capstone
    - Design
    - Literature Survey
    - Commercial Survey
    - Social media Survey
    - Idea/ Design Philosophy
    - Research Methodology
    - Consultancy Project work
    - Collaborative Project work
    - Laboratory/Digital classroom
    - Manage/lead any Event/activity
3. General Capstone
    - State of art
    - Creating YouTube channel
    - Design Blog/Forum
    - Challenges and Prospect of Technology (Engineering) Education in Primary and Secondary Schools
    - Market Statistics

DIGITAL PORTFOLIO :

Individual student should create there own digital portfolio by using the standard professional platforms/blogs based on the record during their entire Under Graduate program. Digital portfolio should be professional, amalgamation of technical, written, graphical/Visual content and Verbal culmination of the skills and knowledge that students have developed over their under graduate program.

1. Process Portfolio
2. Show case Portfolio
3. Hybrid Portfolio

GUIDELINES :

1. Individual student will work for Capstone work for entire semester.
2. Individual student will create their own digital portfolio.
3. Individual student should choose the title of the capstone work with approval from the Supervisor and School Dean
4. Student should work on the topic approved with all necessary information, evidences and the measurable outcomes.
5. Student will have to write the report on the capstone work.
6. Students have to follow the guidelines of plagiarism for capstone report.
7. Student can skip the report if they are attempting Exemplary Capstone i.e. any one of the following. This will ensure the competency of students which they have learn during their undergraduate program. However supervisor can take stand if the capstone work is remarkable, he/she may ask to write a small report for the record.However supervisor can take stand if the capstone work is good, he/she may ask to write one small report.
    - Published Article in Scopus Index Journal
    - Approved Research Proposal
    - Winner for Design Competitions/Tech fest/ Workshop
    - Winner for State/National/International Event (Technical/Non-technical)
    - Valid score in Competitive exams (GATE/CAT/GRE-TOEFL/IELTS)
8. Capstone work and Digital portfolio need to be reviewed by supervisor and one faculty of same department to ensure whether student have followed all the guideline and work is appropriate and worth for evaluation.
9. Final examination will be conducted in the presence of Jury.

ASSESSMENT and EVALUATION :

The two member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the Capstone work supervisor. Assessment shall be done jointly by the guide and jury members.

1. Capstone work Review 1 (25 Marks)
2. Capstone work Review 2 (25 Marks)
3. Creating Digital Portfolio (50 Marks)
4. Report (25 Marks)
5. Final Demonstration (25 Marks)

REFERENCES

1. https://design.berkeley.edu/ Berkeley M.Des. University of California, U.S. . ://design.gatech.edu/ Georgia Institute of Technology, College of Design Atlanta, U.S.
2. https://www.apus.edu/ American Public University
3. https://msu.edu/ Michigan State University's US
4. https://www.cranfield.ac.uk Cranfield University, Shrivenham Swindon UK
5. https://my.bulbapp.com/personalized-learning/assessment-infographic-blog/
6. https://edtechjeffco.weebly.com
7. https://www.invisionapp.com/inside-design/10-portfolio-websites-to-show-off-your-design-work/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2022 - 2023 (R 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Economics
	COURSE CODE	HP405
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP405.CEO.1: To study the basic concepts of economics
HP405.CEO.2: To use the practical applications of economic feasibility
HP405.CEO.3: To understand the concept of banking and features
HP405.CEO.4: To illustrate the financial planning and saving options

COURSE OUTCOMES :

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

HP405.CO.1: Relate the basic concepts of engineering economics
HP405.CO.2: Apply the economic viability of firm/organization under different market conditions
HP405.CO.3: Explain the bank structures and its schemes
HP405.CO.4: Execute the effective way of financial budget and skills

THEORY		
UNIT 1	**Introduction to Economics**	**6 HOURS**
Economic issues and concepts; How economist work, Theory of demand and supply; meaning, Determinants, Equilibrium between demand and supply; Elasticity of demand; Price elasticity; Income elasticity; Cross elasticity, Characteristics of an Indian economy, Concepts of foreign trade, Goods and Services Tax (GST), Globalization, Liberalization, Privatization, Global market indices, Foreign Direct Investment (FDI). **Case studies:** Housing market, General raw products/fuel market, Electronic devices, Startups, etc. **Further readings:** Introduction to Crypto-currency, Impact and analysis in the foreign market.		
UNIT 2	**Micro Economics and Macro Economy**	**6 HOURS**
Revenue concepts, Cost concepts, Short run and long run cost concepts and curves, Opportunity cost. Markets; meaning, types of markets and their characteristics, National Income (NI); meaning, stock and flow concept, NI at current price, NI at constant price, Gross National Product (GNP), Gross Domestic Product (GDP), Net National Product (NNP), Net Domestic Product (NDP), Personal income, Disposal income, Inflation: meaning, types, causes, measures to control. **Case studies:** Economics network, Economic influences of COVID-19 pandemic, etc.		
UNIT 3	**Capital Cost Estimation and Economic Viability Study**	**5 HOURS**
Typical capital cost component, Cost Index (CI), Typical operating cost components, Classes of cost estimates, Cost estimation by applying factors, Detailed cost estimation method, Financial viability calculation (Payback period, Break-even point, Internal rate of return (IRR) and Net present value (NPV); numerical), Cash flow diagrams, Profitability criteria – Project evaluation and index. **Case studies:** Detailed spreadsheet of product cost, Determination of project cost, Net profit/loss, etc.		
UNIT 4	**Introduction to Banking & Money Market**	**5 HOURS**
Banking; meaning, types, functions, Commercial banks- Instruments in operation of an account, Central bank- Reserve Bank of India (RBI); its functions, Concepts and influences- Cash Reserve Ratio (CRR), Bank rate, Repo rate, Reverse repo rate, Statutory Liquidity Ratio (SLR), Introduction to money and capital market, Introduction to fiscal policy- meaning and tools. **Further readings:** Retail banking, Demonetization, Banking management, etc.		
UNIT 5	**Financial Literacy and Planning**	**6 HOURS**
Importance of financial planning, literacy and budgeting, Savings related products, Insurance related products, Pension, Retirement and estate planning, Borrowing related products, Basic and advanced investing, Government schemes for various savings and investment options, Tax savings options. **Case studies:** Shore Financial, Real life examples, Goal-Planning, etc. **Self studies:** Protect your family financial and retirement planning.		

REFERENCE BOOKS

1. N G. Mankiw: Economics: Principles of Economics, Cengage Learning (2003), ISBN: 1305585127.
2. J. Bradfield, Introduction to the Economics of Financial Markets, Oxford University Press, New York (2007), ISBN: 9780195310634.
3. F. Vega-Redondo, Economics and the theory of games, Cambridge University Press (2003), ISBN: 9780521775908.
4. C. S. Park, Fundamentals of Engineering Economics, Prentice Hall (2003), ISBN: 9780130307910.
5. D. E. O'Connor, The Basics of Economics, Greenwood Publisher (2004), ISBN: 9780313325205.
6. V. V. Mahajani, S. M. Mokashi, Chemical Project Economics, Macmillan India Ltd. (2005), ISBN: 1403928142.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2022 - 2023 (R 2019)
FOURTH YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Psychology
	COURSE CODE	HP406
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	-	-	50	25	NIL	NIL	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP405.CEO.1: To introduce the basic concept of Psychology.
HP405.CEO.2: To explain how learning and conditioning occurs in everyday life through both nature and nurture factors.
HP405.CEO.3: To know the main schools of thought and prime contributors to the theory of workplace motivation.
HP405.CEO.4: To develop insight into one's own and others behavior and underlying mental processes.
HP405.CEO.5: To develop Positive Psychology interventions to increase personal well-being.

COURSE OUTCOMES :

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

HP405.CO.1: Explain the basic concepts of Psychology.
HP405.CO.2: Apply the concept of conditioning in day to day life.
HP405.CO.3: Explain the main schools of thought and prime contributors to the theory of workplace motivation.
HP405.CO.4: Demonstrate effetely the personality traits in regular life.
HP405.CO.5: Employ Positive Psychology interventions to increase personal well-being.

THEORY

UNIT 1	Basics of Psychology	6 HOURS

Meaning, Nature, Objective of Psychology, Learning: meaning, classical conditioning, operant conditioning; Attention and Perception: definition, types of attention, determinants of attention.

UNIT 2	Social Interactions	6 HOURS

Conformity, Compliance, Obedience, Stereotypes, Attitudes: nature, characteristics, attitude formation and attitude change; Prejudice and Discrimination- characteristics and types of prejudice, development and maintenance of prejudice and discrimination, manifestation of prejudice, methods of reducing prejudice and discrimination.

UNIT 3	Need and Motivation	6 HOURS

Meaning; extrinsic and intrinsic motivation, Vroom's Expectancy Theory of Motivation, Herzberg's Motivators and Hygiene Factors, Maslow's Hierarchy of Needs.

UNIT 4	Self and Identity	6 HOURS

Meaning and Need, Erik Erikson's Stages of Psychosocial Development, Carl Rogers' Theory of Personality, Thomas Harris's Transactional Analysis, Johari Window, SWOT .

UNIT 5	Positive Psychology	4 HOURS

Introduction to Positive Psychology; From Learned Helplessness to Learned Optimism, 'Building the Skill of Gratitude, VIA Classification of Character Strengths and Virtues, Identifying and Using Your Signature Strengths, Resilience and Optimism, Cognitive Strategies to Increase Optimism and Resilient Thinking, Managing Anxiety and Increasing Positive Emotions .

TEXT BOOK

1. S. Cicearelli, J. Noland White, Psychology 4th Edition, Pearson Publisher, ISBN-13:9780208972241.
2. Robert A. Baron, Introduction to Psychology 3rd Edition, Pearson Education Company, ISBN-10:0536813906.
3. Stephen P. Robbins, Timothy. A. Judge, Organizational Behavior 15th Edition, Pearson Education Inc., ISBN-10:0-13-283487-1.
4. Robert. A. Baron, Nyla. R. Branscombe, Social Psychology 13th Edition, Pearson Education India, ISBN-13:978-9332569911.

REFERENCE BOOK

1. Kathleen M. Galotti, Cognitive Psychology 2nd Edition, SAGE Publications India Pvt. Ltd. ISBN:978-93-515-0277-7.
2. Robert S. Feldman, Understanding Psychology 10th Edition, McGraw Hill Education (India) ISBN:10: 1-25-900305-1.
3. Elliot Aronson, Timothy D. Wilson, Robin M. Akert, Social Psychology 8th Edition, Pearson Education, ISBN:9788131730898.
4. Calvin S. Hall, Gardner Lindzey, John B. Campbell, Theories of Personality 4th Edition Choudhary Press, Delhi, ISBN: 978-81-265-1092-4.

MIT | Academy of Engineering

MIT ACADEMY OF ENGINEERING, ALANDI

Savitribai Phule Pune University

Curriculum for

Bachelor of Technology in

Mechanical Engineering

(Choice Based Credit System)

2019-2023

BoS Chairman	Member Secretary	Chairman
Dean, School of Mechanical & Civil Engineering	Academic Council Dean Academics	Academic Council Director MITAOE

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (2019 PATTERN)

MECHANICAL ENGINEERING

The Bachelor of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION : SEMESTER WISE										
S.N.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1.	Natural Science (NSC)	2	2	1						**5**
2.	Engineering Science (ESC)	3	2		1					**6**
3.	Discipline Core (DC)			3	3	3	3	1	1	**14**
4.	Discipline Elective (DE)							1	1	**2**
5.	Open Elective (OE)					1	1	1		**3**
6.	Humanities and Social Science (HSS)		1		1	1	1		2	**6**
7.	Skill Development and Project (SDP)	1	1	3	2	2	2	3	1	**15**
TOTAL		**6**	**6**	**7**	**7**	**7**	**7**	**6**	**5**	**51**
Audit Course			1	1	2		1			**5**

CREDIT DISTRIBUTION: SEMESTER WISE											
1 Lecture hour = 1 Credit		**2 Lab Hours = 1 Credit**				**1 Tutorial Hour = 1 Credit**					
S.N.	**TYPE OF COURSE**	**NO. OF CREDITS/SEMESTER**								**TOTAL**	**%**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
1.	Natural Science (NSC)	8	8	4						**20**	**12.5**
2.	Engineering Science (ESC)	11	7		4					**26**	**16.25**
3.	Discipline Core (DC)			12	12	11	11	4	4	**54**	**33.75**
4.	Discipline Elective (DE)							3	3	**6**	**3.75**
5.	Open Elective (OE)					4	4	4		**12**	**7.5**
6.	Humanities and Social Science (HSS)	0	2		2	2	2		4	**12**	**7.5**
7.	Skill Development and Project (SDP)			5	3	4	4	10	4	**30**	**18.75**

TOTAL	21	19	21	21	21	21	21	15	160	100

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	19	**40**
2.	Second Year	21	21	**42**
3.	Third Year	21	21	**42**
4.	Final Year	21	15	**36**
TOTAL				**160**

CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	29/27	28/30	**57**
2.	Second Year	31	31	**62**
3.	Third Year	27	30	**57**
4.	Final Year	25	20	**45**
TOTAL				**221**

ABBREVATIONS		
1.	MSE	Mid Semester Exam
2.	ESE	End Semester Exam
3.	IA	Internal Assessment
4.	T/P	Term Work / Practical
5.	DM	Demonstration
6.	L	Lecture
7.	P	Practical
8.	T	Tutorial
9.	Lab	Laboratory

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)												
INDUCTION PROGRAM: 3 WEEKS												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (Version I)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**11**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	**COURSE STRUCTURE (REVISION 2019)**		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**:**	**2019-2020**
FIRST YEAR BACHLEOR OF TECHNOLOGY	**RELEASE DATE**	**:**	**01/07/2019**
	REVISION NO.	**:**	**1.0**

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
PE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN MECHANICAL ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III

SUMMER INTERNSHIP (Audit: ME200**)**

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC5	AS203	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC01	ME231	Strength of Materials	3	2	-	35	35	30	50	0	150	4
DC02	ME232	Thermal Engineering	3	2	-	35	35	30	50	0	150	4
DC03	ME233	Manufacturing Technology	3	2	-	35	35	30	50	0	150	4
SDP3	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP4	ME230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP5	ME241	Skill Development Course (Industrial Measurements & Instrumentation)	0	4	-	0	0	25	0	50	75	2
ESC7	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

SEMESTER: IV

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC8	ME221	Materials Engineering	3	2	-	35	35	30	50	0	150	4
DC04	ME222	Engineering Informatics	3	2	-	35	35	30	50	0	150	4
DC05	ME234	Machines & Mechanisms	3	2	-	35	35	30	50	0	150	4
DC06	ME235	Fluid Mechanics	3	2	-	35	35	30	50	0	150	4
SDP6	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP7	ME240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

MIT Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY IN MECHANICAL ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V

SUMMER INTERNSHIP (Audit: ME300**)**

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	ME341	Machine Design	3	2	-	35	35	30	50	0	150	4
DC08	ME342	Turbomachines	3	2	-	35	35	30	50	0	150	4
DC09	ME343	Hydraulics & Pneumatics	3	0	-	35	35	30	0	0	100	3
OE01	ME35#	Open Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP8	ME371	Skill Development Course (Computer Aided Product Design)	0	4	-	0	0	25	50	0	75	2
SDP9	ME350	Project Design	0	4	-	0	0	25	0	50	75	2
TO0TAL			**15**	**12**	**0**	**140**	**190**	**195**	**200**	**50**	**775**	**21**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	ME344	Design of Transmission Systems	3	2	-	35	35	30	50	0	150	4
DC11	ME346	Heat Transfer	3	2	-	35	35	30	50	0	150	4
DC12	ME347	Quality Management	3	0	-	35	35	30	0	0	100	3
OE02	ME36#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	ME381	Skill Development Course (Mechanical Simulations)	0	4	-	0	0	25	50	0	75	2
SDP11	ME360	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability and Career Development	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN MECHANICAL ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: VII

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC13	ME461	Refrigeration & Air Conditioning	3	2	-	35	35	30	50	0	150	4
DE01	ME47#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	ME49#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP12	ME463	Skill Development Course (Object-Oriented Programming with Python)	-	4	-	0	0	25	50	0	75	2
SDP13	ME470	Project Evaluation	-	8	-	0	0	50	0	100	150	4
SDP14	ME400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	ME462	Machine Dynamics	3	2	-	35	35	30	50	0	150	4
DE02	ME48#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP15	ME480	Capstone Portfolio	-	8	-	-	-	-	-	150	150	4
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2
HSS8	HP406	Engineering Psychology	2	-	-	0	50	25	0	0	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**160**	**50**	**75**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DE02	ME48#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP15	ME480	Capstone Portfolio	-	8	-	-	-	-	-	150	150	4
SDP16	ME467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP17	ME468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**70**	**70**	**60**	**50**	**300**	**550**	**15**

Discipline Elective (DE): 2 Courses and 6 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ME471	Operations Research	3
	ME472	Mechanical Control Systems	
	ME473	Mechanical System Design	
	ME474	Sustainable Energy	
	ME475	Artificial Intelligence	
2.	ME481	Optimization Tools & Techniques	3
	ME482	Product Lifecycle Management	
	ME483	Smart Manufacturing	
	ME484	Reliability Engineering	
	ME485	Machine Learning	
	MESWAYAM01	Discipline Elective_Swayam MOOC Courses	
	MESWAYAM02	Discipline Elective_Swayam MOOC Courses	
	MESWAYAM03	Discipline Elective_Swayam MOOC Courses	

Natural Science (NSC): 5 Courses and 20 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	AS105	Calculus and Differential Equations	4
2.	AS106	Engineering Physics	4
3.	CH101	Science of Nature	4
4.	AS107	Statistics and Integral Calculus	4
5.	AS203/04	Applied Mathematics	4

Humanities and Social Science (HSS): 6 Courses and 12 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	HP103	English for Engineers	2
	HP104	German	
	HP105	Japanese	
Audit	HP106	Indian Constitution	Audit
2.	HP202	Professional Skills	2
Audit	HP203	Liberal Learning	Audit
3.	CS361	Project Management	2
4.	HP305	Employability and Career Development	2
5.	HP405	Engineering Economics	2
6.	HP406	Psychology	2

Engineering Science (ESC): 8 Courses and 26 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	EX102	Electrical and Electronics Engineering	4
2.	CV102	Applied Mechanics	4
3.	ME104	Engineering Graphics	4
4.	ME105	Experimental Tools and Techniques	2
5.	ME106	Design Thinking	2
6.	CS101	Logic Development - C Programming	3
7.	CS102	Application Programming - Python	3
8.	ME221	Material Engineering	4
	IT221	Engineering Informatics	
Audit	CV203	Environmental Sciences	Audit

Discipline Core (DC): 14 Courses and 54 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ME231	Strength of Materials	4
2.	ME232	Thermal Engineering	4
3.	ME233	Manufacturing Technology	4
4.	ME222	Engineering Informatics	4
5.	ME234	Machines & Mechanisms	4
6.	ME235	Fluid Mechanics	4
7.	ME341	Machine Design	4
8.	ME342	Turbomachines	4
9.	ME343	Hydraulics & Pneumatics	3
10.	ME344	Design of Transmission Systems	4
11.	ME346	Heat Transfer	4
12.	ME347	Quality Management	3
13.	ME461	Refrigeration & Air Conditioning	4
14.	ME462	Machine Dynamics	4

Skill Development and Project (SDP): 13 Courses and 30 Credits			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	ET224	Digital Prototyping	2
2.	ME230	Minor Project Design	1
3.	ME225	Skill Development Course 1 (Industrial Measurements & Instrumentation)	2
4.	ET235	Rapid Prototyping	2
5.	ME240	Minor Project Implementation	1
6.	ME371	Skill Development Course 2 (Computer Aided Product Design)	2
7.	ME350	Project Design	2
8.	ME381	Skill Development Course 3 (Mechanical Simulations)	2
9.	ME360	Project Implementation	2
10.	ME463	Skill Development Course 4 (Object Oriented Programming with Python)	2
11.	ME470	Project Evaluation	4
12.	ME400	B. Tech Summer Internship	4
13.	ME480	Capstone Work	4
14.	ME467	Semester Long Internship Design	4
15.	ME468	Semester Long Internship Implementation	4
Audit	ME200	SY Summer Internship	Audit
Audit	ME300	TY Summer Internship	Audit

List of Skill Development Courses				
Programme Name	**Skill Development Course 1**	**Skill Development Course 2**	**Skill Development Course 3**	**Skill Development Course 4**
Chemical	CFD	ASPEN ONE	Aspen EDR	Plant Design Piping
Civil	REVIT/ MS EXCEL	ETABS	Open Road Designer/WaterGEMs	CFD / QGIS
Computer and Information Technology	CPP/Core Java	RHA I/ Web Technology	Adv. Java/ .Net Core/RHA II	AWS cloud services/ Android App Development
Mechanical	Industrial Measurements & Instrumentation	Computer Aided Product Design	Mechanical Simulations	Object Oriented Programing with Python
Electronics Engineering and ENTC	Data Structures and Algorithms	OOP JAVA / C++	Networking Data Science	EMB Linux/Cloud Computing/System Verilog

Open Electives (OE): 03 Courses							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Chemical Engineering	Process Engineering	CH351	Process Engineering	CH371	Process Modeling and Simulation	CH471	Process Intensification and Integration
	Energy Engineering	CH352	Energy Technology	CH372	Energy Modeling and Simulation	CH472	Energy Management and Audit
Civil Engineering	Project Management	CV325	Planning and Management	CV332	Operation Research	CV422	Financial Management
	Environmental Engineering	CV326	Solid Waste Management	CV333	Unit Operations for Liquid Waste/Effluent Treatment	CV423	Environmental Impact assessment and Climate Change
Computer Engineering	Data science	CS351	Descriptive Analytics	CS354	Predictive Analysis	CS461	Big Data Analytics
	Artificial Intelligence and Machine Learning	CS352	Artificial Intelligence	CS355	Machine Learning	CS462	Deep Learning
	Cloud Computing	CS353	Cloud Computing Foundation	CS356	Cloud Native Application Development	CS463	Cloud Native DevOps
Electronics Engineering	Robotics and Automation	ME352	Robot Fundamentals and Kinematics	EX371	Robot Dynamics and Control	EX471	AI in Robotics

Open Electives (OE)							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Electronics & Telecommuni-cation	Healthcare Technology	ET351	Fundamentals of Healthcare Technology	ET371	Healthcare Informatics	ET471	AI in Healthcare
	Internet of Things	ET352	IoT Architecture and Sensors	ET372	IoT Network & Protocols	ET472	Data Management and Analytics
Information Technology	Computer Security	IT351	Cryptography and System Security	IT352	Cyber Security and Forensics	IT461	Ethical Hacking & Cyber Laws
Mechanical Engineering	Computer Aided Engineering	ME351	Finite Element Analysis	ME361	Computational Fluid Dynamics	ME491	Advanced Fluid Dynamics
	Robotics and Automation	ME352	Robot Fundamental & Kinematics	EX371	Robot Dynamics and Control	EX471	AI in Robotics
	Automobile Engineering	ME354	Automobile System Design	ME364	Vehicle Dynamics	ME494	Autotronics and e-Vehicles
Entrepreneur-ship Cell	Innovation, Entrepreneurship & Venture Development	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation

Bachelor of Design

PRODUCT DESIGN

COURSE ABSTRACT

MIT SCHOOL OF DESIGN

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MIT | Academy of Engineering

MIT SCHOOL OF DESIGN

B.Des - PRODUCT DESIGN

SEMESTER 3

Course Code	**:**	**SE20PD301**
Course Title	**:**	**Design Drawing (Product sketching & renderings)**
Course Category	**:**	**L-T-P-0**
Credit Distribution:		**1-0-1-0**
Duration (hours)	**:**	**60 Hours**

RELEVANCE

The course focuses on skill of drawing as a tool for analysis and visualization of form and their structures. The course acquires relevance in terms of skill of drawing being important tool of thinking to visualize, develop and represent forms, design ideas and concepts. The learners are expected to understand and apply skill of drawing as thinking tool for visualization and representation.

OBJECTIVE

- To develop skills of freehand drawing and sketching to aid 3D visualization, observation and communicate design ideas/concepts.
- To understand and appreciate various aspects of construction methods of 3D forms and basic rendering.
- To appreciate concept of memory drawing.
- Application of quick sketching as method for visualization.

CONTENT

- Freehand drawing and sketching to aid 3D Visualization, Observation and Communicate design ideas/concepts.
- Construction methods of 3D forms and basic rendering.
- Memory drawing.
- Quick sketching as method for visualization.

REFERENCES / READING MATERIAL

1 Yan, Henry
Henry yan's figure drawing : techniques and tips.
2 Henry, Kevin
Drawing for product designers.

3 Cane, Kyra
Making & drawing.
4 Simpson, Ian
Drawing : seeing and observation.
5 Ruskin, John
The elements of drawing.
6 Ronin, Gilles
Drawing perspective.
7 Bhatt, N.D. and Panchal, V. M.
Engineering drawing : plane and solid geometry.
8 Loomis, Andrew
Figure drawing for all it's worth : a book of fundamentals for an artistc career.
9 Edwards, Betty
Drawing on the right side of the brain : a course in enhancing creativity and artistic confidence.
10 Robertson, Scott and Bertling, Thomas
How to draw : drawing and sketching objects and environments from your imagination.
11 Taylor, Angie
Design essentials for the motion media artist : a practical guide to principles & techniques.
12 Loomis, Andrew
Creative Illustration.
13 Watson, Lucy
Draw and sketch figures : sketch with confidence in 6 steps or less.
14 Bridgman, George
Bridgman's complete guide to drawing from life.
15 Perard, Victor Semon
Anatomy and Drawing.
16 Hogarth, Burne
Drawing Dynamic Hands.

Course Code	**:**	**CC20PD302**
Course Title	**:**	**Form Studies: Radii Manipulation**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-1-0**
Duration (hours)	**:**	**90**

RELEVANCE

The focus of the course is to develop understanding of the nuances of form integration and the relationships of forms and space. The learners having experienced the nuances of visual semantics in form, space and structure in two dimensions are expected to apply the principles

in three dimensional forms. The course provides insight into the application of visual tools such as radii manipulation to generate emotive qualities in forms as well as form integration. The course acquires relevance through application of learning to generate product forms.

OBJECTIVE

- To provide insight to appreciate 2D & 3D forms and structure in relation to space.
- To develop understanding of relationship of surfaces and its underlying visual semantics and principles.
- To develop understanding and application of visual tools such as radii manipulation and integration of 2D & 3D Forms
- To develop understanding and application of visual tools to generate forms with associative and emotive qualities.

CONTENTS

- 2D & 3D forms and structure in relation to space.
- Relationship of surfaces and its underlying visual semantics and principles.
- Visual tools such as radii manipulation and integration of 2D & 3D Forms
- Visual tools to generate forms with associative and emotive qualities.

REFERENCES / READING MATERIAL

1 Naylor, Maxine and Ball, Ralph
Form follows idea : an introduction to design poetics.
2 Bowers, John
Introduction to two-dimensional design: understanding form and function.

3 Burns, Michael.
Femme digitale : crafting the female form on your computer.
4 Nitschke, Gunter
Japanese gardens: right angle and natural form.
5 Wong, Wucius
Principles of form and design.
6 Jones, John chris
Design methods.
7 Thompson, D'archy wentworth
On growth and form.
8 Alexander, Christopher
Notes on the synthesis of form.
9 Itten, Johannes
Design and form : the basic course at the bauhaus and later.
10 Bucquoye, Moniek E
Forms with a smile.

Course Code	**:**	**SE20PD305**
Course Title	**:**	**Digital Tools (CAID)**
Course Category	**:**	**0-0-P-0**
Credit Distribution	**:**	**0-1-1-0**
Duration (hours)	**:**	**60**

RELEVANCE

The focus of the course is to develop capabilities to draft & represent various products, product details, assembly, manufacturing specifications & parameter, packaging instruction using CAD. The course develops capabilities to apply various tools used for the purpose of making advanced and interactive technical language & representation using CAD.

OBJECTIVE

- To achieve competence, appreciations and understanding of basic concept of 'CAD' software.
- To inculcate required skills to generate forms and products ideas through 'CAD'
- Application of various tools & menus of the software 'CAD'.

CONTENT

- Basic concept of 3D–CAD software.
- Skills to generate forms and product ideas through Rhino.
- Application of various tools & menus of Rhino software.

REFERENCES / READING MATERIAL

1. Beisert, Fridolin T.
   Learning design with alias studio tools : hands on guide to modeling and visualization in 3D.
2 Steel, Paul
   Modeling a character in 3ds max.
3 Ratner, Peter
   3-D human modeling and animation.
4 Learning design with alias studiotools : hands on guide to modeling and visualization in 3D.

5 Modeling a character in 3ds.
6 3-D human modeling and animation.
7 Ratner, Peter
3-D human modeling and animation.

Course Code	**:**	**AE20PD304**
Course Title	**:**	**Introduction to Ergonomics**
Course Category	**:**	**L-0-P-0**
Credit Distribution	**:**	**1-1-2-0**
Duration (hours)	**:**	**90 Hours**

RELEVANCE

To provide scientific understanding of interaction among human beings and other elements of a system and its application to design process in order to optimize human performance and overall system performance.

OBJECTIVE

- To develop understanding relationship between ergonomics of work and human beings.
- To understand and integrate scientific (Objective) methodology to design products, processes and services more efficient, more comfortable with improved usability.
- To develop understanding of physical and cognitive aspects of comfort, efficiency, utility and safety in human machine interfaces, processes and services.

CONTENT

- Relationship between ergonomics of work and human beings.
- Integration of scientific (Objective) methodology to design products, processes and services more efficient, more comfortable with improved usability.
- Physical and cognitive aspects of comfort, efficiency, utility and safety in human machine interfaces, processes and services.

REFERENCES / READING MATERIAL

1 Kroemer, Karl and Kroemer, Henrike
Ergonomics : how to design for ease and efficiency.

2 Tilley, Alvin R.(Henry dreyfuss associates)
The measure of man and women : human factors in design.
3 Kroemer K.H.E. ; Grandjean E.
Fitting the task to the human: a textbook of occupational ergonomics.
4 Martino, Vittorio Di; Corlett, Nigel
Work organization and ergonomics.
5 Tilley, Alvin R.(Henry dreyfuss associates)
The measure of man and women : human factors in design.
6. Gross, Clifford M.
The right fit : the power of ergonomics as a competitive strategy.
7. Nickerson, Raymond S.
Emerging needs and opportunities for human factors research.
8. Sanders,Mark S. ; McCormick,Ernest J.
Human factors in engineering and design.
9. Woodson, Wesley E.; Tillman, Barry ; Tillman, Peggy
Human factors design handbook : information and guidelines for the design of systems, facilities, equipment….
1. Pheasant, Stephen.
Bodyspace : anthropometry,ergonomics and the design o work.
11 Nemeth, Christopher P.
Human factors methods for design : making systems human centered.
12 Van der veer, Gerrit
Cognitive ergonomics : contributions form experimental psychology.
13 Meister, David
Conceptual foundations of human factors measurement.
14 Wilby, David
Digital colour for the internet and other media.
15 Chakrabarti, Debkumar
Indian anthropometric dimensions : for ergonomic design practice.

16 Baker,Andrew
Ergonomics : The way forward.
17 Dixon,Hayley
Ergonomics : Wasted Opportunities.
18 Caan, Shashi
Rethinking design and interiors : human beings in the built environment.
19 Karwowski, Waldemar, Soares, Marcelo M. and Stanton,Neville A.
Human factors and ergonomics in consumer product design : uses and applications.

Course Code	**:**	**CC20PD305**
Course Title	**:**	**Materials - Processes & advance manufacturing**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-2-0**
Duration (hours)	**:**	**90**

RELEVANCE

The learners need to understand a variety of materials in raw, processed & finished form and their application – which act as significant knowledge base for design and development of products.

The learners are expected to develop understanding of tools, equipment & machinery and their limitations, besides, the basic principles of manufacturing processes and their applications.

OBJECTIVE

- To understand the basic technological and structural aspect of development of Products.
- To understand the technological aspect of various materials (Plastics, Metals, Ceramics, Glass, Composites and Natural Materials) and their conversion using diverse range of manufacturing processes.

CONTENT

- Technological and structural aspects of development of Products.
- Technological aspect of various materials (Plastics, Metals, Ceramics, Glass, Composites and Natural Materials) and their conversion using diverse range of manufacturing processes.

REFERENCES / READING MATERIAL

1. Viemeister, Tucker
   Product design 6.
2. Ashby, Mike and Johnson, Kara
   Materials and design: the art and science of material selection in product design.
3. Blaich, Robert
   New + notable product design -II.
4. Edwards, Sandra
   Product Design 2: international award-winning selection of the mid-eighties.
5. Busch,Akiko
   Product Design: international award -winning designs for the home and office.

6. Asensio, Paco
Product design.
7. Davey, Andrew
Detail : exceptional Japanese product design.
8. Lefteri,Chris
Making it : maufacturing techniques for product design.
9. Campos, Cristian
Product design now.
10. archivolto
Contemporary Italian product design.
11. Baxter, Mike
Product design : practical methods for the systematic development of new products.
12. Ulrich,Karl T.;Eppinger;Steve D;Goyal Anita
Product design & development.
13 Lidwell, William; Manacsa, Gerry
Deconstructing product design : exploring the form, function, usability, sustainablity, and commercial success of 100 amazing products.
14 Bramston, David
Basics product design 02 : material thoughts.
15 Morris,Richard
The fundamentals of product design.
16 Shaoqiang, Wang
Happy life : latest product design collection/seats/shelves/Paper backoards/tables/small items/lighting.
17 Boothroyd, Geoffrey; Dewhurst,Peter; Knight, Winston
Product design for manufacture and assembly.
18 Chan, Eric
1000 product design : form, funtion, and technology from around the world.
19 Ashby,Mike;Johnson,Kara
Materials and design: the art and science of material selection in product design.

Course Code	**:**	**DP20PD306**
Course Title	**:**	**Design Project: Simple Product Design with intro to research methods**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-2-0**
Duration (hours)	**:**	**120**

RELEVANCE- RESEARCH METHODS

The courses offered under Inter-design studies are mandatory for learners of all design disciplines. Their contents are spread over the total duration of the academic Program. The relevance of these courses is to acquaint learners with those disciplines that may not directly relate to design, but play a crucial and sustaining role in the problem-solving process followed by atypical twenty first design team.

To learn design research as methodical process is critical to efficiently explore human problems in conjunction to society and environment. The course has been strategically planned as prerequisite to design projects.

OBJECTIVE

- To enable design learners learn and use research as a powerful tool – as it is said that a problem well defined is half solved.
- To enable them learn diverse methodologies to collect, collate and analyze relevant data.
- To develop insights from the analyzed data from where usable design information can be generated to ideate and develop new concepts.

CONTENT

- Research as a powerful tool in the Design Process.
- Methodologies to collect, collate and analyze relevant data.
- Develop insights from the analyzed data from where usable design information can be generated to ideate and develop new concepts.

REFERENCES / READING MATERIAL

1 Leifer, Larry
Design thinking research : Building Innovation Eco-system

RELEVANCE - SIMPLE PRODUCT DESIGN

The course is the first design project which provides the opportunity for integrative application of the basic design fundamentals, design thinking and methodology to address design opportunities in the area of simple Product Design.

The course provides experiences to recognize & comprehend contextual issues of simple products with respect to aesthetics, functionality and user segments associated with it.

The design projects are required to simulate the actual design activity in real world in terms of form, function leading to detailed concepts, prototypes and their partial or substantial validation.

OBJECTIVE

- To realize the design opportunity for integrative application of the basic design fundamentals, design thinking and methodology to address redesign / redefine simple products.
- To develop understanding of relationship between ergonomics and products.
- To realize and apply well informed decision to select right materials and processes.
- To understand the milestone stages of problem solving abilities and their application through design of simple products.

CONTENT

- Design opportunity in integrative application of the basic design fundamentals, design thinking and methodology to address redesign / redefine simple products.
- Relationship between ergonomics and products.
- Selection of right materials and processes.
- Milestone stages of problem solving abilities and their application through design of simple products.

REFERENCES / READING MATERIAL

1. Viemeister, Tucker
   Product design 6.
2. Davey, Andrew
   Detail : exceptional japanese product design.
3. Ashby, Mike and Johnson, Kara
   Materials and design: the art and science of material selection in product design.
4. Blaich, Robert
   New + notable product design -II.
5. Cleminshaw, Douglas
   Design in plastics : successful product design in plastics.
6. Edwards, Sandra
   Product Design 2: international award-winning selections of the mid-eighties.
7. Busch,Akiko
   Product Design: international award -winning designs for the home and office.
8. Rees, Herbert.
   Understanding product design for injection molding.
9. Asensio, Paco

Product design.
10. Lefteri,Chris
Making it : maufacturing techniques for product design.
11. Campos, Cristian
Product design now.
12. Mosberg, Stewart
The best of children's product design.
13 Larchivolto
Contemporary Italian product design.
14 Baxter, Mike
Product design : practical methods for the systematic development of new products.
15 Cross, Nigel
Engineering design methods : strategies for product design.
16 Chester, Katie
Nuffield design & technology : product design /14-16 resources.
17 Ulrich,Karl T.;Eppinger;Steve D;Goyal Anita
Product design & development.
18 Lidwell, William; Manacsa, Gerry
Deconstructing product design : exploring the form, function, usability, sustainablity, and commercial success of 100 amazing products.
19 Bramston, David
Basics product design 02 : material thoughts.

Course Code	**:**	**AE20PD307**
Course Title	**:**	**Basic Typography**
Course Category	**:**	**0-T-P-0**
Credit Distribution	**:**	**Audited course (exposure)**
Duration (hours)	**:**	**30**

RELEVANCE

An introduction to the fundamentals of letterforms and typographic traditions are examined through progressive assignments that stress type rendering and usage at a basic level. Students explore the theoretical and applied use of type as an integral part of visual communication.

OBJECTIVE

- Develop an understanding of the important role of typography in design, including the formal elements of Typography
- Understanding leading, kerning, special characters, ligatures, and other typographical

details in a print layout.

- Develop an understanding of three expressive aspects of typography: letterforms, layout, and color.
- Through interactive lectures and hands-on exercises, students learn how to classify typefaces and use them creatively. Understanding the fundamentals of applied typography across applications.

CONTENT

- Role of typography in design, including the formal elements of Typography
- Concepts of leading, kerning, special characters, ligatures, and other typographical details in a print layout.
- Three expressive aspects of typography: letterforms, layout, and color.
- Classification of typefaces and its creative use. Fundamentals of applied typography across applications.

REFERENCES / READING MATERIAL

1 Carter, Rob; Day, Ben; Meggs, Philip
Typographic design: form and communication.
2 Menten, Theodore
Letter forms 110 complete alphabets.
3 Baines, Phil and Haslam, Andrew
Type & Typography.
4 Ambrose, Harris
Typography.
5 Ambrose, Harris
The fundamentals of creative design.
2. Schmidt, Klaus
Typography 23 : the annual of the type directors club. Type style finder : the busy designer's guide to choosing type.
3. Krause, Jim
Idea index : graphic effects and typographic treatments.
4. willougHardbacky design group
The best of brochure design.
5. Samara,Timothy
Publication design workbook.
10 Sidles, Constance J.
Great production by design: the technical know-how you need to let your design imagination soar.
11 Craig,james
Basic typography:a design manual.
12 Carter, David E.

Little book of Layouts.
13 Knight, Carolyn and Glaser, Jessica
Layout, making it fit : finding the right balance between content and space.
14 English, Marc.
Designing identity : graphic design as a business strategy.

15 Sawahata, Lesa
Limited budget: building great designs on a limited budget.
16 Schmidt, Klaus
Typography 23: the annual of the type directors club.
17 Glenwright, Jerry
WWW. layout: effective design and layout for the world wide web.
18 Samara, Timothy
Design elements: a graphic style manual: understanding the rules and knowing when to break them.

SEMESTER 4

Course Code	**:**	**SE20PD401**
Course Title	**:**	**Design Drawing Digital: sketching & renderings**
Course Category	**:**	**0-T-P-0**
Credit Distribution	**:**	**0-1-1-0**
Duration (hours)	**:**	**60**

RELEVANCE

Designers communicate ideas and conceptualize products close to reality in order to make informed and visual design decisions for development and production. Rendering as communication medium forms a basis to represent and communicate product ideas evocatively, quickly and effectively.

OBJECTIVE

- To develop the ability to represent various products and its surface qualities through rendering with difference media.
- To develop the ability to evaluate ambient light source and manipulate its effect on various types of surfaces, textures, finishes and materials.

CONTENTS

- Representation of products and its surface qualities through rendering with difference media.
- Ambient light source and its effect on various types of surfaces, textures, finishes and materials.

REFERENCES / READING MATERIAL

1. Yan, Henry
   Henry yan's figure drawing : techniques and tips.
2. Henry, Kevin
   Drawing for product designers.
3. Cane, Kyra
   Making & drawing.
4. Simpson, Ian
   Drawing : seeing and observation.
5. Ruskin, John
   The elements of drawing.
6. Ronin, Gilles
   Drawing perspective.
7. Bhatt, N.D. and Panchal, V. M.
   Engineering drawing : plane and solid geometry.
8. Loomis, Andrew
   Figure drawing for all it's worth : a book of fundamentals for an artistc career.
9. Edwards, Betty
   Drawing on the right side of the brain : a course in enhancing creativity and artistic confidence.
10. Robertson, Scott and Bertling, Thomas
    How to draw : drawing and sketching objects and environments from your imagination.
11. Taylor, Angie
    Design essentials for the motion media artist : a practical guide to principles & techniques.
12 Loomis, Andrew
   Creative Illustration.

Course Code	**:**	**SE20PD402**
Course Title	**:**	**Workshop Technology – Material explorations & model making**
Course Category	**:**	**L-T-P-0**
Credit Distribution:		**0-1-2-0**
Duration (hours)	**:**	**120 Hours**

RELEVANCE

The focus of the course is to develop understanding of workshop skills to handle basic machine tools and to model product components and working product model. It also enables them to simulate prototyping through practical intervention of materials & techniques.

The course deals with hands on experience to gain knowledge of and use of skills of subtractive (machining) & additive (fabrication, forming etc) processing of various materials.

OBJECTIVE

Workshop skills

- To develop various workshop skills and their capabilities.
- To develop understanding of machining , forming and fabrication processes
- To develop understanding of product components, sub assembly and assembly.
- To develop understanding of fits, tolerances and fastening
- To develop understanding basic hand tools

Model making

- To learn to observe material and its micro-structure.
- To learn the behavior of material during the process/during manipulation.
- To earn the significance of “dimension” and “precision”.
- To develop passion for physical working with diverse materials.
- To learn to think, plan and measure before act.
- To learn to observe materials, processes and product in a holistic way.

CONTENT

- Workshop skills and their capabilities.
- Machining , forming and fabrication processes
- Product components, sub assembly and assembly.
- Fits, tolerances and fastening

- Basic hand tools
- Material and its micro-structure.
- Behavior of material during the process/during manipulation.
- Significance of “dimension” and “precision”.
- Physical working with diverse materials.

REFERENCES / READING MATERIAL

1. Viemeister, Tucker
   Product design 6.
2. Ashby, Mike and Johnson, Kara
   Materials and design: the art and science of material selection in product design.
3. Blaich, Robert
   New + notable product design -II.
4. Edwards, Sandra
   Product Design 2: international award-winning selection of the mid-eighties.
5. Busch,Akiko
   Product Design: international award -winning designs for the home and office.
6. Asensio, Paco
   Product design.
7. Davey, Andrew
   Detail : exceptional Japanese product design.
8. Lefteri,Chris
   Making it : maufacturing techniques for product design.
9. Campos, Cristian
   Product design now.
10. Larchivolto
    Contemporary Italian product design.
11. Baxter, Mike
    Product design : practical methods for the systematic development of new products.
12. Ulrich,Karl T.;Eppinger;Steve D;Goyal Anita
    Product design & development.
13. Lidwell, William; Manacsa, Gerry
    Deconstructing product design : exploring the form, function, usability, sustainablity, and commercial success of 100 amazing products.
14. Bramston, David
    Basics product design 02 : material thoughts.
15. Morris,Richard
    The fundamentals of product design.

Course Code	**:**	**CC20PD403**
Course Title	**:**	**Form Studies 2: Form Transition**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-1-0**
Duration (hours)	**:**	**60**

RELEVANCE

The nuances of effect of light and its perception in relation to form & space form the basis for Form generation. Ability to aesthetically integrate color, form & space through application of the essential visual semantics has great relevance for designers to generate meaningful and evocative forms.

OBJECTIVES

- To develop understanding of form structure, in relation to surfaces, volume and axis.
- To develop understanding of the relationship of form and color for surface and volume enhancement.

CONTENT

- Understanding of form structure, in relation to surfaces, volume and axis.
- Relationship of form and color for surface and volume enhancement.

REFERENCES / READING MATERIAL

1 Naylor, Maxine and Ball, Ralph
Form follows idea : an introduction to design poetics.

2. Bowers, John
Introduction to two-dimensional design: understanding form and function.

3. Burns, Michael.
Femme digitale : crafting the female form on your computer.

4. Nitschke, Gunter
Japanese gardens: right angle and natural form.

5. Wong, Wucius
Principles of form and design.

6. Jones, John chris
Design methods.

7. Thompson, D'archy wentworth
On growth and form.

Course Code	**:**	**AE20PD404**
Course Title	**:**	**How things work**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-2-0**
Duration (hours)	**:**	**90**

RELEVANCE

In today's context the products have become simple to user friendly, however the understanding of existing and emerging manufacturing technologies has become more important than ever.

It is imperative for the designer to learn the emerging scenarios in terms of new materials, new processes, cost control processes and their intelligent optimization.

OBJECTIVE

- To develop deeper understanding of selection and application of materials & processes in product detailing and development.
- To develop methodology to critically investigate and analyze selection of appropriate materials and processes in view of design solution with product optimization and cost control.

CONTENT

- Selection and application of materials & processes in product detailing and development.
- Methodology to critically investigate and analyze selection of appropriate materials and processes in view of design solution with product optimization and cost control.

REFERENCES / READING MATERIAL

1. Sharma, P. C
   Textbook of Production Engineering
2 Kahney, Leander
   Jony Ive : the genius behind Apple's greatest products

Course Code	**:**	**DP20PD405**
Course Title	**:**	**Design Project 2: Human-Product Interface**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-3-0**
Duration (hours)	**:**	**120**

RELEVANCE

The focus of the course is to develop capabilities to analyze, comprehend the nuances of developing an interface for a product. The course develops the understanding of human aspects to develop efficient and user friendly display & control systems.

OBJECTIVE

- To understand evolution of products and advent of technology that has made interface design critical.
- To develop understanding of human-machine relationship and its applications in interface design.
- To probe into the constraints and possibilities of interface design with reference to the complex, virtual world.
- To develop understanding and application skills of visual and organizational ergonomics.
- To develop application skills of visual hierarchy, concept of grouping for function and frequency of use of the elements.

CONTENTS

- Evolution of products and advent of technology that has made interface design critical.
- Human-machine relationship and its applications in interface design.
- Constraints and possibilities of interface design with reference to the complex, virtual world.
- Application skills of visual and organizational ergonomics.
- Application skills of visual hierarchy, concept of grouping for function and frequency of use of the elements.

REFERENCES / READING MATERIAL

1. Kroemer, Karl and Kroemer, Henrike
   Ergonomics : how to design for ease and efficiency.
2. Tilley, Alvin R.(Henry dreyfuss associates)
   The measure of man and women : human factors in design.

3. Kroemer K.H.E. ; Grandjean E.

Fitting the task to the human: a textbook of occupational ergonomics.
4. Martino, Vittorio Di; Corlett, Nigel
Work organization and ergonomics.
5. Tilley, Alvin R.(Henry dreyfuss associates)
The measure of man and women : human factors in design.
6. Gross, Clifford M.
The right fit : the power of ergonomics as a competitive strategy.
7. Nickerson, Raymond S.
Emerging needs and opportunities for human factors research.
8. Sanders,Mark S. ; McCormick,Ernest J.
Human factors in engineering and design.
9. Woodson, Wesley E.; Tillman, Barry ; Tillman, Peggy
Human factors design handbook : information and guidelines for the design of systems, facilities, equipment….
10. Pheasant, Stephen.
Bodyspace : anthropometry,ergonomics and the design o work.
11. Nemeth, Christopher P.
Human factors methods for design : making systems human centered.
12. Van der veer, Gerrit
Cognitive ergonomics : contributions form experimental psychology.
13 Meister, David
Conceptual foundations of human factors measurement.
14 Wilby, David
Digital colour for the internet and other media.
15. Chakrabarti, Debkumar
Indian anthropometric dimensions : for ergonomic design practice.
16. Baker,Andrew
Ergonomics : The way forward.
17. Dixon,Hayley
Ergonomics : Wasted Opportunities.
18. Caan, Shashi
Rethinking design and interiors : human beings in the built environment.
19. Karwowski, Waldemar, Soares, Marcelo M. and Stanton,Neville A.
Human factors and ergonomics in consumer product design : uses and applications.

Course Code	**:**	**SE20PD406**
Course Title	**:**	**Digital Tools: Advanced CAD**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**0-1-2-0**
Duration (hours)	**:**	**60**

RELEVANCE

Use of modeling software's for developing conceptual models of desirable form and shape is essential for design learners. It helps in presentation and communication of the design issues in the product being designed. At the same time it is also important for the learners to have the ability to model a product from the orthographic sketches. The use of surfacing software's helps the learners for achieving the abovementioned outputs. The course prepares the learners gain the skills of modeling a product/concept in a surfacing software and render them efficiently for presentations.

OBJECTIVE

- To learn to create 3D conceptual models.
- To work on orthographic drawings, images and modeling a product.
- To achieve dimensional details from a modeled product.
- To achieve satisfactory surface quality of the product being modeled.

CONTENT

- Creating 3D conceptual models.
- Orthographic drawings, images and modeling a product.
- Dimensional details from a modeled product.
- Surface quality of the product being modeled.

REFERENCES / READING MATERIAL

1. Beisert, Fridolin T.
   Learning design with alias studiotools : a hands on guide to modeling and visualization in 3D.
2. Steel, Paul
   Modeling a character in 3ds max.

3. Ratner, Peter
   3-D human modeling and animation.
4. Learning design with alias studiotools : hands –on guide to modeling and visualization in 3D.
5. Modeling a character in 3ds.
6. 3-D human modeling and animation.
7. Ratner, Peter
   3-D human modeling and animation.
8. Leake, James M and Borgerson, Jacob L.
   Engineering design graphics : sketching, modeling, and visualization.

Course Code	**:**	**SE20PD407**
Course Title	**:**	**Basic Photography**
Course Category	**:**	**0-T-P-0**
Credit Distribution	**:**	**Audited course (exposure)**
Duration (hours)	**:**	**30**

RELEVANCE

Documentation & communication are means of recording the process of design as well as communication of ideas, concepts and products. Photography medium becomes important tool to communicate and document design process.

OBJECTIVE

- To develop understanding and appreciation of still photography as a medium of documentation and communication.
- To develop understanding of the nuances of ways of seeing and perceiving, capturing, manipulating image, display and subsequent impact.
- To understand “image making” as a process and develop insight into the technical and aesthetic aspects.
- To facilitate and help in grasping aspect of visual literacy.

CONTENTS

- Photography as a medium of documentation and communication.
- Ways of seeing and perceiving, capturing, manipulating image, display and subsequent impact.
- “Image making” as a process - its technical and aesthetic aspects.
- Concept of visual literacy.

REFERENCES / READING MATERIAL

6. Yorath, Dave
   Crash Course : Photography.
7. Kopelman, Arie
   Direct stock.com : web catalog and portal to photography sites.

8. Scott, Alexis
Photography M/W work book.
9. Kopelman, Arie
Greeting form new york : Conceptual still life photography.
10. Roy, Ashok
Fine art through the lens.
6 Scott, Alexis
Photography E/S work book.
7 Hicks,Roger; Schultz, Frances; Larg, Alex
Photographing people: portraits,fashion,glamour.
8 Aaland, Mikkel
Photoshop elements 2 solutions : the art of digital photography.
9 Penn, Irving.
Still life : with an introduction by John Szarkowski.
10 Berg, Jo vad den
Art directors' index to photographers 21.
11 Berg, Jo vad den
Art directors' index to photographers 21.
12 Gaunt, Leonard
Film and paper processing.
13 Daye, David
Professional photography family portraits.
14 Grant, John; and Vysniauskas, Audre
Digital art for the 21st century renderosity.
15 Harnischmacher, Cyrill
Closeup shooting : a guide to closeup,tableup, and.
16 Harnischmacher, Cyrill
Low budget shooting: do it yourself solutions to professional photo gear.

17 Hinkel, Brad
Color management in digital photography.
18 Briot, Alain
Mastering landscape photography.
19 Steinmueller, Uwe; and Gulbins
Fine art printing for photographers : exhibition quality prints with inkjet printers.
20 Steinhoff, Sascha
Scanning negatives and slides : digitizing your photographic archive.

SEMESTER 5

Course Code	:	**SE20PD501**
Course Title	:	**Digital tools – CAD Product detailing**
Course Category	:	**0-T-P-0**
Credit Distribution	:	**0-1-1-0**
Duration (hours)	:	**60**

RELEVANCE

Surface modelling software has multiple advantages for concept modelled in 3D. They can be used for modelling difficult forms while providing the output as conceptualized and can be well used for quality rendering. The software skills are therefore appreciated well in the transportation and product design industry. The course prepares the learners to work on advanced surface modelling software and tune them to be in line with industry requirements

OBJECTIVE

- To prepare the learners to work in advanced surfacing software.
- To work on orthographic drawings, images and modelling a product.
- To be accustomed with types of parametric attributes while making a concept model to be able to seamlessly manipulate it.
- To work for detailing and surface quality for the product being modelled.

PRE-REQUISITES

Basics of CAD modelling

CONTENTS

Developing CAD model of a product with advanced/complex surfaces and forms

SESSION PLAN

Session	Inputs	Methodology
Day 01	Introduction to the subject along with demonstration of relevant CAD features	Lectures, presentations, demonstrations and discussions
Days 02 - 04	Hands-on CAD modelling along with faculty consultation	Faculty and student interaction, intermediate reviews and hands-on guidance
Day 05-08	Hands-on CAD modelling along with	Faculty and student interaction,

	faculty consultation	intermediate reviews and hands-on guidance
Day 09-10	Submissions and Feedback session	Final CAD models as deliverables

EVALUATION METHODOLOGY

The appropriate/ efficient methodology / tools used by the student are evaluated

READING / REFERENCE LIST

Online references tutorials and videos

Course Code	**:**	**AE20PD502**
Course Title	**:**	**Packaging Design**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-0-2-0**
Duration (hours)	**:**	**90**

RELEVANCE

Product packaging is the most critical aspect for product transit, information and visual impact of the product to the user. The ability to design and develop packaging requires cognitive and creative skills to apply ergonomic principles, information structuring, packaging structures & form and safety norms to develop efficient, user friendly and economic packaging design.

OBJECTIVE

- To develop understanding of visual communication through packaging of products.
- To develop understanding of the packaging structure and materials of construction.
- To develop understanding of visual recall.
- To develop understanding of the importance of packaging to communicate, product information and its attributes in structural and graphical terms.
- To develop understanding of the importance of packaging in terms of shelf dominance and branding in retail environment.
- To develop understanding of the functional aspects such as safety, preservation, shelf life and logistics in transportation.

PRE-REQUISITES

Understanding and experience of basic design process

CONTENTS

- Students choose a particular scenario for packaging and work on design/ re-design. they aim to come up with innovative and yet practical packaging solutions.
- Structural as well as graphic aspects of packaging have to be designed and developed

SESSION PLAN

Session	Inputs	Methodology
Days 01 - 03	Introduction to the subject Formation of student groups & topic selection in discussion with mentors	Lectures, presentations and discussions
Days 04 - 13	Analysis, Field studies, Ideation, Concept Generation, Detailing, Prototyping	Faculty and student group discussions, intermediate reviews and presentations
Days 14 - 15	Submissions and Feedback session	Final verbal presentation along with key deliverables

EVALUATION METHODOLOGY

Evaluation is done at key milestones of the project - analysis, conceptualization, detailing, development and prototyping. Renderings, detailed technical drawings of the final concept and a mockup/ prototype are key deliverables.

READING / REFERENCE LIST

- Boku, SayokoPackage form and design : encyclopedia of paper-folding designs.
- Pedersen, Martin, Graphics Packaging 9.
- Gordon, Stacey king, Packaging makeovers : graphic redesign for market change.
- Fishel, Catharine, Design Secrets : packaging 50 real life projects uncovered.
- Denison, Edward; Cawthray, Richard, Packaging prototypes.
- Calver, Giles, What is packaging design ?:essential design handbooks.
- Garrofe, Josep.M, Structural packaging.
- Herriott, Luke, The designer's packaging bible : creative solutions for outstanding design.
- Anne; and Emblem, Henry Design fundamentals packaging 2 prototypes : closures.
- Tang, Roger Fawcett; Mason, Daniel, Experimental formats and packaging : creative solutions for inspiring graphic design.

- Hampshire, Mark; Stephenson, Keith, Demographics packaging : design successful packaging for specific customer groups.
- Kirwan, Mark J., Paper and paperboard : packaging technology.
- Theobald, Nigel ; Winder, Belinda, Packaging closures and sealing systems.

- Athalye A.S, Handbook of packaging - plastics.
- Brody, Aaron L; and Marsh, Kenneth S. , The wiley encyclopedia of packaging technology 2ed.
- Klimchuk, Marianne Rosner; Krasovec, Sandra A, Packaging graphic designesign : successful product branding from concept to shelf.
- Rivers, Charlotte Best of Disc art 1 : innovation in CD,DVD & Vinyl packaging design.
- Lianshun, Shao; Lang Hi, Out of the box : ready-to-use POP packaging.
- Denison, Edward, Print and production finishes for sustainable design.

Course Code	**:**	**SE20PD503**
Course Title	**:**	**Colour, Material, Finish and Trend Studies**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-0-2-0**
Duration	**:**	**90**

RELEVANCE

"Designers must be willing to get their hands dirty and play in order to discover the unexpected."

Industrial Designers have CMF responsibilities in an industry as it is an integral part of the product and its first interface with the potential buyer.

As CMF provide look and feel of the product through various senses, it is imperative for the Industrial Designers to develop thorough understanding and application of CMF to enhance perceived emotive and functional value of the product.

OBJECTIVES

- To develop an appreciation of simultaneous evolution of a product form with its skin becoming an integral part.
- To develop ability to research on trends in evolution of the product surface/skin historically.
- To research on materials and processes R&D, their analysis and apply this learning strategically and creatively to design new product skins/surfaces.
- To develop understanding of reproduction and post-production processes / technologies. To study diverse range of surface morphing processes like chrome-plating, sand-blasting, tampon–printing, film-transfer, hydro-Graphics, textured-painting, powder-coating, anodizing, chemical vapor deposition, vacuum metalizing, flocking etc. (will be part of Content)

PRE-REQUISITES
Basic understanding of colour application from foundation studies

CONTENTS

- understanding CMF from aesthetic, cultural and functional perspectives
- understanding technologies and industry processes on products to achieve various finishes - industry visits are a part of the study process
- influences of fashion trends, culture and technology trends that affect choice of CMF

SESSION PLAN

Session	Inputs	Methodology
Days 01 - 02	Introduction to the subject Formation of student groups & topic selection in discussion with mentors	Lectures, presentations and discussions
Days 03 - 13	Study and analysis of lifestyle chosen, mood board and swatch creation, concept application to product skins	Faculty and student group discussions, intermediate reviews and presentations, industry visits to study manufacturing processes
Days 14-15	Submissions and Feedback session	Final verbal presentation along with key deliverables

EVALUATION METHODOLOGY

For a particular scenario of product and lifestyle, application of CMF has to be performed by students on an existing product category. Evaluation is done at based on trend studies, mood board and swatch board creation, innovative application of CMF and technical feasibility, renderings of the final concept. Mockup samples/ swatches are highly desirable.

READING / REFERENCE LIST

- Fraser, Tom and Banks, Adam, The complete guide to colour.
- Beazley, Mitchell, The colour book.
- Ambrose, Harris, Colour.
- Albers, Josef., Interaction of color : revised and expanded edition.
- Allen, Jeanne, Designer’s guide to color 3.
- Holtzschue, Linda , Understanding color : an introduction for designers.
- Shibukawa, Ikuyoshi; Takahashi, Yumi. Designer’s guide to color - 5.
- Itten,Johannes, The elements of color.
- Marks, Terry; Sutton, Tina, Color harmony compendium : a complete color reference for designers of all types.
- Pantone : the plus series colour formula guide / solid coated and uncoated - GP 1301 XR.

Course Code	**:**	**CC20PD504**
Course Title	**:**	**Product Semantics**
Course Category	**:**	**L-0-P-0**
Credit Distribution	**:**	**1-0-2-0**
Duration (hours)	**:**	**60**

RELEVANCE

Semanticists deal with communicating meaning through visual and form clues.
Product Semantics merges the disciplines of art, ergonomics, communications, logic, philosophy and human cognition.

OBJECTIVES

- To understand the relevance of meaning in form.
- To probe into human perception and factors affecting it.
- To explore and understand the use of semantics in product design through the use of metaphors and meanings.
- To understand relatedness or “sense of family” in a group of products in terms of visual characteristics leading to creation of a style / language recognizable across a varied range of products.

PRE-REQUISITES

Basic principles of aesthetics (form and colour) and product interaction

CONTENTS

- For a particular product, students understand the aspects of similarity, familiarity and meaning within context attributed due to its aesthetic and functional features.
- Students learn how and why products get categorised and classified
- Students learn to articulate a products features so as to achieve particular meaningful interaction and experience in the product

SESSION PLAN

Session	Inputs	Methodology
Days 01 - 02	Introduction to the subject Formation of student groups & topic selection in discussion with mentors	Lectures, presentations and discussions
Days 03 - 09	Study and analysis of lifestyle chosen, mood board creation, creation of product classification, typicality and a-typicality charts based on features and usage, culture etc	Faculty and student group discussions, intermediate reviews and presentations
Day 10	Submissions and Feedback session	Final verbal presentation along with key deliverables

EVALUATION METHODOLOGY

Evaluation is done based on understanding of semantic features for the chosen product, product classification (taxonomy, typicality and a-typicality charts) the influences of product aesthetics (form and colour), culture, interaction, material, finish etc. towards meaning in design. A poster presentation is final deliverable.

READING / REFERENCE LIST

- Klaus Krippendorf, The Semantic Turn
- Sara Hjelm, Semiotics in Product Design

Course Code	**:**	**DP20PD505**
Course Title	**:**	**Design Project 5 (Technically Complex Product)**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-3-0**
Duration (hours)	**:**	**120**

RELEVANCE

The focus of the course is to develop capabilities to analyze, comprehend the nuances of developing products and systems having significant level of complexity. The course develops the abilities to confront the inherent complexities, organize and build relevant context to develop efficient and user friendly product and systems.

OBJECTIVE

- To understand user & context related needs in specific area
- To establish optimally relate product to the user.
- To develop ability to demonstrate performance on problem solution of a complex by specific design process.
- To establish an optimal relationship between electro-mechanical aggregates
- To develop understanding to approach product holistically.
- To rationalize the product design in terms of manufacturability and feasibility.

PRE-REQUISITES

Understanding and experience of basic design process

CONTENTS

Students choose a particular product or problem scenario that demands understanding of technical complexity. they either re-design or come up with a completely new product idea to provide a solution to the problem.

SESSION PLAN

Session	Inputs	Methodology
Days 01 - 03	Introduction to the subject Formation of student groups & topic selection in discussion with mentors	Lectures, presentations and discussions
Days 04 - 15	Analysis, Field studies, Ideation, Concept Generation, Detailing, Prototyping	Faculty and student group discussions, intermediate reviews and presentations
Days 15 - 20	Submissions and Feedback session	Final verbal presentation along with key deliverables

EVALUATION METHODOLOGY

Evaluation is done at key milestones of the project - analysis, conceptualization, detailing, development and prototyping. Renderings, detailed technical drawings of the final concept and a mockup/ prototype are key deliverables.

READING / REFERENCE LIST

- Ashby, Mike and Johnson, Kara, Materials and design: the art and science of material selection in product design.
- Blaich, Robert,New + notable product design -II.
- Edwards, Sandra, Product Design 2: international award-winning selection of the mid-eighties.
- Busch,Akiko, Product Design: international award -winning designs for the home and office.
- Asensio, Paco, Product design.
- Davey, Andrew, Detail : exceptional Japanese product design.
- Campos, Cristian,Product design now.
- Lidwell, William; Manacsa, Gerry, Deconstructing product design : exploring the form, function, usability, sustainablity, and commercial success of 100 amazing products.

Course Code	**:**	**DS20PD506**
Course Title	**:**	**Open Elective 1 (All Disciplines)**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-2-0**
Duration (Hours)	**:**	**90**

RELEVANCE

The focus of the elective is to develop capabilities to handle projects of multi-disciplinary nature, explore diverse range of materials and sensorial experiences (Light, Sound, Olfactory, Gastronomy, Touch etc) and work with them. The elective provides platform to work in the areas across disciplines which are normally not taken up in great detail in the structured design learning.

OBJECTIVES

To enable design learners explore and discover their hidden, untapped potential and skills through diverse experiences with materials, skills, expressions and multiple senses.

PRE-REQUISITES
Depends on the topic of elective

CONTENTS
Depends on the topic of elective

SESSION PLAN

Depends on the topic of elective

EVALUATION METHODOLOGY
Depends on the topic of elective and discretion of faculty

READING / REFERENCE LIST
Depends on the topic of elective

SEMESTER 6

Course Code	**:**	**AE20PD601**
Course Title	**:**	**Design & Business (Design Management)**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-0-1-0**
Duration (hours)	**:**	**60**

RELEVANCE

Design is a relatively new profession and is yet to become an integral and strategic part of business in our country. Young designers need to understand how they need to make design visible in the business.

The course aims at developing a comprehensive understanding of how design processes and design thinking can create new business opportunities.

OBJECTIVES

- To make the young designers understand their role in an organization and also how design is practiced professionally in India and other more developed economies.
- To develop an understanding of how businesses operate and make themselves profitable
- To prepare them for constantly dynamic markets and challenges it offers to test their problem solving abilities.
- To understand the concept of Entrepreneurship and how it will work as engine for growth in the dynamic economy

PRE-REQUISITES

basic awareness on factors that influence business

CONTENTS

The course familiarizes students to business and entrepreneurial terminology. A business case scenario is taken up for study and various influencing parameters are listed down and described. Familiarity with business model generation is to be achieved.

SESSION PLAN

Session	Inputs	Methodology
Days 01 - 02	Faculty talks on various areas, sharing their experiences	Lectures, presentations and discussions
Days 03 - 08	Sessions by industry expert on corporate world, studio working, innovative new companies	Faculty and student group discussions intermediate reviews
Days 09 - 10	Concluding session on Designer's role and industry	Group discussions & formal small talk

EVALUATION METHODOLOGY

Deliverables are a presentation/ video/ info-graphic poster that explain the studies carried out and inferences drawn from the study. Emphasis is placed on methodical approaches taken and the appropriateness of estimations and factual figures.

READING / REFERENCE LIST

- Alexander Osterwalder, Business Model Generation
- John Maeda, The Laws of Simplicity: Design, Technology, Business, Life
- Roger Martin, The Design of Business: Why Design Thinking is the next competitive advantage
- Navi Radjou,et al., Jugaad Innovation
- Riggs, Engineering Economics

Course Code	**:**	**DP20PD602**
Course Title	**:**	**Design Project 4: Design for Special Needs**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-2-0**
Duration (hours)	**:**	**90**

RELEVANCE

Industrial design has a significant role to improve the quality of human life in society by providing innovative ideas and solutions towards product and product systems improvements. However, in India with a human population of more than a billion people where there are large sections of society with some disability, Industrial designers need to develop capabilities to improve lives of often neglected “differently-abled” or underserved.

OBJECTIVE

- To develop empathy towards people having specific disabilities or limitations (e.g. arthritis, blindness, hearing disorder, specific needs of small children, aged etc.) and understanding of the difficulties faced by them in their daily lives.
- To enable design learners to appreciate special needs of the “less-abled” and develop meaningful solutions.
- To enable them to interact effectively with users and domain specialists and learn from them.

PRE-REQUISITES

Understanding and experience of basic design process

CONTENTS

- empathizing with a chosen target group and their special/ unusual functional needs w.r.t. product requirements
- customizing a product to suit the new requirements OR coming up with a completely new product solution

SESSION PLAN

Session	Inputs	Methodology
Days 01 - 03	Introduction to the subject Formation of student groups & topic	Lectures, presentations and discussions

	selection in discussion with mentors	
Days 04 - 15	Analysis, Field studies, Ideation, Concept Generation, Detailing, Prototyping	Faculty and student group discussions, intermediate reviews and presentations
Days 15 - 20	Submissions and Feedback session	Final verbal presentation along with key deliverables

EVALUATION METHODOLOGY

Evaluation is done at key milestones of the project - analysis, conceptualization, detailing, development and prototyping. Renderings, detailed technical drawings of the final concept and a mock-up/ prototype are key deliverables.

READING / REFERENCE LIST

- Case studies on the internet

Course Code	**:**	**CC20PD603**
Course Title	**:**	**Design Ethnography**
Course Category	**:**	**L-T-P-0**
Credit Distribution:		**1-0-1-0**
Duration (hours)	**:**	**60 Hours**

RELEVANCE

Industrial designers have to work for various user-groups. The socio-cultural beliefs and rituals that are hard-wired in their living need to be observed closely in order to design products that can become an integral part of peoples' lives. It is also a way of understanding the way people live as to make the new product or service more meaningful and relevant.

Design Ethnography observes the world from the point of view of the subject/user (not from Ethnographer's point of view) and records all that she observes.

OBJECTIVE

- To capture the "social meanings and ordinary activities" of people.
- To develop a more personal and in-depth portrait of the informants and their community.
- To discover logical patterns and social structure by multiple methods of data collection.
- To develop the ability to observe the world from the point of view of the subject, while maintaining the distinction between perception and reality

CONTENT

Students take up a relevant socio-cultural topic and conduct ethnographic research studies. They use various tools and techniques to obtain information relevant to the topic and draw inferences from the same. They use visual techniques to represent the information in the best way possible.

REFERENCES / READING MATERIAL

- Leifer, Larry, Design thinking research : Building Innovation Eco-system
- Sam Ladner, Practical Ethnography: A Guide to Doing Ethnography in the Private Sector
- Elizabeth Warnock Fernea, Guests of the Sheikh: An ethnography of an Iraqi village

Course Code	**:**	**DS20PD604**
Course Title	**:**	**Design Project 5 (Advance tech based product)**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-3-0**
Duration (hours)	**:**	**150**

RELEVANCE

The focus of the course is to develop capabilities to analyze, comprehend the nuances of developing products and systems having significant level of complexity. The course develops the abilities to confront the inherent complexities, organize and build relevant context to develop efficient and user friendly product and systems.

OBJECTIVE

- To understand user & context related needs in specific area
- To establish optimally relate product to the user.
- To develop ability to demonstrate performance on problem solution of a complex by specific design process.
- To establish an optimal relationship between electro-mechanical aggregates
- To develop understanding to approach product holistically.
- To rationalize the product design in terms of manufacturability and feasibility.

PRE-REQUISITES

Understanding and experience of basic design process

CONTENTS

Students choose a particular product or problem scenario that demands understanding of technical complexity. they either re-design or come up with a completely new product idea to provide a solution to the problem.

SESSION PLAN

Session	Inputs	Methodology
Days 01 - 03	Introduction to topic, study of advance technologies, group formation & selection of topics	Lectures, presentations and group discussions
Days 04 - 15	Analysis, Field studies, Ideation, Concept Generation, Detailing, Prototyping	Faculty and student group discussions, intermediate reviews and presentations
Days 15 - 20	Submissions and Feedback session	Final verbal presentation along with key deliverables

EVALUATION METHODOLOGY

Evaluation is done at key milestones of the project - analysis, conceptualization, detailing, development and prototyping. Renderings, detailed technical drawings of the final concept and a mockup/ prototype are key deliverables.

READING / REFERENCE LIST

- Ashby, Mike and Johnson, Kara, Materials and design: the art and science of material selection in product design.
- Blaich, Robert,New + notable product design -II.
- Edwards, Sandra, Product Design 2: international award-winning selection of the mid-eighties.
- Busch,Akiko, Product Design: international award -winning designs for the home and office.
- Asensio, Paco, Product design.
- Davey, Andrew, Detail : exceptional Japanese product design.
- Campos, Cristian,Product design now.

- Lidwell, William; Manacsa, Gerry, Deconstructing product design : exploring the form, function, usability, sustainablity, and commercial success of 100 amazing products.

Course Code	**:**	**AE20PD605**
Course Title	**:**	**Intro to UI-UX**
Course Category	**:**	**0-T-P-0**
Credit Distribution	**:**	**1-1-1-0**
Duration (Hours)	**:**	**60**

RELEVANCE

Its important for Product designer to have knowledge of user interface & user experience design- research methods. Since lot of product designer find opportunities to work in UX space their readiness to this field and exposure to it will keep them ready to take up such opportunities with ease.

OBJECTIVES

To know the principles of interaction design.
Fundamentals of user cantered design
Design methods used in software/app development
Research methodologies used in UX projects

CONTENTS

To know the principles of interaction design.
Fundamentals of user cantered design
Design methods used in software/app development
Research methodologies used in UX projects

Course Code	**:**	**DS20PD606**
Course Title	**:**	**Open Elective 2 (All Disciplines)**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-2-0**
Duration (Hours)	**:**	**90**

RELEVANCE

The focus of the elective is to develop capabilities to handle projects of multi-disciplinary nature, explore diverse range of materials and sensorial experiences (Light, Sound, Olfactory, Gastronomy, Touch etc) and work with them. The elective provides platform to work in the areas across disciplines which are normally not taken up in great detail in the structured design learning.

OBJECTIVES

To enable design learners explore and discover their hidden, untapped potential and skills through diverse experiences with materials, skills, expressions and multiple senses.

PRE-REQUISITES
Depends on the topic of elective

CONTENTS
Depends on the topic of elective

SESSION PLAN
Depends on the topic of elective

EVALUATION METHODOLOGY
Depends on the topic of elective and discretion of faculty

READING / REFERENCE LIST
Depends on the topic of elective

Course Code	**:**	**Audited course**
Course Title	**:**	**History of Industrial Design**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-0-0-0**
Duration (hours)	**:**	**30**

RELEVANCE

The course focuses as a probe into evolution of man-made objects as industrial products with an understanding of advent of technology, socio-cultural and political development and how they might have influenced industrial design.

It also helps design learners to develop a time-space continuum on evolution of industrial design as economic activity and as a profession endeavour.

OBJECTIVES

- To understand how industrial revolution changed the socio-economic fabric of the society.
- To understand the timeline of industrial and technological innovations and the products and how they influenced our lives in a significant way and continue to do so.
- To probe into various design and art movements.

PRE-REQUISITES

none

CONTENTS

- Understanding the influence of various art and historic movements, technology developments on design languages of products
- Understanding key differentiators of styles of various design eras.

SESSION PLAN

Session	Inputs	Methodology
Days 01 - 03	Series of session on history & development by faculty	Lectures, presentations and discussions
Days 03 - 05	Group assignment for students on one topic for further study	Faculty and student group discussions, intermediate reviews and presentations

EVALUATION METHODOLOGY

Info-graphic poster presentation and a conceptual application of a particular style to a product category.

READING / REFERENCE LIST

Online internet resources

SEMESTER 7

Course Code	**:**	**CC20PD701**
Course Title	**:**	**Project: Nature Inspired Design**
Course Category	**:**	**L-T-P-0**
Credit Distribution:		**1-1-2-0**
Duration (hours)	**:**	**120 Hours**

RELEVANCE

Nature strives to create a harmonious balance between myriads of physical elements and forces to evolve forms which are adaptable in prevailing conditions.

Nature also strikes perfect balance amongst living species for mutual coexistence, survival and evolution. The study of natural forms, structures and systems has the potential to offer designers invaluable references and inspirations towards generations of man-made objects and systems. Also innovations are often triggered by the diligent and vigorous study and observation leading to insights to the way nature performs.

OBJECTIVE

- To regard Nature as vast information resource and to gain learning and insights from it.
- To study the elements of a natural object and its environment and understanding of the principles, functions and purpose.
- To develop understanding of natural objects in terms of its geometry, inter-relationships with other elements, purpose, function, structure, textures, growth and growth patterns and survival instincts.
- Understanding of the relationships between form and purpose (function) and develop an ability to conceptualize a form/ system based on the same.
- To use acquired information as framework / inspiration to develop insights to design products, processes and systems to solve complex human problems.

CONTENT

Students take up a scenario from nature and study it w. r. t. design. Studies involve analysis of the form and function of natural object. Relevant physical, biological and chemical phenomena are studied. The inter-dependencies in are also to be studied. Students take this study as an inspiration and propose applications to solve complex design problems.

REFERENCES / READING MATERIAL

- Janine M. Benyus, Biomimicry: Innovation Inspired by Nature
- Michael Pawlyn, Biomimcry in Architecture
- The Biomimicry Institute - www.biomimicry.org
- Ask nature website - www.asknature.org
- TU Delft, Nature Inspired Design Website - www. http://natureinspireddesign.nl

Course Code	**:**	**AE20PD703**
Course Title	**:**	**GREEN DESIGN : ATTITUDE TO SUSTAINABILITY**
Course Category	**:**	**L-T-P-0**
Credit Distribution:		**2-1-2-0**
Duration (hours)	**:**	**90 Hours**

RELEVANCE

The Course aims at providing awareness on insights into the ecological foot prints in the process of design development and manufacturing of products, systems and services. Designers must be aware of the consequences of design decisions in the context of material selection, detailing and usage.

OBJECTIVE

- To develop insight into the concept consumerism and life-style scenario.
- To develop insight into the concerns of state of the world.
- To develop understanding of products and product systems, life cycles, starting from raw material extraction, processing, transportation use and end of use.
- To develop insight into the areas where designers can contribute.
- To develop approaches to sustainable design.
- To provide exposure to techniques such as design for disassembly.
- To provide experience to the concepts of material usage per service unit (MIPS)
- To develop understanding the concept of ecological “rug-sack”
- To develop understanding to the concepts of Life Cycle Analysis (LCA)

CONTENT

Students take a case study/ scenario which has potential for design intervention w.r.t. sustainability. They study the various materials/ processes/ resources/ energy consumption in this scenario and look for alternatives to make a more sustainable scenario.

REFERENCES / READING MATERIAL

- William McDonough and Michael Braungart, Cradle to Cradle: Remaking the way we make things
- Al Gore, Our choice: A plan to solve the climate crisis
- Sascha Peters, Material Revolution: Sustainable Multi-purpose Materials for Design and Architecture

Course Code	**:**	**DP20PD702**
Course Title	**:**	**PROJECT: SYSTEM DESIGN**
Course Category	**:**	**L-T-P-0**
Credit Distribution:		**1-2-4-0**
Duration (hours)	**:**	**180 Hours**

RELEVANCE

A system is a whole which consists of interacting parts with a single purpose. A system is greater than the sum of its parts. For Designers system approach and systems thinking can become a powerful tool towards change. It offers a powerful new perspective that designers can use to adding the most stubborn of problems as this approach provides with a more accurate picture of reality. It also encourages one to think about problems and solutions with an eye towards a long –time view. Systems thinking stress dynamic interaction and change over time rather than simply an examination of static structures.

OBJECTIVE

- To understand the systems approach and its application in the design process of a product a product system or a science.
- To understand the interrelationships of a product/s with other influencing factors such as environment, user behaviour, change of time, marketing, management and other factors.
- To understand in the content of a product – range interrelationships, interchangeability, modularity growths amongst other things towards the performance of one function individually or several functions together.

CONTENT

Students take up a system and define the boundary/ scope for studying it. They identify the elements of the system and the interaction between these elements. The elements interact with each other at different levels and with different resources - material, money, energy etc.,

Various stakeholders of the system and their interests are identified. A holistic approach is most essential during this study. A visual mapping of the existing system is made.

After mapping the existing system, parallel systems are also inferred and a visual map of the ideal system is drawn. Based on the existing and desired states of the system, problem areas/ areas of design intervention are identified. Design propositions are made again taking a holistic approach.

REFERENCES / READING MATERIAL

- David Stroh, Systems Thinking for Social Change
- Thomas Lockwood, Design Thinking: Integrating Innovation, Customer Experience and Brand Value
- Various cases on the internet

Course Code	**:**	**DSE20PD704**
Course Title	**:**	**Open Elective 3 (All Disciplines)**
Course Category	**:**	**L-T-P-0**
Credit Distribution	**:**	**1-1-2-0**
Duration (Hours)	**:**	**90**

RELEVANCE

The focus of the elective is to develop capabilities to handle projects of multi-disciplinary nature, explore diverse range of materials and sensorial experiences (Light, Sound, Olfactory, Gastronomy, Touch etc) and work with them. The elective provides platform to work in the areas across disciplines which are normally not taken up in great detail in the structured design learning.

OBJECTIVES

To enable design learners explore and discover their hidden, untapped potential and skills through diverse experiences with materials, skills, expressions and multiple senses.

PRE-REQUISITES
Depends on the topic of elective

CONTENTS
Depends on the topic of elective

SESSION PLAN
Depends on the topic of elective

EVALUATION METHODOLOGY
Depends on the topic of elective and discretion of faculty

READING / REFERENCE LIST
Depends on the topic of elective

SEMESTER 8

Course Code	**:**	**DP20PD802**
Course Title	**:**	**Graduation Project**
Course Category	**:**	**0-0-0-N**
Credit Distribution	**:**	**0-0-0-16**
Duration	**:**	**480 hours**

RELEVANCE

The successful completion of the Program at Institute would require each learner to undertake final project in the respective discipline. The project undertaken by learner towards the Graduation jury will be live, i.e., sponsored by industry; however this need not be a condition. Learners would also be free to take up hypothetical projects in the area of their interest having appropriate complexity and opportunities to contribute.

OBJECTIVES

- To provide the graduating learner a professional organization or self-learning eco-system to be able to execute the project professionally.
- To enable graduating learner satisfactory and successful demonstration of acquired design and project management skills in the chosen organization or self-initiated system.

CONTENTS

Working in the industry or on self-initiated design project brief. Activities should cover all aspects of a design process - analysis, user research, ideation, concept generation, detailing, prototyping and testing.

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (COMPUTER ENGINEERING)
2020-24 PATTERN (Revision 2022) W.E.F 2022-23

The Master of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION: SEMESTER WISE						
S.N.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER**				**TOTAL**
		1	**2**	**3**	**4**	
1.	Program Core (PC)	3	1			**04**
2.	Discipline Core (DC)	2	3			**05**
3.	Department Elective (DE)				2	**02**
4.	Skill Development and Project (SDP)		1	1	1	**03**
TOTAL		**5**	**5**	**1**	**3**	**14**

CREDIT DISTRIBUTION: SEMESTER WISE							
1 Lecture hour = 1 Credit **2 Lab Hours = 1 Credit** **1 Tutorial Hour = 1 Credit**							
S.N.	**TYPE OF COURSE**	**NO. OF CREDITS/TRIMESTER**				**TOTAL**	**%**
		1	**2**	**3**	**4**		
1.	Program Core (PC)	10	2			**12**	**18.75**
2.	Discipline Core (DC)	8	12			**20**	**31.25**
3.	Department Elective (DE)		0	6		**06**	**9.37**
4.	Skill Development and Project (SDP)		2	8	16	**26**	**40.62**
TOTAL		**18**	**16**	**14**	**16**	**64**	**100**

	CREDITS			
	1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit			
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	18	16	**34**
2.	Second Year	14	16	**30**
TOTAL				**64**

	CONTACT HOURS			
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	20	21	41
2.	Second Year	21	32	53
TOTAL				**94**

ABBREVATIONS		
1.	ECE	End Course Exam
2.	IA	Internal Assessment
3.	DM	Demonstration
4.	CA	Continuous Assessment
5.	L	Lecture
6.	P	Practical
7.	T	Tutorial
8.	Lab	Laboratory

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2022)		
SCHOOL OFCOMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2022-2023
FIRST YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGINEERING	RELEASE DATE	:	01/12/2022
	REVISION NO.	:	3.0

SEMESTER-I

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT
TYPE	CODE	NAME	Hours/Week			THEORY		PRACT		TOTAL	
			L	P	T	ECE	IA	T/P	DM		
PC1	AS502	Computing and Mathematics	2	-	2	60	40	50	-	150	4
PC2	CS531	Management System	2	-	2	60	40	50	-	150	4
PC3	EX531	Research Methodology	2	-	-	50	25	-	-	75	2
DC1	CS532	Modern Technologies	3	2	-	60	40	50	-	150	4
DC2	CS541	Cloud and Blockchain Security	3	2	-	60	40	-	50	150	4
TOTAL			12	4	**4**	**290**	**185**	**150**	**50**	**675**	**18**

SEMESTER-II

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT
TYPE	CODE	NAME	Hours/Week			THEORY		PRACT		TOTAL	
			L	P	T	ECE	IA	T/P	DM		
PC4	EX533	Technical Writing	2	-	-	-	25	-	50	75	2
DC3	CS542	IoT Technology and Applications	3	2	-	60	40	-	50	150	4
DC4	CS543	Machine Learning	3	2	-	60	40	-	50	150	4
DC5	CS544	Cloud Application Development and Management	3	2	-	60	40	-	50	150	4
SDP1	CS545	Project Work – I	-	4	-			50	25	75	2
TOTAL			11	10	**-**	**180**	**145**	**50**	**225**	**600**	**16**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W. E. F.**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECH/COMP/ETX ENGG	**COURSE NAME**	Computing and Higher Mathematics
	COURSE CODE	AS 502
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	TUTORIAL	MCE	ECE	IA			
2	2	NIL	60	40	50	NIL	150

PRE-REQUISITE:NIL

COURSE OBJECTIVES:

AS501.CEO.1: To learn different numerical methods to solve differential equations and obtain the solution.

AS501.CEO.2: To understand different sampling techniques, analyze the data and process it to obtain a quality product.

AS501.CEO.3: To learn mathematical methodologies, techniques and mathematical tools to obtain an optimal solution of the problems theoretically and also by ANOVA.

COURSE OUTCOMES:

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

AS501.CO.1: Identify the accurate solution method (minimizing the error) to solve the differential equation with given conditions and obtains the particular solution of the problem.

AS501.CO.2: Collect, categorize, analyze, processing mathematically the data, thereby to obtain a quality proven product.

AS501.CO.3: Understand the physical situation, identify the accurate mathematical model and solve the problem mathematically or with the use of Statistical tools available and finally interpret it in the original context.

CONTENTS:

Computational Methods for Ordinary Differential Equations: Euler's Method, Heun's Method, Mid-point Method, Runge-Kutta Method and Multi step Methods-Explicit Adams-Bash forth technique and Implicit Adams-Moulton techniques, Adaptive RK Method, Embedded RK Method, Higher Order Ordinary differential equation- Shooting Method.

Operations Research: Simplex method: Feasible solution to system of equations, reduction of feasible to basic feasible solution, solution of LPP: computational procedure, Penalty (Big M) method. Transportation problem: North-West corner method, Least-cost method, Vogel's approximation method, Assignment Models: Hungerian Method.

Statistics and ANOVA: Central Tendency of data, Variance, Standard Deviation, Coefficient of Variance, Moments, Correlation, Coefficient of Correlation, Least Squares, Linear Regression, Inference in Linear Regression, Multiple Linear Regression, ANOVA for Regression

TUTORIAL NO.1		**2 HOURS**
Introduction to first order first degree Differential equation and its actual solution.		
TUTORIAL NO.02		**2 HOURS**
Euler's Method, Heun's Method, Mid- point Method, Runge-Kutta Method.		
TUTORIAL NO.03		**2 HOURS**
Adams-Bash forth technique and Implicit Adams-Moulton techniques.		
TUTORIAL NO.04		**2 HOURS**
Adaptive RK Method, Embedded RK Method, Shooting Method.		
TUTORIAL NO.05		**2 HOURS**
Solution of system of equations using simplex method (Feasible soln).		
TUTORIAL NO.06		**2 HOURS**
Solution of system of equations using simplex method (Feasible to basic feasible soln).		
TUTORIAL NO.07		**2 HOURS**
Transportation problem: North-West corner method, Least-cost method.		
TUTORIAL NO.08		**2 HOURS**

Transportation problem: Vogel's approximation, Assignment problem: Hungerian method.		
TUTORIAL NO.09		**2 HOURS**
Central Tendency of data, Variance, Standard Deviation.		
TUTORIAL NO.10		**2 HOURS**
Moments, Correlation, Coefficient of Correlation.		
TUTORIAL NO.11		**2 HOURS**
Regression lines.		
TUTORIAL NO.12		**2 HOURS**
ANOVA for Regression.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Peter W. Vik, Regression, ANOVA, and the General Linear Model: A Statistics Primer, First Edition, ISBN-13: 978-1412997355.

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECH/COMP/ETX ENGG	**COURSE NAME**	Management Systems
	COURSE CODE	CS531
	COURSE CREDITS	04
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	TUTORIAL	MCE	ECE	IA			
2	2	NIL	60	40	50	NIL	150

PRE-REQUISITE:NIL

COURSE OBJECTIVES:

CS531.CEO.1: To expose the students to fundamental concepts of management and its processes in organizations.

CS531.CEO.2: To create scientific attitude towards solving a management problem and impart knowledge about tools available for carrying out research.

CS531.CEO.3: To inculcate a spirit of entrepreneurship by promoting inquisitiveness for technological innovations, their conversion into business ideas and evolving strategy for induction of new products in new markets for growth of their entrepreneurial projects.

CS531.CEO.4: To effectively use the latest technology to support ever growing business.

COURSE OUTCOMES:

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

CS531.CO.1: Describe and explain the Significance of Businesses in Society, their Management and linking these up with other relevant systems.

CS531.CO.2: Critically analyze the organizational structure, systems, competencies and identify the areas of improvement.

CS531.CO.3: The ability and confidence to tackle common environmental and financial problems of business.

CS531.CO.4: Build an awareness of ethical and social responsibilities to multi-cultural, team-oriented, rapidly changing environments.

CONTENTS:

Basics of Management: Nature and scope of management; Evolution of Management thought; -Scientific, Behavioral, Systems and Contingency Approaches, Social responsibility of an organization. Analysis for Managerial Decision Making, Corporate Image Building.

Organizational Behavior: Concepts of OB, Designing and Delegation of Authority, Decision Making Process, Management of Creativity and Relationships, Human Resource Management, Skillful use of Emotional Intelligence in conflict management. Techniques for Self-Management and Stress Management for improving personal efficiency.

Economics and Financial Management: Demand and Business Forecasting, Economics of Information and Network Industries, Entrepreneurship and New Ventures, Finance function – Scope and Significance, Capital Budgeting- Nature and Significance.

Project Management: Essentials of Project Management with use of Critical Path Method (CPM) and Programme Evaluation and Review Techniques (PERT), Functioning and growth of a Business Unit with understanding of Break-Even Analysis.

Information System: Business and Data Communications Networks, Technology Management with the help of Cyber Security, Data Mining, Enterprise Resource Planning, Industry 4.0 concepts, Business startups and growth in current Indian Environment.

TUTORIAL NO.1	**Corporate management case presentation**	**4 HOURS**
A corporate management case to be selected by students on their own choice, writing a Synopsis (2.5 Marks) and its Presentation before the class in 5 Minutes including answers to questions by class (2.5 Marks)		
TUTORIAL NO.02	**Entrepreneurial Business Plan presentation**	**6 HOURS**

Preparation and submission of an innovative and entrepreneurial Business Plan of student's own choice, submitting a Power Point Presentation to be evaluated by Faculty (2.5 Marks), and its presenting/ defending it before the class, to be evaluated by two peers on a Format to be given by Faculty (2.5 Marks).

TUTORIAL NO.03	**Industry 4.0**	**6 HOURS**

Understand the concept of Industry 4.0 and prepare a report using any of the technology to prove that use of this technology will improve the performance of the organization.

TEXT BOOK

1. Harold Koontz, Heinz Weihrich and Mark V Cannice, Management – A Global and Entrepreneurial Perspective, Tata McGraw Hill Publications, 12th Edition, 2008.
2. Vachaspati Mishra, Management and Entrepreneurship in Indian Environment – A Perspective through Joining the Dots, Himalaya Publishing House, First Edition, 2016

REFERENCE BOOK

1. Dr A Sivathanu Pillai; Technology Leadership – A Revolution in the Making; Tata McGraw Hill Publishing Company Ltd, New Delhi, 2005
2. James A Alexander and Mark W Hordes; S-Business: Reinventing the Services Organisations, Select Books Inc Biztantra, 2006
3. Vohra ND, Quantitative Techniques in Management; Tata McGraw Hill Publishing Company Limited, Third Edition 2007
4. Nakkiran S and Karthikeyan M; Training Techniques for Management Development; Deep and Deep Publications Pvt Ltd; 2007

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E. F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Modern Technology
	COURSE CODE	CS532
	COURSE CREDITS	04
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME		**E VALUATION SCHEME**				
		THEORY			PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ECE	IA	PRACTICAL		
3	2	60	40	50	–	150

PRE-REQUISITE:

1: Nil

COURSE OBJECTIVES:

CS532.CEO.1: To get familiar with big data and Hadoop system
CS532.CEO.2: To acquire the knowledge of AWS and Google cloud services.
CS532.CEO.3: To study basic principles of Nano car and different modern technologies.
CS532.CEO.4: Apply their knowledge to understand different statistical tools and analysis software.

COURSE OUTCOMES:

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

CS532.CO1: Understand the knowledge of advanced software's.
CS532.CO2: Apply their knowledge in different fields.
CS532.CO3: Apply advance technologies in automobile industry.

CONTENTS:

Full Stack Development: Overview of Java Basics, basics of backend technologies - Servlet, JSP and Hibernate, SQL, UI Skills - Spring basics and framework ,Spring Boot, RESTful web service, basics of frontend stack technologies – JavaScript ,Angular using MongoDB.

DevOps: DevOps overview, Relationship between DevOps and Agile, DevOps Toolchain, Challenges with traditional approach, Overview of DevOps tools, Best practice for DevOps, version control – overview of GitHub, Continuous integration continuous deployment – Jenkins overview, Configuration Management Tool – Puppet and Chef overview, Containerization with Docker – Docker Overview, software and Automation testing framework – JUnit and Cucumber overview.

AWS Cloud: Cloud concepts overview, Global Infrastructure overview- Region, Zone, edge location, Overview of AWS cloud services – Compute - EC2, AWS Lambda, Storage – S3, EBS, S3 Glacier, Databases –RDS, DynamoDB, Security – I AM, Networking and content delivery –AWS VPC, auto scaling and monitoring cloud architecture - Cloud Watch, Cloud economics and Billing –AWS Cost Explorer.

PRACTICAL

PRACTICAL No. 01	**Web application front end development**	**4 HOURS**
Designing of web application using front end technologies.		
PRACTICAL NO.02	**Web application back end development**	**2 HOURS**
Designing of web application using back end technologies.		
PRACTICAL NO.03	**Git and GiHub**	**2 HOURS**
Getting started with Git and GitHub – repository, types of Git workflow, fork, Git pages and Clone		
PRACTICAL NO.04	**Jenkins**	**2 HOURS**
Installing Jenkins, configure, setup Jenkins job.		
PRACTICAL NO.05	**Docker**	**2 HOURS**
Installing Docker, operations – deploy, login exit, start, stop container.		
PRACTICAL NO.06	**AWS Cloud Services – Compute, Storage**	**2 HOURS**
Configuring AWS cloud services – Compute EC2, Storage –S3.		
PRACTICAL No. 07	**AWS Cloud Services – Security, Databases**	**2 HOURS**
Configuring IAM policies and RDS system		
PRACTICAL No. 08	**Deployment of application on cloud platform**	**2 HOURS**
Deployment of web application on cloud – free tier.		

TEXT BOOKS

1. Chris Northwood, "The Full Stack Developer – Your Essential Guide to the everyday Skills Expected of a Modern Full Stack Web Developer", Apress Publications, 1st Edition 2018, ISBN – 1484241517.
2. Micro Hering, "DevOps for the Modern Enterprise – Winning Practices to Transform Legacy IT Organizations", 1st Edition, IT Revolution Publications, 2018, ISBN 1942788193.
3. Joe Baron, Hisham Baz, "AWS Certified Solution Architect official study guide", 1st edition, Sybex publisher, ISBN – 13: 978-1119138556.

REFERENCE BOOKS

1. Azat Mardon, "Full Stack Java Script – Learn Node.js and MongoDB", APress Publication, 1st Edition, ISBN -1484217500.
2. Deepu Sasidharan, "Full Stack Development – Build Full Stack applications and micro service with Spring Boot and Modern JavaScript Frameworks", 2nd Edition, Packt – Publishing, ISBN – 1838824987.
3. Peter Bell, "Introducing Github – A Non – Technical Guide", 1st Edition, Oreilly Publications, ISBN – 1491949740.
4. Jeff Nickoloff, Stephen Kuenzli, "Docker in Action", 2nd Edition, Manning Publications, 2019, ISBN 9781617294761.
5. John Ferguson Smart, "Jenkins the Definitive Guide", 2nd Edition, Oreilly Publications, ISBN - 9781449305352.
6. AWS official documentation - https://docs.aws.amazon.com/

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E. F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Research Methodology
	COURSE CODE	EX531
	COURSE CREDITS	02
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME		**E VALUATION SCHEME**				
		THEORY			PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ECE	IA	PRACTICAL		
2	-	50	25	–	–	75

PRE-REQUISITE:

1: Nil

COURSE OBJECTIVES:

EX531.CEO.1: To understand the basic framework of research process.
EX531.CEO.2: To identify various sources of information of survey and data collection.
EX531.CEO.3: To Illustrate the use of documentation and evaluate its quality.

COURSE OUTCOMES:

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

EX531.CO1: Classify different types of Research , objective and paradigm of research process.
EX531.CO2: Explore the basics of research framework and Hypothesis.
EX531.CO3: Describe about different data collection methods.
EX531.CO4: Explain the different stages of preparing scholarly writing proposals.

PRACTICAL List		
Practical No.01	**Web application front end development**	**4 HOURS**
Designing and development of web application using front end technologies.		
Practical No.02	**Web application back end development**	**2 HOURS**
Designing of web application using back end technologies.		
Getting started with Git and GitHub – repository, types of Git workflow, fork, Git pages and Clone		
Configuring AWS cloud services – Compute EC2, Storage –S3		

CONTENTS:

Introduction: What is research, Research definition, Objective paradigm for the research, Identifying defining the research problem, Literature it's analysis, Qualitative quantitative research, development of theoretical and conceptual frame work.

Hypothesis and Data Processing: Ethical Issues concerning research participants, Ethical issues in data collection, , Definition and functions of hypothesis, Processing operations, Problems in processing, Coding descriptive and quantitative data, Sampling techniques.

Statistics in research: Data collection methods – use , types , examples , Multivariate analysis, Concept of regression, Establishing validity and reliability.

Writing Research Proposal: Interpretation and its meaning, Readability of Manuscript, techniques, Contents, Report writing, structure, types of report, Procedure of writing research proposal, Writing as thinking, Habit of writing, Skills and thought process in technical writing, Role of computer in technical writing.

TEXT BOOKS

1. John W. Creswell," Research Design-Qualitative Quantitative Approaches", SAGE publications, New Delhi ISBN: 0-8039-5254-6
2. Ranjit Kumar," Research Methodology- A Step by Step Guide for Beginners", 2nd ed., Pearson publication, New Delhi ISBN: 978-81-317-0496-7
3. Bernard M. Moret," The Theory of Computation", Pearson Publication ISBN: 978-81-317-0870-5

REFERENCE BOOKS

1. C. R. Kothari," Research Methodology, Methods Techniques", 2nd Edition, New Age International Publication ISBN:978-81-224-1522-3
2. Hamdy A. Taha, "Operation Research- An Introduction", 8th Edition, Pearson Publication , ISBN: 9780132729154

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Advanced Data Structures and Algorithms
	COURSE CODE	CS541
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME		**E VALUATION SCHEME**				
		THEORY			PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ECE	IA	PRACTICAL		
3	2	60	40	–	50	150

PRE-REQUISITE:

1: Data Structures
2: Design and Analysis of Algorithms

COURSE OBJECTIVES:

CS541.CEO.1: To learn advanced data structures like persistent, cache oblivious data structures
CS541.CEO.2: To model data using retroactive and probabilisitc data structures
CS541.CEO.3: To learn online algorithms
CS541.CEO.4: To learn genetic algorithms
CS541.CEO.5: To learn nature inspired algorithms

COURSE OUTCOMES:

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

CS541.CO1: To implement various advanced data structures like disjoint sets, self-adjusting succinct data structures
CS541.CO2: To demonstrate the use of persistent, retroactive, cache oblivious and probabilistic data structures in various applications
CS541.CO3: To differentiate between online and offline algorithms
CS541.CO4: To provide solution to various optimization problems using Genetic Algorithms
CS541.CO5: To provide solution to various optimization problems using Nature Inspired Algorithms

CONTENTS:

Advanced Data Structures: Data structures for disjoint sets, augmented data structures, selfadjusting data structures, persistent data structures, retroactive data structures, cache oblivious data structures, probabilistic data structures

Genetic Algorithms: Introduction to Genetic Algorithms, Variants of Genetic Algorithms, Genetic Algorithms for subset sum problem, TSP, Knapsack

Online Algorithms: Introduction, Online Ski Rental Problem, Line Search Problem, Paging Problem, List Accessing Problem, K-Server Problem

Nature Inspired Algorithms: Swarm Intelligence : Ant colony optimization, Ant clustering algorithm, Particle swarm optimization Biological Motivations: Cuckoo Search, bat algorithm, flower pollination, firefly algorithm Immune Systems: Colnal selection algorithms, Negative selection algorithms, Immune network algorithms

PRACTICAL List

Practical No.01	**Disjoint Sets**	**4 HOURS**
Implement Kruskal's Algorithm for finding minimum spanning tree of graph using disjoint set data structure		
Practical No.02	**Probabilistic Data Structures**	**4 HOURS**
Implement Bloom Filter and Cuckoo Filter		
Practical No.03	**Genetic Algorithms**	**4 HOURS**
Implement Travelling Salesman Problem using Genetic Algorithm		
Practical No.04	**Ant Colony Optimization**	**4 HOURS**
Implement Travelling Salesperson Problem using Ant Colony Optimization		

TEXT BOOKS

1. Cormen, Thomas H., et al. Introduction to algorithms. MIT press, 2009
2. Sahni, Sartaj, and Ellis Horowitz. Fundamentals of computer algorithms. Computer science press, 1978
3. Fiat, Amos, and Gerhard J. Woeginger. Online algorithms: The state of the art. Vol. 1442. Heidelberg: Springer, 1998
4. Goldberg, David E. Genetic Algorithms. Pearson Education India, 2006
5. Kaplan, Haim. "Persistent data structures." Handbook of Data Structures and Applications. Chapman and Hall/CRC, 2018. 511-527
6. Yang, Xin-She. Nature-inspired optimization algorithms. Elsevier, 2014

REFERENCE BOOKS

1. Mehta, Dinesh P., and Sartaj Sahni. Handbook of data structures and applications. Chapman and Hall/CRC, 2004
2. Skiena, Steven S. The algorithm design manual: Text. Vol. 1. Springer Science Business Media, 1998
3. Davis, Lawrence. "Handbook of genetic algorithms." (1991)
4. Chan, Felix, and Manoj Tiwari, eds. Swarm Intelligence: focus on ant and particle swarm optimization. BoD–Books on Demand, 2007

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	IoT Technology and Management
	COURSE CODE	CS542
	COURSE CREDITS	04
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME		**E VALUATION SCHEME**				
		THEORY			PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ECE	IA	PRACTICAL		
3	2	60	40	–	50	150

PRE-REQUISITE:

1: Computer Networks
2: Wireless and Mobile Networks

COURSE OBJECTIVES:

CS542.CEO.1: To get knowledge of key technologies in Internet of Things and their applications in various areas.
CS542.CEO.2: To identify and describe different types of open source hardware.
CS542.CEO.3: To examine issues of privacy and security in IoT.
CS542.CEO.4: To apply the concept of Internet of Things (IoT) in the real world scenario.

COURSE OUTCOMES:

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

CS542.CO1: Apply key technologies in Internet of Things and their applications in various areas.
CS542.CO2: Design the system using Arduino/Raspberry Pi or equivalent hardware.
CS542.CO3: Demonstrate the knowledge of security and ethical issues in IoT.
CS542.CO4: Outline the application usage of IoT in real time scenario.

CONTENTS:

Introduction: Enabling Technologies, Small-Scale Computer Systems, Medium-Scale Computer Systems, Access to the Internet, IP Addressing Evolution, Data Storage and Processing Mobile Devices, Mobility – New Paradigm for IoT Systems, Cloud Computing, Fog Computing, Cognitive IoT Systems ,Data Management Aspects in IoT, Application Domains and Their Specifics, IoT hardwares. **IoT Communications:** Networking overview, Communication models Device to device and Industry 4.0 revolution, Device to gateway, Device to cloud, Media layers - Wired networking, Media layers - Wireless protocols, PHY+MAC+LLC layers, NET (NWY) Layer, Host layer protocols.

IoT security and privacy: Types of vulnerabilities of IoT, Monitoring of vulnerabilities, Malware detection in IoT, IoT security protocols, IoT privacy , privacy preservation, IoT privacy preservation threats

Application: IoT based Precision Agriculture, Irrigation, Precision Livestock Farming, Landslide Prediction and Risk Communication, The Smart Health Care Ecosystem, Novel application using Internet of Flying Things(IoFT).

PRACTICAL List

Practical No.01		**8 HOURS**
Design and simulate Smart Home using Cisco Packet tracer.		
Practical No.02		**8 HOURS**
Design and simulate Smart Home using Cisco Packet tracer.		
Practical No.03		**6 HOURS**
Identify and simulate different kinds of vulnerabilities with practical assignment no.1 and 2.		

TEXT BOOKS

1. ITMO University, "IOT-OPEN.EU: Introduction to the IoT Coursebook in English", v1(ebook), May 2018
2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", ISBN 978-1-118-43062-0 (paperback); ISBN:978-1-118-43063-7 (ebook); 978-1-118-43065-1 (ebook), 2014 John Wiley and Sons, Ltd.
3. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
4. Donald Norris, "Internet of Things: Do-it-yourself", 1st Edition, 2015, McGraw Hill Education, ISBN:978-0-07-183520-6

REFERENCE BOOKS

1. Hakima Chaouchi, "The Internet of Things Connecting Objects to the Web", ISBN : 978-1-84821140-7, Wiley Publications
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key Applications and Protocols", ISBN: 978-1-119-99435-0, 2nd Edition, Wiley Publications
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things",ISBN:978-3-64219156-5,e-ISBN:978-3-642-19157-2, Springer
4. Quasy F Hussain, "Internet of Things A to Z: Technologies and Applications", ISBN: 978-1-11945674-2, Wiley-IEEE Press
5. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, "IoT Fundamentals:Networking Technologies, Protocols, and Use Cases for the Internet of Things", ISBN:9781587144561,Cisco Press

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Technical Writting
	COURSE CODE	EX533
	COURSE CREDITS	02
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME		**EVALUATION SCHEME**				
		THEORY			PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ECE	IA	PRACTICAL		
2	-	–	25	–	50	75

PRE-REQUISITE:

1: Research Methodology

COURSE OBJECTIVES:

EX533.CEO.1: To share the skills and finer aspects of scientific and technical writing with the research students of the Institute order to prepare technical documents clearly, concisely, consistently, and effectively, following internationally accepted standards.

EX533.CEO.2: Students will be made to evaluate the correct error-free writing by being well versed in rules of English grammar and cultivate relevant technical style of communication presentation at their work place and also for academic uses.

EX533.CEO.3: To provide overview of technical English for research paper writing with a special focus on research methods typical for classroom based studies of pedagogical innovations.

COURSE OUTCOMES:

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

EX533.CO1: Creates substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as comprehension, reading, writing and speaking etc.

EX533.CO2: Find information about scientific and technical publications using two premier analytics information resources: the Web of Science platform and Derwent Innovation Index for the patent information discovery.

EX533.CO3: Identify plagiarism and explain how to prevent it.

EX533.CO4: Read and analyze several articles to form your own opinion on a topic - make connections between several articles.

EX533.CO5: Write a 7- 8-page research paper / review paper by using source material correctly with MLA format.

CONTENTS:

Introduction: Introduction to Technical Communication: Reading Skill, Basics of English Grammar, Introduction to Effective Writing: Effective writing as an art, principles of effective writing, types and stages of effective writing, notions of correctness and appropriateness, essentials of academic writing Technical Instructions: Purpose, Content Structure: Understanding the Audience, Creative Writing: Use of tools, Guidelines for Technical Writing, Microsoft Word, Text Editor for Drafting Content, The Role of Visuals in Technical Instructions, the features of Authorizing Tool, Adobe Frame maker, Desktop Publishing and Help Publishing Tool, Snag IT, Image Capturing Tool MS-Visio Image Drawing Tool.

Role of Ethics in Technical Instructions: Role of Ethics in Technical Instructions Understanding the subject: formulating ideas for the paper, developing a thesis statement Preparing the anatomy of the paper: Literature review, research methodology, Writing the results, analysis of the results, discussion and conclusion, apply correct citation, formatting, write the first draft, revise, edit and proofread, Use of tools for research paper help: Grammar checkers, plagiarism checkers, citation generators. Selecting a journal / conference: Targeting a high impact factor journal in Elsevier, IEEE, Springer, Wiley etc., Introduction to the Web of Science, Science Citation Index (SCI)/SCI Expanded (SCIE) and Scopus, preparing the manuscript according to the chosen journal's requirements, submission ethics, and use of peer review comments in a constructive way, submission, revision and galley proof. Proposal writing, the Web of Science platform and Derwent Innovation Index for the patent information discovery, Patent Searching, Drafting and Filing.

Internal Assessment Activities		
Activity No.01	**Preparing the document on**	**6 HOURS**
a) A representativ e official correspondence. b) Work progress report c) Technical broch ures and newsletters d) Instruction Ma nual e) Demo patent w riting		
Activity No.02	**Technical discussions**	**2 HOURS**
Graded technical discussions will be planned online and in class		
Activity No.03	**Quiz**	**2 HOURS**
Quiz on every maj or component of the course.		
Activity No. 04	**Writing gist**	**2 HOURS**
Writing gist from a set of related papers		
Activity No.05	**Writing the technical blogs**	**2 HOURS**
Writing the technical blogs		

Demonstration/Presentation	
Presentation /Demonstration Students will have to submit and present :	**.**
Project proposal to be submitted to the funding agencies of repute (Peer review) Review paper / Research paper or research letter.	

TEXT BOOKS

1. Kenneth G. Budinski, Writing Engineers' Guide to Technical, ASM internationals, ISBN: 978-087170-693-5
2. Gerald. J. Alred, Charles. T.Brusaw, and Walter. E. Oliu, Handbook of Technical Writing, St. Martin's Press, New York, Ninth Ed., ISBN 1250004411, 2008
3. Hofmann, A. Angelika, Scientific Writing and Communication, Oxford University Press, Oxford., ISBN 0199947562 2014

REFERENCE BOOKS

1. Meenakshi Raman and Sangeeta Sharma, Technical Communication – Principles and Practices Oxford Univ. Press, 2016
2. Websites: https://swayam.gov.in/nd1$_{n}$*oc*19$_{h}$*s*31*/Dated* : 22*ndMay*2020

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020 - 2024)	
SCHOOL OF COMPUTER AND INFORMATION TECHNOLOGY	**W.E. F.**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	MACHINE LEARNING
	COURSE CODE	CS543
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**				
		THEORY		TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ECE	IA			
3	2	60	40	NIL	50	150

PRE-REQUISITE:NIL

COURSE OBJECTIVES:

CS543.CEO.1: To provide knowledge about the key algorithms and theory that form the foundation of machine learning and computational intelligence.

CS543.CEO.2: To introduce modern techniques in machine learning, and a practical knowledge of algorithms and methods.

CS543.CEO.3: To formulate machine learning problems as per characteristics of real-world applications.

CS543.CEO.4: To be familiar with the use machine learning ideas, paradigms and techniques with its performance evaluation.

COURSE OUTCOMES:

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

CS543.CO.1: Understand strengths and weaknesses of many popular machine learning approaches.

CS543.CO.2: Understand and differentiate modern machine learning techniques and applications.

CS543.CO.3: Analyze appropriate method based on the particular characteristics of the domains and applications under consideration.

CS543.CO.4: Accurately formulate, test and and evaluate hypothesis and the performance of machine learning algorithms.

CONTENTS:

Introduction to Machine Learning and Applications, Supervised Learning, Unsupervised Learning, Linear Regression Model, Cost Function, Optimization of Cost Function, Gradient Descent, Convergence, Multivariate Linear Regression, Multiple Features, Gradient Descent for multiple variable, Subset Selection, Polynomial Regression.

Logistic Regression, Classification, Cost Function for Classification, Multi class classification and Regularization.

Neural Network, Non-linear Hypothesis, Artificial Neural Network Representation, Training, Initialization and Validation, Parameter Estimation, Feed forward Network, Back-Propagation Algorithm, Cost Function, Gradient Checking.

Hypothesis Evaluation, Model Selection, Cross Validation, Bias and Variance. Support Vector Machine Formulation, Decision Boundary, Kernals. Decision Trees for Classification, Regression Trees, Stopping Criteria and Pruning. Ensemble Learning: Combining Multiple Models, Bagging, Randomization, Boosting, Stacking.

Partitional Clustering, Hierarchical Clustering, BIRCH Algorithm, CURE Algorithm, Density Based Clustering.

Reinforcement Learning, Exploration, Exploitation, Rewards, Penalties, Markov Decision Process in Reinforcement Learning

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
To implement Multiple Linear Regression model with parameter estimation.		
PRACTICAL NO.02		**4 HOURS**
To implement Logistic Regression for Binary Classification.		
PRACTICAL NO.03		**4 HOURS**
To implement Back Propogation Algorithm.		
PRACTICAL NO.04		**4 HOURS**
To implement the Support Vector Machine classifier and find the accuracy for selected dataset.		
PRACTICAL NO.05		**4 HOURS**
To implement the any one algorithm in Partitional Clustering or Hierarchical Clustering.		
PRACTICAL NO.06		**4 HOURS**
Identify real world application and implement mini project using machine learning techniques and Algorithms.		

TEXT BOOK

1. Ethem Alpaydin, "Introduction to Machine Learning", Third Edition, The MIT Press,2014, ISBN 978-0-262-02818-9
2. Tom Mitchell, "Machine Learning" , McGraw Hill, 1997, ISBN 007-0-42807-7
3. Parag Kulkarni, "Reinforcement and Systemic Machine Learning for Decision Making", Wiley, IEEE Press, 2012, ISBN: 978-0-470-91999-6

REFERENCE BOOK

1. Peter Harrington, "Machine Learning in Action", Dreamtech Press, 2012, ISBN 978-1-617-29018-3
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Second Edition, Springer, 2009, ISBN: 978-0-387-84857-0
3. Introduction to Machine Learning with Python: A Guide for Data Scientists, by Andreas Muller,Paperback: 392 pages,Publisher: Shroff/O'Reilly; First edition (2016), ISBN-10: 9352134575, ISBN-13: 978-9352134571
4. Python Machine Learning Cookbook, Prateek Joshi,Paperback: 304 pages, Publisher: Packt Publishing Limited (23 June 2016), ISBN-10: 1786464470 ISBN-13: 978-TMH, 2009, ISBN-13: 978-8120337312
5. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, Hardcover: 744,Publisher: Morgan Kaufmann; 3 edition (25 July 2011), ISBN-10: 9380931913, ISBN-13: 978-9380931913

MIT | Academy of Engineering (An Autonomous Institute)			**COURSE SYLLABI (2020-2024)**		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY			**W.E.F.**	**:**	**AY:**2022-2023 (Rev 2022)
SECOND YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGINEERING			**COURSE NAME**	**:**	Project-I
			COURSE CODE	**:**	CS545
			COURSE CREDITS	**:**	02
RELEASE DATE	**:**	01/12/2022	**REVISION NO.**	**:**	3.0

TEACHING SCHEME :		**EVALUATION SCHEME :**				
		THEORY				
LECTURE	**PRACTICAL**	**ECE**	**IA**	**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
--	04	--	--	--	50	50

PRE-REQUISITE

1. EX531- Research Methodology
2. EX533- Technical Writing

COURSE OBJECTIVES

1. CS545 CEO.1: To Manage the selection and initiation of individual projects
2. CS545 CEO.2: To conduct project planning activities that accurately forecast project costs, timeline and quality.

COURSE OUTCOMES

After completion of the course, the students will be able to

1. CS545 CO.1: Identify the real life problem/ important concepts / current applications from engineering domain
2. CS545 CO.2: Describe the aim and objective of selected problem statement
3. CS545 CO.3: Describe the plan and cost of the project

CONTENTS

Project work is divided into four stages namely Project Stage I, Project Stage II, Project Stage III and Project Stage IV.
Project Stage I is entirely related with selection of PROBLEM STATEMENT /problem by the students related to thrust areas identified by respective departments. Synopsis submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives

Final Project Stage I Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (COMPUTER ENGINEERING)
2020-24 PATTERN (Revision 2022) W.E.F 2022-23

The Master of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION: SEMESTER WISE						
S.N.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER**				**TOTAL**
		1	**2**	**3**	**4**	
1.	Program Core (PC)	3	1			**04**
2.	Discipline Core (DC)	2	3			**05**
3.	Department Elective (DE)				2	**02**
4.	Skill Development and Project (SDP)		1	1	1	**03**
TOTAL		**5**	**5**	**1**	**3**	**14**

CREDIT DISTRIBUTION: SEMESTER WISE							
1 Lecture hour = 1 Credit **2 Lab Hours = 1 Credit** **1 Tutorial Hour = 1 Credit**							
S.N.	**TYPE OF COURSE**	**NO. OF CREDITS/TRIMESTER**				**TOTAL**	**%**
		1	**2**	**3**	**4**		
1.	Program Core (PC)	10	2			**12**	**18.75**
2.	Discipline Core (DC)	8	12			**20**	**31.25**
3.	Department Elective (DE)		0	6		**06**	**9.37**
4.	Skill Development and Project (SDP)		2	8	16	**26**	**40.62**
TOTAL		**18**	**16**	**14**	**16**	**64**	**100**

	CREDITS			
	1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit			
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	18	16	**34**
2.	Second Year	14	16	**30**
TOTAL				**64**

	CONTACT HOURS			
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	20	21	41
2.	Second Year	21	32	53
TOTAL				**94**

ABBREVATIONS		
1.	ECE	End Course Exam
2.	IA	Internal Assessment
3.	T/P	Term Work / Practical
4.	DM	Demonstration
5.	L	Lecture
6.	P	Practical
7.	T	Tutorial
8.	Lab	Laboratory

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2022)		
SCHOOL OFCOMPUTER ENGINEERING AND TECHNOLOGY	W.E.F	:	2022-2023
SECOND YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGINEERING	RELEASE DATE	:	01/12/2022
	REVISION NO.	:	3.0

SEMESTER-III

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT
TYPE	CODE	NAME	Hours/Week			THEORY		PRACT		TOTAL	
			L	P	T	ECE	IA	T/P	DM		
DE1	CS66#	Elective course – I	3	-	-	60	40	-	-	100	3
DE2	CS67#	Elective course – II	3	-	-	60	40	-	-	100	3
SDP2	CS651	Project Work – II	-	16	-	-	-	100	100	200	8
TOTAL			**6**	**16**	**-**	**120**	**80**	**100**	**100**	**400**	**14**

SEMESTER-IV

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT
TYPE	CODE	NAME	Hours/Week			THEORY		PRACT		TOTAL	
			L	P	T	ECE	IA	T/P	DM		
SDP3	CS652	Project Work – III	-	32	-	-	-	200	150	350	16
TOTAL			**-**	**32**	**-**	**-**	**-**	**200**	**150**	**350**	**16**

ANNEXTURE-I

Department Elective Course I: 1 Course		
Sl. No.	**Course Code**	**Course**
1	CS661	Information Retrieval
2	CS662	Computer Vision
3	CS663	Network Security Techniques
4	CS664	Open Elective

Department Elective Course II: 1 Course		
Sl. No.	**Course Code**	**Course**
1	CS671	Big Data Analytics
2	CS672	Business Intelligence
3	CS673	Ad-hoc Wireless Network: Principle, Protocol and Applications
4	CS674	Open Elective

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2022 –2024)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W. E. F.**	**AY:**2022-2023 (Rev 2022)
SECOND YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGG	**COURSE NAME**	Information Retrieval
	COURSE CODE	CS661
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME & MARKS**						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	NIL	NIL	40	40	NIL	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. CS313 - Foundation of Data Mining and Warehousing

COURSE OBJECTIVES:

CS661.CEO.1: : To learn the information retrieval models.
CS661.CEO.2: To be familiar with Web Search Engine.
CS661.CEO.3: To be exposed to Link Analysis
CS661.CEO.4: To understand Hadoop and Map Reduce
CS661.CEO.5: To learn document text mining techniques

COURSE OUTCOMES:

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

CS661.CO.1: To understand the theoretical basis behind the standard models of IR (Boolean, Vector-space, Probabilistic and Logical models)

CS661.CO.2: To understand the difficulty of representing and retrieving documents, images, speech, etc.

CS661.CO.3: To implement, run and test a standard IR system

CS661.CO.4: To Develop the standard methods for Web indexing and retrieval

CS661.CO.5: To evaluate techniques from natural language processing, artificial intelligence, human-computer interaction and visualization integrate with IR, and be familiar with various algorithms and Systems

THEORY COURSE CONTENT

UNIT 1	**INTRODUCTION**	**7 HOURS**

Introduction, History of IR- Components of IR – Issues –Open source Search engine Frameworks – The impact of the web on IR – The role of artificial intelligence (AI) in IR – IR Versus Web Search – Components of a Search engine- Characterizing the web.

UNIT 2	**INFORMATION RETRIEVAL**	**7 HOURS**

Boolean and vector-space retrieval models- Term weighting – TF-IDF weighting- cosine similarity – Preprocessing – Inverted indices – efficient processing with sparse vectors – Language Model based IR – Probabilistic IR –Latent Semantic Indexing – Relevance feedback and query expansion.

UNIT 3	**WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING**	**7 HOURS**

Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement – search engine optimization/spam – Web Search Architectures – crawling – metacrawlers- Focused Crawling – web indexes — Near-duplicate detection – Index Compression – XML retrieval.

UNIT	**4WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH**	**7 HOURS**

Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity – Hadoop Map Reduce – Evaluation – Personalized search – Collaborative filtering and content-based recommendation of documents and products – handling “invisible” Web – Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.

UNIT 5	**DOCUMENT TEXT MINING**	**7 HOURS**

Information filtering; organization and relevance feedback – Text Mining -Text classification and clustering – Categorization algorithms: naive Bayes; decision trees; and nearest neighbor – Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).

TEXT BOOKS

1. C. Manning, P. Raghavan, and H. Schu¨tze, Introduction to Information Retrieval , Cambridge University Press, 2008.
2. Ricardo Baeza -Yates and BerthierRibeiro – Neto
3. Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011.
4. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.
5. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 2010.

REFERENCE BOOKS

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. OphirFrieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series ", 2nd Edition, Springer, 2004.
3. Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", and First Edition, Gate Mustru Publishing, 2008.

MIT | Academy of Engineering (An Autonomous Institute)	**COURSE SYLLABI (2020-2024)**		
DEPARTMENT OF COMPUTER ENGG.	**W. E. F.**	**:**	**AY:**2022-2023 (Rev 2022)
	COURSE NAME	**:**	Computer Vision
	COURSE CODE	**:**	CS662
SY MTECH	**COURSE CREDITS**	**:**	03
RELEASE DATE **:** 1/12/2022	**REVISION NO.**	**:**	3.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
		THEORY					
LECTURE	**PRACTICAL**	**ITA**	**ETA**	**IA**	**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS323 - Signal Processing & Application
2. AS201 - Applied Mathematics

COURSE OBJECTIVES:

1. CS633.CEO.1: To describe the foundation of image formation, measurement, and analysis.
2. CS633.CEO.2: To implement common methods for robust image matching and alignment.
3. CS633.CEO.3: To gain exposure to object and scene recognition and categorization from images.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS633.CO.1: To demonstrate a thorough knowledge of fundamental concepts pertaining to computer vision.
2. CS633.CO.2: To segment objects in an image based on texture and color features.
3. CS633.CO.3: To design and implement a computer vision project utilizing the concepts taught in this course and evaluate their approach, analyze results and present research in class

THEORY:

Introduction: Digital Image Processing & Computer Vision-Introduction, Digital Image Fundamentals, Relationships between pixels, Distance measures; Image operations

Image Enhancement: Image Enhancement in spatial domain Gray level , Histogram processing , Enhancement operations , Frequency Domain 2-D Fourier transform, Convolution and Correlation theorems; Filtering in frequency domain - low pass smoothing, high pass sharpening.

Image restoration and reconstruction: Image degradation and restoration processes, Restoration in the presence of noise, linear position, Geometric

Image processing: Image segmentation, Image compression –Fundamentals, basic compression methods-Huffman coding, golomb coding, bit plane coding, wavelet coding, Image wavelets and description-Wavelets-Background of wavelets, multiresolution expansion, wavelet transforms in one dimensions, Image descriptions Image.

Object Recognition: Patterns and pattern classes; Decision theoretic methods , Structural methods, Need of intelligent processing and expert systems

TEXT BOOKS:

1. R. Gonzalez, R. Woods, and S. Eddins, Digital Image Processing Using Matlab (second edition), Gatesmark Publishing, 2009.
2. Richard Szeliski, “Computer Vision: Algorithm and Applications”,Springer,2011,ISBN 978-184882-935-0

REFERENCES:

1. R. Gonzalez and R. Woods, Digital Image Processing (third edition), Prentice-Hall, 2008
2. Forsyth, David A. & Ponce, Jean,” Computer Vision ,modern Approach” , Prentice Hall Professional Technical Reference,2000
3. Brian L. DeCost,Harshvardhan Jain,Anthony D. Rollett,Elizabeth A. Holm,"Computer Vision and Machine Learning for Autonomous Characterization of AM Powder Feedstocks",Springer ,2016
4. Xianghua XieMark Jones,Gary Tam,"Recognition, Tracking, and Optimization”, Springer 2017

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2022)**	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:**2022-2023 (Rev 2022)
SECOND YEAR MASTERS OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Network Security Techniques
	COURSE CODE	CS634
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME		**EXAMINATION SCHEME AND MARKS**					
(HOURS/WEEK)		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION / DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE :

1. CS303 – Data Communication & Networking

COURSE OBJECTIVES :

1. CS634.CEO.1: Identify various network security threats
2. CS634.CEO.2: Explain the concepts of malicious codes
3. CS634.CEO.3: Build security model to prevent, detect and recover from the attacks
4. CS634.CEO.4: Illustrate various securities issues and techniques applied in network security.

COURSE OUTCOMES:

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

1. CS634.CO.1: Identify various security practices applied in real time applications
2. CS634.CO.2: Analyze information security issue in computer and networking environment.
3. CS634.CO.3: Explain network security principles.
4. CS634.CO.4: Develop security algorithms for given computing system.

THEORY COURSE CONTENT

A Model for Network Security, Classical Encryption Techniques.

Block Ciphers and Data Encryption Standard: Strength of DES, Cryptanalysis, Block Cipher, Design Principles, Finite Fields of the Form GF(p), Advanced Encryption Standard, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms, Public-Key Cryptography and RSA, Diffie-Hellman Key Exchange, El-Gamal Cryptosystem, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Pseudorandom Number Generation Based on an Asymmetric Cipher.

Cryptographic Hash Functions: Simple Hash Functions, Requirements and Security, Cipher Block Chaining, MACs Based on Hash Functions, Authenticated Encryption, And Digital Signature Standard.

Key Management and Distribution: Symmetric Key Distribution Techniques, Distribution of Public Keys, User Authentication Protocols, Remote User Authentication, Federated Identity Management.

TEXT BOOK

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, Fifth Edition, 2011.
2. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007.

REFERENCE BOOK

1. Cryptography and Network Security : Forouzan Mukhopadhyay, McGraw Hill,
2. Godbole," Information Systems Security", Willey Publication
3. Mark Stamp, "Information Security: Principles and Practice", Wiley Inter Science, 2011

MIT | Academy of Engineering (An Autonomous Institute)	**COURSE SYLLABI (2020-2022)**		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F.**	**:**	**AY:**2022-2023 (Rev 2022)
SECOND YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGINEERING	**COURSE NAME**	**:**	Big Data Analytics
	COURSE CODE	**:**	CS671
	COURSE CREDITS	**:**	03
RELEASE DATE : 01/12/2022	**REVISION NO.**	**:**	3.0

TEACHING SCHEME :		**EVALUATION SCHEME :**				
		THEORY				
LECTURE	**PRACTICAL**	**ECE**	**IA**	**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
3	NIL	60	40	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. CS313 - Foundation of Data Mining and Warehousing

COURSE OBJECTIVES:

1. CS671.CEO.1: To learn the concept of Big data and applications of big data analytics 2. CS671.CEO.2: To use framework for processing and storing data.

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS671.CO.1: To apply Hadoop ecosystem components.
2. CS671.CO.2: To Develop Map Reduce Work Application.
3. CS671.CO.3: To Create the HDFS tables and loading them in Hive and learn joining of tables in Hive.
4. CS671.CO.4: To design and build Hive and Hase based Big data Applications.

THEORY		
Unit-I		**8 Hours**
Parallel database architecture, Design of parallel systems, Study of DDBMS architectures, Analysis of Concurrency control in distributed databases, Implementation of Distributed query processing. Introduction to big data : Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting.		
Unit-II		**8 Hours**
Hadoop: History of Hadoop- the Hadoop Distributed File System, Components of Hadoop Analysing the Data with Hadoop, Hadoop Ecosystem 2.0, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run, Failures-Job Scheduling-Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features Hadoop environment.		
Unit-III		**8 Hours**
Frameworks: Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL – Querying Data in Hive, fundamentals of HBase and ZooKeeper, IBM InfoSphere BigInsights and Streams.		

TEXT BOOKS:

1. Coronel, Morris and Rob, “Database Principals: Fundamentals of Design, Implementation and Management”,9th edition, Cengage Learning, (ISBN: 978-81-315-1736-9)
2. Bill Franks, “Taming The Big Data Tidal Wave”, 1st Edition, Wiley, 2012.
3. VigneshPrajapati, “Big Data Analyticswith R and Haoop”, Packet Publishing 2013.
4. Kyle Banker, Piter Bakkum, Shaun Verch, “MongoDB in Action” Dream tech Press
5. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012.

REFERENCES:

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Tom White “Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012.
4. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, CUP, 2012.
5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley& sons, 2012.
6. Glenn J. Myatt, “Making Sense of Data”, John Wiley & Sons, 2007.
7. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.
8. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, 2nd Edition, Elsevier, Reprinted 2008.
9. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, “Intelligent Data Mining”, Springer, 2007.

10. Paul Zikopoulos, Dirkde Roos, Krishnan Parasuraman, Thomas Deutsch, James Giles , David Corrigan, “Harness the Power of Big Data The IBM Big Data Platform”, Tata McGraw Hill Publications, 2012.
11. Arshdeep Bahga, Vijay Madisetti, “Big Data Science & Analytics: A HandsOn Approach “,VPT, 2016
12. Bart Baesens “Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)”, John Wiley & Sons,2014

MIT | Academy of Engineering (An Autonomous Institute)	COURSE SYLLABI (2020-2022)		
DEPARTMENT OF COMPUTER ENGG.	**W.E.F.**	**:**	**AY:**2022-2023 (Rev 2022)
SECOND YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGINEERING	**COURSE NAME**	**:**	Business Intelligence
	COURSE CODE	**:**	CS643
	COURSE CREDITS	**:**	03
RELEASE DATE : 1/12/2022	**REVISION NO.**	**:**	1.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
		THEORY					
LECTURE	**PRACTICAL**	**ITA**	**ETA**	**IA**	**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
3	NIL	40	50	10	NIL	NIL	100

PRE-REQUISITE:

1. CS212 - Database Management Systems
2. AS501 – Computing and Mathematics

COURSE OBJECTIVES:

1. CS643.CEO.1: To introduce the idea of decision making in complex industrial and service environments
2. CS643.CEO.2: To understand the science behind better predictions and decisions.
3. CS643.CEO.3: To generate an ability to design, analyze and perform experiments on real life problems using various Decision making methodologies

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS643.CO.1: To understand articulate modern BI practices, including knowledge integration, sourcing and managing BI solutions.
2. CS643.CO.2: To discuss the social and ethical issues related to the use of Business Intelligence technologies in organizations.
3. CS643.CO.2: To understand articulate the crucial role that Business Intelligence plays in careers as well as in business and society in the 21st century.

4. CS643.CO.4: To understand articulate modern concepts, theories, and research in the field of Business Intelligence.
5. CS643.CO.5: To apply BI enabling technologies in organizational settings.

THEORY:

Introduction: BI Definitions & Concepts, BI Infrastructure Components, The Architecture of BI and its types, Development of a business intelligence system, Role of Data Warehousing in BI, Business Applications of BI.

Definition of system: Representation of the decision-making process, Types of decisions, Approaches to the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system.

Structure of mathematical models: Data exploration, Bivariate analysis, Graphical analysis, Regression, Significance of the coefficients Analysis of variance, Multi-colinearity of the independent variables, Confidence and prediction limits.

Definition of time series: Evaluating time series models Distortion measures Dispersion measures, Decomposition of a time series, Exponential smoothing models, , Removal of trend and seasonality,

Relational marketing: Motivations and objectives, An environment for relational marketing analysis, Lifetime value, The effect of latency in predictive models, Market basket analysis, Web mining, Response functions, Business case studies, Retention in telecommunications, Acquisition in the automotive industry, Cross-selling in the retail industry

TEXT BOOKS:

1. Carlo Vercellis, “Business Intelligence”, John Wiley & sons 2009 edition , ISBN 978-0-470-51138-1

REFERENCES:

1. Elizabeth Vitt, Michael Luckevich, “Business Intelligence: Making Better Decision”, Microsoft Press, 2002 edition, ISBN 0-7356-1627-2
2. Larissa T. Moss, Shaku Atre, “Business Intelligence Roadmap: The Complete Project Life cycle for Decision Support systems”, Addison – Wesley Information Technology Series 2008, ISBN 0-201-78420-3

MIT | Academy of Engineering (An Autonomous Institute)			**COURSE SYLLABI (2020-2022)**		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY			**W.E.F.**	**:**	**AY:**2022-2023 (Rev 2022)
SECOND YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGINEERING			**COURSE NAME**	**:**	Ad-hoc network
			COURSE CODE	**:**	CS643
			COURSE CREDITS	**:**	03
RELEASE DATE	**:**	01/012/2022	**REVISION NO.**	**:**	3.0

TEACHING SCHEME :		**EVALUATION SCHEME :**				
		THEORY				
LECTURE	**PRACTICAL**	**ECE**	**IA**	**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
3	NIL	60	40	NIL	NIL	100

PRE-REQUISITE:

1. CS323 Computer Networks
2. CS412 Wireless and Mobile Network

COURSE OBJECTIVES:

1. CS643.CEO.1: To illustrate principles of different types of Ad hoc network
2. CS643.CEO.2: To design MAC and Routing protocol of Ad hoc network
3. CS643.CEO.3: To explain the importance of QOS and Energy efficiency in Ad hoc network

COURSE OUTCOMES:

After completion of the course, the students will be able to

1. CS643.CO.1: To explain the concept of ad hoc network in real time applications
2. CS643.CO.2: To design various protocols with Ad hoc network constraints
3. CS643.CO.3: To analyze the issues in ad-hoc networks
4. CS643.CO.4: To develop ad hoc wireless network for enhancement in protocols.

Contents

Introduction: Fundamentals of WLANS, IEEE 802.11 Standard, HIPERLAN Standard, Introduction to Ad hoc Wireless Networks and its applications, Cellular and Ad hoc wireless networks, Issues in Ad hoc Wireless Networks, Ad hoc Wireless Internet.

MAC Protocols: Design Issues and goals of MAC protocol for Ad hoc Wireless Networks, Classifications of MAC Protocols, contention Based MAC Protocols with Scheduling Mechanisms, MAC Protocols using Directional Antennas, Other MAC Protocols and applications

Routing Protocols**:** Design Issues and goals of Routing Protocol for Ad hoc Wireless Networks, Classification of Routing Protocols, secure Routing in Ad hoc Wireless Networks, Energy Management in Ad hoc Networks and applications.

Transport Layer and Security Protocols**:** Design Goals and issues of Transport Layer Protocol for Ad hoc Wireless Networks, Classification of Transport Layer protocols, TCP Over Ad hoc Wireless Networks, Security in Ad hoc Wireless Networks, Issues in Security Provisioning, Network Security Attacks, Key Management, Ad-hoc Application of Secure communication in MANET and VANET

Quality of Service**:** Issues and Challenges in Providing QOS in Ad Hoc Wireless Networks, QOS Parameters in Ad Hoc Wireless Network ,Classification of QOS Solutions, MAC Layer Solutions, Network Layer Solutions, QOS Frameworks for Ad Hoc Wireless Networks. Application & Case Study

Wireless Sensor Networks: Wireless Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, IOT with WSN. Energy Management in WSN, Application of energy efficient routing protocol in Agriculture Environment Sensing.

TEXT BOOKS:

1. C D M Cordeiro, D. P. Agarwal, “Ad hoc and Sensor Networks: Theory and applications”, World Scientific, 2006, ISBN: 981-4-338-885
2. Jagannathan Sarangapani, “Wireless Ad hoc and Sensor Networks: Protocols, Performance and Control”, CRC Press, 2007, ISBN: 978-0-8247-2675-1
3. Asoke K Talukder and Roopa R. Yavagal, ”Mobile Computing – Technology, Applications and Service Creation”, 2nd Edition, TMH Publication,2006, ISBN:978-0-07-014457-6
4. C. Siva Ram Murthy & B. S. Manoj,”Ad hoc Wireless Networks”, Pearson Education, Pearson Education India, 2006, 978-8131706886.

REFERENCES:

1. C.K. Toh, “Ad- Hoc Mobile Wireless Networks: Protocols & Systems”, 1st Edition, Pearson Education, ISBN: 9780132442046.
2. C. S. Raghavendra, Krishna M. Sivalingam,”Wireless Sensor Networks”, Springer, 2004, ISBN: 978-3-540-77689-5.
3. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, “Mobile ad hoc networking”, Wiley-IEEE press, 2004, ISBN: 978-0-471-65688-3.
4. Senthilnathan Palaniappan, Kalaiarasan Chellan, “Energy-efficient stable routing using QOS monitoring agents in MANET”, In: Journal of Wireless and Communication and Networking, Springer, 2015.

MIT | Academy of Engineering (An Autonomous Institute)			**COURSE SYLLABI (2020-2022)**		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY			**W.E.F.**	**:**	**AY:**2022-2023 (Rev 2022)
SECOND YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGINEERING			**COURSE NAME**	**:**	Project - II
			COURSE CODE	**:**	CS651
			COURSE CREDITS	**:**	04
RELEASE DATE	**:**	01/12/2022	**REVISION NO.**	**:**	3.0

TEACHING SCHEME :		**EVALUATION SCHEME :**				
LECTURE	**PRACTICAL**	**THEORY**		**TERMWORK**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ECE	**IA**			
--	08	--	--	50	50	100

COURSE OUTCOMES

After completion of the course, the students will be able to

1. CS651 CO 1: Design the real life problems by applying the knowledge and problem solving ability.
2. CS651 CO 2: Analyze alternative approaches, find feasible solution and apply most appropriate one.
3. CS651 CO 3: Use standard engineering tools and processes for analysis, design, simulation, testing, implementation and deployment of idea into practice.

PRE-REQUISITE

1. CS545- PROJECT-I

COURSE OBJECTIVES

1. CS651 CEO. 1: To analyze and design the idea/ real time industrial problem/ current application from engineering domain
2. CS651 CEO. 2: To evaluate an alternative approaches and justify the use of selected tools and methods
3. CS651 CEO 3: To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.
4. CS651 CEO. 4: To understand the roles and responsibility, accountability and learn team work ethics.

4. CS651 CO 4: Participate effectively in multidisciplinary and heterogeneous teams exhibiting team work.

CONTENTS

Project Stage II is related with Goals and Objectives, System Architecture, Algorithm/Methodology. Project report submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- System Analysis and Design
- UML, DFD, Design Details
- Proposed Algorithm
- Expected Outcome and Result

Preparation of manuscript (paper) on Literature survey

Final Project Stage II Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

TEACHING SCHEME :		**ΞVALUATION SCHEME :**				
LECTURE	**PRACTICAL**	**THEORY**		**TERMWORK**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ECE	**IA**			
--	20	--	--	150	50	200

MIT | Academy of Engineering (An Autonomous Institute)			**COURSE SYLLABI (2020-2022)**		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY			**W.E.F.**	**:**	2021-22
SECOND YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGINEERING			**COURSE NAME**	**:**	Project - III
			COURSE CODE	**:**	CS652
			COURSE CREDITS	**:**	10
RELEASE DATE	**:**	01/07/2019	**REVISION NO.**	**:**	2.0

PRE-REQUISITE

1. CS545- PROJECT-I
2. CS651- PROJECT-II

COURSE OBJECTIVES

1. CS652 CEO 1: To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.
2. CS652 CEO. 2: To follow the standard guideline to meet the objective for development of Project
3. CS652 CEO. 3: To understand the roles and responsibility, accountability and learn team work ethics.

COURSE OUTCOMES

After completion of the course, the students will be able to

1. CS651 CO 1: Design the real life problems by applying the knowledge and problem solving ability.
2. CS651 CO 2: Use standard engineering tools and processes for analysis, design, simulation, testing, implementation and deployment of idea into practice.
1. CS651 CO 3: Show the evidence of independent evaluation
2. CS652 CO 4: Critically analyzed the result and their implementation methodology

CONTENTS

Project Stage III is related with Design, Algorithm /Methodology Implementation Results. Project report submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- System Analysis and Design (UML, DFD, Design Details)
- Proposed Algorithm
- Methodology/Approach
- Implementation
- Results
- Preparation of manuscript (paper) on Literature survey as mentioned in Project Work II
- Preparation of manuscript (paper) on analysis and design
- Publication details of paper on Literature survey and Design (Peer reviewed International conference like IEEE, ACM, Elsevier, Springer etc)

Final Project Stage III Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry

TEACHING SCHEME :		**EVALUATION SCHEME :**				
LECTURE	**PRACTICAL**	**THEORY**		**TERMWORK**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ECE	**IA**			
--	20	--	--	200	100	300

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2020-2022)		
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY			**W.E.F.**	**:**	**AY:**2022-2023 (Rev 2022)
SECOND YEAR MASTER OF TECHNOLOGY IN COMPUTER ENGINEERING			**COURSE NAME**	**:**	Project - IV
			COURSE CODE	**:**	CS653
			COURSE CREDITS	**:**	10
RELEASE DATE	**:**	01/12/20122	**REVISION NO.**	**:**	3.0

COURSE OUTCOMES

After completion of the course, the students will be able to

1. CS653 CO 1: Show the evidence of independent evaluation
2. CS653 CO 2: Critically analyzed the result and their implementation methodology
3. CS653 CO 3: Validate the results with standard tools and techniques.

PRE-REQUISITE

1. CS545- PROJECT-I
2. CS651- PROJECT-II
3. CS651- PROJECT-III

COURSE OBJECTIVES

1. CS653 CEO.1: To follow the standard guideline to meet the objective for development of Project
2. CS653 CEO 2: To test rigorously before deployment of Systems
3. CS653 CEO 3: To Verify and Validate the work Undertaken
4. CS653 CEO 4. To Consolidate the work and preparation of final report

4. CS653 CO 4: Understand the importance of documentation and report writing.

CONTENTS

Project work IV is related with Analysis Design, algorithm/methodology, implementation, Results, Result analysis using various charts/graphs, Project report submission and end trimester presentation will be conducted by department based in following points.

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- System architecture
- System analysis and design (UML, DFD, Design Details)
- Proposed Algorithm
- Methodology/Approach
- Implementation
- Result Analysis and discussions
- Conclusions and future scope

- Preparation of manuscript (paper) on literature survey as mentioned in project work –II.
- Preparation on manuscript (paper) on design as mentioned in Project work –III.
- Publication details of paper on Literature survey and Design (Peer reviewed International conference like IEEE, ACM, Elsevier, Springer etc. as mentioned in project Work – III)

Publication details of paper on Result analysis (Peer reviewed / free International Journal) Final Project Stage IV Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (ELECTRONICS ENGINEERING)
2020-22 PATTERN W.E.F 2020-21

The Master of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION : TRIMESTER WISE										
S.N.	TYPE OF COURSE	NO. OF COURSES/TRIMESTER								TOTAL
		1	2	3	4	5	6			
1.	Program Core (PC)	2	1	1						04
2.	Discipline Core (DC)	1	2	2						05
3.	Department Elective (DE)				2					02
4.	Skill Development and Project (SDP)			1	1	1	1			04
TOTAL		3	3	4	3	1	1			15

CREDIT DISTRIBUTION : TRIMESTER WISE											
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit											
S.N.	TYPE OF COURSE	NO. OF CREDITS/TRIMESTER								TOTAL	%
		1	2	3	4	5	6				
1.	Program Core (PC)	8	2	2						12	18.75
2.	Discipline Core (DC)	4	8	8						20	31.25
3.	Department Elective (DE)				6					06	9.37
4.	Skill Development and Project (SDP)			2	4	10	10			26	40.62
TOTAL		12	10	12	10	10	10			64	100

	CREDITS				
	1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit				
SL. NO.	**YEAR**	**TRIMESTER**			**TOTAL**
		1	**2**	**3**	
1.	First Year	12	10	12	**34**
2.	Second Year	10	10	10	**30**
TOTAL					**64**

	CONTACT HOURS				
SL. NO.	**YEAR**	**TRIMESTER**			**TOTAL**
		1	**2**	**3**	
1.	First Year	13	12	16	41
2.	Second Year	14	20	20	54
TOTAL					**95**

ABBREVATIONS		
1.	MCE	Mid-Course Exam
2.	ECE	End Course Exam
3.	IA	Internal Assessment
4.	T/P	Term Work / Practical
5.	DM	Demonstration
6.	L	Lecture
7.	P	Practical
8.	T	Tutorial
9.	Lab	Laboratory

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2020-2022)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2020-21
FIRST YEAR MASTER OF TECHNOLOGY IN ELECTRONICS ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

TRIMESTER: I

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MCE	ECE	IA	T/P	DM		
PC1	AS502	Computing and Higher Mathematics	2	-	2	-	60	40	50	-	150	4
PC2	CS531	Management System	2	-	2	-	60	40	50	-	150	4
DC1	EX532	Modern Technologies	3	2	-	-	60	40	50	-	150	4
TOTAL			**07**	**02**	**04**	**-**	**180**	**120**	**150**	**-**	**450**	**12**

TRIMESTER: II

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MCE	ECE	IA	T/P	DM		
PC3	EX531	Research Methodology	2	-	-	-	50	25	-	-	75	2
DC2	EX541	Advance Embedded Architecture & Processor	3	2	-	-	60	40	-	50	150	4
DC3	EX542	CMOS Design	3	2	-	-	60	40	-	50	150	4
TOTAL			**08**	**04**	**-**	**-**	**170**	**105**	**-**	**100**	**375**	**10**

TRIMESTER: III												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MCE	ECE	IA	T/P	DM		
PC4	EX533	Technical Writing	2	-	-	-	-	25	-	50	75	2
DC4	EX543	Real Time Operating Systems & Design	3	2	-	-	60	40	-	50	150	4
DC5	EX544	Embedded Signal Processor Architecture	3	2	-	-	60	40	-	50	150	4
SDP1	EX545	Project Work - I	-	4	-	-	-	-	-	50	50	2
TOTAL			**08**	**08**	**-**	**-**	**120**	**105**	**-**	**200**	**425**	**12**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2020-22)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2021-22
SECOND YEAR MASTER OF TECHNOLOGY IN ELECTRONICS ENGINEERING	RELEASE DATE	:	01/07/2021
	REVISION NO.	:	1.0

TRIMESTER: IV

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MCE	ECE	IA	T/P	DM		
DE1	EX66#	Elective course I – Refer Annexure	3	-	-	-	60	40	-	-	100	3
DE2	EX67#	Elective course II – Refer Annexure	3	-	-	-	60	40	-	-	100	3
SDP2	EX651	Project Work - II	-	08	-	-	-	-	50	50	100	4
TOTAL			**06**	**08**	**-**	**-**	**120**	**80**	**50**	**50**	**300**	**10**

TRIMESTER: V

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MCE	ECE	IA	T/P	DM		
SDP3	EX652	Project Work - III	-	20	-	-	-	-	150	50	200	10
TOTAL			**-**	**20**	**-**	**-**	**-**	**-**	**150**	**50**	**200**	**10**

TRIMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MCE	ECE	IA	T/P	DM		
SDP4	EX653	Project Work - IV	-	20	-	-	-	-	200	100	300	10
TOTAL			**-**	**20**	**-**	**-**	**-**	**-**	**200**	**100**	**300**	**10**

Annexure

Department Elective Course I : 1 Course		
Sl. No.	**Course Code**	**Course**
1	EX661	Computer Vision
2	EX662	ASIC Design
3	EX663	Open Elective

Department Elective Course II : 1 Course		
Sl. No.	**Course Code**	**Course**
1	EX671	Internet of Things
2	EX672	Hybrid and Electric Vehicle
3	EX673	Open Elective

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY MECH/COMP/ETX ENGG	**COURSE NAME**	Computing and Higher Mathematics
	COURSE CODE	AS502
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	TUTORIAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	2	NIL	60	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS502.CEO.1: To learn different numerical methods to solve differential equations and obtain the solution.

AS502.CEO.2: To understand different sampling techniques, analyze the data and process it to obtain a quality product.

AS502.CEO.3: To learn mathematical methodologies, techniques and mathematical tools to obtain an optimal solution of the problems theoretically and also by ANOVA.

COURSE OUTCOMES :

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

AS502.CO.1: Identify the accurate solution method (minimizing the error) to solve the differential equation with given conditions and obtains the particular solution of the problem.

AS502.CO.2: Collect, categorize, analyze, processing mathematically the data, thereby to obtain a quality proven product.

AS502.CO.3: Understand the physical situation, identify the accurate mathematical model and solve the problem mathematically or with the use of Statistical tools available and finally interpret it in the original context.

CONTENTS:

Computational Methods for Ordinary Differential Equations: Eulers Method, Heuns Method, Mid- point Method, Runge-Kutta Method and Multi step Methods-Explicit Adams-Bash forth technique and Implicit Adams-Moulton techniques, Adaptive RK Method, Embedded RK Method, Higher Order Ordinary differential equation- Shooting Method.

Operations Research: Simplex method: Feasible solution to system of equations, reduction of feasible to basic feasible solution, solution of LPP: computational procedure, Penalty (Big M) method. Transportation problem: North-West corner method, Least-cost method, Vogels approximation method, Assignment Models: Hungerian Method.

Statistics and ANOVA: Central Tendency of data, Variance, Standard Deviation, Coefficient of Variance, Moments, Correlation, Coefficient of Correlation, Least Squares, Linear Regression, Inference in Linear Regression, Multiple Linear Regression, ANOVA for Regression

TUTORIAL NO.1		**2 HOURS**
Introduction to first order first degree Differential equation and its actual solution.		
TUTORIAL NO.02		**2 HOURS**
Eulers Method, Heuns Method, Mid- point Method, Runge-Kutta Method.		
TUTORIAL NO.03		**2 HOURS**
Adams-Bash forth technique and Implicit Adams-Moulton techniques.		
TUTORIAL NO.04		**2 HOURS**
Adaptive RK Method, Embedded RK Method, Shooting Method.		
TUTORIAL NO.05		**2 HOURS**
Solution of system of equations using simplex method (Feasible soln).		
TUTORIAL NO.06		**2 HOURS**
Solution of system of equations using simplex method (Feasible to basic feasible soln).		
TUTORIAL NO.07		**2 HOURS**
Transportation problem: North-West corner method, Least-cost method.		
TUTORIAL NO.08		**2 HOURS**
Transportation problem: Vogels approximation, Assignment problem: Hungerian method.		
TUTORIAL NO.09		**2 HOURS**
Central Tendency of data, Variance, Standard Deviation.		
TUTORIAL NO.10		**2 HOURS**
Moments, Correlation, Coefficient of Correlation.		
TUTORIAL NO.11		**2 HOURS**
Regression lines.		
TUTORIAL NO.12		**2 HOURS**
ANOVA for Regression.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Peter W. Vik, Regression, ANOVA, and the General Linear Model: A Statistics Primer, First Edition, ISBN-13: 978-1412997355.

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY MECH/COMP/ETX ENGG	**COURSE NAME**	Management Systems
	COURSE CODE	CS531
	COURSE CREDITS	04
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	TUTORIAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	2	NIL	60	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS531.CEO.1: To expose the students to fundamental concepts of management and its processes in organizations.

CS531.CEO.2: To create scientific attitude towards solving a management problem and impart knowledge about tools available for carrying out research.

CS531.CEO.3: To inculcate a spirit of entrepreneurship by promoting inquisitiveness for technological innovations, their conversion into business ideas and evolving strategy for induction of new products in new markets for growth of their entrepreneurial projects.

CS531.CEO.4: To effectively use the latest technology to support ever growing business.

COURSE OUTCOMES :

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

CS531.CO.1: Describe and explain the Significance of Businesses in Society, their Management and linking these up with other relevant systems.

CS531.CO.2: Critically analyze the organizational structure, systems, competencies and identify the areas of improvement.

CS531.CO.3: The ability and confidence to tackle common environmental and financial problems of business.

CS531.CO.4: Build an awareness of ethical and social responsibilities to multi-cultural, team-oriented, rapidly changing environments.

CONTENTS:

Basics of Management: Nature and scope of management; Evolution of Management thought; -Scientific, Behavioral, Systems and Contingency Approaches, Social responsibility of an organization. Analysis for Managerial Decision Making, Corporate Image Building.

Organizational Behavior: Concepts of OB, Designing and Delegation of Authority, Decision Making Process, Management of Creativity and Relationships, Human Resource Management, Skillful use of Emotional Intelligence in conflict management. Techniques for Self Management and Stress Management for improving personal efficiency.

Economics and Financial Management: Demand and Business Forecasting, Economics of Information and Network Industries, Entrepreneurship and New Ventures, Finance function Scope and Significance, Capital Budgeting- Nature and Significance.

Project Management: Essentials of Project Management with use of Critical Path Method (CPM) and Programme Evaluation and Review Techniques (PERT), Functioning and growth of a Business Unit with understanding of Break-Even Analysis.

Information System: Business and Data Communications Networks, Technology Management with the help of Cyber Security, Data Mining, Enterprise Resource Planning, Industry 4.0 concepts, Business startups and growth in current Indian Environment.

TUTORIAL NO.1	**Corporate management case presentation**	**4 HOURS**
A corporate management case to be selected by students on their own choice, writing a Synopsis (2.5 Marks) and its Presentation before the class in 5 Minutes including answers to questions by class (2.5 Marks)		
TUTORIAL NO.02	**Entrepreneurial Business Plan presentation**	**6 HOURS**
Preparation and submission of an innovative and entrepreneurial Business Plan of students own choice, submitting a Power Point Presentation to be evaluated by Faculty (2.5 Marks), and its presenting/ defending it before the class, to be evaluated by two peers on a Format to be given by Faculty (2.5 Marks).		
TUTORIAL NO.03	**Industry 4.0**	**6 HOURS**
Understand the concept of Industry 4.0 and prepare a report using any of the technology to prove that use of this technology will improve the performance of the organization.		

TEXT BOOK

1. Harold Koontz, Heinz Weihrich and Mark V Cannice, Management A Global and Entrepreneurial Perspective, Tata McGraw Hill Publications, 12th Edition, 2008.
2. Vachaspati Mishra, Management and Entrepreneurship in Indian Environment A Perspective through Joining the Dots, Himalaya Publishing House, First Edition, 2016

REFERENCE BOOK

1. Dr A Sivathanu Pillai; Technology Leadership A Revolution in the Making; Tata McGraw Hill Publishing Company Ltd, New Delhi, 2005
2. James A Alexander and Mark W Hordes; S-Business: Reinventing the Services Organisations, Select Books Inc Biztantra, 2006
3. Vohra ND, Quantitative Techniques in Management; Tata McGraw Hill Publishing Company Limited, Third Edition 2007
4. Nakkiran S and Karthikeyan M; Training Techniques for Management Development; Deep and Deep Publications Pvt Ltd; 2007

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Modern Technology
	COURSE CODE	EX532
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	-	60	40	50	-	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX532.CEO.1: To get familiar with advance software

EX532.CEO.2: To study the basic knowledge to electrical energy harvesting

EX532.CEO.3: To acquire the knowledge of Battery Management System

COURSE OUTCOMES :

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

EX532.CO.1: Understand the system requirements, design, analysis, verification and validation activities using modern advanced softwares.

EX532.CO.2: Apply knowledge of model based design, energy harvesting in different fields.

EX532.CO.3: Apply advance technologies in automotive industry.

THEORY COURSE CONTENT

Introduction to Modern Tools : MATLAB, SIMULINK verification and validation, computer Aided Engineering Tools (CAE), Automatic code generation tools; modelling and designing a dynamics system, signal processing design and simulation; Introduction and need of model based design concept; Mathematical modelling of a system: motor, battery; System design and validation.

Electric Energy Harvesting: Introduction to Piezo Electric Energy Harvesting-Electromagnetic, Thermal Energy harvesting- RF Energy harvesting, Introduction to Electric Vehicle, Role of battery in present technology era.

Battery Management System (BMS): Battery Boot Camp- important terminology used to describe battery cells, and principles of operation of standard electrochemical battery cells. Principal advantages of lithium-ion cells versus standard electrochemical battery cells, components, and working. BMS sensing and high-voltage control- BMS requirements, and the requirements for sensing and high-voltage control in detail. BMS requirements, studying requirements for protection, interface, performance management, and diagnostics in detail, lithium-ion cells are made and how they can fail.

PRACTICAL		
PRACTICAL NO.01	**Modelling Basics in MATLAB & SIMULINK**	**4 HOURS**

1. Different blocks, toolboxes used in Simulink for modelling
2. Signal Routing, Closed Loop Control System, Integrators & Derivatives
3. Subsystem creation
4. Used defined function in Simulink
5. Interface of MATLAB & Simulink
6. Automatic code generation

PRACTICAL NO.02	**System Design & validation**	**4 HOURS**
DC Motor and Batteries		
PRACTICAL NO.03	**Energy harvesting wireless sensors**	**4 HOURS**
Case studies on Implanted medical devices- Bio-MEMS based applications, MEMS-based applications harvesting for RF sensors		
PRACTICAL NO.04	**Battery Management System**	**2 HOURS**
Case study on Battery management system in Electric Vehicle		
PRACTICAL NO.05	**Battery Application in E Mobility**	**2 HOURS**
Case Study on life cycle of batteries in E mobility		
PRACTICAL NO.06	**Health of Batteries**	**2 HOURS**
Case study on Health Monitoring of batteries in E vehicle		
PRACTICAL NO.07	**Charge Monitoring of Batteries**	**2 HOURS**
Case study on Charge Monitoring of batteries in E vehicle		

TEXT BOOK

1. A. Wayne Wymore, Model-Based Systems Engineering, CRC Press, ISBN-13: 978-0849380129
2. Yen Kheng Tan, Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage, and Power Management, 1^{st} Edition, CRC PRESS
3. Battery Management Systems, Volume 1: Battery Modeling Battery Modeling, Grogery.L Plett ISBN-13:978-1-63081-023-8

REFERENCE BOOK

1. Nicolescu Mosterman, Model-Based Design for Embedded Systems, Routledge, ISBN-13: 9781420067842, 2009.
2. Nasimul Alam Syed, Sanjib Islam, Saroj Kumar Patel, Advanced Guide to MATLAB: Practical Examples in Science and Engineering I K International Publishing House Pvt. Ltd., 2015, ISBN: 978-9384588359.
3. Shashank Priya, Daniel J. Inman, Energy Harvesting Technologies Springer US, 2009, ISBN:978-0-387-76464-1
4. Behaviour of Lithium-Ion Batteries in Electric Vehicles: Battery Health, Performance, Safety, and Cost, Springer science ISBN:978-3-319-69950-9
5. Lithium-Ion Battery: The Power of Electric Vehicles with Basics, Design, Charging technology & Battery Management Systems, Subodh Sarkar, sssNov 8, 2018, ISBN: 978-0-463-16024-4
6. Battery Management Algorithm for Electric Vehicles, Rui Xiong, Springer, Singapore,ISBN: 978-981-15-0248-4

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Research Methodology
	COURSE CODE	EX531
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	-	-	50	25	-	-	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX531.CEO.1: To understand the basic framework of research process
EX531.CEO.2: To identify various sources of information of survey and data collection
EX531.CEO.3: To Illustrate the use of documentation and evaluate its quality

COURSE OUTCOMES :

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

EX531.CO.1: Classify different types of Research , objective and paradigm of research process
EX531.CO.2: Explore the basics of research framework and Hypothesis
EX531.CO.3: Describe about different data collection methods.
EX531.CO.4: Explain the different stages of preparing scholarly writing proposals.

THEORY COURSE CONTENT

Introduction : What is research, Research definition, Objective & paradigm for the research, Identifying & defining the research problem, Literature & its analysis, Qualitative & quantitative research, development of theoretical and conceptual frame work.

Hypothesis and Data Processing : Ethical Issues concerning research participants, Ethical issues in data collection, Definition and functions of hypothesis, Processing operations, Problems in processing, Coding descriptive and quantitative data, Sampling techniques .

Statistics in research : Data collection methods use , types , examples , Multivariate analysis, Concept of regression,Establishing validity and reliability.

Research Documentation : Interpretation and its meaning, Readability of Manuscript, techniques, Contents, Report writing, structure, types of report, Procedure of writing research proposal, Writing as thinking, Habit of writing, Skills and thought process in technical writing, Role of computer in technical writing.

TEXT BOOK

1. John W. Creswell, Research Design-Qualitative & Quantitative Approaches, SAGE publications, New Delhi ISBN: 0-8039-5254-6
2. C. R. Kothari, Research Methodology, Methods & Techniques, Second Edition, New Age International Publication ISBN: 978-81-224-1522-3

REFERENCE BOOK

1. Ranjit Kumar, Research Methodology A Step by Step Guide for Beginners, Second edition., Pearson publication, New Delhi ISBN: 978-81-317-0496-7
2. Hamdy A. Taha, Operation Research- An Introduction, 8th Edition, Pearson Publication , ISBN : 9780132729154
3. R. Panneerselvam Research Methodology, PHI Learning, Second edition , ISBN: 978-8120349469

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Advanced Embedded Architecture & Processor
	COURSE CODE	EX541
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	-	60	40	-	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX541.CEO.1: To review basic organizational and architectural techniques.
EX541.CEO.2: To learn the performance metrics of microprocessors, memory, networks and disks
EX541.CEO.3: To exploit ILP using dynamic scheduling, multiple issue and speculation

COURSE OUTCOMES :

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

EX541.CO.1: Explain pipelining, instruction set architectures, memory addressing
EX541.CO.2: Propose various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges
EX541.CO.3: Describe multithreading by using ILP and supporting thread-level parallelism (TLP)
EX541.CO.4: Describe TI DSP processor family, Intel Atom Processor N2000

THEORY COURSE CONTENT

Architectural Techniques : Classification of set of architecture, basic parallel processing techniques, classification of parallel architecture, Instruction level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulos approach, Hierarchical memory organization, Virtual memory design, RAID, Practical approach of Interconnecting networks, Intel IA-64ILP, Multicore architecture.

Processors family: Vector processing, Graphics Processing units, Review of modern processor, LPC 17XX microcontroller, Programmable DSP (P-DSP) processor, TI DSP Family, TMS320C6000 series processors, on chip peripherals, Intel Xscale Atom Processor N2000, Interrupts, Overlays & Virtual memory.

PRACTICAL Perform at least 7 practicals using any controller of LPC17xx series:		
PRACTICAL NO.01		**6 HOURS**
Interfacing with RGB LED		
PRACTICAL NO.02		**2 HOURS**
Interfacing of ADC and display on LCD.		
PRACTICAL NO.03		**2 HOURS**
Generation of PWM signal and verify output using LED and Buzzer.		
PRACTICAL NO.04		**2 HOURS**
Interfacing of Graphical LCD.		
PRACTICAL NO.05		**2 HOURS**
Interface SD Card.		
PRACTICAL NO.06		**2 HOURS**
Interface EEPROM using I2C protocol.		
PRACTICAL NO.07		**2 HOURS**
Implement CAN Protocol.		
PRACTICAL NO.08		**2 HOURS**
Implement ETHERNET protocol..		
PRACTICAL NO.09	**Capstone mini projects**	**4 HOURS**
Case Study: Control the speed of Motor using PWM signal.		

TEXT BOOK

1. Hennessey and Patterson, "Computer Architecture: A quantitative Approach", 5^{th} Edition, Morgan Kaufman Series , ISBN-13: 978-0123838728.
2. Kai Hwang, Faye A. Brigs., "Computer Architecture and Parallel Processing", , McGraw-Hill, Inc. New York, 1990, 1^{st} Edition , ISBN: 0070315566
3. David Culler, J.P. Singh with Anoop Gupta, "Parallel Computer Architecture : A Hardware/Software Approach", Morgan Kaufman ,1998, ISBN 1-55860-343-3.

REFERENCE BOOK

1. Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architectures: A Design Space Approach", Seventh Impression, Pearson Education, ISBN 978-81-317-0208-6
2. John P. Shen, Mikko Lipasti, "Modern Processor Design: Fundamentals of Superscalar Processors", Waveland PrInc,2013, ISBN 13: 978-1478607830
3. Geoffrey C. Fox, Roy D. Williams, Paul C. Messina, "Parallel Computing Works", 1^{st} Edition, Morgan Kaufman, 1994,ISBN-13: 978-1558602533

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	CMOS Design
	COURSE CODE	EX542
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	-	60	40	-	50	150

PRE-REQUISITE : VLSI Design

COURSE OBJECTIVES :

EX542.CEO.1: To understand the fundamental in Analog and digital CMOS domain.
EX542.CEO.2: To show skill in CMOS domain.
EX542.CEO.3: To aware design tool in IC technology.

COURSE OUTCOMES :

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

EX542.CO.1: Design analog circuits using CMOS.
EX542.CO.2: Demonstrate Circuit design using backend software tool.
EX542.CO.3: Compare ideal & Non ideal MOS cell behavior.

THEORY COURSE CONTENT	
UNIT 1	**Analog CMOS Sub circuits and Amplifier**

Non ideal characteristics of MOSFET & it's effect on CMOS design. Introduction to Analog Integrated Circuit Design , MOSFET as switch, diode and active resistor , MOS Small-signal Models, Common Source Amplifier, Current sinks and sources; Current mirrors; Current and voltage references, band gap reference. Inverters, cascode and differential amplifiers; Output amplifier; Opamp, high speed opamp, micro power opamp, low noise opamp.

Self Study: Basic MOS semiconductor fabrication Process

UNIT 2	**DCMOS Design**

ASIC Design Flow , MOSFET Structure & behavior , Issue in Digital Integrated Circuit Design , Quality metrics of a Digital Design, Static CMOS inverter. Switching threshold and noise margin concepts and their evaluation. Stick diagram. Design Rule Check (DRC), CMOS parasitic. Technology scaling, Lambda parameters.

Self Study: Static, dynamic and short circuit power dissipations.

PRACTICAL: Perform following experiments using XILINX or Open source software

PRACTICAL NO. 01		**4 HOURS**

To design cascade current mirror for output current of 100 A. Prepare layout and simulate. Comment on output resistance

PRACTICAL NO. 02		**4 HOURS**

To design, prepare layout and simulate CMOS differential amplifier for CMRR of 40 dB. Comment on ICMR

PRACTICAL NO. 03		**4 HOURS**

List the sources of cross talk. Explore in detail, the existence of cross talk in each case. What are the mitigation techniques? Prepare case study for one of them. Verify the cross talk and its mitigation through simulation

PRACTICAL NO. 04		**4 HOURS**

To design, prepare layout and simulate CMOS Inverter for the given specifications of load capacitance, propagation delay, power dissipation, foundry etc.

PRACTICAL NO. 05		**4 HOURS**

To design CMOS logic for $F = A + B(C + D) + EFG$ and prepare layout .

TEXT BOOK

1. P. E. Allen and D. R. Holberg, "CMOS Analog Circuit Design", Second Edition, Oxford University Press, ISBN: 9780195116441
2. Thomas Lee, "The Design of CMOS Radio - Frequency Integrated Circuits", Second edition, Cambridge, ISBN: 9780521835398
3. J P Rabaey, A P Chandrakasan and B Nikolic, "Digital Integrated circuits: A design perspective", Prentice Hall electronics and VLSI series, Second Edition, ISBN: 978-0130909961

REFERENCE BOOK

1. B. Razavi, "Design of Analog CMOS Integrated Circuits", McGraw-Hill ISBN: 9780070529038
2. Neil H. E. Weste and David Money Harris, "CMOS VLSI Design: A Circuits and Systems Perspective", ISBN: 9788131762653

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Technical Writing
	COURSE CODE	EX533
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	-	-	-	25	-	50	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX533.CEO.1: To share the skills and finer aspects of scientific and technical writing with the research students of the Institute order to prepare technical documents clearly, concisely, consistently, and effectively, following internationally accepted standards.

EX533.CEO.2: Students will be made to evaluate the correct & error-free writing by being well versed in rules of English grammar and cultivate relevant technical style of communication & presentation at their work place and also for academic uses.

EX533.CEO.3: To provide overview of technical English for research paper writing with a special focus on research methods typical for classroom based studies of pedagogical innovations.

COURSE OUTCOMES :

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

EX533.CO.1: Creates substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as comprehension, reading, writing and speaking etc.

EX533.CO.2: Find information about scientific and technical publications using two premier analytic information resources: the Web of Science platform and Derwent Innovation Index for the patent information discovery.

EX533.CO.3: Identify plagiarism and explain how to prevent it.

COURSE OUTCOMES :

EX533.CO.4: Read and analyze several articles to form your own opinion on a topic - make connections between several articles.

EX533.CO.5: Write a 7- 8-page research paper / review paper by using source material correctly with MLA format.

THEORY COURSE CONTENT

Unit 01

Introduction to Technical Communication : Reading Skill, Basics of English Grammar.
Introduction to Effective Writing: Effective writing as an art, principles of effective writing, types and stages of effective writing, notions of correctness and appropriateness, essentials of academic writing
Technical Instructions : Purpose, Content & Structure: Understanding the Audience
Creative Writing : Use of tools, Guidelines for Technical Writing, Microsoft Word, Text Editor for Drafting Content, The Role of Visuals in Technical Instructions, the features of Authorizing Tool, Adobe Frame maker, Desktop Publishing and Help Publishing Tool, Snag IT, Image Capturing Tool MS-Visio Image Drawing Tool.

Unit 02

Role of Ethics in Technical Instructions
Understanding the subject : formulating ideas for the paper, developing a thesis statement
Preparing the anatomy of the paper : Literature review, research methodology, Writing the results, analysis of the results, discussion and conclusion, apply correct citation, formatting, write the first draft, revise, edit and proofread
Use of tools for research paper help : Grammar checkers, plagiarism checkers, citation generators.
Selecting a journal/conference : Targeting a high impact factor journal in Elsevier, IEEE, Springer, Wiley etc., Introduction to the Web of Science, Science Citation Index (SCI)/SCI Expanded (SCIE) and Scopus, preparing the manuscript according to the chosen journal's requirements, submis- sion ethics, and use of peer review comments in a constructive way, submission, revision and galley proof. Proposal writing, the Web of Science platform and Derwent Innovation Index for the patent information discovery, Patent Searching, Drafting and Filing

IA Activities		
Activity No.01	**Preparing the document on**	**6 HOURS**
1. A representative official correspondence. 2. Work progress report 3. Technical brochures and newsletters 4. Instruction Manual 5. Demo patent writing		
Activity No.02	**Technical discussions**	**2 HOURS**
Graded technical discussions will be planned online and in class		
Activity No.03	**Quiz**	**2 HOURS**
Quiz on every major component of the course.		

Activity No.04	Writing gist	2 HOURS
Writing gist from a set of related papers		
Activity No.05	**Writing the technical blogs**	**2 HOURS**
Writing the technical blogs		

Demonstration/Presentation

Students will have to submit and present :

1. Project proposal to be submitted to the funding agencies of repute (Peer review)
2. Review paper / Research paper or research letter.

TEXT BOOK

1. Kenneth G. Budinski, Writing Engineers' Guide to Technical, ASM internationals, ISBN: 978-0-87170-693-5
2. Gerald. J. Alred, Charles. T.Brusaw, and Walter. E. Oliu, Handbook of Technical Writing, St. Martin's Press, New York, Ninth Ed., ISBN 1250004411, 2008
3. Hofmann, A. Angelika, Scientific Writing and Communication, Oxford University Press, Oxford., ISBN 0199947562 2014

REFERENCE BOOK

1. Meenakshi Raman and Sangeeta Sharma, Technical Communication Principles and Practices, Oxford Univ. Press, 2016
2. NPTEL/Swayam Course : Technical English for engineers Dated : 22nd May 2020

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Real Time Operating Systems & Design
	COURSE CODE	EX543
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	-	60	40	-	50	150

PRE-REQUISITE :

1: Advanced Embedded Architecture & Processor

COURSE OBJECTIVES :

EX543.CEO.1: Learn Real time operating system services and issues

EX543.CEO.2: Know different programming languages for real time programming

EX543.CEO.3: Understand impact of the computer architecture on design considerations of real time system

EX543.CEO.4: Understand real time operating system design and functions

COURSE OUTCOMES :

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

EX543.CO.1: Identify Real time operating system services and issues

EX543.CO.2: Select programming languages to develop real time system

EX543.CO.3: Analyze Impact of the computer architecture on design considerations of real time system

EX543.CO.4: Identify real time operating systems are design and functions

THEORY COURSE CONTENT

Fundamentals of Real-Time Systems : Terminology, Multidisciplinary Design Challenges, Birth and Evolution of Real-Time Systems, Common Misconceptions.

Hardware for Real-Time Systems: Basic Processor Architecture, Memory Technologies, Architectural Advancements, Peripheral Interfacing, Microprocessor versus Microcontroller, Distributed Real-Time Architectures, Enhancing Performance.

Real-Time Operating Systems: Real-Time Kernels, Theoretical Foundations of Scheduling, System Services for Application Programs, Memory Management Issues, Selecting Real-Time Operating Systems, Case Study: POSIX

Programming Languages for Real-Time Systems: Coding of Real-Time Software, Assembly Language, Procedural Languages, Object-Oriented Languages, Overview of Programming Languages, Automatic Code Generation, Compiler Optimizations of Code

Requirements Engineering Methodologies: Requirements Engineering for Real-Time Systems, Formal Methods in System Specification, Semiformal Methods in System Specification, The Requirements Document, Case Study in Software Requirements

Software Design Approaches: Qualities of Real-Time Software, Software Engineering Principles, Procedural Design Approach, Object-Oriented Design Approach, Life Cycle Models, Case Study in Designing Real-Time

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Development of Task Management		
PRACTICAL NO.02		**4 HOURS**
Implementation of time delay and interval		
PRACTICAL NO.03		**4 HOURS**
Exploring Multitasking features		
PRACTICAL NO.04		**2 HOURS**
Implementation of Semaphore Services		
PRACTICAL NO.05		**2 HOURS**
Exploring Mutex Services		
PRACTICAL NO.06		**2 HOURS**
Exploring Message Queue Services		
PRACTICAL NO.07		**2 HOURS**
Demonstrate ISR		

PRACTICAL NO.08		2 HOURS
Real Time Application Development		

TEXT BOOK

1. Phillip A. Laplante and Seppo J. Ovaska, Real-Time Systems Design and Analysis, 4^{th} Ed., IEEE Press, A John Wiley & Sons, Inc., Publication, 2012, ISBN 978-0-470-76864-8
2. J.E. Cooling, Software Design for Real-time Systems, Springer Science Business Media, B.V., 1991, ISBN 978-0-442-31174
3. Jean Labrosse,MicroC/OS-II The Real Time Kernel, CMP Books, 2^{nd} Edition, ISBN-13-97891578201037

REFERENCE BOOK

1. Jane W. S. Liu, Real-Time Systems, Pearson Education, 2000, ISBN-13: 978-0130996510
2. Getting Started for ARM Processor Based Microcontrollers Building Applications with RL-ARM, by Keil Tools by ARM (Keils Online support Document)
3. Frank Vahid and Tony Givargis, Embedded System Design: A Unified Hardware/Software Approach, 3^{rd} edition, Wiley
4. Jonathan Valvano, Embedded Systems:Real Time Operating Systems for the ARM Cortex-M3, Create space Independent Publishing Platform, 4^{th} edition (2012). ISBN-13-1466468863

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Embedded Signal Processor Architectures
	COURSE CODE	EX544
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	-	60	40	-	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX544.CEO.1: To impart knowledge on the practical aspects of signal analysis and processing
EX544.CEO.2: To explore DSP processor architectures
EX544.CEO.3: To understand DSP algorithms in view of embedded architectures
EX544.CEO.4: To elaborate real world DSP applications

COURSE OUTCOMES :

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

EX544.CO.1: Implementing FIR and IIR filters with various combinations
EX544.CO.2: Port DSP algorithms on DSP processor platform.
EX544.CO.3: Explain real world applications of DSP.

THEORY COURSE CONTENT

Signal Analysis and Processing: Discrete Fourier Transform, Fast Fourier Transform, Design of FIR Filters using windowing technique, Design of IIR Filters through Impulse invariance and bilinear transformation technique, Introduction to Adaptive filters.

Introduction to Texas Digital signal processing systems: MAC, Barrel shifter, ALU, Multipliers, Dividers, DSP processor architecture, Software developments, Selections of DSP processors, Hardware interfacing, DSP processor architectures: TMS 320C54XX, TMS 320C67XX, Blackfin processor: Architecture overview, memory management, I/O management, Real time implementation Considerations, Memory System and Data Transfer, Code Optimization.

Representations of the DSP algorithms: Block diagrams, Signal flow graph, Data-flow graph, Dependence graph. Iteration bounds: Critical Path, Loop Bound, Algorithm to compute iteration bound, Longest Path Matrix (LPM).

DSP Applications: Audio Coding and Audio Effects, Digital Image Processing, Two-Dimensional Filtering - Image Enhancement, DTMF generation and detection, Wavelet algorithms, Adaptive algorithm applications like: system identification, inverse modelling, noise cancellation, prediction.

PRACTICAL		
PRACTICAL NO.01	**Performance evaluation of digital filters**	**4 HOURS**
Performance comparison of different filter structures (for example designing FIR LFP using various windows other combination can also be taken). Implementation can be done using MATLAB/Python/R/C or any other suitable platform.		
PRACTICAL NO.02	**Algorithm implementation on DSP processor**	**4 HOURS**
Design and simulate N point DFT/FFT and implement it on DSP processor platform.		
PRACTICAL NO.03	**Audio Signal Processing**	**4 HOURS**
Record a speech file in your own voice with sampling frequency of 8000 Hz. Design a system to decompose a speech signal using Daubechies wavelet using wavelet packet decomposition. Write a program to implement the system and plot the speech signal passed via each wavelet filter. Implementation can be done using MATLAB/Python/R/C or any other suitable platform.		
PRACTICAL NO.04	**Implementation of Adaptive filter**	**2 HOURS**
Implement an adaptive filter for any simple application (either of these: inverse modelling/noise cancellation/prediction or any other). Implementation can be done using MATLAB/Python/R/C or any other suitable platform.		
PRACTICAL NO.05	**Paper Critics**	**2 HOURS**
Choose a quality paper in the domain of signal processing. (2-3 journal papers are in the list below. Other paper can also be taken). Write its summary also write critics for it. Paper needs to be chosen by the student in consultation with the guide and should be approved by the subject teacher.		

TEXT BOOKS

1. Proakis J G, Manolakis D G, Digital Signal Processing ,Principles, Algorithms and Applications, Fourth Edition, Prentice-Hall, ISBN-10: 0131873741, ISBN-13: 978-0131873742.
2. Sen-Maw Kuo, Woon-Seng Gan, Digital Signal Processors: Architectures, Implementations and Applications, Prentice-Hall, ISBN-10 0131277669, ISBN-13: 9780131277663.
3. Keshab K. Parhi, VLSI Digital Signal Processing System, Wiley Publication, ISBN-10: 9788126510986 ISBN-13: 978-8126510986.
4. I. Kuroda and T. Nishitani, "Multimedia processors," in Proceedings of the IEEE (Journal), vol. 86, no. 6, pp. 1203-1221, June 1998, doi: 10.1109/5.687835.

REFERENCE BOOKS

1. Woon-SengGan, Sen M. Kuo, Embedded Signal Processing With the Micro Signal Architecture, Wiley-IEEE Press, ISBN-10: 9780471738411, ISBN-13: 978-0471738411
2. Lawrence R. R, Bernard Gold, Theory and Application of Digital signal Processing, Prentice-Hall, ISBN-10: 0139141014, ISBN-13: 978-0139141010.
3. S. Sigtia, E. Benetos and S. Dixon, "An End-to-End Neural Network for Polyphonic Piano Music Transcription," in IEEE/ACM Transactions on Audio, Speech, and Language Processing, vol. 24, no. 5, pp. 927-939, May 2016, doi: 10.1109/TASLP.2016.2533858.
4. Q. Yan, R. Yang and J. Huang, "Detection of Speech Smoothing on Very Short Clips," in IEEE Transactions on Information Forensics and Security, vol. 14, no. 9, pp. 2441-2453, Sept. 2019, doi: 10.1109/TIFS.2019.2900935.
5. Moir, T.J. FIR system identification for correlated noise using the convolution matrix, an investigation. Springer Signal Image and Video Processing (SIViP) 10, 10491054 (2016). https://doi.org/10.1007/s11760-015-0857-2

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Project Work I
	COURSE CODE	EX545
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE :

1: Research Methodology
2: Technical Writing

COURSE OBJECTIVES :

EX545.CEO.1: To Manage the selection and initiation of individual projects.
EX545.CEO.2: To conduct project planning activities that accurately forecast project costs, timelines, and quality.

COURSE OUTCOMES :

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

EX545.CO.1: Identify important concepts / real time problems from the knowledge of current trends /survey.
EX545.CO.2: Develop effective communication and presentation skills.
EX545.CO.3: Describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths.

Description

Project work is divided in to four stages namely Project Stage I, Project Stage II, Project Stage III and Project Stage IV.
Project Stage is entirely related with selection of topic/problem by the students related to thrust areas identified by respective departments. Synopsis submission and Mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- Proposed Algorithm

Final Project Stage I Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Computer Vision
	COURSE CODE	EX661
	COURSE CREDITS	3
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	-	-	60	40	-	-	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX661.CEO.1: To get exposure to image formation and imaging systems.
EX661.CEO.2: To acquire concepts of edge detection and segmentation
EX661.CEO.3: To become familiar with the technical approaches for motion and shape analysis

COURSE OUTCOMES :

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

EX661.CO.1: Understand image formation and camera models.
EX661.CO.2: Describe edge detection principles and segmentation approaches.
EX661.CO.3: Explain methods for motion estimation and shape analysis.

THEORY COURSE CONTENT

Digital Image formation : Computer Vision - Low-level, Mid-level, High-level, Overview of Diverse Computer Vision Applications, Fundamentals of image formation, Monocular and Binocular imaging systems, Orthographic and Perspective projections, Camera model and Camera Calibration, 3D Model, Auto calibration.

Feature Extraction and Segmentation: Image representation, Edge detection principles, Segmentation, Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, Texture Segmentation; Object detection

Motion Estimation and Shape Analysis: Optical flow computation, Stereo Vision, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation , Structure from motion, Shape representation, Shape from Texture, Colour, Motion and Edges.

TEXT BOOKS

1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited 2011, ISBN: 978-1-84882-934-3
2. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, 2003, ISBN: 978-0-13-608592-8

REFERENCE BOOK

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Addison- Wesley, 1992. ISBN: 978-0133356724.
2. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004, ISBN: 978-0521540513.
3. K. Fukunaga; Introduction to Statistical Pattern Recognition, Second Edition, Academic Press, Morgan Kaufmann, 1990, ISBN:978-0122698514

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	ASIC Design
	COURSE CODE	EX662
	COURSE CREDITS	3
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	-	-	60	40	-	-	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX662.CEO.1: To acquire adequate knowledge about partitioning, floor planning, placement and routing including circuit extraction of ASIC.

EX662.CEO.2: To know about different high-performance algorithms and its applications in ASICs.

EX662.CEO.3: To get aware of design tools in IC technology

COURSE OUTCOMES :

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

EX662.CO.1: Explore the fundamentals of CMOS Technology & skills of designing analog and digital ASICs.

EX662.CO.2: Defining the strategies of modernization for carrying out FPGA and ASIC.

EX662.CO.3: Model Application Specific Digital Circuits using VHDL Verilog.

THEORY COURSE CONTENT

ASIC Synthesis & Circuit Extraction : Comparison between ASIC technologies, ASIC Cell libraries, Physical layout, Behavioral model, A cell icon, Wire-load model, Routine Model, Full custom & Semicustom ASIC, Pipeline & latency in CMOS logic, Data depth, Standard cell & gate, Resistance per square of layers, introduction to IP cores, system case studies, Dynamic Wrap processors, VHDL & logic synthesis, Testing techniques in ASIC like ATPG (Automatic test Pattern Generation), Series & Parallel convertors using EDA tools.

System Partitioning, Routings & Tools: Hierarchical layout and design of single chip, 32 bit CPU, Floor Planning & placement, Global routing, Time driven routing objectives, Clock-net widths, power-bus widths in routings PLA Tools, EDIF-CFI design representation, fault simulation, Automatic test pattern generation, Apex & Cyclone FPGAs. Design flow technology - mapping for FPGAs, Programmable ASIC logic cell, Programmable ASIC I/O cell.

TEXT BOOK

1. Michael Smith, Application Specific Integrated Circuits, ISBN- 978-0321602756, Pearson Education Asia, 1^{st}. Edition
2. Douglas J. Smith, HDL Chip Design, Madison, AL, USA: Doone Publications, 1996

REFERENCE BOOK

1. Farzad Nekoogar and Faranak Nekoogar, From ASICs to SOCs: A Practical Approach, Prentice Hall PTR, 2003.
2. F. Nekoogar. Timing Verification of Application-Specific Integrated Circuits (ASICs). Prentice Hall PTR, 1999.
3. P.K.Chan & S. Mourad, Digital Design Using Field Programmable Gate Array, Prentice Hall, 1994.
4. Wayne Wolf, FPGA-Based System Design, Prentice Hall PTR, 2004.

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Internet of Things
	COURSE CODE	EX671
	COURSE CREDITS	3
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	-	-	60	40	-	-	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX671.CEO.1: To understand the fundamentals of Internet of Things
EX671.CEO.2: To Make use of devices, gateways and data management in IoT
EX671.CEO.3: To explain IoT reference model and its architecture
EX671.CEO.4: To identify sensors, actuators for IoT applications
EX671.CEO.5: To explain basic need of security and privacy in IoT

COURSE OUTCOMES :

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

EX671.CO.1: Analyze IoT platform design methodology
EX671.CO.2: Explain IoT reference models and its architecture
EX671.CO.3: Analysis the protocols used in IoT
EX671.CO.4: Distinguish between IoT and M2M communication
EX671.CO.5: Explain the needs of security and privacy in IoT

THEORY COURSE CONTENT	
UNIT 1	**Introduction to Internet of Things**
Introduction: Definition and Characteristics of IoT, History and Evolution of IoT, Physical and logical Design of IoT, Introduction to IoT Platform, Design methodology, Domain specific applications of IoT's	
UNIT 2	**IoT Architecture**
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 3	**Communication Protocols**
IEEE 802.11, IEEE 802.15, Wireless HART, Z Wave, BLE, Zigbee Smart Energy, HTTP, CoAP , AMQP, MQTT, NFC, LoRa	
UNIT 4	**IoT and M2M Communications**
Introduction to M2M, Difference between IoT and M2M , Software Defined Networks, Network Function Virtualization, difference between SDN and NFV for IoT	
UNIT 5	**Security, Privacy and Governance in IoT**
Elements of Internet of Things security, Privacy In IoT Networks: Secure Data Aggregation, Privacy In Beacons, Overview on Governance in IoT	

TEXT BOOK

1. Arshdeep Bahga and Vijay Madisetti, "Internet of Things: A Hands-on Approach", 1^{st} edition 2015, University Press, ISBN: 978-81-7371- 954-7
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand and David Boyle, "From Machine-to-Machine to the Internet of Things", Academic Press, 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 and Hakim Cassimally, "Designing the Internet of Things", Wiley, 2014, ISBN 978-1-118-43062-0
3. Parikshit N. Mahalle and Poonam N. Railkar, "Identity Management for Internet of Things", River Publishers, ISBN: 978-87-93102-90-3
4. Rajkumar Buyya and Amir Vahid Dastjerdi, "Internet of Things Principles and Paradigms", Elsevier, 2016, ISBN: 978-0-12-805395-9
5. H. S. Kalsi, "Electronic Instrumentation", 3^{rd} edition 2010, Mcgraw Higher Ed, ISBN: 9780070702066
6. Ramon Pallas-Areny and John G. Webster, "Sensors and Signal Conditioning", 2^{nd} edition 2012, Wiley, ISBN: 9780470054574
7. Karen Rose, Scott Eldridge and Lyman Chapin, "The Internet of Things: An Overview", Internet Society, 2015

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Hybrid and Electric Vehicle
	COURSE CODE	EX672
	COURSE CREDITS	3
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	-	-	60	40	-	-	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX672.CEO.1: To get familiar with hybrid and electric vehicle
EX672.CEO.2: To study the propulsion system for hybrid and electric vehicle
EX672.CEO.3: To acquire the energy storage requirement in HEV and EV.

COURSE OUTCOMES :

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

EX672.CO.1: Illustrate the architecture and dynamics of hybrid and electric vehicle.
EX672.CO.2: Interpret the working of motors and drives as a propulsion system.
EX672.CO.3: Analyze the energy storage and charging infrastructure for hybrid and electric vehicle.

THEORY COURSE CONTENT

Introduction to Electric Vehicles-History Advantages-Architectures of HEVs, State of the Art of HEVs, Challenges and Key Technologies Vehicle Mechanics-Electric Propulsion- EV consideration- DC motor drives and speed control, Induction motor drives, Permanent Magnet Motor Drives, Switch Reluctance Motor Drive for Electric Vehicles, Configuration and control of Drives- Power Electronics in HEVs - Energy Storage-Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles- Charging Infrastructure-Case study.

TEXT BOOKS

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric,Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design,CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

REFERENCE BOOKS

1. Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles Principles and Applications with Practical Perspectives, 2011, Wiley publication.
2. Dharmeja Sandeep,(2000) Electric vehicle battery systems Newnes.
3. Pillai S.K., A first course on Electrical drives,New age International (P) Ltd.
4. M. H. Rashid, Power Electronics Devices, Circuits and Applications, 3rd ed., Pearson, 2004
5. C. C. Chan and K. T. Chau, Modern Electric Vehicle Technology, Oxford Science Publication, 2001

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Project Work II
	COURSE CODE	EX651
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	8	-	-	-	50	50	100

PRE-REQUISITE : NIL

COURSE CONTENT

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- Block Diagram
- Proposed Algorithm
- Expected Outcome and Result

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Project Work III
	COURSE CODE	EX652
	COURSE CREDITS	10
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	20	-	-	-	150	50	200

PRE-REQUISITE : NIL

COURSE CONTENT

- Literature survey
- Motivation and problem statement
- Goals and objectives
- Problem statement
- Block diagram
- Proposed algorithm
- Expected outcome and result
- Publication details of review paper on literature survey

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Project Work IV
	COURSE CODE	EX653
	COURSE CREDITS	10
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	20	-	-	-	200	100	300

PRE-REQUISITE : NIL

COURSE CONTENT

- Literature survey
- Motivation and problem statement
- Goals and objectives
- Problem statement
- Block diagram
- Proposed algorithm
- Methodology
- Implementation
- Results
- Result analysis
- Publication details of review paper on literature survey
- Publication details of paper on result analysis

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (MECHANICAL ENGINEERING)
2022-24 PATTERN (Revision 2022) W.E.F 2022-23

The Master of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION: SEMESTER WISE						
S.N.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER**				**TOTAL**
		1	**2**	**3**	**4**	
1.	Program Core (PC)	3	1			**04**
2.	Discipline Core (DC)	2	3			**05**
3.	Department Elective (DE)				2	**02**
4.	Skill Development and Project (SDP)		1	1	1	**03**
TOTAL		**5**	**5**	**1**	**3**	**14**

CREDIT DISTRIBUTION: SEMESTER WISE							
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit							
S.N.	**TYPE OF COURSE**	**NO. OF CREDITS/TRIMESTER**				**TOTAL**	**%**
		1	**2**	**3**	**4**		
1.	Program Core (PC)	10	2			**12**	**18.75**
2.	Discipline Core (DC)	8	12			**20**	**31.25**
3.	Department Elective (DE)		0	6		**06**	**9.37**
4.	Skill Development and Project (SDP)		2	8	16	**26**	**40.62**
TOTAL		**18**	**16**	**14**	**16**	**64**	**100**

	CREDITS			
	1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit			
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	18	16	**34**
2.	Second Year	14	16	**30**
TOTAL				**64**

	CONTACT HOURS			
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	20	21	41
2.	Second Year	21	32	53
TOTAL				**94**

ABBREVATIONS		
1.	ECE	End Course Exam
2.	IA	Internal Assessment
3.	DM	Demonstration
4.	CA	Continuous Assessment
5.	L	Lecture
6.	P	Practical
7.	T	Tutorial
8.	Lab	Laboratory

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2022)		
SCHOOL OF MECHANICAL ENGINEERING	W.E.F	:	2022-2023
FIRST YEAR MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING	RELEASE DATE	:	01/12/2022
	REVISION NO.	:	3.0

SEMESTER-I

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT
TYPE	CODE	NAME	Hours/Week			THEORY		PRACT		TOTAL	
			L	P	T	ECE	IA	T/P	DM		
PC1	AS502	Computing and Mathematics	2	-	2	60	40	50	-	150	4
PC2	CS531	Management System	2	-	2	60	40	50	-	150	4
PC3	EX531	Research Methodology	2	-	-	50	25	-	-	75	2
DC1	ME532	Modern Technologies	3	2	-	60	40	50	-	150	4
DC2	ME541	Advanced Thermodynamics and Combustion Technology	3	2	-	60	40	-	50	150	4
TOTAL			12	4	**4**	**290**	**185**	**150**	**50**	**675**	**18**

SEMESTER-II

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT
TYPE	CODE	NAME	Hours/Week			THEORY		PRACT		TOTAL	
			L	P	T	ECE	IA	T/P	DM		
PC4	EX533	Technical Writing	2	-	-	-	25	-	50	75	2
DC3	ME542	Advanced Heat Transfer	3	2	-	60	40	-	50	150	4
DC4	ME543	Advanced Fluid Mechanics	3	2	-	60	40	-	50	150	4
DC5	ME544	Design of Heat Transfer equipment's	3	2	-	60	40	-	50	150	4
SDP1	ME545	Project Work – I	-	4	-			50	25	75	2
TOTAL			11	10	**-**	**180**	**145**	**50**	**225**	**600**	**16**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W. E. F.**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECH/COMP/ETX ENGG	**COURSE NAME**	Computing and Higher Mathematics
	COURSE CODE	AS 502
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	TUTORIAL	MCE	ECE	IA			
2	2	NIL	60	40	50	NIL	150

PRE-REQUISITE:NIL

COURSE OBJECTIVES:

AS501.CEO.1: To learn different numerical methods to solve differential equations and obtain the solution.

AS501.CEO.2: To understand different sampling techniques, analyze the data and process it to obtain a quality product.

AS501.CEO.3: To learn mathematical methodologies, techniques and mathematical tools to obtain an optimal solution of the problems theoretically and also by ANOVA.

COURSE OUTCOMES:

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

AS501.CO.1: Identify the accurate solution method (minimizing the error) to solve the differential equation with given conditions and obtains the particular solution of the problem.

AS501.CO.2: Collect, categorize, analyze, processing mathematically the data, thereby to obtain a quality proven product.

AS501.CO.3: Understand the physical situation, identify the accurate mathematical model and solve the problem mathematically or with the use of Statistical tools available and finally interpret it in the original context.

CONTENTS:

Computational Methods for Ordinary Differential Equations: Euler's Method, Heun's Method, Mid-point Method, Runge-Kutta Method and Multi step Methods-Explicit Adams-Bash forth technique and Implicit Adams-Moulton techniques, Adaptive RK Method, Embedded RK Method, Higher Order Ordinary differential equation- Shooting Method.

Operations Research: Simplex method: Feasible solution to system of equations, reduction of feasible to basic feasible solution, solution of LPP: computational procedure, Penalty (Big M) method. Transportation problem: North-West corner method, Least-cost method, Vogel's approximation method, Assignment Models: Hungerian Method.

Statistics and ANOVA: Central Tendency of data, Variance, Standard Deviation, Coefficient of Variance, Moments, Correlation, Coefficient of Correlation, Least Squares, Linear Regression, Inference in Linear Regression, Multiple Linear Regression, ANOVA for Regression

TUTORIAL NO.1		**2 HOURS**
Introduction to first order first degree Differential equation and its actual solution.		
TUTORIAL NO.02		**2 HOURS**
Euler's Method, Heun's Method, Mid- point Method, Runge-Kutta Method.		
TUTORIAL NO.03		**2 HOURS**
Adams-Bash forth technique and Implicit Adams-Moulton techniques.		
TUTORIAL NO.04		**2 HOURS**
Adaptive RK Method, Embedded RK Method, Shooting Method.		
TUTORIAL NO.05		**2 HOURS**
Solution of system of equations using simplex method (Feasible soln).		
TUTORIAL NO.06		**2 HOURS**
Solution of system of equations using simplex method (Feasible to basic feasible soln).		
TUTORIAL NO.07		**2 HOURS**
Transportation problem: North-West corner method, Least-cost method.		
TUTORIAL NO.08		**2 HOURS**
Transportation problem: Vogel's approximation, Assignment problem: Hungerian method.		

TUTORIAL NO.09		**2 HOURS**
Central Tendency of data, Variance, Standard Deviation.		
TUTORIAL NO.10		**2 HOURS**
Moments, Correlation, Coefficient of Correlation.		
TUTORIAL NO.11		**2 HOURS**
Regression lines.		
TUTORIAL NO.12		**2 HOURS**
ANOVA for Regression.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Peter W. Vik, Regression, ANOVA, and the General Linear Model: A Statistics Primer, First Edition, ISBN-13: 978-1412997355.

REFERENCE BOOK

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

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECH/COMP/ETX ENGG	**COURSE NAME**	Management Systems
	COURSE CODE	CS531
	COURSE CREDITS	04
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	TUTORIAL	MCE	ECE	IA			
2	2	NIL	60	40	50	NIL	150

PRE-REQUISITE:NIL

COURSE OBJECTIVES:

CS531.CEO.1: To expose the students to fundamental concepts of management and its processes in organizations.

CS531.CEO.2: To create scientific attitude towards solving a management problem and impart knowledge about tools available for carrying out research.

CS531.CEO.3: To inculcate a spirit of entrepreneurship by promoting inquisitiveness for technological innovations, their conversion into business ideas and evolving strategy for induction of new products in new markets for growth of their entrepreneurial projects.

CS531.CEO.4: To effectively use the latest technology to support ever growing business.

COURSE OUTCOMES:

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

CS531.CO.1: Describe and explain the Significance of Businesses in Society, their Management and linking these up with other relevant systems.

CS531.CO.2: Critically analyze the organizational structure, systems, competencies and identify the areas of improvement.

CS531.CO.3: The ability and confidence to tackle common environmental and financial problems of business.

CS531.CO.4: Build an awareness of ethical and social responsibilities to multi-cultural, team-oriented, rapidly changing environments.

CONTENTS:

Basics of Management: Nature and scope of management; Evolution of Management thought; -Scientific, Behavioral, Systems and Contingency Approaches, Social responsibility of an organization. Analysis for Managerial Decision Making, Corporate Image Building.

Organizational Behavior: Concepts of OB, Designing and Delegation of Authority, Decision Making Process, Management of Creativity and Relationships, Human Resource Management, Skillful use of Emotional Intelligence in conflict management. Techniques for Self-Management and Stress Management for improving personal efficiency.

Economics and Financial Management: Demand and Business Forecasting, Economics of Information and Network Industries, Entrepreneurship and New Ventures, Finance function – Scope and Significance, Capital Budgeting- Nature and Significance.

Project Management: Essentials of Project Management with use of Critical Path Method (CPM) and Programme Evaluation and Review Techniques (PERT), Functioning and growth of a Business Unit with understanding of Break-Even Analysis.

Information System: Business and Data Communications Networks, Technology Management with the help of Cyber Security, Data Mining, Enterprise Resource Planning, Industry 4.0 concepts, Business startups and growth in current Indian Environment.

TUTORIAL NO.1	**Corporate management case presentation**	**4 HOURS**
A corporate management case to be selected by students on their own choice, writing a Synopsis (2.5 Marks) and its Presentation before the class in 5 Minutes including answers to questions by class (2.5 Marks)		
TUTORIAL NO.02	**Entrepreneurial Business Plan presentation**	**6 HOURS**
Preparation and submission of an innovative and entrepreneurial Business Plan of student's own choice, submitting a Power Point Presentation to be evaluated by Faculty (2.5 Marks), and its presenting/ defending it before the class, to be evaluated by two peers on a Format to be given by Faculty (2.5 Marks).		
TUTORIAL NO.03	**Industry 4.0**	**6 HOURS**
Understand the concept of Industry 4.0 and prepare a report using any of the technology to prove that use of this technology will improve the performance of the organization.		

TEXT BOOK

1. Harold Koontz, Heinz Weihrich and Mark V Cannice, Management – A Global and Entrepreneurial Perspective, Tata McGraw Hill Publications, 12th Edition, 2008.
2. Vachaspati Mishra, Management and Entrepreneurship in Indian Environment – A Perspective through Joining the Dots, Himalaya Publishing House, First Edition, 2016

REFERENCE BOOK

1. Dr A Sivathanu Pillai; Technology Leadership – A Revolution in the Making; Tata McGraw Hill Publishing Company Ltd, New Delhi, 2005
2. James A Alexander and Mark W Hordes; S-Business: Reinventing the Services Organisations, Select Books Inc Biztantra, 2006
3. Vohra ND, Quantitative Techniques in Management; Tata McGraw Hill Publishing Company Limited, Third Edition 2007
4. Nakkiran S and Karthikeyan M; Training Techniques for Management Development; Deep and Deep Publications Pvt Ltd; 2007

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF MECHANICAL ENGINEERING	**W.E. F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Modern Technology
	COURSE CODE	ME532
	COURSE CREDITS	04
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME		**E VALUATION SCHEME**				
		THEORY			PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ECE	IA	PRACTICAL		
3	2	60	40	50	–	150

PRE-REQUISITE:

1: Nil

COURSE OBJECTIVES:

ME532.CEO.1: To understand the various modes of transport phenomena and HVAC.
ME532.CEO.2: To acquire the knowledge of mathematical modeling and data interpretation techniques.
ME532.CEO.3: To study the basic principles of modern/advanced technologies.
ME532.CEO.4: To understand different statistical tools and analysis software.

COURSE OUTCOMES:

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

ME532.CO.1: Understand the knowledge of advanced technologies related to Transport phenomenaand HVAC.
ME532.CO.2: Apply data interpretation techniques to different mechanical engineering based problems.ME532.CO.3: Study different advance technologies used in automobile industry.
ME532.CO.4: Simulate (2-D geometry) model for different heat transfer equipment's.

CONTENTS:

Full Stack Development: Overview of Java Basics, basics of backend technologies - Servlet, JSP and Hibernate, SQL, UI Skills - Spring basics and framework ,Spring Boot, RESTful web service, basics of frontend stack technologies – JavaScript ,Angular using MongoDB.

DevOps: DevOps overview, Relationship between DevOps and Agile, DevOps Toolchain, Challenges with traditional approach, Overview of DevOps tools, Best practice for DevOps, version control – overview of GitHub, Continuous integration continuous deployment – Jenkins overview, Configuration Management Tool – Puppet and Chef overview, Containerization with Docker – Docker Overview, software and Automation testing framework – JUnit and Cucumber overview.

AWS Cloud: Cloud concepts overview, Global Infrastructure overview- Region, Zone, edge location, Overview of AWS cloud services – Compute - EC2, AWS Lambda, Storage – S3, EBS, S3 Glacier, Databases –RDS, DynamoDB, Security – I AM, Networking and content delivery –AWS VPC, auto scaling and monitoring cloud architecture - Cloud Watch, Cloud economics and Billing –AWS Cost Explorer.

PRACTICAL

PRACTICAL No. 01	**Web application front end development**	**4 HOURS**
Designing of web application using front end technologies.		
PRACTICAL NO.02	**Web application back end development**	**2 HOURS**
Designing of web application using back end technologies.		
PRACTICAL NO.03	**Git and GiHub**	**2 HOURS**
Getting started with Git and GitHub – repository, types of Git workflow, fork, Git pages and Clone		

PRACTICAL NO.04	**Jenkins**	**2 HOURS**
Installing Jenkins, configure, setup Jenkins job.		
PRACTICAL NO.05	**Docker**	**2 HOURS**
Installing Docker, operations – deploy, login exit, start, stop container.		
PRACTICAL NO.06	**AWS Cloud Services – Compute, Storage**	**2 HOURS**
Configuring AWS cloud services – Compute EC2, Storage –S3.		
PRACTICAL No. 07	**AWS Cloud Services – Security, Databases**	**2 HOURS**
Configuring IAM policies and RDS system		
PRACTICAL No. 08	**Deployment of application on cloud platform**	**2 HOURS**
Deployment of web application on cloud – free tier.		

TEXT BOOKS

1. Chris Northwood, "The Full Stack Developer – Your Essential Guide to the everyday Skills Expected of a Modern Full Stack Web Developer", Apress Publications, 1st Edition 2018, ISBN – 1484241517.
2. Micro Hering, "DevOps for the Modern Enterprise – Winning Practices to Transform Legacy IT Organizations", 1st Edition, IT Revolution Publications, 2018, ISBN 1942788193.
3. Joe Baron, Hisham Baz, "AWS Certified Solution Architect official study guide", 1st edition, Sybex publisher, ISBN – 13: 978-1119138556.

REFERENCE BOOKS

1. Azat Mardon, "Full Stack Java Script – Learn Node.js and MongoDB", APress Publication, 1st Edition, ISBN -1484217500.
2. Deepu Sasidharan, "Full Stack Development – Build Full Stack applications and micro service with Spring Boot and Modern JavaScript Frameworks", 2nd Edition, Packt – Publishing, ISBN – 1838824987.
3. Peter Bell, "Introducing Github – A Non – Technical Guide", 1st Edition, Oreilly Publications, ISBN – 1491949740.
4. Jeff Nickoloff, Stephen Kuenzli, "Docker in Action", 2nd Edition, Manning Publications, 2019, ISBN 9781617294761.
5. John Ferguson Smart, "Jenkins the Definitive Guide", 2nd Edition, Oreilly Publications, ISBN - 9781449305352.
6. AWS official documentation - https://docs.aws.amazon.com/

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF MECHANICAL ENGINEERING	**W.E. F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Research Methodology
	COURSE CODE	EX531
	COURSE CREDITS	02
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME		**E VALUATION SCHEME**				
		THEORY			PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ECE	IA	PRACTICAL		
2	-	50	25	–	–	75

PRE-REQUISITE:

1: Nil

COURSE OBJECTIVES:

EX531.CEO.1: To understand the basic framework of research process.
EX531.CEO.2: To identify various sources of information of survey and data collection.
EX531.CEO.3: To Illustrate the use of documentation and evaluate its quality.

COURSE OUTCOMES:

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

EX531.CO1: Classify different types of Research , objective and paradigm of research process.
EX531.CO2: Explore the basics of research framework and Hypothesis.
EX531.CO3: Describe about different data collection methods.
EX531.CO4: Explain the different stages of preparing scholarly writing proposals.

PRACTICAL List		
Practical No.01	**Web application front end development**	**4 HOURS**
Designing and development of web application using front end technologies.		
Practical No.02	**Web application back end development**	**2 HOURS**
Designing of web application using back end technologies.		
Getting started with Git and GitHub – repository, types of Git workflow, fork, Git pages and Clone		
Configuring AWS cloud services – Compute EC2, Storage –S3		

CONTENTS:

Introduction: What is research, Research definition, Objective paradigm for the research, Identifying defining the research problem, Literature it's analysis, Qualitative quantitative research, development of theoretical and conceptual frame work.

Hypothesis and Data Processing: Ethical Issues concerning research participants, Ethical issues in data collection, , Definition and functions of hypothesis, Processing operations, Problems in processing, Coding descriptive and quantitative data, Sampling techniques.

Statistics in research: Data collection methods – use , types , examples , Multivariate analysis, Concept of regression, Establishing validity and reliability.

Writing Research Proposal: Interpretation and its meaning, Readability of Manuscript, techniques, Contents, Report writing, structure, types of report, Procedure of writing research proposal, Writing as thinking, Habit of writing, Skills and thought process in technical writing, Role of computer in technical writing.

TEXT BOOKS

1. John W. Creswell," Research Design-Qualitative Quantitative Approaches", SAGE publications, New Delhi ISBN: 0-8039-5254-6
2. Ranjit Kumar," Research Methodology- A Step by Step Guide for Beginners", 2nd ed., Pearson publication, New Delhi ISBN: 978-81-317-0496-7
3. Bernard M. Moret," The Theory of Computation", Pearson Publication ISBN: 978-81-317-0870-5

REFERENCE BOOKS

1. C. R. Kothari," Research Methodology, Methods Techniques", 2nd Edition, New Age International Publication ISBN:978-81-224-1522-3
2. Hamdy A. Taha, "Operation Research- An Introduction", 8th Edition, Pearson Publication , ISBN: 9780132729154

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020 – 2024)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	AY:2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	COURSE NAME	Advanced Thermodynamics and Combustion Tech
	COURSE CODE	ME541
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	REVISION NO	3.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	2	NIL	60	40	NIL	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME541.CEO.1: To understand the thermodynamic process and the methods for analyzing thermodynamic properties.

ME541.CEO.2: To determine the direction of the process by the analysis of exergy, entropy, free energy, etc.

ME541.CEO.3: To master the property equations and thermodynamic properties of real gases, masterthe methods for analyzing multi-component systems.

ME541.CEO.4: To acquire basic knowledge of chemical thermodynamics, and grasp the thermodynamic processes and properties of special systems.

COURSE OUTCOMES :

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

ME541.CO.1: Perform thermodynamic analysis of realistic problems using computer software.ME541.CO.2: Apply the first and second laws to combustion processes.

ME541.CO.3: Extend the Knowledge with property equations and thermodynamic properties of real gases.

ME541.CO.4: Evaluate thermodynamic properties and basic concepts of phase equilibrium of multi component systems.

ME541.CO.5: Apply basics of chemical thermodynamic to thermodynamics processes and spacial systems.

THEORY COURSE CONTENT		
UNIT 1	**Equation of State and Laws Of Thermodynamics**	**8 HOURS**
State postulate for Simple System and equation of state, Ideal gas equation, Deviation from ideal gas, Equation of state for real gases, generalized Compressibility chart, Law of corresponding states 2nd law Analysis for Engg. Systems, Entropy flow & entropy generation, Increase of entropy principle, entropy change of pure sub, T-ds relations, entropy generation, thermoelectricity.		
UNIT 2	**Availability Analysis and Properties of Pure Substance**	**8 HOURS**
Reversible work - availability - irreversibility and second – law efficiency for a closed system and steady – state control volume. Availability analysis of simple cycles. Thermodynamic potentials. P-V-T susfaces, phase diagram, phase changes, various properties diagram, 1st order phase transition and 2ndorder phase transition, Clapeyron's equation, Ehrenfest's equations, Maxwell's equations, equation for internal energy, enthalpy, entropy, specific heat and joule Thompson coefficient.		
UNIT 3	**Real Gas Behavior and Multi – Component Systems**	**6 HOURS**
Different equations of state – fugacity – compressibility - principle of corresponding States - Use of generalized charts for enthalpy and entropy departure - fugacity coefficient, Lee – Kesler generalized three parameter tables. Fundamental property relations for systems of variable composition. Partial molar properties. Real gas mixtures - Ideal solution of real gases and liquid - activity - equilibrium in multi-phase systems - Gibbs phase rule for non – reactive components.		
UNIT 4	**Chemical Thermodynamics**	**6 HOURS**
Gibb's theorem, Gibbs function of mixture of inert ideal gases, Chemical equilibrium, Thermodynamic equation for phase, Degree of reaction, equation of reaction, law of mass action, heat of reaction and Vant Hoff Isober, Phase Equilibrium for a Single-Component System and Multi-Component System		
UNIT 5	**Statistical Thermodynamics**	**6 HOURS**
Microstates and Macrostates - thermodynamic probability - degeneracy of energy levels - Maxwell – Boltzman, Fermi – Diarc and Bose – Einstein statistics - microscopic interpretation of heat andwork, evaluation of entropy, partion function, calculation of the Macroscopic properties from partition functions.		
UNIT 6	**Irreversible Thermodynamics and Entropy Generation Minimization**	**6 HOURS**
Conjugate fluxes and forces - entropy production Onsager's reciprocity relations - thermo – electric phenomena, formulations.heat transfer, trade-off between competing irreversibilites, principle of thermodynamic isolation, structure of heat exchanger irreversibility, energy storage systems, sensible and latent heat storage.		

PRACTICAL NO:		
PRACTICAL NO.01	**Steady flow cyclic system**	**4 HOURS**
Computer aided energy analysis of steady flow cyclic system.		
PRACTICAL NO.02	**Mixture of gases, gas and vapour**	**4 HOURS**
of mixture of gases, gas and vapour, estimation of properties and preparation of charts.		
PRACTICAL NO.03	**Statistical thermodynamic techniques**	**4 HOURS**
Analysis of ideal gas system using statistical thermodynamic techniques.		
PRACTICAL NO.04	**Behavior of pure substance**	**8 HOURS**
Study of behavior of pure substance with change in pressure and temperature.		
PRACTICAL NO.05	**Adiabatic flame temperature**	**8 HOURS**
Preparation of computer program to study the effect of percentage of theoretical on adiabatic flame temperature and equilibrium composition for a hydrocarbon fuel. (Program to be run for variable input data.)		

TEXT BOOK

1. Adrian Bejan, "Advanced Engineering Thermodynamics", John Wiley and Cons, 3rd Edition,2006, (ISBN: 978-0-471-67763-5)
2. J.P. Holman, "Thermodynamics", McGraw – Hill Inc., 1988. Fourth Edition, (ISBN: 9780070296084) 3.
3. Yunus A. Cengel , Micha el A. Boles, " Thermodynamics- An Engineering approach", McGraw-Hill Education , 8th International edition, (ISBN13 9789814595292)

REFERENCE BOOK

1. Kenneth Wark Jt.m, "Advanced Thermodynamics for Engineers", McGrew – Hill Inc., 1995,(ISBN : 9780071135504)
2. Smith J.M. and Van Ness H.C.,"Introduction to Chemical Engineering Thermodynamics", McGraw – Hill Inc., Fourth. Edition, 1987. (ISBN : 0070587019)
3. Sonntag R.E., and Van Wylen G, "Introduction to Thermodynamics, Classical and Statistical Thermodynamics", John Wiley and Sons, Third Edition, 1991, (ISBN :978-0471614272)
4. Sears F.W. and Salin ger G.I., "Thermodynamics, Kinetic Theory and Statistical Thermodynamics", Narosa Publishing House, New Delhi, Third Edition 1993, (ISBN : 978-81-85015-71-2)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Advanced Heat Transfer
	COURSE CODE	ME542
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	2	NIL	60	40	NIL	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME542.CEO.1: To identify different mode of heat and mass transfer occurring in thermal system.
ME542.CEO.2: To examine the methods of analyzing free and forced convection.
ME542.CEO.3: To analyze steady and transient conduction problem.

COURSE OUTCOMES :

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

ME542.CO.1: Apply principles of heat transfer by conduction also to develop mathematical models for uniform and non uniform fins.
ME542.CO.2: Employ mathematical functions and heat conduction charts in tackling transient heat conduction problems.
ME542.CO.3: Interpret the phenomenon of Natural Convection and Forced Convections of heat transfer.
ME542.CO.4: Apply analytical/logical skill while Modeling various Heat transfer phenomenon in boiling and condensation.
ME542.CO.5: Apply the concept of radiation heat transfer for enclosure analysis.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Modes and Conduction**	**6 HOURS**
Modes of Heat Transfer, Steady and Transient Heat Transfer, Conduction, Thermal Conductivity, Thermal diffusivity, Various Boundary and Initial Conditions, General Heat Conduction Equation in Cartesian, cylindrical and spherical co-ordinate, Thermal Resistance, Critical Thickness of Insulation. Different types of fins and their analysis.		
UNIT 2	**Transient Heat Conduction**	**6 HOURS**
Lumped capacitance and its validity, General lumped capacitance analysis, spatial effects. Problems related with conventional geometries. Use of Haisler and Grober charts, Biot and Fourier numbers. Heat Conduction with moving boundary- heat conduction in melting and solidification, Moving Heat Source.		
UNIT 3	**Forced Convection External Forced Convection**	**6 HOURS**
Concept of velocity and thermal boundary layers: Laminar and Turbulent flow, Parallel flow over Flat plates, Flow across cylinders and spheres, Flow across tube banks- Inline and staggered arrangement. Internal Forced Convection Entrance region, Laminar and Turbulent flow in tubes. Introduction to compact heat exchangers.		
UNIT 4	**Natural Convection Physical Mechanism**	**6 HOURS**
Equation of motion and Grashoff's Number, Natural Convection over surfaces, Natural convection from finned surfaces and PCBs, Natural Convection inside enclosures (Rectangular, Cylinder and Sphere), Combined Natural Convection and Radiation, Combined Natural and Forced Convection		
UNIT 5	**Boiling and Condensation**	**6 HOURS**
Boiling: Boiling modes, the boiling curve, modes of pool boiling, correlations. Forced convectionboiling. Two phase flow. Condensation: Physical mechanisms, laminar film condensation on a vertical plate. Turbulent film condensation, film condensation on radial systems, film condensation in horizontaltubes, on banks of tubes, Drop-wise condensation correlations.		
UNIT 6	**Thermal Radiation**	**6 HOURS**
Thermal Radiation: Thermal radiation, Blackbody radiation, Radiation intensity, Radiation properties, Atmospheric and Solar radiation, Shape factor, Radiation heat transfer in two surface enclosures, Radiation shields, Radiation exchange between Emitting and Absorbing gases.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Transient Heat Conduction using Heisler and Grober charts.		
PRACTICAL NO.02		**4 HOURS**
Numerical method in heat conduction & convection.		
PRACTICAL NO.03		**4 HOURS**
Combined Natural and Forced Convection heat transfer.		
PRACTICAL NO.04		**4 HOURS**
Boiling and Condensation.		
PRACTICAL NO.05		**4 HOURS**
Radiation Heat Transfer in Two Surface Enclosures.		

TEXT BOOK

1. John H Lienhard, "A Heat Transfer Textbook: Fourth Edition", Dover Publications, (ISBN-13 :978-0-486-47931-6)
2. S.P. Sukhatme, "Heat Transfer" Fourth Edition, Universities press, (ISBN: 81 7371 544 0)
3. Y V C Rao, "Heat Transfer" First Edition, Universities press, (ISBN: 81 7371 384 7)
4. Suhas V. Patankar, "Numerical Heat Transfer and Fluid Flow", (ISBN: 0-89116-522-

REFERENCE BOOK

1. Bergman, Theodore L.; Lavine, Adrienne S.; Incropera, Frank P.; DeWitt, David P., "Fundamen-tals of Heat and Mass Transfer, Fundamentals of Heat and Mass Transfer", New York,1985,Wiley Publication, 2011,(ISBN 0470501979)
2. Frank Kreith:, "Principles of Heat Transfer", Harper and Row Publishers, New York, Fourth edition,1986, (ISBN 0060437855)
3. Donald Q. Kern, "Process Heat Transfer", Tata McGraw Hill Publishing Company Ltd., New Delhi. 1950, (ISBN 9780074632178)
4. Oszisik, "Heat Transfer", McGraw Hill,1985, (ISBN 9780070664609)
5. Yunus A. Cengel, "Heat Transfer A Practical Approach", McGraw Hill International Edition, 2007, (ISBN 0073129305)
6. J P Holman, "Heat Transfer",McGraw-Hill Companies;1996, 8th edition, (ISBN 0078447852)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020–2024)	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Technical Writting
	COURSE CODE	EX533
	COURSE CREDITS	02
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME		**EVALUATION SCHEME**				
		THEORY			PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ECE	IA	PRACTICAL		
2	-	–	25	–	50	75

PRE-REQUISITE:

1: Research Methodology

COURSE OBJECTIVES:

EX533.CEO.1: To share the skills and finer aspects of scientific and technical writing with the research students of the Institute order to prepare technical documents clearly, concisely, consistently, and effectively, following internationally accepted standards.

EX533.CEO.2: Students will be made to evaluate the correct error-free writing by being well versed in rules of English grammar and cultivate relevant technical style of communication presentation at their work place and also for academic uses.

EX533.CEO.3: To provide overview of technical English for research paper writing with a special focus on research methods typical for classroom based studies of pedagogical innovations.

COURSE OUTCOMES:

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

EX533.CO1: Creates substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as comprehension, reading, writing and speaking etc.

EX533.CO2: Find information about scientific and technical publications using two premier analytics information resources: the Web of Science platform and Derwent Innovation Index for the patent information discovery.

EX533.CO3: Identify plagiarism and explain how to prevent it.

EX533.CO4: Read and analyze several articles to form your own opinion on a topic - make connections between several articles.

EX533.CO5: Write a 7- 8-page research paper / review paper by using source material correctly with MLA format.

CONTENTS:

Introduction: Introduction to Technical Communication: Reading Skill, Basics of English Grammar, Introduction to Effective Writing: Effective writing as an art, principles of effective writing, types and stages of effective writing, notions of correctness and appropriateness, essentials of academic writing Technical Instructions: Purpose, Content Structure: Understanding the Audience, Creative Writing: Use of tools, Guidelines for Technical Writing, Microsoft Word, Text Editor for Drafting Content, The Role of Visuals in Technical Instructions, the features of Authorizing Tool, Adobe Frame maker, Desktop Publishing and Help Publishing Tool, Snag IT, Image Capturing Tool MS-Visio Image Drawing Tool.

Role of Ethics in Technical Instructions: Role of Ethics in Technical Instructions Understanding the subject: formulating ideas for the paper, developing a thesis statement Preparing the anatomy of the paper: Literature review, research methodology, Writing the results, analysis of the results, discussion and conclusion, apply correct citation, formatting, write the first draft, revise, edit and proofread, Use of tools for research paper help: Grammar checkers, plagiarism checkers, citation generators. Selecting a journal / conference: Targeting a high impact factor journal in Elsevier, IEEE, Springer, Wiley etc., Introduction to the Web of Science, Science Citation Index (SCI)/SCI Expanded (SCIE) and Scopus, preparing the manuscript according to the chosen journal's requirements, submission ethics, and use of peer review comments in a constructive way, submission, revision and galley proof. Proposal writing, the Web of Science platform and Derwent Innovation Index for the patent information discovery, Patent Searching, Drafting and Filing.

Internal Assessment Activities		
Activity No.01	**Preparing the document on**	**6 HOURS**
a) A representativ e official correspondence. b) Work progress report c) Technical broch ures and newsletters d) Instruction Ma nual e) Demo patent w riting		
Activity No.02	**Technical discussions**	**2 HOURS**
Graded technical discussions will be planned online and in class		
Activity No.03	**Quiz**	**2 HOURS**
Quiz on every maj or component of the course.		
Activity No. 04	**Writing gist**	**2 HOURS**
Writing gist from a set of related papers		
Activity No.05	**Writing the technical blogs**	**2 HOURS**
Writing the technical blogs		

Demonstration/Presentation
Presentation /Demonstration Students will have to submit and present : **.**
Project proposal to be submitted to the funding agencies of repute (Peer review) Review paper / Research paper or research letter.

TEXT BOOKS

1. Kenneth G. Budinski, Writing Engineers' Guide to Technical, ASM internationals, ISBN: 978-087170-693-5
2. Gerald. J. Alred, Charles. T.Brusaw, and Walter. E. Oliu, Handbook of Technical Writing, St. Martin's Press, New York, Ninth Ed., ISBN 1250004411, 2008
3. Hofmann, A. Angelika, Scientific Writing and Communication, Oxford University Press, Oxford., ISBN 0199947562 2014

REFERENCE BOOKS

1. Meenakshi Raman and Sangeeta Sharma, Technical Communication – Principles and Practices Oxford Univ. Press, 2016
2. Websites: https://swayam.gov.in/nd1$_{n}$*oc*19$_{h}$*s*31*/Dated* : 22*ndMay*2020

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	AY:2022-2023 (Rev 2022)
FIRST YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Advanced Fluid Mechanics
	COURSE CODE	ME543
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	2	NIL	60	40	NIL	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME543.CEO.1: To remember the fundamentals of fluid mechanics.
ME543.CEO.2: To apply the Navier Stokes equation for fluid flow systems.
ME543.CEO.3: To apply knowledge of boundary layer theory for several airfoils.
ME543.CEO.4: To analyze turbulent flow and compressible flow.

COURSE OUTCOMES :

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

ME543.CO.1: Recall basic of fluid mechanics.
ME543.CO.2: Apply the governing equations in different forms.
ME543.CO.3: Apply knowledge of boundary layer theory for several airfoils.
ME543.CO.4: Analyze turbulent flow and compressible flow.

THEORY COURSE CONTENT		
UNIT 1	**Governing Equations: Review of Fluid Mechanics**	**6 HOURS**
Definition and properties of Fluids, Fluid as continuum, Continuum model, and Flow kinematics: - Langragian and Eulerian description, Basic flow-analysis techniques, Flow Patterns: Streamlines, Streak lines, and Pathlines. Reynolds transport theorem, Conservation of mass, Linear momentum equation, Energy equation, Frictionless flow, Bernoulli equation. Acceleration field of a fluid, differentialequation of mass conservation, Boundary Conditions for the basic equations, Velocity Potential, StreamFunction, Vorticity.		
UNIT 2	**Navier-Stokes Equations**	**6 HOURS**
Generalized form of NSE, Special forms: Euler equations, Bernoulli equation Exact solutions: fully developed flow in channel, pipe, flow between concentric rotating cylinders, Couette flow, Stokes First problem (unsteady flow), Creeping flow past a sphere, cylinder.		
UNIT 3	**Boundary Layers**	**6 HOURS**
Boundary layer assumptions, equations, Flow over a flat plate, Similarity (Blasius) solution, Falkner-Skan equation, Momentum integral method, Flow separation. Flow past a circular cylinder, Magnus effect; Kutta-Joukowski lift theorem; Concept of lift and drag.		
UNIT 4	**Potential Flows**	**6 HOURS**
Elementary Plane-Flow Solutions: Circulation, Superposition of Plane-Flow Solutions: Irrotational vortex, Vortex flow, Doublet, Complex potential functions. Conformal transformation to analyze the flow over flat plate, cylinder, oval body and airfoils. Thin airfoil theory – generalized airfoil theory for cambered and flapped airfoils.		
UNIT 5	**Turbulent flow**	**6 HOURS**
Turbulent flow, losses during flow through pipes. Pipes in series and parallel – transmission of power through pipes, characteristics of turbulence, laminar-turbulent transition, Correlation functions, Mean and fluctuations, Governing equations, Turbulent boundary layer, Boundary conditions, shear stress models, Prandtl's mixing length, Velocity profile over a flat plate and in pipes, Equations for free shear layers: mixing layer, plane and axisymmetric jet, and wake, two equation model (k-σ), Large Eddy Simulation, Various Turbulent Models.		
UNIT 6	**Compressible Flow**	**6 HOURS**
One-dimensional flow: Fanno and Rayleigh curve, Normal shock relations, Introduction to oblique shocks, Prandtl-Meyer expansion waves, and simple supersonic wind tunnel – Design of supersonic windtunnel Nozzle. Two dimensional Subsonic flow: - Flow with small perturbations, Flow past a wave shaped wall – Gothert's rule-Laitone's modification of Prandtl Glauret rule – affine transformations – Hodograph method –Tangent Gas approximations – Rayleigh Johnson method.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Flow over a cylinder/sphere at different Re. Pressure variation over the body and drag Estimation.		
PRACTICAL NO.02		**4 HOURS**
Flow past an aerofoil: Pressure measurements, calculation of lift.		
PRACTICAL NO.03		**4 HOURS**
Flow through a converging-diverging nozzle: subsonic and supersonic flows.		
PRACTICAL NO.04		**4 HOURS**
Friction factor determination: incompressible flow through pipes/ducts of variable cross section.		
PRACTICAL NO.05		**4 HOURS**
Laminar/Turbulent boundary layer over a flat plate.		

TEXT BOOK

1. Dr. R K Bansal, Fluid Mechanics and Hydraulic Machines, Laxmi Pulications,2010, (ISBN: 978-81-318-0815-3)
2. E. Ratha Krishnan, "Gas Dynamics", PHI Learning Pvt. Ltd New Delhi, 2004, (ISBN : 9788120348394)
3. Dr. P.N. Modi, Dr. S. M. Seth, "Fluid Mechanics and Hydraulic Machines", Standard book house 2009 (ISBN No. 78-8189401269)

REFERENCE BOOK

1. S.M.Yahya, "Fundamentals of Compressible flow", New Age Publishers, Third edition, 1992, (ISBN: 8122414680)
2. Streeter, "Fluid Dynamics", McGraw Hill, New York, 2010, (ISBN: 9780070701403)
3. William Graebel, "Advanced Fluid Mechanics", Academic Press,2007, (ISBN: 9780123708854)
4. Kundu, Cohen, Dowling,"Fluid Mechanics", Elsevier India, 2015, ISBN-13: 978-0124059351
5. FOX, McDONALD, PRITCHARD, "Fluid Mechanics", Wiley publication,2015 (ISBN No. 978-81-265-4128-7)
6. A J Raudkivi , Owls books, Toledo, "Advanced Fluid Mechanics", USA, 1972, (ISBN : 0470709405)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
FIRST YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Design of Heat Transfer Equipment's
	COURSE CODE	ME544
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	2	NIL	60	40	NIL	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME544.CEO.1: To understand the functioning of different heat transfer equipment's.
ME544.CEO.2: To Understand thermal behavior of heat transfer equipment's.
ME544.CEO.3: To Design the heat transfer equipment's from thermal point of view.

COURSE OUTCOMES :

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

ME544.CO.1: List the different types heat exchangers, cooling towers and furnaces
ME544.CO.2: Select the different types of heat exchangers, cooling towers and furnaces according to application.
ME544.CO.3: Apply the different methods to calculate effectiveness and pressure drop in heat exchanger.
ME544.CO.4: Analyze different heat transfer Equipment's from thermal point of view.
ME544.CO.5: Select and design appropriate heat transfer equipment for a given application.

THEORY COURSE CONTENT		
UNIT 1	**Classification of Heat Exchangers**	**8 HOURS**
Introduction, Classification, Overview of Heat Exchanger Design Methodology, Process and Design Specifications, Thermal and Hydraulic Design, Mechanical Design, Optimum Design , Heat Exchanger Variables and Thermal Circuit, Assumptions, Basic Definitions, ϵ - NTU Method , The P-NTU Method , TEMA , Multi-pass Exchangers, LMTD, Heat Exchanger Arrays and Multi-passing, Sizing and Rating Problems, Kern Method, Bell Delaware Method, Numerical on Shell and tube HEX.		
UNIT 2	**Solution Methods for Determining Exchanger Effectiveness**	**6 HOURS**
Exact Analytical Methods, Approximate Methods, Numerical Methods, Matrix Formalism, Chain Rule Methodology , Flow-Reversal Symmetry, Design Problems, Longitudinal Wall Heat Conduction Effects, Multipass Exchangers, Non-uniform Overall Heat Transfer Coefficients, Temperature - Length - Combined Effect.		
UNIT 3	**Shell and tube heat exchangers**	**6 HOURS**
Shell and tube heat exchangers - tube layouts, baffle spacing, classification of shell and tube exchangers, Design calculation of shell and tube heat exchangers, shell-side film coefficients, shell-side equivalent diameter, true temperature difference in a 1-2 heat exchanger, influence of approach temperature on correction factor, shell and tube sides pressure drop; performance analysis of 1-2 heat exchangers, design calculation of shell and tube heat exchangers; flow arrangements for increased heat recovery.		
UNIT 4	**Heat Transfer Characteristics**	**6 HOURS**
Dimensionless Surface Characteristics, Experimental Techniques for Determining Surface Characteristics, Steady-State Kays and London Technique, Wilson Plot Technique, Transient Test Techniques, Friction Factor Determination, Hydrodynamic ally Developing Flows, Thermally Developing Flows, Extended Reynolds Analogy, Heat Exchanger Surface Geometrical Characteristics, Selection of Heat Exchangers and Their Components, Temperature Difference Distributions.		
UNIT 5	**Direct contact heat transfer**	**6 HOURS**
Classification of cooling towers, wet-bulb and dew point temperatures, Lewis number, cooling-tower internals, heat balance, heat transfer by simultaneous diffusion and convection; Design and analysis of cooling towers, determination of the number of diffusion units, performance evaluation of cooling towers, influence of process conditions and operating variables on their design		
UNIT 6	**Heat Pipes**	**8 HOURS**
Heat pipes - types and applications, operating principles, working fluids, wick structures, control techniques, pressure balance, maximum capillary pressure, liquid and vapor pressure drops, effective thermal conductivity of wick structures, capillary limitation on heat transport capability, sonic, entrainment and boiling limitations, determination of operating conditions; Heat pipe design – fluid selection, wick selection, material selection, preliminary design considerations, heat pipe design procedure, determination of heat pipe diameter, design of heat pipe containers, wick design, entertainment and boiling limitations, design problems; Non conventional heat pipes – flat, rotating, reciprocating and disc shaped heat pipes, heat pipes in cooling microelectronics – micro and mini heat pipes.		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Visit to study heat exchanger manufacturing.		
PRACTICAL NO.02		**4 HOURS**
Study of Instrumentation used related to Heat exchanger.		
PRACTICAL NO.03		**4 HOURS**
Study of plate heat exchanger		
PRACTICAL NO.04		**4 HOURS**
Experimentation on any one Heat exchanger		
PRACTICAL NO.05		**4 HOURS**
Experimentation on Heat pipe		

TEXT BOOK

1. Process Heat Transfer – Donald Q. Kern, Tata McGraw-Hill
2. Process Heat Transfer – Hewitt ,Shires & Bott, CRC Press

REFERENCE BOOK

1. Cooling Tower, Fundamentals- John C. Hensley, SPX Cooling Technologies
2. Heat exchangers Selection, Rating and Thermal Design – Sadik Kakac,Hongtan Liu, Anchasa Pramunjanaroenkij, CRC Press
3. Heat Pipes Theory, Design & Applications – D.A. Reay, P.D.Dunn, Pergamon
4. Cooling Techniques for Electronic Equipment– Dave S. Steinberg, Wiley-InterScience Publication
5. Fundamentals of Heat Exchanger Design -Ramesh K. Shah, Dusan P. Sekulic,Wiley-India
6. Compact Heat Exchangers- Kays, W. M. and London, A. L., 2nd Edition, McGraw – Hill, New

MIT | Academy of Engineering (An Autonomous Institute)			COURSE SYLLABI (2020-2024)		
SCHOOL OF MECHANICAL ANDCIVIL ENGINEERING			**W.E.F.**	**:**	**AY:**2022-2023 (Rev 2022)
FIRST YEAR MASTEROF TECHNOLOGY MECHANICAL ENGINEERING			**COURSE NAME**	**:**	Project-I
			COURSE CODE	**:**	ME545
			COURSE CREDITS	**:**	02
RELEASE DATE	**:**	01/12/2022	**REVISION NO.**	**:**	3.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
NIL	4	NIL	NIL	NIL	NIL	50	50

PRE-REQUISITE : Research Methodology, Technical Writing

COURSE OBJECTIVES :

ME545.CEO.1: To Manage the selection and initiation of individual projects

ME545.CEO.2: To conduct project planning activities that accurately forecast project costs, timelineand quality.

COURSE OUTCOMES :

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

ME545.CO.1: Identify the real life problem/ important concepts / current applications from engineeringdomain

ME545.CO.2: Describe the aim and objective of selected problem statement

ME545.CO.3: Describe the plan and cost of the project

CONTENTS

Project work is divided into four stages namely Project Stage I, Project Stage II, Project Stage III and Project Stage IV. Project Stage I is entirely related with selection of PROBLEM STATEMENT /prob- lem by the students related to thrust areas identified by respective departments. Synopsis submission and mid trimester presentation will be conducted by department based on following points,

Literature survey

Motivation and Problem Statement

Goals and Objectives

Final Project Stage I Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (MECHANICAL ENGINEERING)
2020-24 PATTERN (Revision 2022) W.E.F 2022-23

The Master of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION: SEMESTER WISE						
S.N.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER**				**TOTAL**
		1	**2**	**3**	**4**	
1.	Program Core (PC)	3	1			**04**
2.	Discipline Core (DC)	2	3			**05**
3.	Department Elective (DE)				2	**02**
4.	Skill Development and Project (SDP)		1	1	1	**03**
TOTAL		**5**	**5**	**1**	**3**	**14**

CREDIT DISTRIBUTION: SEMESTER WISE							
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit 1 Tutorial Hour = 1 Credit							
S.N.	**TYPE OF COURSE**	**NO. OF CREDITS/TRIMESTER**				**TOTAL**	**%**
		1	**2**	**3**	**4**		
1.	Program Core (PC)	10	2			**12**	**18.75**
2.	Discipline Core (DC)	8	12			**20**	**31.25**
3.	Department Elective (DE)		0	6		**06**	**9.37**
4.	Skill Development and Project (SDP)		2	8	16	**26**	**40.62**
TOTAL		**18**	**16**	**14**	**16**	**64**	**100**

	CREDITS			
	1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit			
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	18	16	**34**
2.	Second Year	14	16	**30**
TOTAL				**64**

	CONTACT HOURS			
SL. NO.	**YEAR**	**SEMESTER**		**TOTAL**
		1	**2**	
1.	First Year	20	21	41
2.	Second Year	21	32	53
TOTAL				**94**

ABBREVATIONS		
1.	ECE	End Course Exam
2.	IA	Internal Assessment
3.	T/P	Term Work / Practical
4.	DM	Demonstration
5.	L	Lecture
6.	P	Practical
7.	T	Tutorial
8.	Lab	Laboratory

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2022)		
SCHOOL OF MECHANICAL ENGINEERING	W.E.F	:	2022-2023
SECOND YEAR MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING	RELEASE DATE	:	01/12/2022
	REVISION NO.	:	3.0

SEMESTER-III

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT
TYPE	CODE	NAME	Hours/Week			THEORY		PRACT		TOTAL	
			L	P	T	ECE	IA	T/P	DM		
DE1	ME66#	Elective course – I	3	-	-	60	40	-	-	100	3
DE2	ME67#	Elective course – II	3	-	-	60	40	-	-	100	3
SDP2	ME651	Project Work – II	-	16	-	-	-	100	100	200	8
TOTAL			**6**	**16**	**-**	**120**	**80**	**50**	**50**	**400**	**14**

SEMESTER-IV

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT
TYPE	CODE	NAME	Hours/Week			THEORY		PRACT		TOTAL	
			L	P	T	ECE	IA	T/P	DM		
SDP3	ME652	Project Work – III	-	32	-	-	-	200	150	350	16
TOTAL			**-**	**32**	**-**	**-**	**-**	**200**	**150**	**350**	**16**

ANNEXTURE-I

Department Elective Course I: 1 Course		
Sl. No.	**Course Code**	**Course**
1	ME661	Advances in IC engines
2	ME662	Energy Conservation and Management
3	ME663	Computational Fluid Dynamics
4	ME664	Compressible Fluid flow and Gas Dynamics

Department Elective Course II: 1 Course		
Sl. No.	**Course Code**	**Course**
1	ME671	Advanced Air Conditioning and Refrigeration Technology
2	ME672	Industrial Hydraulics and Pneumatics
3	ME673	Cryogenics and Vacuum Technology
4	ME674	Steam Engineering

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2022- 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Advances in IC Engines
	COURSE CODE	ME661
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	NIL	NIL	60	40	NIL	NIL	100

PRE-REQUISITE : Advanced Thermodynamics and Combustion Technology

COURSE OBJECTIVES :

ME661.CEO.1: To recall the fundamentals of I.C engines and testing of an engine for analyzing its performance.

ME661.CEO.2: To study the combustion and its controlling factors in order to design efficient engine

ME661.CEO.3: To study emissions from I.C. engines and its controlling methods, various emission norms.

COURSE OUTCOMES :

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

ME661.CO.1: Recall basics of alternative fuel technology.

ME661.CO.2: Apply fundamentals of IC engines to enhance its performance-emission characteristics.

ME661.CO.3: Develop models for simulation-based engine calibration

ME661.CO.4: Demonstrate the emission controlling methods and emission standards for various engines.

THEORY COURSE CONTENT		
UNIT 1	**Measurement & Testing**	**6 HOURS**
Basics of IC engine, engine performance parameters, measurement and testing of engine operating parameters, performance maps, Mathematical models of SI and CI Engines.		
UNIT 2	**Alternate Fuels**	**6 HOURS**
Thermo-chemistry of Fuel – Air mixtures, Solid fuels, liquid fuels, gaseous fuels, hydrogen, new generation alternative fuels and their properties. Dual & Multi fuel engines: Performance advantages, modifications required in fuel system.		
UNIT 3	**Engine Design**	**6 HOURS**
Engine design parameters, Preliminary analysis, cylinder number, size and arrangement, experimental development. Design of engine combustion chamber for IDI and DI engines.		
UNIT 4	**Electronic Injection System**	**6 HOURS**
Electronic fuel injection control system, spray structure, atomization, penetration, drop size distribution, spray evaporation, injection timing. Mixing formation and control, Modern EFI systems: GDI, MPFI, CRDI etc.		
UNIT 5	**Engine Emissions & Control**	**6 HOURS**
Genesis and formation of engine emissions, Air pollution due to IC engines: HC, CO, NOx, particulates, other emissions, Emission measuring equipments, Strategies for control of emissions: exhaust gas recirculation, Catalytic converter, SCR, modern methods. Trends in vehicle emission standards, emission limits, test procedures, driving cycles.		
UNIT 6	**Simulation Technique**	**6 HOURS**
Simulation-based engine calibration: Tools, Techniques, and Applications, Modern developments in IC Engines: VVT, VGT, DTSI, PCCI, HCCI, LTC. Detail mechanism of NVH (Noise vibration and Harshness) in engine.		

TEXT BOOK

1. V Ganesan, “Internal Combustion Engines”, 4th edition, Tata McGraw Hill, 2012, (ISBN-10: 1259006190)
2. Jack Erjavec and Rob Thompson, “Automotive Technology”, 6th edition, Delmar Thomson Learning, 2014, (ISBN-10: 1133933734)
3. Mathur M. L., “Internal Combustion Engine”, 4th edition, Dhanpat Rai Publication, (ISBN-10: 8189928465)
4. Shyam K. Agrawal. , “Internal Combustion Engine”, 4th edition, New Age publishers, 2007,(ISBN-10: 8122417825)

REFERENCE BOOK

1. Charles Fayette Taylor, ”The Internal Combustion Engine in Theory and Practice”, Volume I & II, 2nd The MIT Press, 1985, (ISBN: 9780262200523)
2. Bosch Gmbh, Robert Bosch GmbH, “Gasoline Engine Management, Bosch handbook”,2nd edition, Professional Engineering Publishing, 2004, (ISBN 10: 1860584349)
3. Gordon P Blair, “Design and Simulation of four stroke engines”, 4th edition, SAE
4. International, 1999, (ISBN-10: 0768004403)
5. Willard W. Pulkrabek, Engineering Fundamentals of the Internal Combustion Engine, 2nd Edition, Pearson Prentice Hall, 2004.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020 – 2024)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	AY: 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	COURSE NAME	Energy Conservation and Management
	COURSE CODE	ME662
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	REVISION NO	3.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	NIL	60	40	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME662.CEO.1: To remember importance of energy conservation and management.
ME662.CEO.2: To understand the concept of thermal systems.
ME662.CEO.3: To apply knowledge of various modes of energy conservation.
ME662.CEO.4: To understand various global protocols regarding Energy conservation an management

COURSE OUTCOMES :

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

ME662.CO.1: Recall importance of energy conservation and management.
ME662.CO.2: Understand the concept of thermal system.
ME662.CO.3: Apply knowledge of various modes of energy conservation.
ME662.CO.4: Understand various global protocols regarding Energy conservation an management

THEORY COURSE CONTENT		
UNIT 1	**Energy scenario**	**5 HOURS**
Classification of Energy, Indian energy scenario, Sectorial energy consumption (domestic, industrial and other sectors), energy needs of growing economy, energy intensity, long term energy scenario, energy pricing, energy security, energy conservation and its importance, energy strategy for the future. Energy Conservation Act 2001 and related policies: Energy conservation Act 2001 and its features, notifications under the Act, Schemes of Bureau of Energy Efficiency (BEE) including Designated consumers		
UNIT 2	**Financial Management and Energy Monitoring and Targeting**	**6 HOURS**
Investment-need, appraisal and criteria, financial analysis techniques simple payback period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options, energy performance contracts and role of Energy Service Companies (ESCOs) Energy Monitoring and Targeting: Defining monitoring & targeting, elements of monitoring & targeting		
UNIT 3	**Energy Management & Audit: Thermal Systems**	**8 HOURS**
Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, Bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel and energy substitution, energy audit instruments and metering		
UNIT 4	**Energy Efficiency in Thermal Utilities and systems:**	**24 HOURS**
Boilers: Types, combustion in boilers, performances evaluation, analysis of losses, feed water treatment, blow down, energy conservation opportunities. Boiler efficiency calculation, evaporation ratio and efficiency for coal, oil and gas. Soot blowing and soot deposit reduction, reasons for boiler tube failures, start up, shut down and preservation, Thermic fluid heaters, super critical boilers. Steam System: Properties of steam, assessment of steam distribution losses, steam leakages, steam trapping, condensate and flash steam recovery system, identifying opportunities for energy savings. Steam utilization, Performance assessment more details, installation, thermo-compressor, steam pipe insulation, condensate pumping, steam dryers Furnaces: Classification, general fuel economy measures in furnaces, excess air, heat distribution, temperature control, draft control, waste heat recovery. Forging furnace heat balance, Cupola, non-ferrous melting, Induction furnace, performance evaluation of a furnace, hot air generators. Insulation and Refractories: Insulation-types and application, economic thickness of insulation, heat savings and application criteria, Refractory-types, selection and application of refractories, heat loss. Cold insulation. Heat Exchangers: Types, networking, pinch analysis, multiple effect evaporators, condensers, distillation column, etc. Waste Heat Recovery: Classification, advantages and applications, commercially viable waste heat recovery devices, saving potential. Cogeneration: Definition, need, application, advantages, classification, saving potentials. Heat balance, steam turbine efficiency, tri-generation, micro turbine. Heating, ventilation, air conditioning (HVAC) and Refriger- ation System: Factors affecting Refrigeration and Air conditioning system performance and savings Opportunities. Vapor absorption refrigeration system: Working principle, types and comparison with vapor compression system and saving potential, heat pumps and their applications, section on ventilation system, ice bank system, and performance assessment of window and split room air conditioners, Star labeled pumps, cold storage refrigeration, and humidification system		

UNIT 5	Energy and environment, air pollution, climate change:	5 HOURS
United Nations Framework Convention on Climate Change (UNFCC), sustainable development, Kyoto Protocol, Conference of Parties (COP), Clean Development Mechanism (CDM), CDM Procedures case of CDM – Bachat Lamp Yojna and industry; Prototype Carbon Fund (PCF)		

TEXT BOOK

1. L.C. Witte, P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation", Hemisphere Publication, Washington, 1988, (ISBN 0891163220)
2. O. Callaghn, P.W., "Design and Management for Energy Conservation", Pergamon Press, Oxford, 1981, (ISBN: 0080272878)

REFERENCE BOOK

1. G.C. Dryden, "The Efficient Use of Energy", Publ. Butterworth-Heinemann, London, 1982, (ISBN 1483107914)
2. W.C. turner, "Energy Management Hand book", Wiley, New York, 1982, (ISBN 1466578289)
3. W.R. Murphy and G. Mc KAY, "Energy Management", Butterworth's, London 1982, (ISBN 0408005084)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Computational Fluid Dynamics
	COURSE CODE	ME663
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	NIL	NIL	60	40	NIL	NIL	100

PRE-REQUISITE : Advanced Heat Transfer, Advanced Fluid Mechanics

COURSE OBJECTIVES :

ME663.CEO.1: Recall the knowledge of fluid mechanics and heat transfer.

ME663.CEO.2: Develop a two dimensional flow problem by using CFD.

ME663.CEO.3: Apply the Discretization scheme to solve Navier-stokes equation and Reynold's transport theorem.

ME663.CEO.4: Analyze different turbulence models to the flow problems

COURSE OUTCOMES :

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

ME663.CO.1: Identify the key aspects of fluid mechanics and heat transfer relevant to the setting up of a problem for CFD, and to the interpretation of the results.

ME663.CO.2: Develop a two-dimensional flow problem for CFD solution, including geometry, boundary conditions, flow models and solution parameters.

ME663.CO.3: Appreciate the significance of error control and validation in CFD.

ME663.CO.4: Describe the nature of turbulent flows and explain why 'turbulence models' are necessary to many CFD solutions

THEORY COURSE CONTENT		
UNIT 1	**Introduction to CFD**	**8 HOURS**
Governing equations: the continuity equation, momentum equation and energy equations, convective forms of the equations and general description, Reynolds transport theorem. Classification of partial differential equations; physical examples of elliptic, parabolic and hyperbolic equations. Mathematical nature of the flow equations & their boundary conditions, Grid generation.		
UNIT 2	**Finite Difference Methods and Finite Volume Methods**	**8 HOURS**
Discretization: Basic discretization techniques applied to model equations and systems of equations: finite difference, finite volume and finite element methods. Application of FEM to ID and 2D problems in fluid flow and heat transfer Analysis of numerical schemes, Numerical Integration, Solvers and Algorithms.		
UNIT 3	**Euler's equations and Navier-Stokes Equations**	**8 HOURS**
Solution to Euler's equations: Formulations of Euler equations, Discretization methods for Euler equations Navier-Stokes Equations: Governing equation, Properties of Navier-Stokes equation, discretiza- tion of NS equation.		
UNIT 4	**Turbulence Modeling**	**6 HOURS**
Introduction, Statistical representation of turbulent flows: General Properties of turbulent quantities, Closure problem: Necessity of turbulence modeling, Reynolds average Navier stokes (RANS) equation, Different types of turbulence model: Eddy viscosity models, Mixing lengths model, Turbulent kinetic energy and dissipation, k-ϵ model, Advantages and disadvantages of k-ϵ model, Two-equation models: k-ϵ model and k-ω model, Reynolds stress equation model (RSM).		

TEXT BOOK

1. Taylor, C and Hughes J.B., "Finite Element Programming of the Navier Stock Equation", Pineridge Press Ltd. U.K., 1st Edition 1981, (ISBN: 0-906674-16-6)
2. Fletcher C. A. J., "Computational Techniques for Fluid Dynamics: Fundamental and General Techniques", Springer-Verlag, 1st Edition, 1987, (ISBN: 0387181512/ 978-0387181516)
3. Bose T. K., "Numerical Fluid Dynamics", Narosa Publishing House, 1st Edition, 1997, (ISBN: 8173191662, 9788173191664)

REFERENCE BOOK

1. Versteeg H. K., Malalasekera. W., " An introduction to computational fluid dynamics: The finite volume method", Prentice Hall, 2nd Edition, 2007, (ISBN: 9780131274983/ 978-0131274983)
2. Anderson, D.A., Tannehill, I.I., and Pletcher, R.H., "Computational Fluid Mechanics and Heat Transfer", Hemisphere Publishing Corporation, New York, USA, 3rd Edition, 2012, (ISBN: 1591690374/ 978-1591690375)
3. Niyogi P., Laha M.K., Chakrabarty S.K., "Introduction to Computational Fluid Dynamics", Pearson Education, India, 1st Edition, (ISBN: 8177587641/ 9788177587647)
4. Muralidhar, K and Sundararajan T., "Computational Fluid Flow and Heat Transfer", Narosa Publishing House, New Delhi, 1st Edition, 2003, (ISBN: 1842651722)
5. Ghoshdastidar, P. S., "Computer Simulation of flow and heat transfer", Tata McGraw-Hill Publishing Company Ltd.,1st Edition, 1998, (ISBN: 0074631500/9780074631508)

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Compressible Fluid Flow and Gas Dynamics
	COURSE CODE	ME664
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	NIL	NIL	60	40	NIL	NIL	100

PRE-REQUISITE : Advanced Fluid Mechanics

COURSE OBJECTIVES :

ME664.CEO.1: To basic fundamentals of compressible flow concepts.

ME664.CEO.2: To understand non-dimensional numbers in compressible flow and to solve the simple compressible flow problems.

ME664.CEO.3: To apply the effect of compressibility in nozzles and diffusers, design criteria of nozzles and diffusers.

ME664.CEO.4: To analyze isentropic compressible flow problems.

ME664.CEO.5: To judge fluid properties, and their static-dynamic nature.

COURSE OUTCOMES :

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

ME664.CO.1: Understand the fluid properties, and their static-dynamic nature.

ME664.CO.2: Understand fundamental behavior of compressible fluid.

ME664.CO.3: Apply their understanding in solving real life problem.

ME664.CO.4: Analyze isentropic compressible flow problems.

ME664.CO.5: Judge fluid properties, and their static-dynamic nature.

THEORY COURSE CONTENT		
UNIT 1	**Basic concepts and isentropic flows**	**8 HOURS**
Introduction to Compressible Flow- Concept of continuum-system and control volume approach-conservation of mass, momentum and energy- stagnation state- compressibility-Entropy relations.Wave propagation- Acoustic velocity-Mach number-effect of Mach number on compressibility- Pres- sure coefficient-physical difference between incompressible, subsonic, sonic and supersonic flows- Machcone-Sonic boom-Reference velocities- Impulse function-adiabatic energy equation-representation of various flow regimes on steady flow adiabatic ellipse		
UNIT 2	**Flow through Constant Area Ducts**	**8 HOURS**
One dimensional steady isentropic flow- Adiabatic and isentropic flow of a perfect gas- basic equations-Area-Velocity relation using 1D approximation-nozzle and diffuser-mass flow rate-chocking in isentropic flow-flow coefficients and efficiency of nozzle and diffuser- working tables-charts and tables for isentropic flowoperation of nozzle under varying pressure ratios –over expansion and under expansion in nozzles.		
UNIT 3	**Normal Shock**	**6 HOURS**
Irreversible discontinuity in supersonic flow- one dimensional shock wave- stationary normal shock-governing equations- Prandtl- Meyer relations- Shock strength- Rankine- Hugoniot Relation- Normal Shock on T-S diagram- working formula- curves and tables-Oblique shock waves - supersonic flow over compression and expansion corners (basic idea only).		
UNIT 4	**Jet Propulsion**	**6 HOURS**
Flow in a constant area duct with friction (Fanno Flow) – Governing Equations- Fanno line on h-s and P-v diagram- Fanno relation for a perfect gas- Chocking due to friction- working tables for Fanno flow-Isothermal flow		
UNIT 5	**Space Propulsion**	**5 HOURS**
Flow through constant area duct with heat transfer (Rayleigh Flow)- Governing equations- Rayleigh line on h-s and P-v diagramRayleigh relation for perfect gas- maximum possible heat additionlocation of maximum enthalpy point- thermal chocking- working tables for Rayleigh flow.Types of rocket engines – Propellants-feeding systems – Ignition and combustion –Theory of rocket propulsion – Performance study – Staging – Terminal and characteristic, Velocity – Applications – space flights.		

TEXT BOOK

1. J. D. Anderson, “Modern Compressible flow”, McGraw Hill, 3rd Edition, 2003, (ISBN-13: 978-0072424430)
2. H. Cohen, G.E.C. Rogers and Saravanamutto, “Gas Turbine Theory”, Longman Group Ltd., 2008. ISBN-13: 978-0132224376
3. J. D .Anderson, “Fundamentals of Aerodynamics”, McGraw Hill, 5th Edition, (ISBN-13: 978-0073398105)

REFERENCE BOOK

1. G.P. Sutton, “Rocket Propulsion Elements”, Oscar Biblarz, 2010, (ISBN-13: 978-0470080245)
2. A.H. Shapiro, “Dynamics and Thermodynamics of Compressible fluid Flow”, John Wiley & Sons; Volume 1 edition (1 March 1977), (ISBN-13: 978-0471066910)
3. Robert D. Zucker Oscar Biblarz, “Fundamentals of Gas Dynamics”, Wiley; 2 edition (July 15, 2002), (ISBN-13: 978-0471059677)
4. N.J. Zucrow, “Aircraft and Missile Propulsion”, vol.1 & II, John Wiley, 1975, (ISBN-13: 978-1124142098)
5. Gas Turbines, V. Ganesan, Tata McGraw Hill Publishing Co., New Delhi, 1999. (ISBN: 9780070681927)
6. Anderson, Modern compressible flow, 3e McGraw Hill Education, 2012

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020 – 2024)	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Advanced Air Conditioning & Refrigeration Tech
	COURSE CODE	ME671
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	NIL	NIL	60	40	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME671.CEO.1: To Tell variety of air conditioning systems and its applications
ME671.CEO.2: To state complete control systems and its choice
ME671.CEO.3: To Apply various methods in duct system design.
ME671.CEO.4: To Solve numericals on Applied Psychrometry and summer and winter load calculations

COURSE OUTCOMES :

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

ME671.CO.1: Solve numericals on Applied Psychrometry and summer and winter load calculations
ME671.CO.2: Apply various methods in design of duct system
ME671.CO.3: State variety of air conditioning systems, its applications, complete control systems and its choice

THEORY COURSE CONTENT		
UNIT 1	**Multipressure systems**	**6 HOURS**
Introduction, need of multistage system, Intermediate pressure, two stage compression with flash gas removal and liquid intercooler, single compressor with multiple evaporator: individual and multiple expansion valves, individual compressors, cascade system: application and numerical (numerical only by using p-h chart).		
UNIT 2	**Thermal Comfort**	**6 HOURS**
Thermal comfort, Heat transfer from human body by sensible and latent heat transfer. Metabolic heat generation, steady state and unsteady state model for heat transfer, effect of clothing and definition of effective temperatures. PMV and PPD. ASHRAE comfort chart, Infiltration and ventilation, IndoorAir Quality (IAQ), Sources of indoor air pollution, Methods of control of IAQ, Fresh air requirementsfor IAQ.		
UNIT 3	**Heating and Cooling load calculations**	**6 HOURS**
Differences between winter and summer load calculations, Inside and Outside design conditions, Various sources of the internal and external heat gains, heat losses, Solar radiation, Solar radiation through glass, SHGC and shading coefficients, Heat transfer through building structure, Methods of heat load calculations, Numerical on summer and winter load calculations.		
UNIT 4	**Advanced system design**	**6 HOURS**
Load estimating: comfort conditions, weather data, solar heat gain, cooling and heating loads. Aircon-ditioning systems: central and unitary systems, duct design and fan selection, heating and cooling coil design, cooling tower design and selection, air cleaners and scrubbers, hydronic heating and cooling systems, humidification and dehumidification equipement, automatic controls, noise reduction. Energy conservation and air conditioning for special applications: waste heat, recovery, cogeneration of power and refrigeration, industrial air conditioning, textile processing, clean spaces.		
UNIT 5	**Air conditioning systems**	**6 HOURS**
All air systems, All water systems, Air water systems, Direct Refrigerant, Unitary systems, Chilled ceilings and chilled beams, displacement ventilation, VAV Air Conditioning, Air cooled VRV (VRF) systems, Water cooled VRV (VRF), Two stage Evaporative cooling, Desiccant Dehumidification, Heat Pumps and their types Air Conditioning applications –Supermarkets, Restaurants, Kitchen exhaust ventilation systems Hospitals, Office buildings.		
UNIT 6	**Control systems for Refrigeration and Air conditioning applica-tions**	**6 HOURS**
Closed loop and open loop control systems, Choice of control systems, Types of control action, Energy sources, controllers and controlled devices, Control based on space temperature, Control based on outside temperature, Control based on heating and cooling medium, Control of humidity, Complete control systems.		

TEXT BOOK

1. Jan F.Kredier, “Handbook of Heating, Ventilation and Air Conditioning” CRC Press LLC, 1st edition, Year-2000, (ISBN 9780849395840).
2. C P Arora, “Refrigeration and Air conditioning”, Tata McGraw Hill Publication, 3rd edition,Year-2008, (ISBN-13:9780070083905).

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2020 – 2024)	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Industrial Hydraulics and Pneumatics
	COURSE CODE	ME672
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	NIL	NIL	60	40	NIL	NIL	100

PRE-REQUISITE : Advanced Fluid Mechanics

COURSE OBJECTIVES :

ME672.CEO.1: To provide student with knowledge on the application of fluid power in process, construction and manufacturing Industries.

ME672.CEO.2: To provide students with an understanding of the fluids and components utilized in modern industrial fluid power system.

ME672.CEO.3: To evaluate the hydraulic or pneumatic devices for their performance.

ME672.CEO.4: To develop a measurable degree of competence in the design, construction and operation of fluid power circuits.

ME672.CEO.5: To design suitable hydraulic and pneumatic circuit for given application.

COURSE OUTCOMES :

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

ME672.CO.1: Explain the Fluid power and operation of different types of devices.

ME672.CO.2: Summarize the features and functions of actuators and Flow control valves.

ME672.CO.3: Explain the different types of Hydraulic circuits and systems.

ME672.CO.4: Explain the working of different pneumatic circuits and systems.

ME672.CO.5: Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Industrial Fluid Power Systems**	**6 HOURS**
Fluid power and its history. Governing laws for fluid flow: Pascal's law, continuity equation, Bernoulli's theorem, Boyle's, Charles's. Working fluids used in hydraulic & pneumatic systems its ISO/BIS stan- dards and designations, properties, advantages and limitations. Hydraulic systems - concept, applica- tion, advantages and limitations. Pneumatic systems - concept, application, advantages and limitations.		
UNIT 2	**Devices in Hydraulic and Pneumatic system**	**6 HOURS**
Control valves and its types. Directions control valves and its types-symbolic representation, construc- tion, function. Pressure control valves and its types- symbolic representation, construction, function. Flow control valves and its types-symbolic representation, construction, function. Actuator and its type. Hydraulic motors and cylinders-single and double acting cylinder, symbolic representation of hydraulic actuators, cylinders and motors. Construction and working of rotary actuators such as gear, vane, piston motors, Compressors.		
UNIT 3	**Basic Hydraulics and pneumatics systems**	**6 HOURS**
Basic Hydraulic System. Types, construction, working, applications and selection criteria. Hydraulic Pumps, Hydraulic Actuators, cylinder cushions and mountings. Hydraulic Control valves, Hydraulic Accessories Basic Pneumatic System- types, construction, working, application, selection criteria. Ap- plications of following air preparation and conditioning elements: Air compressors. Air receivers and air dryers. Air Filters, Regulators, Lubricators (FRL unit). Pneumatic Actuators, Pneumatic Control valves.		
UNIT 4	**Hydraulic and pneumatic circuits designs**	**6 HOURS**
Design of circuits for Drilling, Planning, Shaping, Punching, Press. Electro-pneumatic circuits. Se- quential circuit design for a simple application using cascade method, Selection, fault finding and maintenance of hydraulic components, Selection criteria of pneumatic components – Installation fault finding and maintenance of pneumatic components. Hydraulic and Pneumatic power packs.		
UNIT 5	**Installation of hydraulic and pneumatic system**	**6 HOURS**
Causes and remedies for common troubles arising in hydraulic elements. Maintenance of hydraulic sys- tems. Maintenance schedule. Troubleshooting of hydraulic system. Causes and remedies for troubles arising in pneumatic elements. Maintenance of pneumatic system. Maintenance schedule. Trou- bleshooting of pneumatic system.		
UNIT 6	**Hydro-pneumatics**	**6 HOURS**
Concept, advantages and disadvantages. Types, construction, working, Circuit diagram and application of following hydro pneumatic elements: Air oil reservoir. Hydraulic series check unit. Hydraulic parallel check unit. Hydro pneumatic cylinder. Air oil intensifier. Comparison between hydro pneumatic, hydraulic and pneumatic systems.		

TEXT BOOK

1. Anthony Esposito," Fluid Power with Applications", PHI / Pearson Education, 2005.
2. Douglas M. Considine," Process Instruments and Control Handbook" McGraw-Hill, New York. 1985
3. Majumdar, S.R., "Pneumatic Systems – Principles and Maintenance", Tata McGraw Hill, 2007.

REFERENCE BOOK

1. Andrew Jaico, "Hydraulic And Pneumatics A Technician's & Engineer's Guide",Butterworth-Heinemann; 3 edition (March 11, 2011) Publishing House, 2/e, 2013, (ISBN-13: 978-0080966748)
2. Noah Manring, "Hydraulic Control Systems", Wiley; 1 edition (April 15, 2005), (ISBN-13: 978-0471693116)
3. Fluid Power Generation, Transmission and Control Jagadeesha, T. Universities Press (India) Private Limited, 1/e, 2014, (ISBN: 9788126539543)
4. Shanmuga sundaram.K, "Hydr aulic and Pneumatic controls", SChand & Co, 2006.
5. Majumdar, S.R., "Oil Hydraulics Systems- Principles and Maintenance", Tata McGraw Hill, 2001
6. Micheal J, Pinches and Ashby, J.G., "Power Hydraulics", Prentice Hall, 1989.
7. 99 Example of pneumatic application, Author G Prede & D. Schloz Publisher FESTO –AG Germany.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Cryogenics and Vacuum Technology
	COURSE CODE	ME673
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	NIL	NIL	60	40	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME673.CEO.1: To Recall the fundamentals of cryogenic and vacuum Technology
ME673.CEO.2: To Summarize various cryogenic and Vacuum operated system
ME673.CEO.3: To Identify the safety techniques for cryogenic and vacuum system
ME673.CEO.4: To Discover the advance application of Cryogenic Engineering

COURSE OUTCOMES :

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

ME673.CO.1: Recall the fundamentals of cryogenic and vacuum Technology
ME673.CO.2: Summarize various cryogenic and Vacuum operated machines
ME673.CO.3: Identify the safety techniques for cryogenic and vacuum system
ME673.CO.4: Discover the advance application of Cryogenic Engineering

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Cryogenic Systems**	**6 HOURS**
Introduction to Cryogenic and its applications, Properties of Cryogenic fluids, Properties of Material at Cryogenic temperature, Gas liquefaction and refrigeration system ,Gas separation and Purification		
UNIT 2	**Thermodynamics of Cryogenic system**	**8 HOURS**
Thermodynamic Cycles in Cryogenics: Carnot Liquefaction Cycle, F.O.M. and Yield of Lique- faction Cycles. Inversion Curve - Joule Thomson Effect. Liquefaction Cycles: Linde- Hampson Cycle, Precooled Linde- Hampson Cycle, Claudes Cycle, Collins Cycle, Dual Pressure Cycle **Cryogenic Refrigerators:** J.T. Cryocoolers, Stirling Cycle Refrigerators, G.M. Cryocoolers .Pulse Tube Refrigerators, Regenerators used in Cryogenic Refrigerators, Magnetic Refrigerators Storage and transfer of Cryogenic liquids **Cryogenic Insulations. Cryostat design. Safety in Cryogenics**		
UNIT 3	**Vacuum Techniques**	**8 HOURS**
Basic Theory of Vacuum Techniques: Gas kinetic theory, pressure, conductance, gas flow regimes, vapour pressure, pumping speed, throughput. **Vacuum Pumps:** Mechanical, diffusion, molecular drag, turbo molecular, cryopumps, ion pumps - general working principles, operating regimes. **Vacuum Instrumentation**: Vacuum gauges, gas regulators, flow meters, residual gas analyzers, interpretation of data. Design Concepts: Materials, chambers, components, joins, seals, valves. Overall system design and integration. **Problem Solving**: Leak detection and detectors, gas signatures. **Vacuum Applications:** Freeze drying, packaging, vacuum coating, microelectronics, particle accel- erators, distillation, metallurgical processes, television and X-ray tubes, cryogenic insulation, space simulation.		
UNIT 4	**Advanced Application in Cryogenics**	**6 HOURS**
Vortex tube and applications, Cryogenic Engine for space vehicles Cryogenic Applications: Applications in gas industry cryogenic fluids space research, Cryobiology, food processing, electronics nuclear and high energy physics, chemical Processing metal manufacturing cryogenic power generation, medicine, analytical Physics and chemistry.		

REFERENCE BOOK

1. Barron R. F., “Cryogenic Systems”, 2nd Ed., Oxford University Press, 1985, (ISBN-0-19-503567-4).
2. Timmerhaus K. D. and Flynn T. M., “Cryogenic Process Engineering”, 1st ed., Springer, 1989, ISBN-0-19-503567-4. ISBN-10: 1468487582, (ISBN-13: 978-1468487589)
3. Randall F. Barron, ”Cryo genics Systems”, Second Edition Oxford Univesity Press New York, Clarendon Press, Oxford, 1985. ISBN: 0195035674 9780195035674.
4. V.V. Rao, T.B. Ghosh, K.L. Chopra,, Vacuum Science and Technology, Allied Publishers Ltd., New Delhi, ISBN: 9788170237631, 8170237637
5. A. Roth, Vacuum Technology, North Holland Publishing Company, Amsterdam ISBN 10: 0444108017 / ISBN 13: 9780444108012.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Steam Engineering
	COURSE CODE	ME674
	COURSE CREDITS	3
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
3	NIL	NIL	60	40	NIL	NIL	100

PRE-REQUISITE : Advanced Thermodynamics and Combustion Technology.

COURSE OBJECTIVES :

ME674.CEO.1: To recall the fundamentals of boilers and significance of mountings and accessories.
ME674.CEO.2: To apply energy conservation principle for steam generation
ME674.CEO.3: To analyze the performance of boilers.

COURSE OUTCOMES :

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

ME674.CO.1: Recall basics of steam piping system, its components for a process and also economical and effective insulation.
ME674.CO.2: Apply knowledge of thermal system for sources of waste heat design a systems for waste heat recovery.
ME674.CO.3: Develop controls and instrumentation for effective monitoring of the process.
ME674.CO.4: Design a steam piping system, its components for a process and also economical and effective insulation.

THEORY COURSE CONTENT		
UNIT 1	**Introduction**	**7 HOURS**
Fundamentals of steam generation, Quality of steam, Use of steam table, Mollier Chart, Sub critical and Super critical Steam Generators, Fluidized Bed Boilers, Mountings and Accessories, Combustion stoichiometry in boilers, Determination of adiabatic flame temperature, quantity of flue gases, Boiler water treatment - need, types / methodology, IBR, Boiler standards.		
UNIT 2	**Piping & Insulation**	**5 HOURS**
Water Line, Steam line design and insulation; Insulation-types and application, Economic thickness of insulation, Heat savings and application criteria, Refractory-types, selection and applications. Piping accessories: Valves (types, selection and characteristics) moisture separators, strainers etc.		
UNIT 3	**Steam Systems**	**5 HOURS**
Assessment of steam distribution losses, Steam leakages, Steam traps and trap monitoring, Condensate and flash steam recovery system, Steam Engineering Practices; Steam Based Equipment's / Systems: Steam operated pumps, Flash vessels, Stalling etc.		
UNIT 4	**Boiler Performance Assessment**	**8 HOURS**
Performance Test codes and procedure, Boiler Efficiency, Analysis of losses; performance evaluation of accessories; factors affecting boiler performance. Chimney height, Chimney Efficiency, Condition for maximum discharge. Reheat-regenerative cycle, binary cycle, topping and superimposed cycle.		
UNIT 5	**Energy Conservation and Waste Minimization**	**5 HOURS**
Energy conservation options in Boiler; waste minimization, methodology; economic viability of waste minimization. Steam Audit and Performance matrix of steam systems.		
UNIT 6	**Instrumentation & Control**	**6 HOURS**
Consideration of modern steam generators, Process instrumentation; control and monitoring. Need, types, applications for flow, pressure and temperature measuring and controlling instruments.		

TEXT BOOK

1. T. D. Estop, A. McConkey, Applied Thermodynamics, Parson Publication.
2. Domkundwar; a Course in Power Plant Engineering; Dhanapat Rai and Sons.
3. Yunus A. Cengel and Boles, "Engineering Thermodynamics ", Tata McGraw-Hill Publishing Co. Ltd.

REFERENCE BOOK

1. Energy Efficiency in Thermal Utilities; Bureau of Energy Efficiency.
2. Energy Performance Assessment for Equipment & Utility Systems; Bureau of Energy Efficiency.
3. Edited by J. B. Kitto & S C Stultz; Steam: Its Generation and Use; The Babcock and Wilcox Company.
4. P. Chatopadhyay; Boiler Operation Engineering: Questions and Answes; Tata McGrawHill Education Pvt Ltd, N Delhi.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Project-II
	COURSE CODE	ME651
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
NIL	8	NIL	NIL	NIL	50	50	100

PRE-REQUISITE : Project-I

COURSE OBJECTIVES :

ME651.CEO.1: To analyze and design the idea/ real time industrial problem/ current application from engineering domain

ME651.CEO.2: To evaluate an alternative approaches and justify the use of selected tools and methods

ME651.CEO.3: To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.

ME651.CEO.4: To understand the roles and responsibility, accountability and learn team work ethics.

COURSE OUTCOMES :

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

ME651.CO.1: Design the real life problems by applying the knowledge and problem solving ability.

ME651.CO.2: Analyze alternative approaches, find feasible solution and apply most appropriate one.

ME651.CO.3: Use standard engineering tools and processes for analysis, design, simulation, testing, implementation and deployment of idea into practice.

ME651.CO.4: Participate effectively in multidisciplinary and heterogeneous teams exhibiting team work.

CONTENTS

Project Stage II is related with Goals and Objectives, System Architecture, Algorithm/Methodology. Project report submission and mid trimester presentation will be conducted by department based on following points,

Literature survey

Motivation and Problem Statement

Goals and Objectives

Problem statement

System Architecture

System Analysis and Design

UML, DFD, Design Details

Proposed Algorithm

Expected Outcome and Result

Preparation of manuscript (paper) on Literature survey Final Project Stage II Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Project-III
	COURSE CODE	ME652
	COURSE CREDITS	4
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
NIL	20	NIL	NIL	NIL	150	50	200

PRE-REQUISITE : Project-II

COURSE OBJECTIVES :

ME652.CEO.1: To inculcate skills in engineering product design and development process, budgeting, Planning, testing, effective trouble-shooting practices.

ME652.CEO.2: To follow the standard guideline to meet the objective for development of Project.

ME652.CEO.3: To understand the roles and responsibility, accountability and learn team work ethics.

COURSE OUTCOMES :

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

ME652.CO.1: Design the real life problems by applying the knowledge and problem solving ability.

ME652.CO.2: Use standard engineering tools and processes for analysis, design, simulation, testing, implementation and deployment of idea into practice.

ME652.CO.3: Show the evidence of independent evaluation.

ME652.CO.4: Critically analyzed the result and their implementation methodology.

CONTENTS

Project Stage III is related with Design, Algorithm /Methodology Implementation Results. Project report submission and mid trimester presentation will be conducted by department based on following points,

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- Problem statement
- System Architecture
- System Analysis and Design (UML, DFD, Design Details)
- Proposed Algorithm
- Methodology/Approach
- Implementation
- Results
- Preparation of manuscript (paper) on Literature survey as mentioned in Project Work II
- Preparation of manuscript (paper) on analysis and design
- Publication details of paper on Literature survey and Design (Peer reviewed International con-ference like IEEE, ACM, Elsevier, Springer etc)

Final Project Stage III Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	**COURSE SYLLABI (2020 – 2024)**	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2022 - 2023
SECOND YEAR MASTER OF TECHNOLOGY MECHANICAL ENGINEERING	**COURSE NAME**	Project-IV
	COURSE CODE	ME653
	COURSE CREDITS	10
RELEASED DATE : 01/12/2022	**REVISION NO**	3.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA			
NIL	20	NIL	NIL	NIL	200	100	300

PRE-REQUISITE : Project-III

COURSE OBJECTIVES :

ME653.CEO.1: To follow the standard guideline to meet the objective for development of Project
ME653.CEO.2: To test rigorously before deployment of Systems
ME653.CEO.3: To Verify and Validate the work Undertaken
ME653.CEO.4: To Consolidate the work and preparation of final report

COURSE OUTCOMES :

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

ME653.CO.1: Show the evidence of independent evaluation.
ME653.CO.2: Critically analyzed the result and their implementation methodology.
ME653.CO.3: Validate the results with standard tools and techniques.
ME653.CO.4: Understand the importance of documentation and report writing.

Project work IV is related with Analysis Design, algorithm/methodology, implementation, Results, Result analysis using various charts/graphs, Project report submission and end trimester presentation will be conducted by department based in following points.

- Literature survey
- Motivation and Problem Statement
- Goals and Objectives
- System architecture
- System analysis and design (UML, DFD, Design Details)
- Proposed Algorithm
- Methodology/Approach
- Implementation
- Result Analysis and discussions
- Conclusions and future scope

- Preparation of manuscript (paper) on literature survey as mentioned in project work –II.
- Preparation on manuscript (paper) on design as mentioned in Project work –III.
- Publication details of paper on Literature survey and Design (Peer reviewed International conference like IEEE, ACM, Elsevier, Springer etc. as mentioned in project Work – III)

Publication details of paper on Result analysis (Peer reviewed / free International Journal) Final Project Stage IV Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.