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 Savitribai Phule Pune University

CURRICULUM FRAMEWORK (2019 PATTERN)

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)	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					**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				
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				**220**

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						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 (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						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
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 (2019 - 2023)		
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
SDP3	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP4	ET230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP5	ET226	Skill Development Course Data Structures and Algorithms	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	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
DC07	EX232	Circuit Simulation Tools and Techniques	0	2	-	-	-	50	-	-	50	1
SDP6	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP7	ET240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skills	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	18	0	140	140	220	150	150	800	21

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
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		
DC08	ET341	Control System	3	2	-	35	35	30	50	0	150	4
DC09	EX341	Computer N / W	3	0	-	35	35	30	0	0	100	3
DC10	ET342	Digital Signal Processing	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
SDP8	ET344	Skill Development Course OOP JAVA / C++	0	4	-	0	0	25	50	0	75	2
SDP9	ET350	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	ET361	VLSI Design	3	2	-	35	35	30	50	0	150	4
DC12	EX362	Power Electronics & Application	3	-	-	35	35	30	-	0	100	3
DC13	ET363	Machine Learning	3	2	-	35	35	30	50	0	150	4
OE02	ET37# / EX37#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	ET364	Skill Development Course 3 Networking (CCNA)	0	4	-	0	0	25	50	0	75	2
SDP11	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**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS	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	EX461	MEMS	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
SDP12	ET463	Skill Development Course Embedded Linux	0	4	-	0	0	25	50	0	75	2
SDP13	ET470	Project Evaluation	0	8	-	0	0	50	0	100	150	4
SDP14	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		
DC15	EX462	Electronic Communication Systems	3	2	-	35	35	30	50	0	150	4
DE02	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP15	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
HSS8	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		
DC15	EX462	Electronic Communication Systems	3	2	-	35	35	30	50	0	150	4
DE02	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP16	ET467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP17	ET468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**0**	**0**	**70**	**70**	**60**	**0**	**300**	**550**	**15**

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.	AS204	Applied Mathematics

Engineering Science (ESC) : 7 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
5.	CS102	Application Programming
6.	ME221	Material Engineering
7.	CV203	Environmental Sciences
8.	IT221	Engineering Informatics

Humanities and Social Science (HSS) : 10 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	HP103	English for Engineers
2.	HP104	German
3.	HP105	Japanese
4.	HP106	Indian Constitution
5.	HP202	Professional Skills
6.	HP203	Liberal Learning
7.	CS361	Project Management
8.	HP305	Professional Skills
9.	HP405	Engineering Economics
10.	HP406	Psychology

Discipline Core (DC) : 15 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	ET221	Electronic Devices and Circuits
2.	ET222	Digital Systems and Applications
3.	ET223	Signals & Systems
4.	ET231	Electromagnetic Theory and Applications
5.	ET232	Network Analysis Techniques
6.	ET233	Microcontroller & Interfacing
7.	EX232	Circuit Simulation Tools and Techniques
8.	ET341	Control System
9.	EX341	Computer N / W
10.	ET342	Digital Signal Processing
11.	ET361	VLSI Design
12.	EX362	Power Electronics & Application
13.	ET363	Antenna Theory & Design
14.	EX461	MEMS
15.	ET462	Machine Learning

Discipline Elective (DE) : 2 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	ET481	Digital Image Processing
	ET482	Microwave Engineering
	ET483	RISC Processors
	ET484	Deep Learning
	ET485	Fiber optic communications
	ET486	Statistical Signal Processing
	ET487	EMI/EMC
2.	EX491	Biomedical Engineering
	ET491	Natural Language Processing
	ET492	Internet of Things
	ET493	Electric Vehicle
	EX492	Speech Signal Processing
	ET494	System Programming & Operating System
	ET495	SCADA Systems
	EX493	Industrial Networks

Skill Development and Project (SDP) : 17 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	ME105	Experimental Tools and Techniques
2.	ME106	Design Thinking
3.	ET224	Digital Prototyping
4.	ET230	Minor Project Design
5.	ET226	Skill Development Course Data Structures & Algorithms
6.	ET235	Rapid Prototyping
7.	ET240	Minor Project Implementation
8.	ET344	Skill Development Course OOP JAVA / C++
9.	ET350	Project Design
10.	ET364	Skill Development Course 3 Networking (CCNA)
11.	ET360	Project Implementation
12.	ET463	Skill Development Course 2 Embedded Linux
13.	ET470	Project Evaluation
14.	ET400	Summer Internship
15.	ET480	Capstone Work
16.	ET467	Semester Long Internship Design
17.	ET468	Semester Long Internship Implementation

Open/Minor Elective School Wise : Electronics Engineering			
Minor Track	**Semester**	**Course Code**	**Course Name**
Embedded System	V	ET351	Embedded programming and Operating System
	VI	ET371	Embedded Processors
	VII	ET471	RTOS
IoT	V	ET352	IoT Architecture & Sensors
	VI	ET372	IoT Network & Protocols
	VII	ET472	Data Management & Analytics
Robotics	V	ME352	Robot fundamentals and Kinematics
	VI	EX371	Robot Dynamics and Control
	VII	EX471	AI in Robotics /Cognitive Robotics

Honors Elective Tracks : 4 Courses					
Sl. No.	**Minor Track**	**Semester**	**Course Code**	**Course Name**	**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

Open//Minor Electives (OE)							
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 and Automation	EX351	Fundamentals of Robotics	EX371	Robot Dynamics and Control	EX471	Robotics Vision

Open//Minor Electives (OE)							
Programme Name	**Minor 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

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An Autonomous Institute Affiliated to

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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/	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 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 (2019 - 2023)		
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
SDP3	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP4	ET230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP5	ET226	Skill Development Course Data Structures and Algorithms	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	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
DC07	EX232	Circuit Simulation Tools and Techniques	0	2	-	-	-	50	-	-	50	1
SDP6	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP7	ET240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skills	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	18	0	140	140	220	150	150	800	21

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	ET226
	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 :

ET226.CEO.1: To explore the basic concepts of data structures and algorithms.
ET226.CEO.2: To understand the different ways of data representation.
ET226.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,

ET226.CO.1: Summarize the searching and sorting techniques.
ET226.CO.2: Develop and implement code for linked list , stack and Queue data structures.
ET226.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 ELECTRONICS ENGINEERING	**COURSE NAME**	Circuit simulation Tools and Techniques
	COURSE CODE	EX232
	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	ICE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	25	25	NIL	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX232.CEO.1: Design of analog or digital or hybrid electronics and electrical circuits.

EX232.CEO.2: Use the open source simulation software for implementation and design of the analog and digital circuits

COURSE OUTCOMES :

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

EX232.CO.1: Design various analog and digital circuits using NGspice / LTSpice (L3)

EX232.CO.2: Design and Simulate CMOS layout of basic digital circuits (L3)

THEORY COURSE CONTENT

UNIT 1 | Fundamental SPICE Simulation

General purpose circuit simulation using Schematic Editor, Introduction to Netlist Command Based SPICE simulation, Basic Netlist Commands; Solve, Simulate and Analyze Electrical & Electronics Circuits, Simulation of CMOS Inverter using SPICE for transfer characteristic.

UNIT 2 | CMOS Based Integrated Circuit Simulation

Fabrication Process of MOSFETs, Basic steps CMOS Technology, Layout Design Rules, Layout design using back end Design tools: Logic Gates MOS inverter static characteristics, Resistive Load Inverter, CMOS inverter Design: CMOS Inverter design, Layout design of basic digital circuits

PRACTICAL: Practicals will be performed using open source softwares for PSPICE and CMOS fabrication simulation

PRACTICAL NO.01	**SPICE labs**	**10 HOURS**

1. Simulation of one rectifier circuit and one clipper/clamper circuit.
2. Simulation of one rectifier circuit and one clipper/clamper circuit.
3. Simulation of any one transistor biasing circuit.
4. Simulation of CE single/double stage amplifier circuit.
5. Simulation of any one JFET/MOSFET amplifier circuit.
6. Simulation of any one negative feedback circuit.
7. Simulation of simple combinational logic using SPICE
8. Simulation of encoder/multiplexer circuit.
9. Simulation of decoder/de multiplexer circuit.
10. Simulation of flip-flop circuit using gates.
11. Simulation of BCD adder using SPICE
12. Simulation of any register/counter circuit.
13. Simulation of CMOS inverter schematic using SPICE
14. Simulation of MOSFET schematic using SPICE

(any five among above 10)

PRACTICAL NO.02	**CMOS Based Integrated Circuit Simulation Labs**	**6 HOURS**

1. Design of CMOS inverter
2. Design of AND/OR/NAND/ NOR Gates
3. Design of Multiplexer
4. Design of counters

(any three among above 4)

Capstone project	**8 HOURS**

The student has to carry out any one project based on the following topics :
Design and development of any complex analog or digital or hybrid circuit, implement it using simulation software and design the same using either Microwind/ tanner/ caliber/ Pspice
More emphasis will be on CMOS Based spice simulation

TEXT BOOK

1. Rashid Muhammad H, Introduction to PSpice Using OrCAD for Circuits and Electronics, Pearson Third Edition, ISBN 10: 9780131019881, ISBN 13:0131019880
2. R. Jacob Baker, H. W. Li, D. E. Boyce, CMOS, Circuit Design, Layout, and Simulation, Wiley India Pvt. Ltd.CMOS Circuit Design, Layout, and Simulation , IEEE Press Prentice Hall of India Private limited, ISBN-81-203-1682-7.
3. Etienne Sicard, Sonia Delmas Bendhia, Basics of Cmos Cell Design, TMH Publication, ISBN-10: 0070599335, ISBN-13: 978-0070599338
4. Tobin, Paul. "PSpice for circuit theory and electronic devices." Synthesis Lectures On Digital Circuits and Systems 2.1 (2007): 1-159.

REFERENCES

1. http://www.linear.com/
2. http://ngspice.sourceforge.net
3. https://www.mentor.com/products/ic_nanometer_design/calibre-integration/

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

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Curriculum for

Third Year

Bachelor of Technology in Electronics Engineering

2019-2023

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
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		
DC08	ET341	Control System	3	2	-	35	35	30	50	0	150	4
DC09	EX341	Computer N / W	3	0	-	35	35	30	0	0	100	3
DC10	ET342	Digital Signal Processing	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
SDP8	ET344	Skill Development Course OOP JAVA / C++	0	4	-	0	0	25	50	0	75	2
SDP9	ET350	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	ET361	VLSI Design	3	2	-	35	35	30	50	0	150	4
DC12	EX362	Power Electronics & Application	3	-	-	35	35	30	-	0	100	3
DC13	ET363	Machine Learning	3	2	-	35	35	30	50	0	150	4
OE02	ET37# / EX37#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	ET364	Skill Development Course 3 Networking (CCNA)	0	4	-	0	0	25	50	0	75	2
SDP11	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**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

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 ELECTRONICS ENGINEERING	**COURSE NAME**	Computer Network
	COURSE CODE	EX341
	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	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX341.CEO.1: To acquainted the students with taxonomy and terminology of the Computer Networking area.

EX341.CEO.2: To introduce the student to advanced networking concepts

EX341.CEO.3: To acquire the required skill to design simple computer networks.

EX341.CEO.4: To classify the computer networks according to IP address classes

COURSE OUTCOMES :

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

EX341.CO.1: Interpret basic computer network technology

EX341.CO.2: Identify the different types of network devices and their functions within a network.

EX341.CO.3: Analyze the performance of the network

EX341.CO.4: Distinguish among the network based on address classification

EX341.CO.5: Explain various layers of communication and related protocols

THEORY COURSE CONTENT		
UNIT 1	**Basics of Computer Network**	**8 HOURS**

Introduction, Data communications: components, data representation (ASCII, ISO etc.), direction of data flow (simplex, half duplex, full duplex); Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN, WAN).
Internet: brief history, internet today; Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.

Application: Communication between two computers

Self-study: ISDN services & ATM

UNIT 2	**Physical Layer**	**8 HOURS**

Overview of data (analog & digital), signal (analog & digital), transmission (analog & digital) & transmission media (guided & non-guided); TDM, FDM, WDM; Circuit switching: time division & space division switch, TDM bus; Telephone network.

Application: Voice signal transmission over Public Switched Telephone network.

Self-study: DSL technology, Cable modem.

UNIT 3	**Data Link Layer**	**6 HOURS**

Types of errors, framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC.
MAC Sub layer: Point to point protocol, LCP, NCP, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA; Traditional Ethernet, fast Ethernet.

Application: Wi-Fi Carrier sense

Self-study: Wireless LAN: IEEE 802.11

UNIT 4	**Network Layer**	**6 HOURS**

Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address, subnetting; Routing : techniques, static vs. dynamic routing , routing table for classful address; Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing; Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols.

Application: Simplify routing with subnetting

UNIT 5	**Transport Layer**	**6 HOURS**

Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve QoS.

Application: Performance analysis of high speed congestion control protocol

Self-study: Introduction to bluetooth, VLAN's

UNIT 5	Application Layer	6 HOURS

DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

Application: Finding your own IP address.

Self-study: Cellular telephony & Satellite network. Quantum cryptography – Case study

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:** 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/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
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 Programming and Operating System
	COURSE CODE	ET351
	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 :

ET351.CEO.1: To comprehend the importance of linkers, loaders and software tools in embedded system programming.
ET351.CEO.2: To understand the architecture and assembly programming of 16-bit processor.
ET351.CEO.3: To know the fundamentals of an operating system.
ET351.CEO.4: To learn process, resource, memory and I/O management.

COURSE OUTCOMES :

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

ET351.CO.1: Apply various embedded system software tools such as compilers, linkers, loader. (L3)
ET351.CO.2: Implement the assembly language programming of 16-bit processor. (L3)
ET351.CO.3: Examine the process management, scheduling concepts in OS. (L4)
ET351.CO.4: Classify memory and I/O Organization. (L2)

THEORY COURSE CONTENT		
UNIT 1	**Programming Embedded System**	**8 HOURS**
Compiling, Linking and locating, downloading and debugging using Programmer and IDE tool, Components of System Software, Language Processing Activities, Fundamentals of Language Processing. Compiler, Interpreters, loaders and linkers Macro Processors: Macro Definition and call, Macro expansion, Nested Macro Calls, Advanced Macro Facilities, Design of a two-pass macro-processor		
UNIT 2	**Introduction to 16-bit processor**	**8 HOURS**
Architecture of 16 bit processor, Programming model, Instruction set, Assembler: Assembly language programming, simple assembly scheme, Pass structure of assembler.		
UNIT 3	**Fundamentals of Operating System**	**8 HOURS**
Architecture, Goals and Structures of O.S, Basic functions, Interaction of O. S. and hardware architecture, System calls, Batch, multiprogramming. Multitasking, time sharing, parallel, distributed and real -time O.S Process and threads, Scheduling - Non pre-emptive and pre-emptive scheduling, Real Time Scheduling **Case Study:** Task management in multi-cores OS.		
UNIT 4	**Memory Organisation**	**8 HOURS**
Types and organization, Virtual memory and its implementation, System and Cache memory, Memory management unit , Magnetic Hard disks, Optical Disks. **Case Study:** Memory Management.		
UNIT 5	**I/O organization**	**8 HOURS**
Direct Memory Access and DMA controller, Interrupts and Interrupt Controllers, Arbitration, Multilevel Bus Architecture, Interface circuits - Parallel and serial port. Features of PCI and PCI Express bus. **Case Study:** I/O Management		

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Write C Program to implement Lexical Analyzer for simple arithmetic operation which creates output tables (Uniform Symbol Table or a. Identifier Table b. Literal Table c. Symbol Table)		
PRACTICAL NO.02		**2 HOURS**
Design of PASS I of two pass assembler for pseudo machine code		

PRACTICAL NO.03		**2 HOURS**
Design of a MACRO PASS-I.		
PRACTICAL NO.04		**4 HOURS**
To perform the arithmetic operations using16-bit processor in ALP		
PRACTICAL NO.05		**2 HOURS**
Block transfer, Block exchange using 16-bit processor in ALP		
PRACTICAL NO.06		**2 HOURS**
System Calls to handle Processes and files		
PRACTICAL NO.07		**6 HOURS**

Case Study

1. Android mobile operating system
2. Study of System calls to list files, directories
3. Study of System calls to handles process

TEXT BOOK

1. John J. Donovan, Systems Programming, 2^{nd} Edition, McGraw Hill, 2010, ISBN: 9780074604823
2. Dhamdhere D., Systems Programming and Operating Systems, 2^{nd} Edition, TMH

REFERENCE BOOK

1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Operating System Concepts, 8^{th} Edition, Wiley, 2009, ISBN: 9788126520510
2. A. S. Tanenbaum, Modern Operating Systems, 3^{rd} Edition, PHI, 2009, ISBN: 9788120339040
3. Alfred Aho, Ravi Sethi and Jeffrey D. Ullman, Compilers - Principles, techniques and tools, Pearson education, ISBN: 0-321-48681-1
4. Leland L. Beck, System Software, Pearson Editions, ISBN: 9788177585551
5. Douglas V Hall, Microprocessors and Interfacing, 3^{rd} edition, McGraw, ISBN: 9781259006159

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	25	25	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 to 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**
Demonstration with Robo Analyser Software / 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 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 Affilated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**COURSE NAME**	Object Oriented Programming using JAVA
	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	25	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET344.CEO.1: To familiarize basic concepts of object oriented programming with Java
ET344.CEO.2: To implement classes and objects of Java
ET344.CEO.3: To emphasize on inheritance and package, IO package and GUI
ET344.CEO.4: To cognize exception handling and multithreading in Java

COURSE OUTCOMES :

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

ET344.CO.1: Describe the principles of object oriented programming
ET344.CO.2: Apply the concepts of classes, methods & inheritance to write Java program
ET344.CO.3: Describe and use the concepts in Java to develop simple user friendly applications

PRACTICAL: Perform any 10 practicals, 11^{th} is mandatory		
PRACTICAL NO.01	**Creation of classes and its instances in Java**	**6 HOURS**
To declare a class, making objects. Implement simple codes to understand Class-Object Relationship. At least two different examples.		
PRACTICAL NO.02	**Different types of methods (functions) in Java**	**4 HOURS**
Implementing methods in Java for example factorial, finding area, finding average etc... or similar type.		
PRACTICAL NO.03	**Constructors in Java**	**4 HOURS**
Declare class and object. Implement at least 2 types of constructors. Different ways of parameter passing to be implemented.		
PRACTICAL NO.04	**Inheritance in Java**	**4 HOURS**
Declare a parent class. Inherit few child classes from the parent class to understand all terms of inheritance. Understanding the significance of public, private and protected keywords.		
PRACTICAL NO.05	**Method overloading in Java**	**4 HOURS**
Declare class and object. Implement overloading for 2 methods, so that student understands polymorphism.		
PRACTICAL NO.06	**Packages in Java**	**2 HOURS**
Declare class and object. Understanding packages by defining methods/functions within a package and outside the package. Using import instruction to use these methods/functions.		
PRACTICAL NO.07	**Interfaces in Java**	**2 HOURS**
Declare class and object. Implement the concept of abstract class and then interfaces.		
PRACTICAL NO.08	**Exception handling mechanism in Java**	**4 HOURS**
Define Class. Write a java program which uses try and catch for exception handling. Also include finally command		
PRACTICAL NO.09	**Multi-Threading in Java**	**4 HOURS**
Write a program to create multiple threads and demonstrate how two threads communicate with each other. Discuss the sequence of occurrences of thread.		
PRACTICAL NO.10	**Applet in Java**	**2 HOURS**
Write a simple program in java to involve the concept of applet. For example: A simple calculator		
PRACTICAL NO.11	**Course Project**	**6 HOURS**
A course project in Java: A group of 4 students can develop a small application in Java. Small projects like: Calculator, Dialog box, Chat box, GUI based music selection, GUI based Image display, GUI based bank database system, GUI based online shopping based on choice, E-learning system, GUI based Admission management system, making small games like Tetris, Snake & ladder etc. **Apart from the above, student can choose any other topic with the approval of the course instructor.**		

TEXT BOOKS

1. Hervert Schildt, The Complete Reference: JAVA2, McGraw Hill, 2011, ISBN: 9781259002465
2. E. Balaguruswamy, Programming with Java: A Primer, McGraw Hill, 2009, ISBN: 9780070141698
3. R Nageswara Rao, Core Java, An Integrated Approach, Dream-tech Press, 2012, ISBN: 9788177228366

REFERENCES:

1. John P. Flynt, Java Programming for the Absolute Beginner, Course Technology, 2007, ISBN: 9781598632750
2. Ken Arnold, The Java Programming Language, Pearson Education India 2008, ISBN: 9788131702215

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**	1.0

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 :

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. 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

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*