
MIT

Academy of
Engineering


MIT ACADEMY OF ENGINEERING, ALANDI
Savitribai Phule Pune University

Curriculum for
Bachelor of Technology in

Electronics & Telecommunication
Engineering

(Choice Based Credit System)

2019-2023


BoS Chairman
Dean, School of
Electrical Engineering


Member Secretary
Academic Council
Dean Academics


Chairman
Academic Council
Director MITAOE



MIT Academy of Engineering, Alandi, Pune
An Autonomous Institute affiliated to SavitribaiPhule Pune University

CURRICULUM FRAMEWORK (REVISION 2019)
ELECTRONICS & TELECOMMUNICATION ENGINEERING

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


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

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

CREDITS				
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	19/21	40
2.	Second Year	21	20	41
3.	Third Year	22	22	44
4.	Final Year	21	15	36
TOTAL				161


CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	29/27	28/30	57
2.	Second Year	31	29	60
3.	Third Year	30	32	62
4.	Final Year	25	20	45
TOTAL				224

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

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


SEMESTER: I (Version I)												
INDUCTION PROGRAM: 3 WEEKS												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			12	16	1	60	220	160	390	60	890	21

SEMESTER: II (Version I)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers //(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC6	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
ESC7	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			11	16	1	60	160	120	390	60	790	19

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

SEMESTER: I (Version II)												
INDUCTION PROGRAM: 3 WEEKS												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
ESC7	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			10	16	1	60	160	120	390	60	790	19

SEMESTER: II (Version II)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
PE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
ESC4	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			13	16	1	60	220	160	390	60	890	21

 Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
	SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	: 2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	: 01/06/2020	
	REVISION NO.	: 1.0	


SEMESTER: III												
SUMMER INTERNSHIP												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC01	ET221	Electronic Devices and Circuits	3	2	-	35	35	30	50	0	150	4
DC02	ET222	Digital Systems and Applications	3	2	-	35	35	30	50	0	150	4
DC03	ET223	Signals & Systems	3	2	-	35	35	30	50	0	150	4
SDP1	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP2	ET230	Minor Project Design	0	2	-	0	0	0	0	50	50	1
SDP3	ET225	Skill Development Course-Data Structures & Algorithms	0	4	-	0	0	25	0	50	75	2
ESC9	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	18	0	140	140	170	200	150	800	21

SEMESTER: IV												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC8	IT221	Engineering Informatics	3	2	-	35	35	30	50	0	150	4
DC04	ET231	Electromagnetic Theory	3	0	-	35	35	30	0	0	100	3
DC05	ET232	Network Analysis Techniques	3	2	-	35	35	30	50	0	150	4
DC06	ET233	Microcontroller & Interfacing	3	2	-	35	35	30	50	0	150	4
SDP4	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP5	ET240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			13	16	0	140	140	170	150	150	750	20

MIT Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
	SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	: 2021-2022
	THIRD YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	: 01/06/2020
REVISION NO.		: 1.0	

SEMESTER: V												
SUMMER INTERNSHIP												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	ET341	Control Systems	3	2	-	35	35	30	50	0	150	4
DC08	ET342	Digital Signal Processing	3	2	-	35	35	30	50	0	150	4
DC09	ET343	Embedded Systems Design	3	2	-	35	35	30	50	0	150	4
OE01	ET35# / EX35#	Open Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP6	ET34#	Skill Development - Data Science	0	4	-	0	0	25	50	0	75	2
SDP7	ET350	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			14	16	0	140	190	195	200	50	825	22

SEMESTER: VI												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	ET361	Power Electronics	3	2	-	35	35	30	50	0	150	4
DC11	ET362	Principles of Communication Systems	3	2	-	35	35	30	50	0	150	4
DC12	ET363	Soft Computing	3	2	-	35	35	30	50	0	150	4
OE02	ET37# / EX37#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP8	ET36#	Skill Development course	0	4	-	0	0	25	50	0	75	2
SDP9	ET360	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability Skills	0	4	-	0	0	25	0	50	75	2
TOTAL			12	20	0	140	140	195	250	100	825	22

 Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
	SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	: 2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	: 01/06/2020	
	REVISION NO.	: 1.0	

SEMESTER: VII												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
DC13	ET461	HDL-Digital Circuit Design	3	2	-	35	35	30	50	0	150	4
DE01	ET48# / EX48#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	ET47# / EX47#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	ET46#	Skill Development Course	0	4	-	0	0	25	50	0	75	2
SDP11	ET470	Project Evaluation	0	8	-	0	0	50	0	100	150	4
SDP12	ET400	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			9	16	0	105	105	165	150	250	775	21

SEMESTER: VIII (PART A)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	ET462	Process Automation	3	2	-	35	35	30	50	0	150	4
DE01	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	-	-	0	50	25	0	0	75	2
TOTAL			10	10	0	70	170	185	50	75	550	15

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
DE02	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
SDP14	ET467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP15	ET468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			6	2	0	70	70	60	50	300	550	15

Natural Science (NSC) : 5 Courses and 20 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	AS105	Calculus and Differential Equations	4
2.	AS106	Engineering Physics	4
3.	CH101	Science of Nature	4
4.	AS107	Statistics and Integral Calculus	4
5.	AS204	Applied Mathematics	4

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

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

Discipline Core (DC) : 14 Courses and 55 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	ET221	Electronic Devices and Circuits	4
2.	ET222	Digital Systems and Applications	4
3.	ET223	Signals & Systems	4
4.	ET231	Electromagnetic Theory	3
5.	ET232	Network Analysis Techniques	4
6.	ET233	Microcontroller & Interfacing	4
7.	ET341	Control Systems	4
8.	ET342	Digital Signal Processing	4
9.	ET343	Embedded Systems Design	4
10.	ET361	Power Electronics	4
11.	ET362	Principles of Communication Systems	4
12.	ET363	Soft Computing	4
13.	ET461	HDL-Digital Circuit Design	4
14.	ET462	Process Automation	4

Discipline Elective (DE) : 2 Courses AND 6 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	ET481	Deep Learning	3
	ET482	Digital Image Processing	
	ET483	Electric Vehicles	
	ET484	RTOS	
2.	ET491	ASIC Design	3
	ET492	Network Security	
	ET493	Signal Detection and Estimation Techniques	
	ET494	Biomedical Engineering	
	ETSWAYAM01	Discipline Elective Swayam MOOC Course	
	ETSWAYAM02	Discipline Elective Swayam MOOC Course	
	ETSWAYAM03	Discipline Elective Swayam MOOC Course	

Skill Development and Project (SDP) : 13 Courses and 30 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	ET224	Digital Prototyping	2
2.	ET230	Minor Project Design	1
3.	ET225	Skill Development Course - Data Structures & Algorithms	2
4.	ET235	Rapid Prototyping	2
5	ET240	Minor Project Implementation	1
6. A	ET344	Skill Development course – Data Science	2
6. B	ET345	Skill Development - Infosys Springboard : Foundation in Data Science	2
7	ET350	Project Design	2
8. A	ET364	Skill Development Course - Networking	2
8. B	ET365	Skill Development Course – MATLAB Based System Modeling	2
9	ET360	Project Implementation	2
10. A	ET463	Skill Development Course – Embedded Linux	2
10. B	ET464	Skill Development Course – Cloud Computing	2
10. C	ET465	Skill Development Course – System Verilog	2
11	ET470	Project Evaluation	4
12	ET400	B Tech Summer Internship	4
12	ET480	Capstone Work	4
14	ET467	Semester Long Internship Design (Elective)	4
15	ET468	Semester Long Internship Implementation (Elective)	4
Audit	ET200	SY Summer Internship	Audit
Audit	ET300	TY Summer Internship	Audit

Open / Minor Elective School Wise : Electronics & Telecommunication Engineering				
Minor Track	Semester	Course Code	Course Name	Course Credits
IoT	V	ET352	IoT Architecture & Sensors	4
	VI	ET372	IoT Network & Protocols	4
	VII	ET472	Data Management & Analytics	4
Robotics	V	ME352	Robot fundamentals and Kinematics	4
	VI	EX371	Robot Dynamics and Control	4
	VII	EX471	AI in Robotics	4
Healthcare Technology	V	ET351	Fundamentals of Healthcare Technology	4
	VI	ET371	Healthcare Informatics	4
	VII	ET471	AI in Healthcare	4

Honors Elective Tracks : 4 Courses					
Sl. No.	Minor Track	Semester	Course Code	Course Name	Course Credits
1	Entrepreneurship	V	HP311	Foundation Course in Entrepreneurship	4
2		VI	HP312	Advanced Course in Entrepreneurship	4
3		VII	HP411	Startup and Incubation	4
4		VIII	HP412	Project: Startup/Venture Development	4
1	Product Design	V	PD301	Fundamental of Design Elements	4
2		VI	PD302	Packaging Design	4
3		VII	PD401	Ergonomics & Human - Product Interface	4
4		VIII	PD402	Product / Systems Design Project	4

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

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)**NPTEL / SWAYAM COURSES RECOMMENDED BY SEE**

Sl. No.	Course Code	Course Name	Credits	Duration in Week	Offering Institute
1	ETSW01	Deep Learning for Computer Vision	3	12	IIT Hyderabad
2	ETSW02	Natural Language Processing	3	12	IIT Kharagpur
3	ETSW03	Modern Digital communication Techniques	3	12	IIT Kharagpur
4	ETSW04	Digital Speech Processing	3	12	IIT Kharagpur
5	ETSW05	Introduction To Industry 4.0 And Industrial Internet of Things	3	12	IIT Kharagpur
6	ETSW06	Introduction To Cloud Computing	3	12	IIT KGP
7	ETSW07	Introduction To Biomedical Imaging System	3	12	IIT Madras
8	EXSW01	Introduction to Robotics	3	12	IIT Madras
9	ETSW08	Data Analytics with Python	3	12	IIT Roorkee
10	ETSW09	Artificial Intelligence: Knowledge Representation And Reasoning	3	12	IIT Madras

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)**NPTEL / SWAYAM COURSES RECOMMENDED BY SEE**

Sl. No.	Course Code	Course Name	Credits	Duration in Week	Offering Institute
11	ETSW10	Computer Networks and Internet Protocol	3	12	IIT Kharagpur
12	ETSW11	Programming in Java	3	12	IIT Kharagpur
13	ETSW12	Introduction To Internet of Things	3	12	IIT Kharagpur
14	ETSW13	Microprocessors and Interfacing	3	12	IIT Guwahati
15	ETSW14	Digital System Design	3	12	IIT Ropar
16	ETSW15	Computer Vision and Image Processing - Fundamentals and Applications	3	12	IIT Guwahati

Open Electives (OE): 03 Courses and 12 Credits							
Programme Name	Minor Track Name	Semester V		Semester VI		Semester VII	
		Course Code	Course Name	Course Code	Course Name	Course Code	Course Name
Chemical Engineering	Process Engineering	CH351	Process Engineering	CH371	Process Modeling and Simulation	CH471	Process Intensification and Integration
	Piping Design and engineering	CH352	Piping Engineering	CH372	Piping Layout	CH472	Piping Design & Engineering
Civil Engineering	Construction Project Management	CV325	Construction Planning and Management	CV332	Operation Research	CV422	Financial Management
	Environmental Engineering	CV326	Solid Waste Management	CV333	Unit Operations for Liquid Waste / Effluent Treatment	CV423	Environmental Impact assessment and Climate Change
	Structural Engineering	CV327	Advanced mechanics of Solids	CV334	Advanced Structural Analysis	CV424	Advanced RC design
Computer Engineering	Data science	CS351	Descriptive Analytics	CS353	Predictive Analysis	CS461	Big Data Analytics
	Machine Learning	CS352	Artificial Intelligence	CS354	Machine Learning	CS462	Deep Learning
Electronics Engineering	Robotics	ME352	Robot fundamentals and Kinematics	EX371	Robot Dynamics and Control	EX471	AI in Robotics

Open Electives (OE): 03 Courses and 12 Credits							
Programme Name	Minor Track Name	Semester V		Semester VI		Semester VII	
		Course Code	Course Name	Course Code	Course Name	Course Code	Course Name
Electronics & Telecommunication Engineering	Internet of Things	ET352	IoT Architecture and Sensors	ET372	IoT Network & Protocols	ET472	Data Management and Analytics
	Healthcare Technology	ET351	Fundamentals of Healthcare Technology	ET371	Healthcare Informatics	E471	AI in Healthcare
Information Technology	Computer Security	ET471	Cryptography and System Security	ET471	Cyber Security and Forensics	IT461	Ethical Hacking & Cyber Laws
Mechanical Engineering	Computer Aided Engineering	ME351	Finite Element Analysis	ME361	Computational Fluid Dynamics	ME491	Advanced Analysis
	Robotics and Automation	ME352	Fundamentals of Robotics	ME362	Kinematics & Dynamics of Robots	ME492	Electrical and Electronics Systems of Robots
	Industrial Engineering & Management	ME353	Industrial Engineering	ME363	Operations Management	ME493	Supply Chain Management
	Automobile Engineering	ME354	Automobile System Design	ME364	Vehicle Dynamics	ME494	Autotronics and e-Vehicles
Entrepreneurship Cell	Innovation, Entrepreneurship & Venture Development	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation



MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to


Savitribai Phule Pune University

Curriculum for

First Year


Bachelor of Technology

2019-2023

 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	
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	
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
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

 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

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

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

COURSE OUTCOMES :

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

THEORY COURSE CONTENT		
UNIT 1	Ordinary Differential Equations of First Order and First Degree	6 HOURS
Exact differential equations, Differential equations reducible to exact form-Integrating factors, Linear differential equations, Differential equations reducible to linear form.		
UNIT 2	Applications of Ordinary Differential Equations of First Order and First Degree	6 HOURS
Orthogonal Trajectories, Newton's law of cooling, Growth & Decay, Electric circuits, Chemical applications- Mixing problems.		
UNIT 3	Linear Differential Equation of Second Order and Higher Order	7 HOURS
General solutions of linear differential equations with constant coefficients, Method of variation of parameters, Equations reducible to linear differential equations with constant coefficients: Cauchy and Legendre's linear differential equation, Simultaneous linear differential equations, Applications.		
UNIT 4	Partial Differentiation	7 HOURS
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables, Homogeneous functions, Euler's Theorem, Differentiation of Implicit functions.		
UNIT 5	Applications of Partial Differentiation	6 HOURS
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function using Jacobians, Functional dependence, Maxima and Minima of functions of two variables.		
UNIT 6	Partial Differential Equations	7 HOURS
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration, Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.		
TUTORIAL		
TUTORIAL NO.01		1 HOURS
Exact differential equations, Differential equations reducible to exact form-Integrating factors.		
TUTORIAL NO.02		1 HOURS
Linear differential equations, Differential equations reducible to linear form.		
TUTORIAL NO.03		1 HOURS
Orthogonal Trajectories, Newton's law of cooling, Growth & Decay		
TUTORIAL NO.04		1 HOURS
Electric circuits, Chemical applications- Mixing problems.		


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

TEXT BOOK

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

REFERENCE BOOK

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

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

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

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

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

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

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

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

COURSE OUTCOMES :

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

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

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

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

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

AS106.CO.5: Evaluate and apply the Schrödinger's equation to the motion of an electron orbiting round the shell.

AS106.CO.6: Apply the concepts of Quantum Physics in different branches of engineering.

THEORY COURSE CONTENT

UNIT 1	Measurement and importance of span (order) of physical quantities	6 HOURS
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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
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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
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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
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Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Planck's quantum law of blackbody radiation, Matter-waves, De-Broglie's concept of matter waves, Heisenberg's Uncertainty Principle, Wave-function, Physical significance of wave function.

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

UNIT 6	LASER and Optical Fiber	5 HOURS
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Stimulated Absorption, Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einstein's coefficients), Principle and working of LASER (Ruby Laser), Application of LASER in optical fiber communication.

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


TEXT BOOK

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

REFERENCE BOOK

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

3. Jenkins & White, Fundamentals of Optics, 4th Edition, Mc Graw Hill Science, 2016, ISBN-0070853460.
4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary, Concepts of Modern Physics-, 6th Edition, Mc Graw Hill Education (India) Pvt. Ltd., 2009, ISBN-10- 0070151555.
5. L I Schiff, Quantum Mechanics, 3rd Edition, Tata Mc Graw Hill Education (India) Pvt. Ltd., ISBN-10- 0070856435, ISBN- 13- 9780070856431.
6. PAM Dirac, Principles of Quantum Mechanics, 4th Edition, CBS publishers and Distributors, 2004, ISBN-10- 0195671074, ISBN- 13- 978019567107
7. D J Griffiths, Introduction to Quantum Mechanics, 2nd Edition, Cambridge India, 2016, ISBN-9781316646513.

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

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

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

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

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

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

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

COURSE OUTCOMES :

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

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

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

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

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

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

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

THEORY COURSE CONTENT		
UNIT 1	Introduction to Science of Nature	7 HOURS
<p>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.</p>		
UNIT 2	Applications of Biology	6 HOURS
<p>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.</p>		
UNIT 3	The Role of Chemistry for Engineers	7 HOURS
<p>(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.</p> <p>(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.</p>		
UNIT 4	Chemical Bonding - The Formation of Materials	8 HOURS
<p>(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.</p> <p>(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.</p>		
UNIT 5	Chemical Analysis and Instrumentation	6 HOURS
<p>Schrodinger's equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohr's atomic model.</p>		

UNIT 6	Water Treatment and Effluent Management	5 HOURS
<p>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</p>		

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


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

TEXT BOOK

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

REFERENCE BOOK

1. Jeffrey S. Gaffney and Nancy A. Marley General Chemistry for Engineers, Elsevier, 2018, ISBN: 978-0-12-810425-5
2. Skoog, West, Holler, Crouch, "Fundamentals of Analytical Chemistry", 8th Edition Cengage Learning, 2009, ISBN-13: 978-81-315-0051-4, ISBN-10: 81-315-0051-9
3. Willard, Merritt, Dean and Settle, "Instrumental Methods of analysis (Chemistry)", 6th edition, Wadsworth Publishing Co., 1988, ISBN-10: 0534081428, ISBN-13: 978-0534081423.
4. Donald R. Askeland, Pradeep Fulay, W. J. Wright, "The Science & Engineering of Materials", 6th Edition, Cengage Learning, 2010, ISBN: 0495668028.
5. O. G. Palanna, "Engineering Chemistry", 1st Edition, Tata McGraw Hill education Pvt. Ltd., 2009, ISBN-13: 978-0-07-014610-5, ISBN (10): 0-07-014610-1.
6. Pradeep T., "A Text Book of Nanoscience and Nanotechnology", Tata McGraw Hill, New Delhi, 2012.
7. Reece, J. B., Taylor, M. R., Simon, E. J. and Dickey, J. L. (2013) Campbell Biology: Concepts and Connections (Seventh Edition) (Pearson) ISBN 1292026359

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

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

COURSE OUTCOMES :

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

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

THEORY COURSE CONTENT		
UNIT 1	AC Circuits	7 HOURS
Energy Scenario, General structure of electrical power systems, A.C. fundamentals, RMS and average value, R-L,R-C,RLC series and parallel circuits, phasor diagram, power triangle and power factor, measures to improve power factor and its effects on Power system and consumer. Work, Power & Energy, costing of electricity, Application of Renewable Energy Systems, Design of PV system (offgrid), Battery selection and its series parallel connections		
UNIT 2	Three Phase Circuit and Power Measurement	7 HOURS
Three phase voltage generation and its waveform, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, three phase 4 wire system, Difference between neutral and ground conductors, Safety measures in electrical system, types of wiring, Active and Reactive Power measurement in single and three phase balanced system.		
UNIT 3	Power Supply and Electronics Devices	7 HOURS
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply, Clipper, Clamper. BJT - Structure and operation, CE, CB, CC configurations, biasing methods, DC Load Line, Transistor as a switch and Amplifier. Opto-electronic devices – Photo conductive cell, Photo Voltaic cell.		
UNIT 4	Digital Systems	7 HOURS
Logic gates, Boolean algebra, KMap, SOP representation. Combinational circuit Design: Adder, Subtractor, MUX, DMUX, Comparator, Code converter Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor and Microcontroller based systems.		
UNIT 5	Measuring System	7 HOURS
Elements of measuring system, Sensors & Transducers –Temperature, Flow, Pressure, Level, IR, Speed & LVDT, Op-Amp – IC 741 pin configuration, Op-amp parameters, Inverting, Non- Inverting & Differential configuration. Applications: Summing & Difference amplifier, Comparator, Voltage follower.		
UNIT 6	Electrical Machines	7 HOURS
Construction of Transformer, principle of operation, EMF equation, VA Rating, Efficiency and Voltage regulation, OC/SC Test on Transformer. Construction, principle of operation and types of DC motor, Speed Control, characteristics equation, PMDC, BLDC, Universal motor, Single phase Induction Motor, Stepper motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICAL:		
PRACTICAL NO.01	Kirchhoff's laws and Superposition theorem	2 HOURS
To develop a circuit for Kirchhoff's laws and Superposition theorem. To build and test both theorems.		
PRACTICAL NO.02	Single Phase Energy (Watt-hour) Measurement.	2 HOURS
To measure energy and power factor. To examine improvement in the power factor. To estimate and compare energy consumption with energy meter.		
PRACTICAL NO.03	R-L-C series A.C. Circuit	2 HOURS
To calculate exact values of R , L and C for variations in X_L and X_C (3 cases) To justify the lagging and Leading nature for the three cases. To find power losses in total R , L and C and verify with total power consumed.		
PRACTICAL NO.04	Verification of relation between Line and Phase quantities in Star and Delta Circuits.	2 HOURS
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation between Line and Phase Quantities. To connect Bulb load in Delta connection and verify the relation between Line and Phase Quantities.		
PRACTICAL NO.05	Power Measurement in Three Phase Balanced Circuit and Single Phase Circuit.	2 HOURS
To measure active and reactive power by Two wattmeter method in three phase circuit. To measure reactive power by One wattmeter method in three phase circuit.		
PRACTICAL NO.06	Open Circuit & Short Circuit Test on a Single Phase Transformer	2 HOURS
To find iron losses and no load circuit parameters To find full load copper losses and Equivalent circuit parameters To determine efficiency and regulation of transformer at various different loading conditions.		
PRACTICAL NO.07	Speed Control of D.C. Shunt Motor	2 HOURS
To vary field current and measure speed To vary armature voltage and measure speed Draw conclusion from both the methods through graphs.		
PRACTICAL NO.08	Step Angle Measurement of Stepper Motor.	2 HOURS
To become familiar with the properties of Stepper Motor. To calculate the step angle of motor.		
PRACTICAL NO.09	Electronics Components and Measuring Instruments	2 HOURS
To study Passive components - Resistors, Capacitors & Inductor. To test semi-conducting components - Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		


PRACTICAL NO.10	D.C. Regulated Power Supply	2 HOURS
To design 12V/ 9V/ 5V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	BJT as a Switch and Amplifier	2 HOURS
To adapt BJT as a switch – On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier – Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		
PRACTICAL NO.12	Combinational Digital Circuits	2 HOURS
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	Sequential Digital Circuits	2 HOURS
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	OP-AMP Applications	2 HOURS
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OP-AMP as summing and difference amplifier. To verify the application of OP-AMP as voltage follower.		
PRACTICAL NO.15	Sensors and Transducer	2 HOURS
To study and verify operation of LVDT. To study and verify the operation of Temperature sensors. (PT100, LM35)		
PRACTICAL NO.16	Design and Simulate using MULTISIM (Min.2)	2 HOURS
To design a counter to display 2-digit Decimal Number (00 to 99) on 7-Segment Display. To design a Flashing LED Display for a specific Pattern using MUX. To design of Inverting/Non-Inverting Amplifier using Op-Amp IC-741 for a specific gain.		

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

TEXT BOOK
<ol style="list-style-type: none"> 1. Edward Hughes, “Electrical and Electronic Technology” 10th Edition, Pearson India, 2011, ISBN-13: 978-8131733660 2. Thomas L. Floyd, “Electronics Devices & Circuits”, 5th Edition, Pearson Education India, 1998, ISBN-13: 978-0136491385. 3. A. Anand Kumar, “Fundamentals of Digital Circuits”, 4th Edition, Prentice Hall of India, 2016, ISBN-13: 978-8120352681

REFERENCE BOOK

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

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

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

COURSE OUTCOMES:

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


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

THEORY COURSE CONTENT		
UNIT 1	Fundamentals of Statics	8 HOURS
<p>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.</p> <p>Further Reading: *Self study-Application to jib crane.</p>		
UNIT 2	Friction	6 HOURS
<p>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.</p> <p>Further Reading: *Self study-Screw friction.</p>		
UNIT 3	Properties of Surfaces	6 HOURS
<p>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.</p> <p>Further Reading: *Self study- Mass moment of Inertia.</p>		
UNIT 4	Kinematics of Planar Motions	7 HOURS
<p>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.</p> <p>Further Reading: *Self study- Curvilinear motion in polar coordinates.</p>		
UNIT 5	Kinetics- Force and Acceleration	6 HOURS
<p>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.</p> <p>Further Reading: *Self study- Free Vibrations.</p>		
UNIT 6	Kinetics Energy and Momentum	6 HOURS
<p>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.</p> <p>Further Reading: *Self study- Space mechanics.</p>		

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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II",10th edition, Tata Mc-Graw-Hill Education, 2012, ISBN: 978-0077402327 2. Ferdinand Singer, "Engineering Mechanics Statics and Dynamics", 3rd edition Harper and Row, 1994 ISBN:0063506610 3. Manoj K Harbola "Engineering Mechanics",1st edition, Cengage Learning, 2009, ISBN:8131509907

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES:

ME104.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.

ME104.CEO.2: To develop & apply visualization skills to simple Objects.

ME104.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES:

The students after completion of the course will be able,

ME104.CO.1: Develop and/or comprehend a simple engineering drawing in both First and Third angle orthographic projections.

ME104.CO.2: Interpret engineering drawings.

ME104.CO.3: Apply visualization skills to development of surfaces.

ME104.CO.4: Analyze engineering drawings.

ME104.CO.5: Decide annotations for two dimensional drawings.

ME104.CO.6: Create manual drawing & CAD data using SP46 standards.

THEORY COURSE CONTENT		
UNIT 1	Visual Thinking and Solid Geometry	12 HOURS
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	Orthographic Projections and Sectional Views	4 HOURS
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views, Missing views.		
UNIT 3	Isometric Projections	4 HOURS
Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of isometric View of Pyramid, Cone, Sphere.		
UNIT 4	Development of Surfaces	2 HOURS
Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.		
UNIT 5	Auxiliary Projections	2 HOURS
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View		
UNIT 6	Freehand Sketching and Technical Drawing	4 HOURS
Free hand sketching- FV & TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles.		

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


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

TEXT BOOK

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

REFERENCE BOOK

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

 MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS		
	SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2019-2020 (Rev. 2019)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	English for Engineers	
	COURSE CODE	HP103	
	COURSE CREDITS	2	
RELEASE DATE : 01/07/2019	REVISION NO	1.0	

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						TOTAL
		THEORY			PRACTICAL			
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	CA	
NIL	4	NIL	NIL	NIL	NIL	60	40	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP103.CEO.1: Introduce a variety of English texts to the students.
 HP103.CEO.2: Teach basic English grammar.
 HP103.CEO.3: Enrich the vocabulary of the students with AWL and NAWL
 HP103.CEO.4: Guide the students to write in English coherently and formally.
 HP103.CEO.5: Improve the students' overall communicative competence in English through activities like group discussions and debates.
 HP103.CEO.6: Develop the students' reading and listening skills with the use of written audio and video texts.

COURSE OUTCOMES :

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


HP103.CO.1: Interpret texts written in English.
 HP103.CO.2: Apply English grammar rules correctly.
 HP103.CO.3: Choose and employ appropriate words from AWL and NAWL in communication.
 HP103.CO.4: Develop sentence and text in English coherently and formally.
 HP103.CO.5: Demonstrate overall improvement in communication skills.
 HP103.CO.6: Analyze and infer from written, audio and video texts.

PRACTICAL:		
PRACTICAL NO.01	Pronunciation and Phonemic Transcription	4 HOURS
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	Parts of Speech	3 HOURS
Use of parts of speech in a sentence composition		
PRACTICAL NO.03	Tenses	5 HOURS
Use of tenses in day to day communication and academic writing		
PRACTICAL NO.04	Vocabulary Enrichment and Common Errors	8 HOURS
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills and Common errors in grammar while speaking and writing English		
PRACTICAL NO.05	Letter and Email Writing	4 HOURS
How to write an email, characteristics and essentials of a good email, formal letter writing and layout of business letters		
PRACTICAL NO.06	Essay Writing	4 HOURS
What is an essay? Tips to write a good essay, Types of essays		
PRACTICAL NO.07	Report Writing and Summarizing	4 HOURS
Types of reports, format and writing a report, what is summarizing? Rules of summarizing		
PRACTICAL NO.08	Group Discussion	4 HOURS
Concept of GD, Criteria for evaluation, types of GD – General, Creative and Technical, Dos and Don'ts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.09	Presentation Skills	4 HOURS
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.10	Role Play	4 HOURS
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation		
PRACTICAL NO.11	Debate	4 HOURS
Concept, Dos and Don'ts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.12	Listening Skills	4 HOURS
Active listening; Conversations, audio and video clips; Listening with comprehension		

PRACTICAL NO.13	Reading Comprehension	4 HOURS
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Ashok Thorat and Munira Lokhandwala: Enriching Oral and Written Communication in English, ISBN 9788125037446
2. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
3. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
4. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
5. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
6. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
7. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
8. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

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

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

COURSE OUTCOMES:

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

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

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

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

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


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

TEXT BOOK

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

REFERENCE BOOK

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

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP105.CEO.1: To perform daily basic activities including below mentioned.
 HP105.CEO.2: Self Introduction, Greetings in Japanese.
 HP105.CEO.3: Introduction to Japanese scripts- Hiragana, Katakana, Kanji.
 HP105.CEO.4: Develop basic vocabulary through group 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

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

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						TOTAL
		THEORY			PRACTICAL			
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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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

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

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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
<ol style="list-style-type: none"> 1. Study and analysis of various components on the motherboard of a standard desktop computer 2. Installation of various components like hard disk drive on the motherboard and check the system setup for verification 3. Formatting the hard disk drive and installation of Windows and Linux operating system making the system dual boot 4. Study of various network components like switch, Router and configure the devices. 5. Crimping of Unshielded Twisted Pair cable. (Cat-6) 6. Study of TCP/IP Stack, and configure as well as develop a Local Area Network. 7. Configuration of Network Monitoring tool and checking the results 8. Installation of DHCP server and checking the results. 9. Installation of web server and checking the results. 10. Configuration of MS Access and Deploying Access 2007 Runtime-Based Solutions. 11. Study and usage of Google Tools (creating Forms, Blog). 12. Using the Google form with add on, create a PDF file of the form. 13. Designing a static HTML page 14. Uploading the pages using FTP server on a web site 15. Deploy a simple web site using LAMP server 16. Creation of a web site using Google sites. 		
PRACTICAL NO.02	Electronics Engineering (Any 06 practical's from the following list)	12 HOURS
<ol style="list-style-type: none"> 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). 		


<p>15 Study of Virtual Instrumentation.</p> <p>16 Open IT : Optical Mouse, Cathode Ray Oscilloscope, Study of Power Supply PA System, CD Player, TV, Microwave oven (Any Two)</p>		
PRACTICAL NO.03	Mechanical Engineering (Any 6 practicals from the following list)	12 HOURS
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. To find the area and included angle of given plot and fix boundary from given plan. 2. To determine the level difference between 5 points with level tube and determine height of tower with trigonometry. 3. To draw the plan of given parcel of land to a given scale. 4. To draw line diagram of household water supply line and sewage line with list of materials used. 5. To draw line diagram of rain water harvesting unit with all details and its importance. 6. To make report on daily water requirement in public building and its waste water disposal, and reuse. 7. To identify and make report on the earthquake resisting structural members of building and its role. 8. To demonstrate the life saving do s and don'ts during the different natural calamities. 9. To demonstrate the dos and donts after different natural calamities. 		

Assessment	Common to all branches	4 HOURS
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TEXT BOOK
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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.

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

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

COURSE OUTCOMES:

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


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

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

TEXT BOOK
<ol style="list-style-type: none"> 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

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

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

COURSE OUTCOMES:

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

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

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

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


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

TEXT BOOK

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

REFERENCE BOOK

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

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

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						TOTAL
		THEORY			PRACTICAL			
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 $e=mc^2$ 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. <ul style="list-style-type: none"> • If n is single digit print square of it. • If n is two digit print square root of it. • If n is three digit print cube root of it. 		
PRACTICAL NO.03		4 HOURS
Solve the Fibonacci sequence using recursive function in Python.		
PRACTICAL NO.04		4 HOURS
Write a Python program to print different patterns.		
PRACTICAL NO.05		2 HOURS
To accept student's five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is $60 \geq$ and <75 then the grade is first division. If aggregate is $50 \geq$ and <60 , then the grade is second division. If aggregate is $40 \geq$ 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
<ol style="list-style-type: none"> 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:		
<ol style="list-style-type: none"> 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", 2nd Edition, Green Tea Press, 2015. (<http://greenteapress.com/thinkpython2/thinkpython2.pdf>) (Chapters 15, 16, 17) (Download pdf files from the above links)

REFERENCE BOOK

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

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

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

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

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

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

COURSE OUTCOMES:

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

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

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

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

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

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

TEXT BOOK

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

REFERENCE BOOK

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



MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to


Savitribai Phule Pune University

Curriculum for

Second Year


**Bachelor of Technology in
Electronics & Telecommunication
Engineering**

2019-2023

 MIT Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III													
SUMMER INTERNSHIP													
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL		
			L	P	T	MSE	ESE	IA	T/P	DM			
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150		4
DC01	ET221	Electronic Devices and Circuits	3	2	-	35	35	30	50	0	150	4	
DC02	ET222	Digital Systems and Applications	3	2	-	35	35	30	50	0	150	4	
DC03	ET223	Signals & Systems	3	2	-	35	35	30	50	0	150	4	
SDP1	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2	
SDP2	ET230	Minor Project Design	0	2	-	0	0	0	0	50	50	1	
SDP3	ET225	Skill Development Course-Data Structures & Algorithms	0	4	-	0	0	25	0	50	75	2	
ESC9	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit		
TOTAL			13	18	0	140	140	170	200	150	800	21	

SEMESTER: IV													
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL		
			L	P	T	MSE	ESE	IA	T/P	DM			
ESC8	IT221	Engineering Informatics	3	2	-	35	35	30	50	0	150		4
DC04	ET231	Electromagnetic Theory	3	0	-	35	35	30	0	0	100	3	
DC05	ET232	Network Analysis Techniques	3	2	-	35	35	30	50	0	150	4	
DC06	ET233	Microcontroller & Interfacing	3	2	-	35	35	30	50	0	150	4	
SDP4	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2	
SDP5	ET240	Minor Project Implementation	0	2	-	0	0	0	0	50	50	1	
HSS3	HP202	Professional Skill	0	4	-	0	0	25	0	50	75	2	
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit		
TOTAL			13	16	0	140	140	170	150	150	750	20	

 Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS		
	SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2020-2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY IT/COMP/ETX AND E&TC ENGINEERING	COURSE NAME	Applied Mathematics	
	COURSE CODE	AS204	
	COURSE CREDITS	4	
RELEASE DATE : 01/07/2020	REVISION NO	1.0	

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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, Diagonalization.		
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, Newton's and Lagrange's 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, Simpson's 1/3rd and Simpson's 3/8th rule.		
PRACTICAL NO.06		2 HOURS
Interpolation techniques: Lagrange's Interpolation.		
PRACTICAL NO.07		2 HOURS
Interpolation techniques: Newton's Interpolation.		
PRACTICAL NO.08		2 HOURS
Solution of differential equation by modified Euler's method.		
PRACTICAL NO.09		2 HOURS
Solution of differential equation by Runge-Kutta method.		
PRACTICAL NO.10		2 HOURS
Curve Fitting: Linear, Quadratic.		
PRACTICAL NO.11		2 HOURS
Solution of algebraic equations: Newton- Raphson method.		
PRACTICAL NO.12		2 HOURS
Solution of algebraic equations: Bisection method.		
PRACTICAL NO.13		2 HOURS
Curve Fitting: Cubic, Exponential.		

TEXT BOOK

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

REFERENCE BOOK

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

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering			COURSE SYLLABI (2019 – 2023)			
	SCHOOL OF ELECTRICAL ENGINEERING			W.E.F	AY: 2020 - 2021 (Rev. 2019)		
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
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 runaway, 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, 3rd Edition, ISBN:9780070634336
3. Boylestad & Louis Nashelsky, Electronic Devices & Circuit theory, Pearson New International Edition, 11th 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, 8th Edition, Pearson Education Limited 2014, ISBN: 978-1292025681
3. David A. Bell, Operational Amplifiers and Linear ICs, Prentice Hall of India, 2nd Edition ISBN: 8120323599
4. Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits , TMH, 2002,3rd Edition, ISBN: 9780070530447

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering			COURSE SYLLABI (2019 – 2023)	
	SCHOOL OF ELECTRICAL ENGINEERING			W.E.F	AY: 2020 - 2021 (Rev. 2019)
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
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
<p>BCD Arithmetic operations, Digital Codes and Parity, Applications of data selector and distributors, Applications of Multi I/O combinational circuits, Parity generators / checkers. Applications: Adder / Subtraction System, Process controller using comparator.</p> <p>Further Reading: Data transmission system with error detection</p>		
UNIT 2	Sequential Circuits	8 HOURS
<p>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 .</p> <p>Further Reading: Digital clock</p>		
UNIT 3	State Machines	8 HOURS
<p>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.</p> <p>Further Reading: ATM Machine</p>		
UNIT 4	Digital Logic Families and Semiconductor Memories	8 HOURS
<p>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.</p>		
UNIT 5	Introduction to HDL	10 HOURS
<p>Introduction to hardware description languages, Modeling and signal assignments in VHDL, Basic constructs and Programming using VHDL.</p> <p>Further Reading: Application for VHDL: Design of combinational circuits</p>		


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, 10th edition (2011) (ISBN-10: 813173448X, ISBN-13: 978-8131734483).
2. Tokheim, Digital Electronics Principles and Applications, McGraw Hill Education, 6th edition (20 May 2004) (ISBN-10: 0070587906, ISBN-13: 978-0070587908).
3. J. Bhasker, VHDL Primer, Pearson India, 3rd edition (ISBN: 978-9332557161).

REFERENCE BOOK

1. M. Morris Mano, Digital Design, PHI, 8th Edition, 2006 (ISBN: 9780131989245).
2. D. P Leach, A. P. Malvino and G. Saha, Digital Principles and Applications, Tata McGraw-Hill, 3rd Edition, 2006 (ISBN-: 978-0028018218).
3. S. Salivahanan, S. Pravin Kumar, Digital Circuits and Design, Vikas Publishing House, 4th edition (2012) (ISBN-10: 9325960419, ISBN-13: 978-9325960411).
4. John F. Wakerly, Digital Design: Principles and Practices, Pearson, 4th Edition, 2008 (ISBN: 9788131713662).
5. A. Anandkumar, Fundamental of Digital Circuits, PHI, 2nd Edition, 2009 (ISBN: 9788120336797).

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021 (Rev. 2019)
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
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
<p>a. To generate standard elementary signals in continuous and discrete time domain.</p> <p>b. To study behavior of plots of elementary signals.</p>		

PRACTICAL NO.02	Dependent and independent operations on signals	2 HOURS
<p>a. To perform signal addition and multiplication in continuous and discrete time domain.</p> <p>b. To perform time shifting, scaling operations in continuous and discrete time domain.</p> <p>c. To observe the effect of change of parameter on signal like speech/image signal.</p>		
PRACTICAL NO.03	Response of Linear Time Invariant (LTI) system	2 HOURS
<p>a. To observe responses of LTI system whose impulse response is known</p> <p>b. To observe responses of LTI system for various impulse responses.</p>		
PRACTICAL NO.04	Fourier analysis of on a speech signal	2 HOURS
<p>a. Applying Fourier and Inverse Fourier transform on speech signal.</p> <p>b. To observe spectra and calculate ESD of speech signal.</p>		
PRACTICAL NO.05	Correlation of a signal	4 HOURS
<p>a. To correlate speech signals.</p> <p>b. To comment on results of autocorrelation and cross correlation.</p>		
PRACTICAL NO.06	Solving differential equation using Laplace Transform	2 HOURS
<p>a. To formulate differential Equation using Laplace Transform.</p> <p>b. To solve differential equation using inverse Laplace transform.</p>		
PRACTICAL NO.07	Sampling Theorem	2 HOURS
<p>a. To analyze under sampled and oversampled signals.</p> <p>b. To comment on reconstructed signal while observing sampling signal.</p> <p>c. To observe the effect of changing sampling rate on reconstructed audio signal.</p>		
PRACTICAL NO.08	LTI system using z Transform	2 HOURS
<p>a. To study the transfer function of the system.</p> <p>b. To check if the given system is stable and causal.</p>		


PRACTICAL NO.09	Audio signal processing	2 HOURS
<p>a. To read .wav file and plot audio input signal.</p> <p>b. To implement sampling and reconstruction of audio/music signals.</p> <p>c. To perform filtering audio/music signals.</p>		
PRACTICAL NO.10	Image analysis	2 HOURS
<p>a. To show image information.</p> <p>b. To perform image filtering</p>		

TEXT BOOK

1. Signals and Systems, Alan V. Oppenheim, Alan S. Willsky and Ian T. Young, 2nd Edition, Pearson, 2015 (ISBN: 978-9332550230)
2. Principles of Linear Systems and Signals, B. P. Lathi, 2nd Edition, Oxford Press, 2009 (ISBN: 978-0198062271)
3. Fundamentals of Signals and Systems, Michael Robert and Govind Sharma, 2nd Edition, McGraw Hill Education, 2010 (ISBN: 978-0070702219)

REFERENCE BOOK

1. Signals and Systems, Simon Haykin, Barry Van Veen, 2nd Edition, John Wiley & Sons, 2007 (ISBN: 978-8126512652)
2. An Introduction to Analog and Digital Communications, Simon Haykins, 2nd Edition Wiley India, 2006 (ISBN: 978-0471432227)
3. Signals and Systems - principles and applications, Shaila Dinkar Apte, 1st Edition, Cambridge University press, 2016. (ISBN: 978-1107146242)
4. Signals and Systems with MATLAB, Won Young Yang, 1st Edition, Springer, 2011 (ISBN: 978-8132203957)

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021 (Rev. 2019)
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. Soldering <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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, <ol style="list-style-type: none">1. Creation of data flow diagram2. Creation of block diagram3. 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 (An autonomous Institute Affiliated to SPPU)	Academy of Engineering	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021 (Rev. 2019)
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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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 (1st week and 2nd week)
2. Finalizing title, feasibility study and approval: 3 Weeks (3th week to 5th week)
3. Engineering Ethics: 3rd week
4. Project Review 1 Presentation: 6th week
5. Analysis and Design of the Project: 3 Weeks (7th week to 9th week)
6. Project Review 2 Presentation: 10th week
7. Report Writing, Documentation and Presentation: 2 Weeks (11th week and 12th week)
8. Project Review 3 Presentation: 13th week (Assessment by Guide)
9. Final Evaluation/Examination Presentation: 14th 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 <ul style="list-style-type: none"> • 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

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Data Structures and Algorithms
		COURSE CODE	ET225
		COURSE CREDITS	2
RELEASED DATE : 01/07/2020		REVISION NO	1.0

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

COURSE OBJECTIVES :

- ET225.CEO.1: To explore the basic concepts of data structures and algorithms.
 ET225.CEO.2: To understand the different ways of data representation.
 ET225.CEO.3: To study the representation, implementation and applications of linear data structures.

COURSE OUTCOMES :

- The students after completion of the course will be able to,
 ET225.CO.1: Summarize the searching and sorting techniques.
 ET225.CO.2: Develop and implement code for linked list , stack and Queue data structures.
 ET225.CO.3: Design code for various real time application.

Data Structure is the mechanism by which you can store data in a computer system. It allows an application to fetch and store data in the computers memory in an efficient manner. It is very important to identify and select the correct type of data structure for particular application. We are exploring the different types of data structures and learn how to implement them to solve real world problems.

PRACTICAL		
PRACTICAL NO.01	Array and Structure with Functions	2 HOURS
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Array of Structures. • Create, display, search and delete operations on Database. • Assignment No. 3.1 		
PRACTICAL NO.04	Dynamic Memory Management	4 HOURS
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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 , 4th Edition , (ISBN 13 : 978-1259029967).
2. Yashavant Kanetkar, Data Structures Through C, BPB Publication, 2nd 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, 3rd Edition, 2010 (ISBN: 9781259029547).
2. D. P Yedidyah Langsam, Moshe J Augenstein, Aaron M Tenenbaum, Data structures using C, Pearson India , 2nd Edition (ISBN-: 978-8131702291).
3. S.K. Srivastav, Deepali Srivastav, Data Structure Through C, BPB Publication , 2nd 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 SYLLABUS	
	SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	COURSE NAME	Environmental Science
	COURSE CODE	CV203
	COURSE AUDIT	1
RELEASE DATE : 01/07/2020	REVISION NO	1.0

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

PRE-REQUISITE :

COURSE OBJECTIVES :

- CV203.CEO.1: Create awareness about environmental problems among future citizens.
 CV203.CEO.2: Interpret basic knowledge about the environment and its allied problems.
 CV203.CEO.3: Develop an attitude of responsibility for the environment and society.
 CV203.CEO.4: Perceive the importance of sustainable development.

COURSE OUTCOMES :

- The students after completion of the course will be able to,
- CV203.CO.1: summarize the importance of ecosystem and biodiversity for maintaining ecological balance.
 CV203.CO.2: identify environmental problems arising due to engineering and technological activities and the science behind those problems.
 CV203.CO.3: categorize the major pollutants along with sources and abatement devices for the environmental management.
 CV203.CO.4: perceive the social and professional responsibility towards the environment.

THEORY		
Module I	Overview of Environment	2HOURS
Multidisciplinary nature of environmental studies, Types of spheres, Natural Resources: Forest, Water, Mineral, Energy, Land, Ecosystems, Biodiversity and its conservation, Natural cycles: Hydrologic, Carbon, Nitrogen, Phosphorus and Sulphur cycle.		
Module II	Environmental Pollution	2 HOURS
Environmental Pollution: Air, Water, Soil, Solid and Hazardous Waste Management; Environment and human health, Overutilization of natural resources, Environmental Legislation, Environmental monitoring organizations in India, Environmental Protection Agency (EPA)		
Module III	Global Environmental Issues	2 HOURS
Introduction to: Climate change, Global warming, Acid rain, Ozone layer depletion, Plastic waste management, Municipal solid waste management, Food problem, E-waste management, Social Issues: Environmental ethics and economics.		
Module IV	Sustainable Development	2 HOURS
Concept of sustainable development, International Institute of Sustainable Development (IISD) : Introduction Sustainable goals, Environmental Audits, Rainwater harvesting Water management techniques		


Activity Based Learning and Evaluation:		
Activity No. 1	Site Visit	02 HOURS
<p>Students have to visit any one nonhazardous polluted site for finding the various reasons of its pollution and suggest preventive measures for it. Prepare the detailed report on it along with the photos. This could be completed in a group.</p>		
Activity No. 2A	Students has to perform any one of the following activities : (2A or 2B)	02 HOURS
<p>Students have to organize any one of the following activities in the institute and prepare a detailed report on their experience of organizing conducting the activity, its possible benefits to the environment along with the photos. This could be completed in group of students:</p> <ol style="list-style-type: none"> 1. No Car and Bike Day 2. Shutting down the fans and air conditioning systems of the campus for an hour. 3. Environmental awareness programs like organizing essay competition, poster competition, slogan making competition or any other related to it. 4. Celebrating various environmental days. 5. Any other similar activity related to the environment. 		
Activity No. 2B	Project Work	2 HOURS
<p>Students have to identify the real life environmental problems from their daily observations and try to find out the various feasible solutions for it as their project work. They are supposed to prepare the prototype, demonstration model, poster, detailed report and present it to the evaluators. The project should be related to the below mentioned heads:</p> <ol style="list-style-type: none"> 1. Reuse, Recycle and Reduce 2.Environmental Pollution Monitoring and Control 3.Material Balance Concept 4.Sustainable Development 5.Environmental Innovations The evaluation is based on at least one number of project presentation reviews apart from the final project presentation. 		

TEXT BOOK

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

REFERENCE BOOK

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

 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 (Rev. 2019)	
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						TOTAL
		THEORY			PRACTICAL			
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	2	35	35	30	NIL	25	25	150

PRE-REQUISITE: CS102 Application Programming - Python, ME105 Engineering Tools and Techniques

COURSE OBJECTIVES :

IT221.CEO.1: To introduce facts, concept and theory of an information system for decision making.
IT221.CEO.2: To understand information evolution using data processing cycle.
IT221.CEO.3: To explain information transmission for its visualization and interpretation.
IT221.CEO.4: To design digital data acquisition system for information generation.

COURSE OUTCOMES :

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

IT221.CO.1: Interpret Data, Information and Knowledge.
IT221.CO.2: Make use of data acquisition techniques for an information system.
IT221.CO.3: Categories different storage techniques.
IT221.CO.4: Develop dashboard for effective communication of information.
IT221.CO.5: Determine components of Human computer interface interaction.
IT221.CO.6: Design digital information acquisition system.


THEORY :		
UNIT 1	Fundamentals of Informatics	6 HOURS
<p>Data, Types of Data: Primary data, Secondary data, Operational data, Derived data, Structured, Semi-Structured, Unstructured</p> <p>Meta data : Administrative and Descriptive</p> <p>Data forms: Analog and Digital (Telephone and Stenography) ADC and DAC.</p> <p>Information, Information Life Cycle</p> <p>Knowledge, Types of Knowledge: Procedural, Declarative, Tacit and Explicit etc.</p> <p>Self-Study: Grade Sheet Generation system</p> <p>Further Reading: Customer Relationship Management (CRM)</p>		
UNIT 2	Data Acquisition and Information generation	6 HOURS
<p>Data Collection Methods:</p> <p>Human Interface Interview, Interrogation, Survey and Observation</p> <p>Hardware and Software Interface Digital Data Acquisition System: Introduction to Microprocessor and Micro-controller</p> <p>Web Interface: Web scrapper</p> <p>Data Processing Cycle, Data Processing Stages Activities, Business Pyramid Model, Information System.</p> <p>Self-Study: Weather forecasting System</p> <p>Further Reading: Trivago, Spot Code, QR Code</p>		
UNIT 3	Information Storage and Transmission	6 HOURS
<p>Need of data storage, Types of storage: stand alone, centralized, distributed</p> <p>Cloud: Deployment Model, Services, Advantages and Disadvantages</p> <p>Transmission Modes : Simplex, Half Duplex and Full Duplex</p> <p>Transmission Types :- Serial (Synchronous and Asynchronous) and Parallel, Satellite Transmission : Features and Types (GEO,MEO and LEO)</p> <p>Wireless Communication : Bluetooth, Zigbee and RFID</p> <p>Encryption and Decryption.</p> <p>Self-Study: Evolution of Storage</p> <p>Further Reading: LoRa and Sigfox</p>		
UNIT 4	Information Visualization	6 HOURS
<p>Dashboard: Definition, Components: Pivot Table, Pivot Chart, Slicer and General Charts</p> <p>Types: Operational, Strategic and Tactical, Advantages</p> <p>KPI / Grains: Definition, Design Rules, Assessing Quality of Dashboard</p> <p>Dashboard Vs Scoreboard.</p> <p>Self-Study: Dashboard Vs. Scoreboard</p> <p>Further Reading: Information Dashboard Design</p>		

UNIT 5	Interactive Interface attributes	6 HOURS
<p>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</p>		
UNIT 6	Acquisition system and IoT	6 HOURS
<p>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</p>		
PRACTICAL :		
PRACTICAL NO.01		8 HOURS
<p>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:</p> <ul style="list-style-type: none"> • 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
<p>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.</p> <ul style="list-style-type: none"> • 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
<p>Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi.</p> <ul style="list-style-type: none"> • 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 		

<p>TEXT BOOK</p> <hr/> <ol style="list-style-type: none"> 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

<p>REFERENCE BOOK</p> <hr/> <ol style="list-style-type: none"> 1. Gerard Joungyun 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
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 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021 (Rev. 2019)
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		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		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
<p>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.</p> <p>Self-Study: Review of Vector Algebra & Vector Calculus</p> <p>Application: Electrostatic Discharge & Cathode Ray Oscilloscope</p> <p>Book: R Shevgaonkar, Electromagnetic Waves & Matthew N. O. Sadiku, Elements of Electromagnetics</p>		
UNIT 2	Magnetostatic Fields	8 HOURS
<p>Steady magnetic field, Biot-Savarts Law, Amperes Circuit Law, Magnetic Flux Density, Scalar and Vector Potentials, Magnetic Forces, Magnetic Torque & Moment, Magnetic Dipole.</p> <p>Self-Study: Applications of ACL</p> <p>Application: Lightning & Polywell</p> <p>Book: E. C Jordan, K. G Balmain, Electromagnetic Waves & Radiating Systems, Matthew N. O. Sadiku, Elements of Electromagnetics</p>		
UNIT 3	Maxwell's Equations	8 HOURS
<p>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.</p> <p>Application Note: Memristor</p> <p>Case Study: EMI/EMC Testing Labs</p> <p>Demonstration: Maxwells Equation using MATLAB</p> <p>Book: Matthew N. O. Sadiku, Elements of Electromagnetics</p>		
UNIT 4	Electromagnetic Waves	10 HOURS
<p>Waves in General, Wave Propagation in Lossy Dielectrics, Plane waves in dielectric media, conducting media, Skin Effect & Surface Impedance. Reflection of Plane Waves.</p> <p>Transmission Lines: Distributed Parameters, Transmission Line Equations, Standing Waves, Impedance Matching, Smith chart, Scattering Parameter, Microstrip Transmission Line. Introduction to waveguides.</p> <p>Self Study: Applications of Transmission Line Quarter Wave Transformer, Single Stub Tuner</p> <p>Application: Microwave Oven The Cheese Experiment</p> <p>Case Study: Analysis of RMSA using HFSS</p> <p>Book: R Shevgaonkar, Electromagnetic Waves & Matthew N. O. Sadiku, Elements of Electromagnetics</p>		

UNIT 5	Radio Wave Propagation	6 HOURS
<p>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 Earth's Magnetic Field, Space Link Geometry.</p> <p>Self Study: Radar Range Equation, Phase & Group Velocity, Ionospheric Abnormalities.</p> <p>Application Note: Block diagram of Satellite and Radar Communication</p> <p>Book: Matthew N. O. Sadiku, Elements of Electromagnetics & William H. Hayt Jr., Engineering Electromagnetics</p>		

TEXT BOOK
<ol style="list-style-type: none"> 1. Matthew N. O. Sadiku, Elements of Electromagnetics, Oxford Univ Press (Sd); 6th edition, 2014, ISBN-13: 978-019974300. 2. R Shevgaonkar, Electromagnetic Waves, McGraw Hill Education, 1st Edition, 2017, ISBN-13: 978-0070591165.

REFERENCE BOOK
<ol style="list-style-type: none"> 1. William H. Hayt, Jr., Engineering Electromagnetics, McGraw Hill Education (India) Private Limited; 8th edition, 2011, ISBN-13: 978-0073380667. 2. E. C Jordan, K. G Balmain, Electromagnetic Waves & Radiating Systems, PHI Learning Pvt Ltd.; 2nd edition, 1964, ISBN-13: 978-8120300545. 3. Karl E. Lonngren, Sava Savov, Randy J. Jost, Fundamentals of Electromagnetics with MATLAB, SciTech Publishing Inc; 3rd edition, 2012, ISBN-13: 978-8120337374. 4. Joseph Edminister, Electromagnetics (Schaum's Outline Series), McGraw Hill Education (India) Private Limited; 2nd edition, 2010, ISBN-13: 978-0070681958.

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering		COURSE SYLLABI (2019 – 2023)	
	SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021 (Rev. 2019)
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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, wavelength, 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. Interconnection of two ports (series connection, parallel connection) 2. Design Equivalent networks 		
PRACTICAL NO.09	Measurement of transmission line parameters	2 HOURS
<ol style="list-style-type: none"> 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 , 12th edition, Pearson Education, ISBN-978-0137146666.
2. Ravish R. Singh, Electrical Network, 1st Edition, McGraw Hill Education ISBN-13: 978-0070260962
3. John Douglas Ryder, Networks Lines and Fields, 2nd Edition, PHI, 1949, ISBN: 9788120302990

REFERENCE BOOK

1. D. Roy Choudhary, Network and Systems, 2nd Edition, New Age International, 2010 ISBN: 9788122427677
2. William Hayt, Jack Kemmerly and Steven Durbin, Engineering Circuit Analysis, 8th Edition, McGrawhill, 2013, ISBN: 9781259098635
3. Franklin F. Kuo, Network Analysis and Synthesis, 2nd Edition, Wiley, 2010 (ISBN: 9788126510016).
4. M. E. Van Valkenburg, Network Analysis, 3rd Edition, Pearson Education India, 2015 (ISBN: 978-9332550131).
5. S. P.Ghosh and A. K. Chakraborty, Network Analysis and Synthesis, 1st edition, 2009, McGraw Hill Education, ISBN-9780070144781
6. William D. Stanley, Network Analysis with Applications, 4th, 2003, Pearson Education India, ISBN-978-8131703182.

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)		
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021 (Rev. 2019)	
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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 × 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

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021 (Rev. 2019)
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. Final Presentation and demonstration of models. 2. Report submission (assessment). 		

REFERENCE BOOK
<ol style="list-style-type: none"> 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.

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021 (Rev. 2019)
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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, it's 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 (1st, 2nd week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (4th, 5th week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (9th, 10th week)
4. Preparation of Project Progress Report I (week 11th and 12th) Project Phase-II
5. Project Review III (10 marks) (11th week)
6. Evaluation by external examiner (End Semester by 12th, 13th week)

Demonstration and Presentation (50 Marks)

1. **Review 1 (Project Implementation) (10 marks)**
2. **Review 2 (Project Demonstration) (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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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

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

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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
<ol style="list-style-type: none"> 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 (An Autonomous Institute Affiliated to SPPU)	Academy of Engineering	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES		W.E.F	2020-2021 (Rev. 2019)
SECOND YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Liberal Learning
		COURSE CODE	HP203
		COURSE CREDITS	AUDIT
RELEASE DATE : 01/07/2020		REVISION NO	1.0

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

<p>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.</p>		
Track 8	Yoga and Meditation	12 HOURS
<p>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.</p>		
Track 9	Automotive Skills	12 HOURS
<p>Introduction to Automotive system, Brake system, Power train of automotive, Suspension system, Computer Aided Engineering, Manufacturing and safety, Assembly and finishing.</p>		
Track 10	Empathy & Compassion	12 HOURS
<p>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.</p>		
Track 11	Singing	12 HOURS
<p>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.</p>		
Track 12	Chess	12 HOURS
<p>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.</p>		
Track 13	RC Plane	12 HOURS
<p>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.</p>		

Track 14	Drone Making	12 HOURS
<p>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.</p>		

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



MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to

Savitribai Phule Pune University

Curriculum for

Third Year


**Bachelor of Technology in
Electronics & Telecommunication
Engineering**

2019-2023

MIT Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
	SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	: 2021-2022
	THIRD YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	: 01/06/2020
REVISION NO.		: 1.0	

SEMESTER: V												
SUMMER INTERNSHIP												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	ET341	Control Systems	3	2	-	35	35	30	50	0	150	4
DC08	ET342	Digital Signal Processing	3	2	-	35	35	30	50	0	150	4
DC09	ET343	Embedded Systems Design	3	2	-	35	35	30	50	0	150	4
OE01	ET35# / EX35#	Open Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP6	ET34#	Skill Development - Data Science	0	4	-	0	0	25	50	0	75	2
SDP7	ET350	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			14	16	0	140	190	195	200	50	825	22

SEMESTER: VI												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	ET361	Power Electronics	3	2	-	35	35	30	50	0	150	4
DC11	ET362	Principles of Communication Systems	3	2	-	35	35	30	50	0	150	4
DC12	ET363	Soft Computing	3	2	-	35	35	30	50	0	150	4
OE02	ET37# / EX37#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP8	ET36#	Skill Development course	0	4	-	0	0	25	50	0	75	2
SDP9	ET360	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability Skills	0	4	-	0	0	25	0	50	75	2
TOTAL			12	20	0	140	140	195	250	100	825	22

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)		
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)	
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
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.

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Digital Signal Processing
		COURSE CODE	ET342
		COURSE CREDITS	4
RELEASED DATE : 01/07/2021		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET342.CEO.1: To understand the concept of digital signal processing and its implications
 ET342.CEO.2: To explore different transforms & their use in design and analysis of LTI systems
 ET342.CEO.3: To explore the design techniques of IIR and FIR filters by different methods
 ET342.CEO.4: To analyze concept of multi-rate signal processing & its applications
 ET342.CEO.5: To introduce architecture of DSP processor TMS320C5xxx

COURSE OUTCOMES :

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

ET342.CO.1: Analyze LTI systems using DFT
 ET342.CO.2: Model & Synthesize IIR and FIR filters
 ET342.CO.3: Develop single stage and multi-stage sampling rate converters
 ET342.CO.4: Build practical applications using DSP processor in the context of architecture and programming


THEORY COURSE CONTENT		
UNIT 1	Discrete Fourier Transform	9 HOURS
<p>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</p> <p>Applications: Spectral Analysis, JPEG Image compression using DCT & Video Compression using MPEG</p>		
UNIT 2	IIR Filter Design	9 HOURS
<p>Concept of IIR, Design methods Impulse Invariance, Bi-linear Transformation, Butterworth, Chebyshev, Frequency transformations, Filter Structures, Finite word length effect in IIR filter design</p> <p>Applications: IIR filter design for real time Applications</p>		
UNIT 3	FIR Filter Design	8 HOURS
<p>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</p> <p>Applications: Removal of ECG Signal noise using FIR filter</p>		
UNIT 4	Multirate Signal Processing	8 HOURS
<p>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</p> <p>Applications: Speech & audio coding using Multirate Signal Processing</p>		
UNIT 5	DSP Processors	8 HOURS
<p>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</p> <p>Applications: Implementation of IIR and FIR Filters, FFT Algorithm, Fast Convolution</p>		

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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 1. Implementation of Filter IIR, FIR 2. Implementation of FFT Algorithm 		

TEXT BOOK
<ol style="list-style-type: none"> 1. John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 4th Ed., Pearson, 2007, ISBN: 9788131710005 2. S. K. Mitra, Digital Signal Processing - A Computer Based approach, 3rd Ed., McGraw Hill Education, 2007, ISBN: 978-007066756 3. Emmanuel C. Ifeakor and Barrie W. Jervis, Digital Signal Processing: A Practical Approach, 2nd Edition, Pearson, 2008, ISBN: 9788131708248

REFERENCE BOOK
<ol style="list-style-type: none"> 1. Alan V. Oppenheim and Ronald W. Schaffer, Discrete Time Signal Processing, 3rd Edition, Pearson, 2013, ISBN: 9789332505742 2. Sen M. Kuo and Woon-Seng S. Gan, Digital Signal Processors: Architectures, Implementations and Applications, 1st Ed., Pearson, 2010, ISBN: 9788131717936 3. Li Tan, Digital Signal Processing: Fundamentals and Applications, 1st Edition, Elsevier-Academic Press, 2008, ISBN: 9780123740908 4. P. P. Vaidyanathan, Multirate Systems And Filter Banks, 1st Edition, Pearson, 2008, ISBN: 978-0136057185 5. Wills Tompkins, Biomedical Digital Signal Processing, Prentice Hall, 1999, ISBN: 9780130672162 6. 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

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Embedded System Design
		COURSE CODE	ET343
		COURSE CREDITS	4
RELEASED DATE : 01/07/2021		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET343.CEO.1: To Introduce Hardware/ Software co-design in embedded system
 ET343.CEO.2: To Illustrate ARM Cortex processor & its features
 ET343.CEO.3: To discuss ARM Cortex based microcontroller & its applications in embedded system
 ET343.CEO.4: To explain real world interfacing & programming with ARM

COURSE OUTCOMES :

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

ET343.CO.1: Interpret H/W & S/W co-design.
 ET343.CO.2: Explain architecture of ARM processor
 ET343.CO.3: Analyze ARM cortex microcontroller with its applications in embedded system.
 ET343.CO.4: Develop applications using ARM Cortex based microcontroller.

THEORY COURSE CONTENT		
UNIT 1	Hardware/ Software Co-design	6 HOURS
Introduction to embedded systems, Characteristics of embedded system, hardware software partitioning techniques, Components & categories of co-design, Hardware / Software system model, Embedded system design and development cycle		
UNIT 2	Introduction to ARM	4 HOURS
Design approaches - RISC design philosophy, ARMs approach towards RISC, ARM processors and its versions, ARM7, ARM9 & ARM11 features, advantages , Embedded system Hardware & Software, Memory , AMBA bus, Pipeline in ARM		
UNIT 3	ARM Cortex Processor	8 HOURS
Introduction to ARM CORTEX series processors, Features & Applications, Improvement of CORTEX over classical series, block diagram, Register set and operating modes, Bit banding, Tail Chaining, Thumb & Thumb2 instructions, Mixing ARM and Thumb instructions, Interrupts & Exceptions, Memory Mapping, CMSIS standard for ARM Cortex		
UNIT 4	ARM Cortex based Microcontroller	8 HOURS
Survey on ARM Cortex based microcontrollers, its features and comparison, ARM CORTEX based controller architecture, Memory mapping, System Control, Clocking & Power control, NVIC, GPIO, Pin connect block.		
UNIT 5	Real World Interfacing	6 HOURS
Interfacing of LED , GLCD, Keypad, Programming of on chip peripherals ADC, UART, Timer, PWM Case Studies- Home Automation, Patient monitoring system , Smart precision irrigation system		
UNIT 6	Configuring Communication Protocols	8 HOURS
Programming of I2C, SPI, CAN , ETHERNET, USB, Wi-Fi Case Studies- ECU & ABS control using CAN, Ethernet for IoT, SD card using SPI		

PRACTICAL		
PRACTICAL NO 01		2 HOURS
Interfacing & Programming of LED with different patterns		
PRACTICAL NO 02		4 HOURS
Interfacing & Programming of Graphical LCD with different patterns		
PRACTICAL NO 03		2 HOURS
Programming of on chip UART		


PRACTICAL NO 04		2 HOURS
Implementation of on-chip 10-bit ADC (4 / 8 channels)		
PRACTICAL NO 05		2 HOURS
Programming on chip PWM for motor control		
PRACTICAL NO 06		4 HOURS
Interfacing of EEPROM using in-built I2C Protocol		
PRACTICAL NO 07		4 HOURS
Implementation and programming of CAN bus protocol		
PRACTICAL NO 08		4 HOURS
Implementation and programming of Ethernet bus protocol		
PRACTICAL NO 09		4 HOURS
Implementation and programming of SPI protocol		
PRACTICAL NO 10		2 HOURS
Programming of on chip Timer		

TEXT BOOK

1. Andrew N. Sloss, Dominic Symes and Chris Wright, ARM System Developers Guide Designing and Optimizing System Software, 1st Edition, 2014, Morgan Kaufmann Publishers, ISBN:1-55860-874-5
2. Joseph Yiu, The Denitive Guide to ARM Cortex-M3 and Cortex-M4 Processors, 3rd Edition, Elsevier, ISBN: 978-0-12-382090-7
3. Arnold S Berger, Embedded System Design, 1st edition, CMP books, ISBN:1-57820-073-3

REFERENCE BOOK

1. Trevor Martin, The Designers Guide to the Cortex-M Processor Family, 2nd Edition, 2013, Elsevier, ISBN: 9780080982991
2. Steve Furber, ARM System on Chip Architecture, 2nd Edition, 2001, Pearson, ISBN: 9788131708408.
3. Daniel Gajski, Frank Vahid, Sanjiv Narayan, Jie Gong, Specification & Design of embedded system, 2nd edition, 2008, Pearson, ISBN: 978-81-317-1612-0.
4. Technical references and user manuals on www.arm.com

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)		
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)	
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
<p>IoT Architecture: Building architecture, Main design principles and needed capabilities, An IoT architectural overview.</p> <p>IoT Reference Model: IoT domain model, Information model, Functional model, Communication Model, Security Model.</p> <p>IoT Reference Architecture: Deployment and Operational view.</p>		
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
<p>Purpose and Requirements specification for IoT, IoT level Specification, Operational view specification, application development</p> <p>Case studies: Home automation, Cities: Smart parking, Environment: Whether monitoring system, Air pollution monitoring, Forest fire detection, Agriculture: Smart irrigation</p>		

PRACTICAL		
MODULE 01	Introduction to IoT Programming	2 HOURS
To implement the Queue using array.		
MODULE 02	CISCO Packet Tracer (Any 3)	6 HOURS
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • To build real-time Environment Monitoring System using ESP8266 and ThingSpeak • To build an Home Automation System using Thingier.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
<ul style="list-style-type: none"> • Raspberry Pi OS Installation • Introduction of basic Linux commands 		

TEXT BOOK

1. Arshdeep Bahga and Vijay Madisetti, Internet of Things, A Hands-on Approach, 1st 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, 3rd Edition 2010, Mcgraw Higher Ed, ISBN: 9780070702066
5. Ramon Pallas-Areny and John G. Webster, Sensors and Signal Conditioning, 2nd 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 (An autonomous Institute Affiliated to SPPU)	Academy of Engineering			COURSE SYLLABI (2019 – 2023)	
	SCHOOL OF ELECTRICAL ENGINEERING			W.E.F	AY: 2021 - 2022 (Rev. 2019)
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/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME352.CEO.1: To understand the basics of robotics and various robot structures.
 ME352.CEO.2: To describe different types of sensors and actuators
 ME352.CEO.3: To discuss forward kinematics and Inverse kinematics of robots
 ME352.CEO.4: To analyze different transmission system used in robot.
 ME352.CEO.5: To evaluate the Trajectory planning techniques used for robots
 ME352.CEO.6: To apply the concepts of balancing the robots

COURSE OUTCOMES :

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


ME352.CO.1: List the key components of Industrial robot. [L1]
 ME352.CO.2: Classify, sensors and actuators of industrial robots. [L2]
 ME352.CO.3: Select transmission system for robots. [L4]
 ME352.CO.4: Apply the kinematics and Inverse kinematics principles to robot. [L3]
 ME352.CO.5: Determine Trajectory for given robot. [L5]
 ME352.CO.6: Build the task based robot by applying knowledge of sensors, actuators. [L6]

THEORY COURSE CONTENT		
UNIT 1	Introduction	6 HOURS
<p>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.</p> <p>Self Learning topics: Recent advancement in Robotics.</p>		
UNIT 2	Sensor and Actuators	8 HOURS
<p>Sensors: Sensor classification, Internal Sensors, External Sensors, Sensor Selection Criteria, Interfacing with microcontrollers.</p> <p>Actuators: Pneumatic, hydraulic, electric (DC, servomotor, stepper motor), Selection of motors, Interfacing with microcontrollers.</p> <p>Self Learning topics: Remote Center Compliance Device (RCC)</p>		
UNIT 3	Power Transmission System & Robot End Effectors	6 HOURS
<p>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.</p> <p>Self Learning topics: Harmonic Drive and its construction</p>		
UNIT 4	Kinematics of Robot	8 HOURS
<p>Translational Matrix, Rotation Matrix, Homogenous transformation, Euler's Angle, Denavit Harden-berg parameters, Direct kinematics of a manipulator, Inverse kinematics by Geometric approach and Algebraic approach. Velocity and Static forces in Manipulators</p> <p>Self Learning topics: Kinematics model of Industrial Robot</p>		
UNIT 5	Trajectory Planning and Manipulator Control	6 HOURS
<p>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.</p> <p>Self Learning topics: Potential field method for motion planning</p>		
UNIT 6	Balancing of Robots	6 HOURS
<p>Centre of Gravity, Static balancing, Dynamic balancing, Balancing of revolving masses and Balancing of reciprocating masses, Critical speed.</p> <p>Self Learning topics: Balancing machines. Vibration Isolators</p>		

PRACTICAL		
PRACTICAL NO.01		4 HOURS
Topic Selection and component requirement analysis of particular robot.		
PRACTICAL NO.02		4 HOURS
Interfacing and programming of different types of sensors with Microcontroller using Electronics Trainer Kit.		
PRACTICAL NO.03		4 HOURS
Interfacing and programming DC, Servo motors using Microcontroller with and without Joystick.		
PRACTICAL NO.04		2 HOURS
Performance on Pneumatic Actuators using trainer kit.		
PRACTICAL NO.05		2 HOURS
Build and simulate the kinematic model of a given robot using a suitable software		
PRACTICAL NO.06		4 HOURS
To determine trajectory for a given robot using trajectory planning technique		
PRACTICAL NO.07		2 HOURS
Study of Robot operating System (ROS).		
PRACTICAL NO.08		6 HOURS
Capstone Project - Build a task based Robot with sensors and Actuators		

TEXT BOOK
1. Mikell P. Groover, Industrial Robots - Technology, Programming and applications, McGraw Hill, New York, 2014, ISBN: 978-0070249899
2. Deb S. R. and Deb S., Robotics Technology and Flexible Automation, Tata McGraw Hill Education Pvt. Ltd, 2010. ISBN: 978-0070077911
3. John J.Craig, Introduction to Robotics, Pearson, 2009, 2 nd edition, ISBN: 978-0201543612
4. Reza Jazar, Theory of Applied Robotics, 2010, Springer US, ISBN: 978-0-387-68964

REFERENCE BOOK
1. Richard Klafner, 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 (An autonomous Institute Affiliated to SPPU)	Academy of Engineering	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Fundamentals of Healthcare Technology
		COURSE CODE	ET351
		COURSE CREDITS	4
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

COURSE OBJECTIVES :
ET351.CEO.1: To acquire the concepts of engineering principles in anatomy and physiology of human body.
ET351.CEO.2: To study sensors, electrodes, basic and latest technological development in Healthcare related to human systems
ET351.CEO.3: To discern the role of engineers in Healthcare sector and e-health services.
ET351.CEO.4: To learn the necessity and applications of Healthcare 4.0
ET351.CEO.5: To get the concepts of smart healthcare instrumentation.
ET351.CEO.6: To study technical aspects of E-healthcare System

COURSE OUTCOMES :
The students after completion of the course will be able to,
ET351.CO.1: Connect the concepts of engineering principles with anatomy, physiology, bio-signals and disorders of the human system.
ET351.CO.2: Explore the sensors, electrodes, basic and latest technological development in Healthcare related to human systems.
ET351.CO.3: Relate the role of engineers in Healthcare sector and tele- health services.
ET351.CO.4: Intricate the Healthcare 4.0
ET351.CO.5: Correlate the necessity of Smart and 3D printing medical devices with the current health-care requirements.
ET351.CO.6: Discover the opportunities of development in e-healthcare System

THEORY COURSE CONTENT		
UNIT 1	Human Physiology and Bio signal	3 HOURS
Human Anatomy, Physiology, Pathology. Cellular, extra cellular matrix, tissues, organs and systems as integrated system. Bio signal Generation and propagation Action and Resting potential Self-Study: Physiological systems of Human body and their Interrelation with each other.		
UNIT 2	Human Body Systems	9 HOURS
Basic Anatomy, Physiology, deceases / disorders, Bio-signals, Sensors and Electrodes, Basic Technologies, latest technological development in Healthcare for following Human body systems: Cardiovascular System, Nervous System, Respiratory system. Self-Study: Special senses (vision, hearing, equilibrium, smell, taste).		
UNIT 3	Management of Healthcare systems	4 HOURS
Healthcare System/ Hospital: Structure and organization, Management and IT Healthcare. Fostering relation among medical sciences and Engineering - Psychology, Logic interfaces, Social role and Application. Role of Engineer, Equipment and Technologies in every department of a Healthcare System. Biomedical Ethics. Hazards safety.		
UNIT 4	Healthcare 4.0	4 HOURS
Healthcare 4.0: Overview, necessity and requirements, Management and Technologies, Applications		
UNIT 5	Smart Healthcare Instrumentation system	10 HOURS
Healthcare Instrumentation system: Smart Medical devices - Internet of Medical Things (IoMT), Affordable medical devices, 3-D Printing Medical devices		
UNIT 6	e-connected Healthcare system	6 HOURS
E-Healthcare System IT Healthcare, Biotelemetry System, Telemedicine System, M-Healthcare System, E-Pharmacy Case study: Tele-ambulance, eICU		

PRACTICAL		
PRACTICAL NO.01	Charts and Models Home Assignment	2 HOURS
Identification of various organs and skeletal parts from charts and models.		
PRACTICAL NO.02	Modeling Resting and Action Potential	2 HOURS
Simulate and understand the different stages of action potential and the biophysical explanation behind the generation of action potential.		

PRACTICAL NO.03	ECG measurement and analysis	4 HOURS
<ul style="list-style-type: none"> • ECG Electrodes, ECG extraction and ECG Analysis. • Design and Simulate to count pulse rate from ECG. • Measure pulse rate using finger plethysmography 		
PRACTICAL NO.04	EEG measurement and analysis	2 HOURS
EEG Electrodes, EEG extraction and EEG Analysis.		
PRACTICAL NO.05	Spirometry	2 HOURS
Recording respiratory parameters through spirometry		
PRACTICAL NO.06	BP Measurement and Analysis	2 HOURS
To study, measure and analyze Blood Pressure using sphygmomanometer / Digital BP Instrument		
SHORT TERM INTERNSHIP (STI):		
The main objective of keeping Internship in the course is to give exposure of real world problems in healthcare industry through interaction with medical experts and technician, operating procedure and manufacturing of medical equipment and their limitations.		
It will be in two parts: one in healthcare organization and second in healthcare industry.		
STI 01	Healthcare organization	8 HOURS
In any hospitals / diagnostic center / Blood bank / pathology labs		
STI 02	Healthcare Industry	8 HOURS
In any Biomedical equipment manufacturing industry		
Outcome of STI:		
<ul style="list-style-type: none"> • Need to present the exposure of work experience gained. • Identify the problems or requirements in the existing healthcare system / instrument • Propose the possible solution for identified problem / requirements. • Work on the proposed solution as a project in next two semesters. 		


TEXT BOOK
<ol style="list-style-type: none"> 1. K. Saladin, Anatomy & Physiology: The Unity of Form and Function, McGraw-Hill College, 7th edition, 2014. 2. L. Cromwell, F. J. Weibell and E. A. Pfeiffer, "Biomedical Instrumentation and Measurements", Pearson Education, 2nd edition, ISBN: 81-317-0315-0. 3. D. Jude Hemanth, J. Anitha, George A. Tsihrintzis, Internet of Medical Things: Remote Healthcare Systems and Applications (Internet of Things)

REFERENCE BOOK

1. Shalini Suri, Hospital Management and Hospital Operations, APH
2. Gupta Joydeep Das, Hospital Administration And Management: A Comprehensive Guide, Jaypee
3. Joel Rodrigues, Sandra Sendra Compte and Isabel Dez, e-Health Systems- Theory and Technical Applications, 1st Edition

FURTHER READINGS

1. S Ramakrishnan, Manual of Medical Laboratory Techniques, Jaypee Brothers Medical Publishers , First edition, 2012
2. [VirtualLabs-NPTEL Labs for Biotechnology and Biomedical Engineering \(vlab.co.in\)](#)
3. [Neuron Simulation Virtual Lab \(pilot\) : Biotechnology and Biomedical Engineering: Amrita Vishwa Vidyapeetham Virtual Lab](#)
4. [VirtualLabs \(vlabs.ac.in\)](#)
5. <https://www.ncbi.nlm.nih.gov/books/NBK44714/>
6. <https://www.ncbi.nlm.nih.gov/books/NBK221803/>

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering			COURSE SYLLABI (2019 – 2023)		
	SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY			W.E.F		AY: 2021 - 2022 (Rev. 2019)
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			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
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
<p>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</p> <p>Case Study:</p>		
UNIT 2	Systems and Procedures for Planning and Control	5 HOURS
<p>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)</p> <p>Case Study:</p>		
UNIT 3	Cost Estimating, Budgeting and Risk Management	5 HOURS
<p>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</p> <p>Case Study:</p>		
UNIT 4	Project Quality Management and Organization Behavior	5 HOURS
<p>Contents: The Concept of Quality, The Processes of Project Quality Management, Techniques for Quality Assurance during System Development, Stakeholders, Managing Participation, Teamwork and Conflict.</p> <p>Case Study:</p>		
UNIT 5	The Corporate Context	5 HOURS
<p>Contents: Project Management Maturity and Maturity Models, Knowledge and Time Management, International Projects and associated problems, Entrepreneurs and Startup.</p> <p>Case Study:</p>		

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

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Skill Development Course: Data Science
		COURSE CODE	ET344
		COURSE CREDITS	2
RELEASED DATE : 01/07/2021		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET344.CEO.1: Familiarize basic concepts of python programming
 ET344.CEO.2: Summarize the concepts of algebra, calculus and statistics
 ET344.CEO.3: Make use of data visualization libraries and feature engineering techniques

COURSE OUTCOMES :


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

ET344.CO.1: Apply python programming concepts
 ET344.CO.2: Relate basic concepts of algebra, calculus and statistics
 ET344.CO.3: Apply different data visualization libraries and feature engineering techniques

MODULES		
MODULE NO.01	Python Programming	12 HOURS
<ol style="list-style-type: none"> 1. Basic Python Programming (Syntax, Comments, Variables, Data types, Operations) 2. Data Structures (List, Dictionary, Set, Tuple and operations) 3. Loops and statements (if-else, for, while, continue, break) 4. In-built functions, User defined functions, Lambda function 5. Handling dates 6. Some useful libraries/packages 7. Numpy package 8. Pandas package 		
MODULE NO.02	Algebra & Calculus	04 HOURS
<ol style="list-style-type: none"> 1. Matrix Algebra <ul style="list-style-type: none"> • Types of matrices • Algebraic Operations on matrices • Transpose, Determinant, Inverse of matrix • Solving System of Linear Equations • Eigen values Eigen vectors • G-inverse • Singular Value Decomposition • Applications of Matrix algebra in Business cases 2. Calculus <ul style="list-style-type: none"> • Mathematical Functions • Derivatives • Integration • Gradient Descent Algorithm • Applications of Calculus algebra in Business cases 		

MODULE NO.03	Statistics	18 HOURS
<ol style="list-style-type: none"> 1. Introduction, Visualizing and Summarize different types of data 2. Random variable, Probability and Probability distributions 3. Bernoulli, Binomial, Poisson 4. Normal 5. Population and Sample 6. Sampling Distributions 7. Tests of hypothesis (t-test, Chi-square test, F-test for mean, variance, proportion, attribute dependency) 8. Correlation and Simple Linear Regression 		
MODULE NO.04	Data Visualization	04 HOURS
<ol style="list-style-type: none"> 1. Data Visualization Libraries in Python 2. Pandas, Matplotlib, Seaborn 3. Data Visualization for different types of data 4. Bar chart, Pie chart, Histogram, Density plot, scatter-plot, scatter-matrix 		
MODULE NO.05	Feature Engineering	02 HOURS
<ol style="list-style-type: none"> 1. Transformations on data 2. Min-max, Binary, Discrete, Standardize, Log and Power transformations, One-hot-encoding, Zero-One. 		

REFERENCE BOOK
<ol style="list-style-type: none"> 1. Samir Madhavan, “Mastering Python for Data Science”, Packt Publishing; 1st edition, ISBN-13: 978-1784390150, August 2015. 2. Allen B. Downey, “Think Stats: Probability and Statistics for Programmers”, O’Reilly Media, Inc., ISBN: 9781449307110, July 2011. 3. Jake VanderPlas, “Python Data Science Handbook: Essential Tools for Working with Data”, O’Reilly Media, 1st edition, ISBN-13: 978-1491912058, December 2016. 4. Peter Bruce and Andrew Bruce, “Practical Statistics for Data Scientists”, O’Reilly; 1st edition, ISBN-13:978-1491952962, June 2017.

 MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Project Design
		COURSE CODE	ET350
		COURSE CREDITS	2
RELEASED DATE : 01/07/2021		REVISION NO	0.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET350.CEO.1: To embrace innovation and creativity in project design while empathizing real world needs.

ET350.CEO.2: To acquaint with requirement analysis process and techniques.

ET350.CEO.3: To inculcate the agile project management tools for project design and planning.

ET350.CEO.4: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

ET350.CO.1: Delineate the problem to be solved.

ET350.CO.2: Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges.

ET350.CO.3: Carry out systematic literature review, planning and project design.

ET350.CO.4: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

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

GUIDELINES

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

COLLABORATIVE/SPONSORED PROJECT

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

TIMELINE

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

ASSESSMENT and EVALUATION

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

1. Background Study and Literature Review (10 Marks)
2. Synopsis (5 Marks)
3. Project Review I: Problem Identification, Motivation, Relevance, Background Study, Literature Review (10 Marks)
4. Project Review II: Literature Review, Problem Definition, Project Planning, Analysis and Design (10 Marks)
5. Project Report (10 Marks)
6. Final Presentation and Demonstration (30 Marks)

REFERENCES

1. Nicholas John M., "Project Management for Engineering, Business and Technology", Butterworth Heinemann, ISBN: 9780080967042
2. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
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 re-search 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. Guide-line 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 / re-search papers / research material / industry report / books / blogs / Websites / manuals etc. for the de-cided topic.

Week 6	Guideline to perform background study /Literature Review and various ways of documenting literature review.(School Level Awareness Session)	Documentation of referred resources, publication details, contribution and identification of opportunities/gap in the field.	Systematic literature review, background study, and its documentation.
Week 7 and 8	Guidelines for defining problem statement, objectives, and scope of the work.	Explore related work and define problem statement, objectives etc.	Refinement in proposed work /synopsis if any.
Week 9	Verification and Validation of Project Proposal created by students.	Refinement in the proposal as per suggestion by guide and review members.	Review Presentation II.
Week 10 and 11	Introduction of tools for Project Design, Modelling, Simulation and planning etc. Verification of the Proposed Methodology of the solution.	Use various software/hardware tools for Project Management, Project Design, and Simulation. Description of methodology. Algorithm Steps, Process, Modules, milestones. System Architecture, Modeling diagrams etc.	Design Documentation, Graphical Presentation of proposed solution and entire planning of project implementation and evaluation.
Week 12 and 13	Introduction to Project Report Writing tools and plagiarism checking. Guidelines for Project Documentation and Ethics in Writing. (School Level Awareness Session)	Prepare the Project Report as per format shared by Project Coordinator.	Project Documentation: Project Report Writing, Final Synopsis.
Week 14	Verification of Project Report, Final Synopsis prepared by Students	Refinement in the project report as per suggestion by guide and review members.	Review Presentation III.
Final End Semester Examination: Project Design: Report, Presentation and Demonstration.			

NOTE:

1. School should organize awareness sessions on topics highlighted in RED.
2. Suggested to provide templates for project documents at the starting of the semester such as Synopsis, Literature Review, Report, Review Presentation I, II, III and Final Presentation

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering			COURSE SYLLABI (2019 – 2023)			
	SCHOOL OF ELECTRICAL ENGINEERING			W.E.F	AY: 2021 - 2022 (Rev. 2019)		
THIRD YEAR BACHELOR OF TECHNOLOGY				COURSE NAME		Power Electronics	
				COURSE CODE		ET361	
				COURSE CREDITS		4	
RELEASED DATE : 01/07/2021				REVISION NO		1.0	

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET361.CEO.1: Understand working & analysis of controlled converters.
 ET361.CEO.2: understand the working of 1 φ and 3 φ inverters.
 ET361.CEO.3: Study and analyze applications like UPS, electronic ballast, HVDC transmission.
 ET361.CEO.4: Study use of power electronics for renewable energy sources.

COURSE OUTCOMES :

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

ET361.CO.1: Design and implement a triggering / gate drive circuit for power converters.
 ET361.CO.2: Design and analyze different power electronic converters.
 ET361.CO.3: Analyze various power quality issues and their remedies.
 ET361.CO.4: Analyze applications of power electronics.

THEORY COURSE CONTENT		
UNIT 1	Power Semiconducting Devices	6 HOURS
Construction, Principle of operation : Power diodes, SCR, TRIAC, MOSFET, IGBT; Methods of turning ON SCR, Methods of Driving/Firing circuits, SCR commutation circuit, series and parallel connections, Study of datasheet, Protection of SCR.		
UNIT 2	Converters : Rectifiers	8 HOURS
Introduction to Uncontrolled Rectifier, Single phase Semi & Full wave rectifiers with R and RL load and effect of freewheeling diode, Three phase controlled Semi & Full wave rectifiers with R and RL load and effect of freewheeling diode and effect of source inductance. Input and output performance parameters like power factor. Application: Triggering circuit for mobile charger, Control circuit for Household UPS.		
UNIT 3	Converters : Inverters	8 HOURS
Operation of Single phase half / full bridge voltage source inverter with R and RL load and performance parameters. Voltage control of single phase PWM inverter, harmonic neutralization technique. Three phase voltage source inverter with balanced R star load with 120 and 180 mode of operation.		
UNIT 4	DC-DC converters & AC Voltage Controller	6 HOURS
Working principle of step down chopper, step up chopper, Control strategies, Classification of Chopper, Online and Offline UPS. Single-phase AC voltage controller with R load, Cyclo-converters, types of cyclo-converter. Application: Control circuit for SMPS of a desktop.		
UNIT 5	Power Electronics Applications - Electric Vehicle - I	6 HOURS
Overview, Components of electric vehicles, General Layout of EV, EV Classification, Comparison with Internal combustion Engine and hybrid electric vehicle : Technology, Advantages and Disadvantages of EV. Energy Sources Techniques; Introduction to EV charging strategies, EV charging options and infrastructure. Overview of Tesla car.		
UNIT 6	Power Electronics Applications - Electric Vehicle - II	6 HOURS
Introduction and operation of brushless DC motor, Commutation of brushless motor, Speed change of brushless motor using PWM technique. PI control of brushless motor with electric vehicle as load and calculation of performance parameters overshoot, rise time, settling time and stability.		
PRACTICAL: Perform following experiments using PSIM, MATLAB or Open source software		
PRACTICAL NO.01		2 HOURS
Design and Implement Triggering circuit for Thyristor (Using R or RC or UJT or IC-785)		
PRACTICAL NO.02		2 HOURS
VI Characteristics of SCR, IGBT, MOSFET / Study of datasheets.		


PRACTICAL NO.03		2 HOURS
Simulation of AC-DC conversion		
PRACTICAL NO.04		2 HOURS
Simulation of DC-AC conversion		
PRACTICAL NO.05		2 HOURS
Simulation of DC-DC conversion		
PRACTICAL NO.06		2 HOURS
Simulation of AC-AC conversion		
PRACTICAL NO.07		2 HOURS
Study of various elements of the transmission system (clutch, differentials, gearbox, etc.)		
PRACTICAL NO.08		2 HOURS
Speed control of DC motor using IGBT		
PRACTICAL NO.09		2 HOURS
Speed Control of BLDC Motor		
PRACTICAL NO.10		2 HOURS
Case study of Tesla car/ Toyota prius.		

TEXT BOOK

1. M. H. Rashid, "Power Electronics circuits, devices and applications", 3rd edition, Pearson Education, 2014, ISBN-13: 978-93325357704.
2. Robert W. Erickson, "Fundamentals of Power Electronics", 2nd Edition, Kluwer Academic Publishers, 2001, ISBN-13: 978-0792372707.
3. James Larminie and John Lowry, "Electric Vehicle Technology Explained", 2nd Edition, Wiley Publication, 2012, ISBN: 978-1-119-94273-3.

REFERENCE BOOK

1. U. R. Moorthi, "Power Electronics, Devices, Circuits & Industrial Applications", Oxford University Press India; 1st Edition, 2005, ISBN: 978-0195670929.
2. M. S. Jamil Asgar, "Power Electronics", PHI Learning Private Limited-New Delhi; 1st Edition, 2004, ISBN: 978-8120323964.
3. D. P. Kothari, "Renewable Energy Sources and Emerging Technologies", PHI Learning Private Limited-New Delhi; 2nd edition, 2011, ISBN: 978-8120344709.
4. Mehrdad Ehsani, Yimin Gao and Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Standards media", 2009, ISBN: 978-1420053982.

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Principles of Communication Systems
		COURSE CODE	ET362
		COURSE CREDITS	4
RELEASED DATE : 01/07/2021		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET362.CEO.1: Study the fundamental concepts of communication engineering
 ET362.CEO.2: Scrutinize various modulation and demodulation techniques
 ET362.CEO.3: Understand the concept of random variables and processes as applied to communication engineering
 ET362.CEO.4: Learn transmitter and receiver techniques
 ET362.CEO.5: Examine error performance in digital communication system
 ET362.CEO.6: Understand information theoretic behavior in communication system, several source and channel coding techniques

COURSE OUTCOMES :

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

ET362.CO.1: Illustrate the fundamental concepts and terminologies of communication systems
 ET362.CO.2: Inspect different analog modulation, demodulation schemes along with transmitter and receiver circuitry
 ET362.CO.3: Explain the concept of random variables and processes with statistical parameters
 ET362.CO.4: Analyze various source and channel coding methods
 ET362.CO.5: Examine optimum receiving techniques and error performances of digital modulation schemes

THEORY COURSE CONTENT		
UNIT 1	Communications Systems	6 HOURS
Elements of communication Systems, Terminologies in communication, Modulation and Demodulation, Noise analysis		
UNIT 2	Analog Modulation	8 HOURS
Principles and types of analog modulation, Types of Amplitude and Angle modulation, Spectra of AM and FM, AM and FM transmitter and receiver		
UNIT 3	Random Variables and Processes	8 HOURS
Random Variables, Probability density function, Cumulative distribution function, marginal and conditional distributions, mean, variance, correlation, covariance, Gaussian distribution, Random process, Types of random processes		
UNIT 4	Digital Modulation Techniques	8 HOURS
Signal space representation, Orthogonal expansion of signals, Gram Schmidt process, Digital modulation techniques: Amplitude, phase and frequency shift keying, Pulse Code Modulation, Delta Modulation, Continuous phase modulation		
UNIT 5	Optimum Receivers	8 HOURS
Channel model, Maximum A posteriori Probability and Maximum Likelihood receiver, Error probability, Correlation and Matched filter receiver, Optimal Detection and Error Probability for ASK, PSK and QAM		
UNIT 6	Information Theory, Capacity and Coding	8 HOURS
Introduction to information theory, Mutual Information, Source encoding and decoding, Channel capacity, Channel encoding and decoding, Hamming codes, Error correction and detection capability		

PRACTICAL: Perform following experiments using MATLAB and LabVIEW - USRP 2901		
PRACTICAL NO.01	Amplitude Modulation	2 HOURS
Investigate classical analog amplitude modulation and the envelope detector (Hardware and/or Software experiment)		
PRACTICAL NO.02	Double Sideband Suppressed Carrier	2 HOURS
Generate Double Sideband Suppressed Carrier (Hardware and/or Software experiment)		
PRACTICAL NO.03	Frequency Modulation	2 HOURS
Generate and demodulate Frequency Modulated waveform (Hardware and/or Software experiment)		
PRACTICAL NO.04	Amplitude Shift Keying	2 HOURS
Transmit and receive ASK signal (Hardware and/or Software experiment)		


PRACTICAL NO.05	Frequency Shift Keying	2 HOURS
Transmit and receive FSK signal (Hardware and/or Software experiment)		
PRACTICAL NO.06	Binary Phase Shift Keying	2 HOURS
Perform BPSK modulation technique (Hardware and/or Software experiment)		
PRACTICAL NO.07	Quadrature Phase Shift Keying	2 HOURS
Perform QPSK modulation technique (Hardware and/or Software experiment)		
PRACTICAL NO.08	Equalization	2 HOURS
Study of equalization technique to deal with inter symbol interference (Software experiment)		
PRACTICAL NO.09	Error Performance of any Digital Modulation Scheme	2 HOURS
Simulate any digital modulation scheme and analyze its error performance (Software experiment)		
PRACTICAL NO.10	Any Source code/Channel Code implementation	2 HOURS
Write a code to implement any one source code or channel code (Software experiment)		

TEXT BOOK

1. Wayne Tomasi, "Electronic Communications Systems: Fundamentals through Advanced", Pearson-Always Learning, 5th edition ISBN : 987-8131719534
2. George Kennedy, Bernard Davis and S R M Prasanna, "Electronic Communication Systems", McGraw Hill Education Pvt. Ltd. 5th Edition, ISBN (13) : 978-0-07-107782-8
3. John G. Prokis and Masoud Salehi, "Communication Systems Engineering", Pearson-Always learning, 2nd edition ISBN-13: 9787040169058

REFERENCE BOOK

1. Simon Haykin, "Communication System", 4th Edition, Wiley publications, ISBN 0471178691
2. Amitabha Bhattacharya, "Digital Communication", TMH, ISBN 9780070591172
3. Bernard Sklar, "Digital Communication", Pearson, 2nd Edition, ISBN: 9788131720929
4. P. Ramkrishna Rao, "Digital Communication", TMH, ISBN: 9780070707764
5. Peyton Z. Peebles Jr., "Probability, Random Variables and Random Signal Principles", 4th Edition, Tata McGraw-Hill, New Delhi, 2002, ISBN: 978-0071127820
6. H. Stark and J. W. Woods, "Probability and Random Processes with Applications to Signal Processing", Pearson, 2003, ISBN: 978-0130200716

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering			COURSE SYLLABI (2019 – 2023)	
	SCHOOL OF ELECTRICAL ENGINEERING			W.E.F	AY: 2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY			COURSE NAME		Soft Computing
			COURSE CODE		ET363
			COURSE CREDITS		4
RELEASED DATE : 01/07/2021			REVISION NO		1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET363.CEO.1: Illustrate the basic concepts and techniques of machine learning.

ET363.CEO.2: Explore supervised and unsupervised learning paradigms of machine learning for regression and classification

ET363.CEO.3: Develop a deeper understanding of several algorithms in machine learning.

ET363.CEO.4: Evaluate and interpret the results of the machine learning algorithms for solving practical problems.

COURSE OUTCOMES :

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

ET363.CO.1: Explain fundamentals of machine learning.

ET363.CO.2: Describe supervised and unsupervised learning.

ET363.CO.3: Analyze mathematically various machine learning approaches and paradigms.

ET363.CO.4: Implement machine learning solutions for classification, regression, and clustering problems.

ET363.CO.5: Compare various machine learning techniques and to get an insight of when to apply a particular machine learning approach.

THEORY COURSE CONTENT		
UNIT 1	Machine Learning Fundamentals	6 HOURS
Introduction to Machine Learning, Types of Learning, Linear Regression, Logistic Regression, Concept of Underfitting and Overfitting, Bias-Variance Tradeoff, Model assessment, Cross Validations, Accuracy and Error measures, Confusion metric, Precision, Recall, F1 Score, Analysis of ROC, AUC.		
UNIT 2	Statistics and Probabilistic Learning	8 HOURS
Probability Concept, Decision Trees, Random Forest, Nave Bayes, Introduction to Ensemble Methods		
UNIT 3	Supervised Machine Learning Algorithm	6 HOURS
K Nearest Neighbors (KNN.) Support Vector Machine, Optimization Objective of SVM, Maximum Margin Principle, Lagrangian Multipliers for SVM and Kernel Function.		
UNIT 4	Artificial Neural Network	8 HOURS
Neural Network Representation, Perceptron, Activation Function and Types, Multilayer Network and Backpropagation Algorithm.		
UNIT 5	Unsupervised Learning	8 HOURS
Feature Space, Dimensionality Reduction, Principal Components Analysis (PCA), Principal of Clustering, K-Means, Hierarchical Agglomerative clustering, Case Study Using Clustering Algorithm.		
UNIT 6	Open CV for Computer Vision	8 HOURS
Introduction to OpenCV, Installation, Image Operations eg. read, display, writing, reading and setting image properties. opening video, Capture Video/Frame from Camera, applying functions on frame, Drawing geometric shapes on frame eg. line, rectangle, circle, ellipse, polygon, text. Arithmetic Operations on Image, ROI, RBG and HSV Color Space. Case Study on Computer Vision using Machine Learning Algorithm		

PRACTICAL		
PRACTICAL NO.01	Experimental Data Analysis: Perform following operations on any open dataset available in Python/Kaggle	2 HOURS
<ul style="list-style-type: none"> • Load data into a data frame from a csv or any other file format. • Identification of variables and data types. • Find Missing Values. Replace/eliminate missing values • Drop unessential columns. • Find average/min/max of numeric columns. Display summary of data frame. • Bivariate analysis using plots through seaborn functions, cleaning the data, plotting graphs. 		


PRACTICAL NO.02	Liner Regression and Logistic Regression Model Implementation on Given Dataset	4 HOURS
<ul style="list-style-type: none"> • Build a Linear Regression Model using Real estate price prediction dataset. • Developed a Logistic regression model for classification. 		
PRACTICAL NO.03	Implementation of Decision Tree, Random Forest, KNN, Nave Bayes with hyperparameter tuning	4 HOURS
Developed Supervised Learning Model on selected Dataset.		
PRACTICAL NO.04	Machine Learning for Image Classification	2 HOURS
<ul style="list-style-type: none"> • Use of SVM for Image Classification. • Implementation of PCA 		
PRACTICAL NO.02	Implementation of Unsupervised Machine Learning	2 HOURS
Implement both the k-means algorithm and the Hierarchical Agglomerative Clustering (HAC) algorithm		
PRACTICAL NO.06	Implementation of IOT Solution using Machine Learning	4 HOURS
<ul style="list-style-type: none"> • Data Collection. • Data Cleaning, Filtering and Feature Extraction • Evaluation and Identification of ML Model • Training the ML Model • Outcome Predication • ML Model Deployment. 		
PRACTICAL NO.07	ANN for Computer Vision	2 HOURS
<ul style="list-style-type: none"> • Creating Simple Neural Network. • Implement ANN for Image Classification. 		
PRACTICAL NO.08	Open CV for Computer Vision	2 HOURS
Use Open CV Library for Image Processing		

TEXT BOOK

1. Ethem Alpaydin, “Introduction to Machine Learning”, 2nd Edition, MIT Press, ISBN: 978-0-262-01243-0
2. Christopher Bishop, “Pattern Recognition and Machine Learning”, 2nd Edition, Springer. 2006, ISBN-13: 978-0387310732
3. Andreas C. Mller and Sarah Guido, “Introduction to Machine Learning with Python: A Guide for Data Scientists”, 1st Edition, O’Reilly Media, ISBN 978-14-4936-941-5
4. Tom Mitchell, “Machine Learning”, 1st Edition, McGraw-Hill Science/Engineering/Math, 1997, ISBN: 0070428077

REFERENCE BOOK

1. Trevor Hastie, Robert Tibshirani and Jerome Friedman, “The Elements of Statistical Learning”, 2nd Edition, Springer-Verlag,2009, ISBN: 978-0-387-84857-0
2. Kevin Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012, ISBN: 9780262018029
3. Simon Haykin, “Neural Networks: A comprehensive foundation”, Prentice Hall International Inc. 1999, ISBN: 0132733501

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)		
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)	
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	IoT Network and Protocols	
		COURSE CODE	ET372	
		COURSE CREDITS	4	
RELEASED DATE : 01/07/2021		REVISION NO	1.0	

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET372.CEO.1: Categorize the basic taxonomy and terminology of networking.
 ET372.CEO.2: Correlate the functioning of various protocol as per communication layer.
 ET372.CEO.3: Appraise the importance of computer network in IoT applications.
 ET372.CEO.4: Illustrate the cryptography and network security techniques.

COURSE OUTCOMES :

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

ET372.CO.1: Interpret fundamentals underlying principles of networking
 ET372.CO.2: Prioritize networking protocol as per the real time applications
 ET372.CO.3: Articulate the cryptography techniques used in network security
 ET372.CO.4: Defend various security parameters related to network

THEORY COURSE CONTENT		
UNIT 1	Fundamentals of Networking	8 HOURS
Layered Architecture, Design Issues for layers, Introduction to OSI and TCP/IP model, Addressing Types, Switching Systems: Circuit and Packet Switching, Error Detecting Techniques, Error Correction, Data Link Controls		
UNIT 2	Networks Protocols	6 HOURS
Routing Algorithm: Distance Vector Routing Algorithm, Link State Routing, Network Addressing : IPv4 and IPv6, RPL, TCP, UDP, HTTP, DHCP, CAN Protocol		
UNIT 3	Communications Protocols	10 HOURS
IEEE 802.11 : CSMA/CA, IEEE 802.15: Bluetooth and ZigBee, Z- Wave, BLE, Wireless HART, CoAP, AMQP, MQTT, NFC, LoRa, RFID		
UNIT 4	Introduction to Cryptography	8 HOURS
Threats in Networks, Introduction to the Concept of Security, Cryptographic Techniques, Symmetric and Asymmetric Key Cryptographic Algorithms, One-Time Pads, The Vernam Cipher, Data Encryption Standard (DES) Algorithm, Advanced Encryption Standard (AES) Algorithm, RSA algorithm and Diffie-Hellman key exchange algorithm		
UNIT 5	Network Security	8 HOURS
Public Key Infrastructure (PKI): Digital Signature Properties of Digital Signature, Public Key Protocol; Certificates; Certificate Authorities, Secure Socket Layer (SSL) SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) Features, Components, Dual Signature		


PRACTICAL		
PRACTICAL NO.01	CISCO Packet Tracer (any 2)	4 HOURS
<ol style="list-style-type: none"> 1. Study of basic network command and Network configuration commands. 2. Configure a Network using Distance Vector Routing Protocol 3. Configure a Network using Link State Routing Protocols 4. Implementation of File Transfer Protocol 5. Half Duplex Chat Using UDP 6. Full Duplex Chat Using TCP/IP 		

PRACTICAL NO.02	IoT Programming (any 3)	6 HOURS
<ol style="list-style-type: none"> 1. Implementation of Error Detection / Error Correction Techniques <ol style="list-style-type: none"> (a) Write a program for Error Detection using CRC-CCITT 2. Data Encryption and Decryption <ol style="list-style-type: none"> (a) Program to implement One Time Pad Cipher (b) Program to implement Data Encryption Standard (DES) (c) Program to implement RSA algorithm (d) Program to implement Diffie-Hellman key exchange algorithm 		
PRACTICAL NO.03	Raspberry pi / ESP 8266 (any 3)	6 HOURS
<ol style="list-style-type: none"> 1. Build an Home Automation System using Google assistant, IFTTT, Adafruit. io and MQTT 2. Interfacing of Bluetooth HC-05 module 3. Interfacing of Bluetooth XBee module 4. Create a Z-Wave Smart Home hub 5. Interfacing of RFID Module 		
PRACTICAL NO.04	Cloud Computing AWS	8 HOURS
<ol style="list-style-type: none"> 1. Introduction to AWS IoT Service 2. Use of IAM, SNS, SQS and AWS MQ service 3. Build an IoT application with AWS IoT 		

TEXT BOOK
<ol style="list-style-type: none"> 1. Andrew S. Tenenbaum, “Computer Networks”, PHI, ISBN 81-203-2175-8.2. 2. Fei Hu, “Security and Privacy in Internet of Things (IoTs): Models, Algorithms and Implementations”, ISBN 9781498723183, 2016

REFERENCE BOOK

1. Holger Karl and Andreas Willing, “Protocols and Architectures for Wireless Sensor Networks”, Wiley India, ISBN:9788126533695
2. B. Fourauzan, “Data Communications and Networking”, 5th Edition, TataMcGraw-Hill Publications
3. Reese, G., “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud”, Sebastopol, CA: O’ Reilly Media, Inc., ISBN: 9780596157647, 2009.
4. Brian Russell and Drew Van Duren, “Practical Internet of Things Security”, Packt Publishing Ltd. ISBN: 9781788625821, 2018.

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Robot Dynamics and Control
		COURSE CODE	EX371
		COURSE CREDITS	4
RELEASED DATE : 01/07/2021		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX371.CEO.1: Introduce robotic control system and robotic control problem.
 EX371.CEO.2: Understand the time domain modelling approach
 EX371.CEO.3: Introduce various control techniques and methodologies applied to trajectory tracking problems in robotics.
 EX371.CEO.4: Study the manipulator motion and statics
 EX371.CEO.5: Explore the dynamic modeling of various types of robots

COURSE OUTCOMES :

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

EX371.CO.1: Explain block schematic of robotic control system
 EX371.CO.2: Design of controller using state space.
 EX371.CO.3: Develop control law for a given application
 EX371.CO.4: Compute the manipulator motion and statics
 EX371.CO.5: Apply knowledge of mathematics to obtain the dynamic model of robotic arm

THEORY COURSE CONTENT		
UNIT 1	Introduction	6 HOURS
Elements of Control system, Open and Closed loop Control, Transfer function of manipulator joint, Manipulator control problem, Stability and Analysis using Root Locus and Frequency Response. Self-Study: Characteristics of second order linear system, SISO tool for design of system		
UNIT 2	Modeling via State Space	8 HOURS
Mathematical modeling of electro-mechanical systems for position and Velocity control: State space approach, Controllability and Observability concepts, Introduction to Observer and Controller design (based on acceleration, velocity and position feedback). Self-Study: Modeling of DC Motor		
UNIT 3	Stability and Control of Manipulators	8 HOURS
Lyapunov Stability, Linear Control Methods, Single-axis PID control, PD-Gravity control, Computed torque control, Variable-structure control, Impedance control Case Study: Control system in Industrial Automation		
UNIT 4	Manipulators Motion and Statics	8 HOURS
Velocity of Rigid Body, Manipulator Jacobian, Analysis of - 2 Axis and 3 Axis Planar, Four axis SCARA Robot		
UNIT 5	Robot Dynamic Modeling	10 HOURS
Lagranges Method, Inertial properties of rigid bodies, Newton-Euler equations for a rigid body, Dynamics of a two-link planar robot, Lagrangian for an open-chain manipulator.		

PRACTICAL		
PRACTICAL NO.01		2 HOURS
To Model and Analyze non-linear system		
PRACTICAL NO.02		2 HOURS
To design of compensator using Root locus/Frequency Response method/Pole placement		
PRACTICAL NO.03		2 HOURS
To study Lyapunov stability of given system		
PRACTICAL NO.04		2 HOURS
To study of PID tuning of a system		
PRACTICAL NO.05		2 HOURS
To study and program industrial Robot		
PRACTICAL NO.06		2 HOURS
To study collaborative Robot (Cobot)		


PRACTICAL NO.07		2 HOURS
To design line follower robot		
PRACTICAL NO.08		2 HOURS
To program PLC to implement control for robotic arm.		
PRACTICAL NO.09		2 HOURS
Project work and seminar		

TEXT BOOK

1. Richard Murray, Z Li and S Sastry, "A Mathematical Introduction to Robotic Manipulator", CRC Press, 1st edition, ISBN-13: 978-0849379819
2. Katsuhiko Ogata, "Modern control engineering", Pearson, 5th edition, ISBN-13 : 978-0136156734
3. R K Mittal and I J Nagrath, "Robotics and Control", McGraw Hill Publishing, 6th edition, ISBN : 0-07-048293-4

REFERENCE BOOK

1. Mark Spong and M. Vidyasagar, "Robot Dynamics and Control", John Wiley & Sons, 1989, ISBN : 9812-53-078-9
2. Robert J. Schilling, "Fundamentals of Robotics-Analysis and Control", PHI, ISBN : 978-81-203-1047-6
3. Andrew J Kurdila, "Dynamics and Control of Robotic Systems", John Wiley and Sons Ltd, ISBN : 9781119524830

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Healthcare Informatics
		COURSE CODE	ET371
		COURSE CREDITS	4
RELEASED DATE : 01/07/2022		REVISION NO	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET371.CEO.1: To introduce the basic concept of biomedical signal acquisition, preprocessing, and analysis

ET371.CEO.2: To study of biomedical signal preprocessing, processing, and analysis methods for various problem statements

ET371.CEO.3: To exposure of medical algorithms for diagnosis and detection

ET371.CEO.4: To introduce the advancement of technologies in healthcare

COURSE OUTCOMES :

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

ET371.CO.1: Illustrate the role of healthcare informatics and the significance of Electronics health records

ET371.CO.2: Transform biomedical signals

ET371.CO.3: Analyze biomedical signals

ET371.CO.4: Design medical algorithms for diagnosis and detection

ET371.CO.5: Elaborate the role of data visualization and analytics in healthcare

THEORY COURSE CONTENT		
UNIT 1	Introduction	8 HOURS
Introduction to Healthcare Informatics Triple aim of healthcare: Care, health and cost, Role of healthcare informatics in achieving the triple aim, Introduction to Electronics health records (EHR), EHR implementation challenges, Information Retrieval, Bioinformatics. Case study: Evidence-based medicine		
UNIT 2	Biomedical signal acquisition and preprocessing	8 HOURS
Acquisition of 1D, 2D, and 3D biomedical signals, Noise, Motion artifacts, Power-line interference, and other artifacts during acquisition, preprocessing, and artifact removal methods. Self-learning: Artifacts in various signals and image modalities		
UNIT 3	Biomedical signal analysis	6 HOURS
Statistical, Time, Frequency, and Time-Frequency analysis of the biomedical signal. Case Study: Feature extraction for the neurological and cardiovascular disorder Self-learning: Application of Transform		
UNIT 4	Medical algorithms and Medical decision making	10 HOURS
Machine Learning algorithms for healthcare data, Feature selection methods, thresholding-based detection methods, Calculation classification performance, and medical decision-making process (diagnosis, treatment, and monitoring). Self-learning: Study of various abnormal conditions and their correlation with the biomedical signal		
UNIT 5	Data analytics and visualization in healthcare	8 HOURS
Introduction: techniques and their applications, Data analytics life cycle, data visualization and analytical tools and their application in healthcare, Challenges and future of big data in healthcare, Introduction to Big data tools in healthcare Case study: Predicting onset (type-2) of diabetes from medical records using binary class classification Self study: Data visualization for COVID-19 data		

PRACTICAL		
PRACTICAL NO.01		2 HOURS
Import different biomedical signals.		
PRACTICAL NO.02		2 HOURS
Implementation of noise and artifact removal for EEG or ECG signals (for given problem statements).		


PRACTICAL NO.03		4 HOURS
Time-frequency analysis of the biomedical signal (for given problem statements).		
PRACTICAL NO.04		4 HOURS
Healthcare data classification and regression (for given problem statements).		
PRACTICAL NO.05		4 HOURS
Visualizing and analysis of healthcare data with data visualizing and analysis tools (for given problem statements).		
PRACTICAL NO.06		4 HOURS
Implementation of machine learning model using spark (for given problem statements).		

TEXT BOOK

1. R M Rangayyan Biomedical Signal Analysis: A case Based Approach, IEEE Press, John Wiley & Sons. Inc, 2002
2. D C Reddy Biomedical Signal Processing: Principles and Techniques, Tata McGraw-Hill Publishing Co. Ltd, 2005
3. Wager, K. A., Lee, F. W., & Glaser, J. P. (2017). Health care information systems: A practical approach for health care management -4th Edition
4. Pantea Keikhosrokiani Big Data Analytics for Healthcare, Academic Press

REFERENCE BOOK

1. Stephan P. Kudyba Healthcare Informatics: Improving Efficiency and Productivity, CRC press
2. Edward H. Shortliffe, James J. Cimino, Biomedical Informatics: Computer Applications in Health Care and Biomedicine (Health Informatics), Springer, 2006

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Skill Development Course - Networking
		COURSE CODE	ET364
		COURSE CREDITS	2
RELEASED DATE : 01/07/2021		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET364.CEO.1: Configure various networks
 ET364.CEO.2: Analyze switching and routing of information

COURSE OUTCOMES :

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


ET364.CO.1: Assign various IP address in network
 ET364.CO.2: Install and configure the web server
 ET364.CO.3: Configure network for routing and switching

PRACTICAL: Perform following experiments using Open source software (Packet Tracer)		
PRACTICAL NO.01		2 HOURS
Network commands & IP address configurations.		
PRACTICAL NO.02		2 HOURS
Fault detection of Cable tester for of UTP-CAT5 Cross / Straight LAN cable		
PRACTICAL NO.03		2 HOURS
Implementation of LAN using star topology and connectivity between two computers using cross over UTP CAT5 cable		
PRACTICAL NO.04		2 HOURS
Installation and configuration of Web Server and hosting web page using HTML programming		
PRACTICAL NO.05		2 HOURS
Configure network topology using packet tracer		
PRACTICAL NO.06		2 HOURS
Configure network using Application layer protocols (DNS, HTTP, DHCP)		
PRACTICAL NO.07		2 HOURS
Configuration of TELNET using packet tracer		
PRACTICAL NO.08		2 HOURS
Configure network using Distance Vector Routing Protocol		
PRACTICAL NO.09		2 HOURS
Configure network using Link State vector routing protocol		
PRACTICAL NO.10		2 HOURS
Mini Project		
<ol style="list-style-type: none"> 1. Connection and configuration of a basic switch. 2. Configuration of basic router. 3. Setup an email server. 		

TEXT BOOK
<ol style="list-style-type: none"> 1. Behrouz A. Forouzan, “Data Communications and Networking”, 4th Edition, TATA McGraw Hill , ISBN - 9780070634145 2. Andrew Tanenbaum, “Computer Networks”, 4th Edition, Pearson Education.ISBN-9780130661029 3. Kurose and Ross, “Computer Networking: A top Down Approach featuring the Internet”. 3rd edition, Pearson Education,ISBN-9788131790540

REFERENCE BOOK

1. Behrouz A. Forouzan, "TCP/IP protocol Suit", 3rd edition, TATA McGraw Hill, ISBN 9780070706522
2. Wayne Tomasi, "Introduction to Data Communication & Networking", 1st edition, Pearson Education, ISBN - 9788131709306

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)		
	SCHOOL OF ELECTRICAL ENGINEERING		W.E.F
THIRD YEAR BACHELOR OF TECHNOLOGY	COURSE NAME		MATLAB Based System Modeling
	COURSE CODE		ET365
	COURSE CREDITS		2
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET365.CEO.1: To reduce computational complexity and improve efficiency
 ET365.CEO.2: To utilize the concept of OOP in MATLAB environment
 ET365.CEO.3: To get explore to app designing part in various domain
 ET365.CEO.4: To build a model using Simulink and simscape environment

COURSE OUTCOMES :

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

ET365.CO.1: Implement methodology to improve efficiency of MATLAB programming code
 ET365.CO.2: Exploit the concept of OOP in MATLAB
 ET365.CO.3: Create an application using App Designer
 ET365.CO.4: Build a system model in electrical, mechanical and power domain
 ET365.CO.5: Design a user friendly application


PRACTICAL		
PRACTICAL NO.01	Computational Complexity and Efficiency	6 HOURS
<ul style="list-style-type: none"> • Algorithmic complexity • Vectorization • Efficiency in practice 		
PRACTICAL NO.02	Object Oriented Programming	10 HOURS
<ul style="list-style-type: none"> • Introduction • Handle Classes • More on OOP • Trying it together 		
PRACTICAL NO.03	App Designing	10 HOURS
<ul style="list-style-type: none"> • New version of GUI • General example of App Designing • App designing in Image Processing, Communication, Signal processing 		
PRACTICAL NO.04	Simulink and Simscape	8 HOURS
<ul style="list-style-type: none"> • Electrical modelling • Mechanical modelling • Power modelling 		
PRACTICAL NO.05	Application	8 HOURS
<ul style="list-style-type: none"> • Standalone application • Project 		

TEXT BOOK

1. Stephan J. Chapman, MATLAB Programming for engineers, 5th edition, Cengage Learning, ISBN 9781111576721
2. Amos Gilat, MATLAB : An introduction with applications, New Delhi, Wiley Publications, 4th edition, ISBN:9788126537204
3. Harold Klee, Randal Allen Simulation of Dynamic Systems with MATLAB and Simulink CRC Press, 3rd edition, 2017, ISBN-13: 978-1498787772

REFERENCE BOOK

1. Ned Mohan, Advanced Electric Drives: Analysis, Control, and Modeling Using MATLAB / Simulink, Wiley Publication, 1st edition, 2014, ISBN-13: 978-1118485484
2. Dorothy C. Attaway, MATLAB: A Practical Introduction to Programming and Problem Solving, Butterworth-Heinemann Pub., 5th edition, 2018, ISBN-13: 978-0128154793

 MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2021 - 2022 (Rev. 2019)
THIRD YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Project Implementation
		COURSE CODE	ET360
		COURSE CREDITS	2
RELEASED DATE : 01/07/2021		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET360.CEO.1: Understand latest techniques, algorithms, models and design process in the field of project

ET360.CEO.2: Implement/develop/experiment/simulate techniques, algorithms and processes in software and real time

ET360.CEO.3: Upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

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

ET360.CO.1: Analyze techniques, algorithms and design process relate to the project

ET360.CO.2: Implement/develop/experiment/simulate/test techniques/process and infer conclusions from it.

ET360.CO.3: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

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

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

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

GUIDELINES

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

COLLABORATIVE/SPONSORED PROJECT

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

TIMELINE

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

ASSESSMENT and EVALUATION


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

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

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

REFERENCES

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

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

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
NIL	4	NIL	NIL	NIL	60	15	75

PRE-REQUISITE : Professional Skills

COURSE OBJECTIVES :

HP305.CEO.1: To define the importance of Employability skills in students life.
 HP305.CEO.2: To explain them necessary, specific Employability Career Development skills.
 HP305.CEO.3: To appraise students for placements through acquisition of professional skills.
 HP305.CEO.4: To support them detect their present level in respect of each Career Development skill and show direction for improvement..

COURSE OUTCOMES :

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

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

SECTION A: Personal Development with the help of Professionals (30 Marks)		
PRACTICAL NO.01	Self Management	2 HOURS
Concept of Johari Window, Advantages and disadvantages of every quadrant, Identifying the proportion of each quadrant in respect of self, Using the tools of self-evaluation, self-development and Goal Setting, Stress management, Career anchor.		
PRACTICAL NO.02	Personal Interviews	4 HOURS
Preparing for Interviews, Typical expected questions suggested responses, Posture, Body language, Greetings and pleasantries, , Handling unforeseen questions.		
PRACTICAL NO.03	Group Discussion and Public Speaking	4 HOURS
Parameters of assessment, Initiating the discussion, Effective listening, Own contribution, Paraphrasing, Arguing and counter-arguing, Giving direction to the discussion, Public Speaking skills.		
PRACTICAL NO.04	Team Building and Motivation	2 HOURS
Hallmark of effective teams, Barriers to teamwork, Subjugation of Individual interests for achievement of teams goal, Leading motivating team members.		
PRACTICAL NO.05	Innovative Thinking	2 HOURS
Relevance and importance of innovative thinking, Introduction to Brain Storming technique, Collective and individual Brain Storming.		
PRACTICAL NO.06	Profile Development	4 HOURS
Resume Writing: Introduction to the Resume, Key Components of a Resume and Cover Letter, Enhancing tips for Resume and Cover Letter. Letter of recommendation (LOR) preparation: Details on types, samples, structure, content tips format for letters of recommendation for student. Statement of Purpose (SOP) preparation: SOP Formats, Templates, and Guidelines for SOP Writing. Job application and professional email writing.		

SECTION B:	Aptitude Training with the help of BtechGuru Platform (30 Marks)	18 HOURS
<ol style="list-style-type: none"> 1. Number System 2. HCF LCM , Surds and Indices. 3. Percentages and Average. 4. Time and work. 5. Time, Speed and Distance. 6. Probability. 7. Quadratic Equations. 8. Profit and Loss. 9. Simple and Compound Interest. 10. Ratio and proportion. 11. Permutation and Combination. 12. Boats and Streams, Pipes and Cisterns. 13. Mixtures and Allegations, Mensuration. 14. Data Interpretation – Tables, Pie Charts, Bar Graphs, Line Graphs. 		
SECTION C:	Final Assessment with the help of career Assessment Test (15 marks)	2 HOURS

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. R S Agrawal, Quantitative Aptitude, S. Chand Publishing (2020), ISBN: 9789352534029, 9789352534029.
4. Shakuntala Devi, Puzzles to Puzzle You, Orient Paperbacks, ISBN: 9788122200140, 9788122200140.

REFERENCE BOOK

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



MIT ACADEMY OF ENGINEERING, ALANDI

An Autonomous Institute Affiliated to


Savitribai Phule Pune University

Curriculum for

Final Year

**Bachelor of Technology in
Electronics & Telecommunication
Engineering**

2019-2023


 Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (REVISION 2019)		
	SCHOOL OF ELECTRICAL ENGINEERING	W.E.F	: 2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY IN ELECTRONICS & TELECOMMUNICATION ENGINEERING	RELEASE DATE	: 01/06/2020	
	REVISION NO.	: 1.0	

SEMESTER: VII													
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL		
			L	P	T	MSE	ESE	IA	T/P	DM			
DC13	ET461	HDL-Digital Circuit Design	3	2	-	35	35	30	50	0	150	4	
DE01	ET48# / EX48#	Discipline Elective	3	-	-	35	35	30	0	0	100	3	
OE03	ET47# / EX47#	Open Elective	3	2	-	35	35	30	50	0	150	4	
SDP10	ET46#	Skill Development Course	0	4	-	0	0	25	50	0	75	2	
SDP11	ET470	Project Evaluation	0	8	-	0	0	50	0	100	150	4	
SDP12	ET400	Summer Internship	-	-	-	-	-	-	-	150	150	4	
TOTAL			9	16	0	105	105	165	150	250	775	21	

SEMESTER: VIII (PART A)													
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL		
			L	P	T	MSE	ESE	IA	T/P	DM			
DC14	ET462	Process Automation	3	2	-	35	35	30	50	0	150	4	
DE01	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3	
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4	
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2	
HSS8	HP406	Psychology	2	-	-	0	50	25	0	0	75	2	
TOTAL			10	10	0	70	170	185	50	75	550	15	

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS					CREDIT	
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT			TOTAL
			L	P	T	MSE	ESE	IA	T/P	DM		
DE02	ET49# / EX49#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP13	ET480	Capstone Work	-	8	-	0	0	75	0	75	150	4
SDP14	ET467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP15	ET468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			6	2	0	70	70	60	50	300	550	15

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	HDL - Digital Circuit Design
		COURSE CODE	ET461
		COURSE CREDITS	4
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET461.CEO.1: Explore PLD applications in VLSI
 ET461.CEO.2: Introduce Verilog HDL programming
 ET461.CEO.3: Implement Digital Designs with Verilog
 ET461.CEO.4: Give exposure of verification methodology with digital circuits

COURSE OUTCOMES :

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

ET461.CO.1: Analyse different architectures of PLDs
 ET461.CO.2: Comprehend the basic concepts of Verilog
 ET461.CO.3: Model digital circuits with Verilog, simulate, synthesis and prototype in PLDs
 ET461.CO.4: Examine the verification process for given digital circuit

THEORY COURSE CONTENT		
UNIT 1	VLSI Design Flow	8 HOURS
Overview of the VLSI design flow, Hardware Description Language: History, Types, Brief comparison of Hardware Description Languages, Digital Logic Circuits and PLDs: PAL, PLA, CPLD-Features and Architecture, Applications; FPGA Features and Architecture, Applications Case Study: CPLD/FPGA Analysis with Xilinx/Altera Series		
UNIT 2	Verilog HDL-I	6 HOURS
Program Structure, Logic System, Nets, Variables, Constants, Vectors & Operators, Arrays, Logical Operators & Expressions. Case Study: Study and analysis of synthesis aspects with Verilog programming		
UNIT 3	Verilog HDL-II	6 HOURS
Hierarchical Modeling Concepts, data types, Modules and Ports, Gate-Level Modeling, Dataflow Modeling, Behavioral Modeling, Test Bench Case Study: Study and analysis of synthesis aspects with Verilog programming		
UNIT 4	Digital circuits with Verilog	8 HOURS
Verilog implementation of Digital Circuits: Combinational and Sequential circuits: Arithmetic circuit design, Multiplexers, FSM modeling, Data path, controller design, Memory modeling Case Study: Practical applications of FSM like traffic light/Coffee vending/ General Purpose Processor		
UNIT 5	System Verification	8 HOURS
Verification Process, Basic testbench functionality, Directed testing, Testbench components, Constrained-Random stimulus, Connecting the test bench and design, Functional coverage Case Study: Combinational Logic verification		
UNIT 6	HDL Applications	6 HOURS
HDL Application Study: Communication Applications, Processor Design, SoC Application, Image processing, Electric motor control, Memory Design		

PRACTICAL: Modeling and Functional Simulation, synthesis and implementation on PLDs of the following digital circuits (with Xilinx ISE/ Vivado tools/Mentor Graphics Tools) using Verilog Hardware Description Languages.		
PRACTICAL NO.01		2 HOURS
Design and implement Multiplexers in Verilog		
PRACTICAL NO.02		2 HOURS
HDL design for Arithmetic Logic Unit		
PRACTICAL NO.03		2 HOURS
Design and implementation of basic sequential circuits		


PRACTICAL NO.04		4 HOURS
Design of sequence detector (FSM)		
PRACTICAL NO.05		4 HOURS
Design and implement Counters in Verilog		
PRACTICAL NO.06		2 HOURS
Memory Design using Verilog HDL		
PRACTICAL NO.07		2 HOURS
Verification of Combinational Circuit		
PRACTICAL NO.08		2 HOURS
Verification of Sequential Circuit		

TEXT BOOK

1. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis, 2nd Edition Publisher: Prentice Hall PTR Pub, February 21, 2003, ISBN: 978-0132599702.
2. Ashok B Mehta, "ASIC/SoC Functional Design Verification: A Comprehensive Guide to Technologies and Methodologies, Springer
3. Enoch O. Hwang, "Digital Logic and Microprocessor Design With VHDL, Thomson Engineering

REFERENCE BOOK

1. Wyane Wolf, "Modern VLSI Design (System on Chip), 4th Edition, Pearson Education, 2008, ISBN: 9780137145003
2. Chris Spear, "System Verilog for Verification: A Guide to Learning the Testbench Language Features Springer
3. John F Wakerly, "Digital Design-Principles and Practices, 4th Edition Pearson education, ISBN : 9780131863897.

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Deep Learning
		COURSE CODE	ET481
		COURSE CREDITS	3
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET481.CEO.1: To illustrate the basic concepts and techniques of Deep Learning
 ET481.CEO.2: To explore Convolution Neural Network and Sequence Model
 ET481.CEO.3: To develop a deeper understanding of Deep Learning algorithms
 ET481.CEO.4: To implement Deep Learning algorithms for solving practical problems

COURSE OUTCOMES :


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

ET481.CO.1: Explain fundamentals of Neural Network and Deep Learning
 ET481.CO.2: Describe Convolution Neural Network
 ET481.CO.3: Explain Sequence Model and Encoder Decoder Model
 ET481.CO.4: Develop Deep Learning model for classification and object detection
 ET481.CO.5: Evaluate the performance of Deep Learning models

THEORY COURSE CONTENT		
UNIT 1	Deep Learning Basics	9 HOURS
<p>Introducing Neural Computation, Perceptron, Feedforward Neural Network, Gradient Descent, Back-propagation, Momentum, Stochastic GD, AdaGrad, RMSProp, Adam. Bias-Variance Tradeoff, Regularization, Early stopping, Dataset augmentation, Dropout. Better weight initialization methods, Batch Normalization. Difference between Classical Machine Learning and Deep Learning. Various activation functions, Deep Learning process. Deep Learning using Convolutional Neural Network (CNN). The importance of striding, dilation, pooling used in CNN</p> <p>Case Study: Image Classification using MLP and CNN</p>		
UNIT 2	Convolution Neural Networks and Transfer Learning	9 HOURS
<p>Convolution Neural Networks, LeNet, AlexNet, VGGNet, Inception-V3, ResNet, Mobilenet. Visualizing Convolution Neural Networks using Transfer Learning</p> <p>Case Study: Image Classification using Transfer Learning</p>		
UNIT 3	Object Detection	6 HOURS
<p>Object Detection Using Yolo, Object Detection Using Faster R-CNN, ROI-CNN, Mask R-CNN</p> <p>Case Study: Object Detection on Image using Yolo</p>		
UNIT 4	Sequence Model	8 HOURS
<p>Introduction to Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTMs), Gated Recurrent Units (GRUs), Vanishing and Exploding Gradients, Backpropagation through time (BPTT), Generative Adversarial Networks (GAN)</p> <p>Case Study: Text Analysis</p>		
UNIT 5	Encoder Decoder Models	8 HOURS
<p>Introduction to Encoder Decoder Models, Denoising Autoencoders, Sparse Autoencoders</p>		

TEXT BOOK
<ol style="list-style-type: none"> 1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.10. 2. Daniel Graupe, Deep Learning Neural Networks: Design and Case Studies, WorldScientific Publishing Co., Inc., 2016. 3. Andreas C. Mller and Sarah Guido, Introduction to Machine Learning with Python: A Guide for Data Scientists, First Edition, O'Reilly Media, ISBN 978-14-4936-941-5

REFERENCE BOOK
<ol style="list-style-type: none"> 1. Ral Rojas, Neural Networks: A Systematic Introduction, 1996 2. Christopher Bishop, Pattern Recognition and Machine Learning, 2007 3. Simon Haykin, Neural Networks: A comprehensive foundation, Prentice Hall International Inc., 1999, ISBN: 0132733501.

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering			COURSE SYLLABI (2019 – 2023)	
	SCHOOL OF ELECTRICAL ENGINEERING			W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY			COURSE NAME		Digital Image Processing
			COURSE CODE		ET482
			COURSE CREDITS		3
RELEASED DATE : 01/07/2022			REVISION NO		1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET482.CEO.1: To identify various basic operations on an image
 ET482.CEO.2: To analyze spatial and frequency domain processing on an image
 ET482.CEO.3: To design an algorithm for image compression and segmentation
 ET482.CEO.4: To develop algorithms for features extraction and filtering
 ET482.CEO.5: To get acquainted with basic possibilities and constraints of computer vision

COURSE OUTCOMES :

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

ET482.CO.1: Analyze fundamentals of image processing
 ET482.CO.2: Develop an algorithm for spatial and frequency domain filtering
 ET482.CO.3: Determine various image compression and segmentation techniques
 ET482.CO.4: Design various applications based on image processing
 ET482.CO.5: Solve the problems in the field of robotics and other vision based applications


THEORY COURSE CONTENT		
UNIT 1	Basics of Image Processing	8 HOURS
Components and basic steps involved in digital image processing, Sampling and quantization of images, Grading image quality (Spatial and Gray level resolution), significance of various file formats of image. Basic operations on images - image addition, subtraction, logical operations, scaling translation, rotation. Introduction to Color Image processing (RGB Model)		
UNIT 2	Image analysis in Spatial Domain	10 HOURS
Point processing techniques: Intensity transformation, contrast stretching, histogram, histogram equalization. Neighborhood processing techniques: Concept of 2D filtering (2D Convolution), Smoothing filters with mask size of 3x3 and 5x5 (Low pass filter, median filter). Sharpening filters (high pass filter)		
UNIT 3	Image analysis in Frequency Domain	6 HOURS
Fast Fourier Transform, 2D FFT, Representing image in frequency domain. Gaussian low pass filtering and high pass filtering. Homomorphism filtering. Image Restoration: Noise models, restoration using Inverse filtering and Wiener filtering.		
UNIT 4	Image Compression	6 HOURS
Redundancy and compression relation. Image compression models, Lossless compression: Variable length coding, LZW coding. Lossy Compression: Transform based coding DCT based compression, JPEG compression standard		
UNIT 5	Morphological Image Processing and Segmentation	6 HOURS
Basic, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, Boundary, Detection, Hole filling, Connected components, convex hull, thinning, thickening skeletons, and pruning. Segmentation: Edge detection Case Study: Real time application in Biomedical field		
UNIT 6	Computer Vision in Image Processing	6 HOURS
Introduction to OpenCV, Image formation and Image model, Radiometry, Representation of color, Filters and Convolution, Edge detection, Texture Representation, The Geometry of multiple views. Segmentation by fitting a model, Segmentation and fitting using probabilistic methods. Geometric methods, Data segmentation.		

TEXT BOOK

1. Rafael C Gonzalez and Richard E Woods, Digital Image Processing, 3rd Edition, Pearson, 2013 ISBN: 9789332518469.
2. S. Jayaraman, S Esakkirajan, T Veerakumar, Digital Image Processing, 3rd Edition, Tata McGraw Hill, 2011, ISBN: 9780070144798.

REFERENCE BOOK

1. S. Annadurai and R. Shammugalakshmi, Fundamentals of Digital Image Processing, 1st Edition, Pearson, 2007, ISBN : 8177584790
2. William K Pratt, Digital Image Processing, 4th Edition, Willey, 2010,ISBN: 9788126526840
3. Arthur Weeks Jr., Fundamentals of Digital Image Processing, 1st Edition, Wiley-IEEE, 1996,ISBN: 9780780334106.

 MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)		
	SCHOOL OF ELECTRICAL ENGINEERING		W.E.F
FINAL YEAR BACHELOR OF TECHNOLOGY	COURSE NAME		Electric Vehicle
	COURSE CODE		ET483
	COURSE CREDITS		3
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET483.CEO.1: To understand the Vehicle Dynamics, Modelling and Simulation
 ET483.CEO.2: To become familiar with Electric motor and their controller
 ET483.CEO.3: To study the battery Modelling and its Parameters
 ET483.CEO.4: To learn Model Based Development using MATLAB and SIMULINK
 ET483.CEO.5: To become familiar with different Electric vehicle case studies

COURSE OUTCOMES :

The students after completion of the course will be able to,
 ET483.CO.1: Model vehicle parameters
 ET483.CO.2: Explore the EV motors and their controllers
 ET483.CO.3: Develop the battery modelling and its parameters
 ET483.CO.4: Illustrate the Model Based Development using MATLAB and SIMULINK
 ET483.CO.5: Analyse different Electric vehicle case studies


THEORY COURSE CONTENT		
UNIT 1	Introduction to Vehicle Dynamics: Modelling and Simulation	10 HOURS
<p>Roadway Fundamentals, Laws of Motion, Tractive Effort,- Rolling Resistance Force, Aerodynamic Drag, Hill Climbing Force, Acceleration Force, Total Tractive Effort, Modelling Vehicle Acceleration- Acceleration Performance Parameters-Modelling the Acceleration of an Electric Scooter, Modelling Electric Vehicle Range- Driving Cycles- Range Modelling of Battery Electric Vehicles- Constant Velocity Range Modelling</p> <p>Case study: Dynamic Modelling of Three Wheeler</p>		
UNIT 2	Electric Motors and their Controllers	8 HOURS
<p>Electric Motors fundamentals and characteristics - Brushless Electric Motors- The Brushless DC Motor, Permanent magnet Synchronous Motors, Motor Cooling, Efficiency, Size and Mass, DC Regulation and Voltage Conversion.</p>		
UNIT 3	Battery Modelling	8 HOURS
<p>Battery basics, Battery Parameters- Battery Capacity, Discharge Rate, State of charge, state of discharge, Depth of discharge, Technical Characteristics- Practical Capacity, Capacity Redefined, Battery Energy, Constant Current Discharge, Specific Energy, Battery Power- Specific Power, Battery Pack Design, Ragone Plots, Battery modelling, Battery pack sizing and design issues</p> <p>Electric Vehicle Case Study: GM EV1, Nissan Leaf, Mitsubishi Miev, Design of a Battery Electric Vehicle (BEV).</p>		
UNIT 4	Model Based Development using MATLAB and SIMULINK	8 HOURS
<p>Overview of Automotive Industry, Software Development demands of Automotive Industry, Model Based Development in Automotive Industry & Model Based Development in MATLAB, Requirement Analysis in Model Based Development, Model Based Development Configuration Parameters Settings, Introduction to ADAS & Levels of Autonomous Driving, Overview to ADAS Features</p> <p>Case study: Vehicle Direction Detection, Adaptive Cruise Control</p>		
UNIT 5	Battery Charging	8 HOURS
<p>Battery Chargers: Conductive (Basic charger circuits, Microprocessor based charger circuit. Arrangement of an off-board conductive charger, Standard power levels of conductive chargers, Inductive (Principle of inductive charging, Soft-switching power converter for inductive charging), Battery indication methods Charging Infrastructure: Domestic Charging Infrastructure, Public Charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone.</p>		

TEXT BOOK

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003

REFERENCE BOOK

1. Chris Mi, M. Abul Masrur, David Wen zhong Gao, Hybrid Electric Vehicles Principles and Applications with Practical Perspectives, 2011, Wiley publication.
2. Dharmeja Sandeep,(2000) Electric vehicle battery systems Newnes.
3. Pillai S.K., A first course on Electrical drives,New age International (P) Ltd.
4. M. H. Rashid, Power Electronics Devices, Circuits and Applications, 3rd ed., Pearson, 2004
5. C. C. Chan and K. T. Chau, Modern Electric Vehicle Technology, Oxford Science Publication, 2001

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	RTOS
		COURSE CODE	ET484
		COURSE CREDITS	3
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET484.CEO.1: To Illustrate the characteristics of real-time embedded applications
 ET484.CEO.2: To provide the knowledge of real time kernel
 ET484.CEO.3: To make use of Scheduling and synchronization in RTX.
 ET484.CEO.4: To elaborate the inter task communication in RTX
 ET484.CEO.5: To study popular RTOS

COURSE OUTCOMES :

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


ET484.CO.1: Explain the characteristics of real-time embedded applications
 ET484.CO.2: Interpret the RTX Kernel Structure
 ET484.CO.3: Apply Scheduling and synchronization in RTX
 ET484.CO.4: Utilize the inter task communication in RTX for an application
 ET484.CO.5: Summarize popular RTOS

THEORY COURSE CONTENT		
UNIT 1	Real-Time Software System Concepts	8 HOURS
<p>Foreground/ Background systems, Critical section of code, Resource, Shared resource, multitasking, Task, Context switch, Kernel, Scheduler, Non-Preemptive Kernel, Preemptive Kernel, Reentrancy, Round robin scheduling, Task Priorities, Static & Dynamic Priority, Priority Inversion, Assigning task priorities, Mutual Exclusion, Deadlock, Clock Tick, Memory requirements, Advantages & disadvantages of real time kernels</p>		
UNIT 2	RTOS Kernel Structure	8 HOURS
<p>Kernel Structure: Tasks, Task States, TCB, Ready List, Task Scheduling, Task Level Context Switching, Locking and unlocking of scheduler, Idle Task, Statistics Task, Interrupts, Clock Tick, Initialization, Starting the OS.</p> <p>Application: Identification of the services to lift management system</p> <p>Self-Study: RTLinux/Vxworks Kernel structure</p>		
UNIT 3	Scheduling in RTX	8 HOURS
<p>Task Management: Creating/ Deleting and Suspending/ Resuming Tasks, Task Stacks and checking, Changing Task Priority, Time Management: Delaying/Resuming Task, System Time, Event Control Blocks</p> <p>Application: Finalizing the task behavior and designing it for lift management system</p> <p>Self-Study: RTLinux/Vxworks Process states and data structures</p>		
UNIT 4	Synchronization in RTX	8 HOURS
<p>Semaphore Management: Creation/Deletion, Pending /Posting / Acceptance / Query. Mutual Exclusion Semaphores: Creation/Deletion, Pending /Posting /Acceptance / Query Event Flag Management: Internals, Creation/Deletion of Event Flag groups, Waiting / Setting / Clearing</p> <p>Application: Identify need of synchronization and imbibe in lift management system</p> <p>Self-Study: RTLinux/Vxworks Synchronization.</p>		
UNIT 5	Inter task Communication in RTX	8 HOURS
<p>Message Mailbox Management: Creating / Deleting a Mailbox, Waiting / Sending / Getting without waiting a Message from Mailbox, Status of Mailbox, Alternate uses of Mailbox, Message Queue Management: Creating / Deleting / Flushing a Message Queue, Waiting / Sending / Getting without waiting a Message from Queue</p> <p>Application: Software integration of lift management system</p> <p>Self-Study: RTLinux/Vxworks Inter task communication. Mechanism.</p>		

TEXT BOOK
<ol style="list-style-type: none"> 1. Rajib Mall, Real-Time Systems: Theory and Practice, Pearson Education, 2007, ISBN: 9788131700693 2. Getting Started for ARM Processor-Based Microcontrollers Building Applications with RL-ARM, by Keil Tools by ARM. (Keils Online support Document)

REFERENCE BOOK

1. Dr. K V K Prasad, “Embedded Real time Systems: Concept, design and programming, Dream tech press. New Edition (2003) ISBN-13: 978-8177224610.
2. Jonathan Valvano, “Embedded Systems: Real-Time Operating Systems for the Arm Cortex-M3, Create Space Independent Publishing Platform; Fourth edition (2012), ISBN-13: 978-1466468863
3. RL-ARM User’s Guide, by Keil Tools by ARM. (Keils Online support Document)
4. Technical references and user manuals on www.arm.com

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Data Management & Analytics
		COURSE CODE	ET472
		COURSE CREDITS	4
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET472.CEO.1: To identify the different types of data
 ET472.CEO.2: To illustrate the basic concept of database management system
 ET472.CEO.3: To demonstrate basic operations with DBMS
 ET472.CEO.4: To outline the steps involved in carrying out routine data analysis tasks
 ET472.CEO.5: To summarize the basic concepts of big data analytics

COURSE OUTCOMES :

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

ET472.CO.1: Demonstrate the data lifecycle
 ET472.CO.2: Apply basic concepts of database management system
 ET472.CO.3: Apply basic operations with DBMS
 ET472.CO.4: Infer the importance of the domain context for data analytics
 ET472.CO.5: Illustrate basic concepts of big data analytics and their components
 ET472.CO.6: Analyze the database system design, implementation, and maintenance

THEORY COURSE CONTENT		
UNIT 1	Introduction	7 HOURS
Type of data, data classification, data lifecycle, purpose of database systems and applications, view of data, database languages, relational databases, database design, database architecture, introduction to data mining and data warehouse Self-Study: Data storage		
UNIT 2	Introduction to Relational Database and SQL	8 HOURS
Relational database structure, database schema, keys, relational query languages and operations, overview of the SQL query, SQL data definition language (DDL), normalization Self-Study: Schema diagrams		
UNIT 3	Intermediate SQL	10 HOURS
SQL data manipulation language (DML), data control language (DCL), transaction control language (TCL), basic operations, aggregate functions with grouping, sub-queries, join expressions, views, integrity constraints Self-Study: Date & Time types in SQL, Authorization		
UNIT 4	Data Analytics	10 HOURS
Requirements and importance of data analytics, quality issues for data analysis, data analysis task, EDA, types of data analytics, data analytics tools		
UNIT 5	Big Data Analytics	7 HOURS
Introduction to Big Data, Big Data Analytics: Hadoop, Introduction to Hadoop Distributed File System (HDFS), Introduction to Map Reduce, YARN Self-Study: Cloud Platform		


PRACTICAL		
MODULE 01	SQL	7 HOURS
On any relational database case study, perform and execute; <ol style="list-style-type: none"> 1. Data Definition Query Language (DDL) 2. Data Manipulation Query Language (DML) 3. Data Control Query Language (DCL) 4. Advance SQL features like sub-queries, view creation, indexing and different operations Platforms: MySQL Workbench or any cloud platform, Python IDE's: Jupyter Notebook, Google Colab, Pycharm etc.		

MODULE 02	NoSQL	8 HOURS
<p>On any NoSQL database case study, perform and execute queries like;</p> <ol style="list-style-type: none"> 1. Create 2. Insert 3. Update <p>Platforms: MongoDB Compass or any other platform, Python IDE's: Jupyter Notebook, Google Colab, Pycharm etc.</p>		
MODULE 03	Data Analytics Tool	7 HOURS
<p>Perform data analysis using any data analytics tool</p> <p>Platforms: Tableau, Power BI etc.</p>		
MODULE 04	Big Data Analytics	8 HOURS
<ol style="list-style-type: none"> 1. Introduction to Hadoop system 2. Installation of Hadoop system 3. Connection of Hadoop-spark with python 4. Introduction and use of AWS cloud platform in big data analysis 5. Perform big data analysis using spark, AWS and python on any given case study <p>Platforms: AWS, Hadoop-Spark, Python IDE's: Jupyter Notebook, Google Colab, Pycharm</p>		

TEXT BOOK
<ol style="list-style-type: none"> 1. Silberschatz A., Korth H. and Sudarshan S., "Database System Concepts", 7th Edition, McGraw Hill Publishers, 2019, ISBN 9780078022159 2. Elmasri R. and Navathe S., "Fundamentals of Database Systems", 7th Edition, Pearson, Education, 2017, ISBN 9789332582705 3. Radha Shankarmani and M. Vijayalakshmi, "Big Data and Analytics, 2nd edition, Wiley, 2016, ISBN-13 : 978-8126565757 4. Subhashini Chellappan and Seema Acharya, "Big Data and Analytics, 2nd edition, Wiley, 2019, ISBN-13 : 978-8126579518 5. Edward Mize, "Data Analytics: The Ultimate Beginner's Guide to Data Analytics, Venture Ink, 2019, ISBN-13 : 978-1925997576

REFERENCE BOOK

1. Coronel C., Steven Morris “Database Systems: Design, Implementation & Management”, 13th Edition, Course Technology, 2018, ISBN 1337627909
2. Date C., “An Introduction to Database Systems”, 7th Edition, Pearson Education, 2002, ISBN 81-7808-23
3. DT Editorial Service, “Big Data, Black Book: Covers Hadoop 2, Map Reduce, Hive, YARN, Pig, R and Data Visualization, Dreamtech Press; 1st edition, 2016, ISBN-13 : 978-8184891430
4. Venkat Ankam, “Big Data Analytics, Packt Publishing Limited, 2016, ISBN-13 : 978-1785884696
5. Oliver Theobald, “Data Analytics for Absolute Beginners, 2019, ISBN-13 : 978-1081762469

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	AI in Robotics
		COURSE CODE	EX471
		COURSE CREDITS	4
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX471.CEO.1: Consolidate different techniques and algorithms for Search, Planning
 EX471.CEO.2: Become familiar with Robotic vision algorithms for systems
 EX471.CEO.3: Explore various algorithms in machine learning.
 EX471.CEO.4: Explore various fields in robotic applications

COURSE OUTCOMES :

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

EX471.CO.1: Apply suitable algorithm for Search and Planning for AI robotics system.
 EX471.CO.2: Apply Robotic vision algorithms for vision guided robotics.
 EX471.CO.3: Apply suitable algorithm for machine learning algorithms for AI robotics systems.
 EX471.CO.4: Analyze various applications in the field of AI Robotics & Vision guided Robotics.

THEORY COURSE CONTENT		
UNIT 1	AI Search and Path Planning Techniques	8 HOURS
<p>Introduction to AI, Definition, Seven areas of AI for Robotics Search Techniques: Best first search, A* algorithm, Heuristics Search, Constraint Satisfaction Search Topological Path Planning: Relational Methods, Associative Methods Metric Path Planning: Configuration Space, Representations, Graph Based Planners Case study: Robot Global path planning using A* algorithm for maze with obstacles</p>		
UNIT 2	Robotic Vision-Set up and preprocessing	9 HOURS
<p>Robotic Vision System: Basic components Robotic Vision setup: Camera frame calibration, Fixed frame offset, Tool offset, Fixed camera, Robot mounted camera, Calibration grid Illumination Techniques: Structured lightening, Front/ back lightening, Beam splitter, Retro reflectors, Diffused lightening, Robotic Cell Layout: Robot Centered, Inline, Mobile, Safety Measures, Ethics considerations Image pre-processing: Geometric and Brightness transformations Image Segmentation: Thresholding, Edge detection, Region based segmentation Case study: FANUC (R-30iA), Kuka robot vision setup examples</p>		
UNIT 3	Object Recognition	6 HOURS
<p>Object Recognition: System components, Object centered representation and Viewer centered representation, Feature detection, Recognition strategies, Object Classification, Geometry & Appearance based recognition, Template matching, Texture recognition Pedestrian Detection: Dalal-Triggs pedestrian detector Face detection: Viola-Jones sliding window face detection</p>		
UNIT 4	Machine Learning for Robotics	7 HOURS
<p>Learning process, Machine learning system, Types of learning Clustering algorithm: Aspects of clustering, partitioning methods, k-means clustering algorithms. Inductive learning: Concept, Basic algorithm, IL by Curve fitting Learning by decision trees: Attribute based representations, Entropy approach, decision making by information gain Naive Bayes Learning: Probabilistic Models, MAP classification, NB Algorithm.</p>		
UNIT 5	Reinforcement Learning for Robotics	7 HOURS
<p>Reinforcement Learning: Markov Decision Process (MDP), Value function, Q function, Model based and model free approaches, Passive and Active RL Learning, Generalization, Convergence of results. Case study: Rover Navigation in Sand area using Reinforcement Learning</p>		

UNIT 6	AI Robotics Real Life applications	7 HOURS
Robot Tele-operation: Environment properties, Organization of a Tele-system, Semi-autonomous and Autonomous control modes, Ethics in Deliberative Robots		
AI Robotics applications: Delivery Robots, Domestic Robots, Agriculture Robots, Ethics in social Robots		
Industrial Robotics applications: Material Handling Operations, Industry Process Operations		

PRACTICAL		
PRACTICAL NO.01	A* Algorithm	4 HOURS
Implementation of A* algorithm for path planning for an autonomous robot in a Maze with obstacles		
PRACTICAL NO.02	Image Pre-processing	4 HOURS
Implementation of image pre-processing algorithms in robotic vision system Like object detection, Face detection etc		
PRACTICAL NO.03	Image Segmentation	4 HOURS
Implement image segmentation algorithms for robot vision applications.		
PRACTICAL NO.04	Object Defection	4 HOURS
Application and development of object detection techniques in Vision guided robotic system		
PRACTICAL NO.05	Machine Learning- Supervised (Decision Tree)	4 HOURS
Implementation of Supervised classification Algorithm- Decision Tree on a suitable database		
PRACTICAL NO.06	Machine Learning- Supervised (Nave Bayes)	4 HOURS
Implementation of Supervised classification Algorithm- Nave Bayes on a suitable database		
PRACTICAL NO.07	Machine Learning- Unsupervised (Clustering)	4 HOURS
Implementation of Unsupervised machine learning Algorithm-K means clustering on a suitable database		
PRACTICAL NO.08	Paper Critics (Lab Activity)	4 HOURS
Paper critics based on a refereed research paper in the field of AI Robotics and Vision guided robotics		
PRACTICAL NO.09	Laboratory Project and Demonstration	4 HOURS
Demonstration of Laboratory project implementing AI Robotics algorithms on suitable robotic system. Presentation of implementation of results for Practical 1 to 7 for assigned problem statement		

TEXT BOOK


1. Murphy, Robin R. Introduction to AI robotics, MIT press, 2019 ISBN: 978-0262038485
2. Stuart Russell, Peter Norvig, Artificial Intelligence: A modern approach, Pearson Education, India 2003., ISBN: 978-0136042594.
3. Saeed B Niku, Introduction to Robotics: Analysis, Systems, applications, 2nd Ed New Delhi, Prentice Hall of India, 2009. 978-81-203-2379-7 Paperback
4. Fu K S, Gonzalez R C, Lee C S G, Robotics: Controls, Sensing, Vision and Intelligence, 2009, 00710990107, McGraw-Hill Education, 978-0071004213

REFERENCE BOOK

1. Roland Siegwart, Illah Reza Nourbakhsh, Davide Scaramuzza, Introduction to Autonomous Mobile Robots, Bradford Company Scituate, USA, 2011.
2. Mikell P Groover, "Automation, Production Systems, and Computer-Integrated Manufacturing", Pearson Education, 2015.
3. Hong Cheng, Autonomous Intelligent Vehicles: Theory, Algorithms and Implementation, Springer, 2011.
4. Richard D. Klafter, Robotics Engineering: An integrated approach, Prentice-Hall (4 April 1989), 978-0134687520
5. Rafael C. Gonzalez and Richard E. Woods. Digital Image Processing, Wesley, 2007. ISBN 13: 978813726952

REFERENCE PAPER

1. Qualitative vision-based mobile robot navigation, Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), 2006.
2. Qualitative vision-based path following, IEEE Transactions on Robotics, 25(3):749-754, June 2009.
3. Person Following with a Mobile Robot Using Binocular Feature-Based tracking, Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS), 2007
4. Visual detection of lintel-occluded doors from a single camera, IEEE Computer Society Workshop on Visual Localization for Mobile Platforms (in association with CVPR), 2008.
5. Histograms of Oriented Gradients for Human Detection, Navneet Dalal and Bill Triggs, CVPR05
6. Rapid Object Detection using a Boosted Cascade of Simple Features, Viola and Jones, 2001
7. Clustering-Based Robot Navigation and Control, Omur Arslan, Dan P. Guralnik, and Daniel E. Koditschek, 2016 IEEE International Conference on Robotics and Automation May 2016.

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Skill Development Course: Embedded Linux Systems
		COURSE CODE	ET463
		COURSE CREDITS	2
RELEASED DATE : 01/07/2022		REVISION NO	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
NIL	4	NIL	NIL	NIL	30	45	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET463.CEO.1: To configure and implement Linux Kernel for embedded hardware.
 ET463.CEO.2: To design program for Embedded application using open source Linux platform.

COURSE OUTCOMES :

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


ET463.CO.1: Explore the features of Linux through command line and shell programming
 ET463.CO.2: Demonstrate the usage of file system in Linux
 ET463.CO.3: Apply toolchain in the embedded Linux environment
 ET463.CO.4: Implement the various device drivers for embedded application
 ET463.CO.5: Build a simple application on embedded board in Linux environment

PRACTICAL: Perform following Practical on any Linux Distribution		
PRACTICAL NO.01		4 HOURS
Practice of Linux Commands & Linux File System		
PRACTICAL NO.02		4 HOURS
Practice of C Programming in Linux using GCC		
PRACTICAL NO.03		4 HOURS
Create Makefile using GNU Make Utility for automatically building executable programs from the source code (in C)		
PRACTICAL NO.04		4 HOURS
Configure, Compile and deploy the Linux Kernel on ARM based Embedded Board		
PRACTICAL NO.05		4 HOURS
Write, build and execute simple applications of displaying a message in Embedded Linux Environment		
PRACTICAL NO.06		4 HOURS
Write, build and execute simple applications of a thread in Embedded Linux Environment		
PRACTICAL NO.07		8 HOURS
Implementation of Kernel Loadable Device Driver Module in Embedded Linux Environmen		
PRACTICAL NO.08		8 HOURS
Capstone Project		

TEXT BOOK
<ol style="list-style-type: none"> 1. Daniel P. Bovet, “Understanding the Linux Kernel”, 3rd Edition, O’Reilly Publication, ISBN-13: 978-0596005658 2. Karim Yaghmour, Jon Masters, Gilad Ben-Yossef, & Philippe Gerum, “Building Embedded Linux systems”, 2nd Edition, O’Reilly Publication, ISBN-13: 978-0596529680 3. Alessandro Rubini & Jonath Corbet, “Linux Device Drivers”, 3rd Edition, O’Reilly Publication, ISBN: 978-0-596-00590-0

REFERENCE BOOK

1. Chris Simmonds, “Mastering Embedded Linux Programming, 2nd revised Edition (30 June 2017), Packt Publishing Limited; ISBN-13: 978-1787283282.
2. Gene Sally, “Pro Linux Embedded System, Apress; 1st ed. edition (28 December 2009), ISBN-13: 978-1430272274.
3. Christopher Hallinan, Embedded Linux Primer: A Practical Real-World Approach, 2nd Edition, Prentice Hall Publications, ISBN-13: 978-0137017836.
4. The Atmel ARM926EJ-S ARM Thumb Processor - based Microcontroller AT91SAM9260 manual
5. Linux Standard Base Project, <http://www.linuxfoundation.org/collaborate/workgroups/lsb>

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Skill Development Course: Cloud Computing
		COURSE CODE	ET464
		COURSE CREDITS	2
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET464.CEO.1: To familiarize with the fundamental concept of cloud computing
 ET464.CEO.2: To explain the concept of customer relationship management solutions
 ET464.CEO.3: To familiarize with the ecosystem of salesforce.com and different solutions it offers
 ET464.CEO.4: To make use of the model view controller architecture and its applications
 ET464.CEO.5: To summarize the software delivery lifecycle and application prototype

COURSE OUTCOMES :

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

ET464.CO.1: Rewrite the core concepts of cloud computing embracing different services
 ET464.CO.2: Illustrate fundamental concept of customer relationship management solutions across different business activities
 ET464.CO.3: Explain the object relationship to develop user interface using model view controller
 ET464.CO.4: Estimate the platform capabilities to develop custom applications
 ET464.CO.5: Combine the application security concepts with the data security, data management, application security access

PRACTICAL:		
MODULE NO.01	Cloud Computing and Salesforce.com	4 HOURS
<ol style="list-style-type: none"> 1. Introduction to Cloud Computing 2. Evolution of Cloud Computing 3. Characteristics of Cloud Services 4. Classifications of cloud services IaaS, PaaS, SaaS 5. What is CRM/Cloud CRM 6. SFDC as cloud computing technology 7. SFDC and its business offering 8. Evolution of Products 9. Different Editions of Salesforce.com 10. How to sign-up for the free developer edition 		
MODULE NO.02	Introduction to the Cloud CRM	4 HOURS
<ol style="list-style-type: none"> 1. Understand SFDCs architecture 2. Technologies behind the SFDC 3. Salesforce.com cloud CRM application walkthrough 4. Understand the application/Object/Fields 5. Standard fields/Page Layouts/ Custom Fields 6. Understand the relational database 7. Master-Detail Relationship/ many to many 8. Look-up Relationship/ one to many 9. Self-Look-up /one to one 		


MODULE NO.03	Customization & Application setup (Part-1)	4 HOURS
<ul style="list-style-type: none"> • Setting up the company profile • Setting up users /roles/ profiles • Learn about the access control using profiles • Custom objects/Custom fields and tabs • Learn about business processes and record types • Customize page layouts, related lists and fields • Define dependent picklist • Use field level security for access control • Create Rollup summary fields 		
MODULE NO.04	Customization & Application setup (Part-2)	4 HOURS
<ol style="list-style-type: none"> 1. Create formula fields 2. Create Validation Rules /Maintain data Quality 3. Create different types of fields and their arrangement on to the page layout 4. Introduction to lightning components 		
MODULE NO.05	Security and Access Control	4 HOURS
<ol style="list-style-type: none"> 1. Define Organization Wide Defaults 2. Record sharing concepts and pyramid of access control 3. Role hierarchy, Public groups, Queues and Permission Set 4. Sharing rules 		
MODULE NO.06	Business Process Automation Tools	4 HOURS
<ol style="list-style-type: none"> 1. Define Workflow 2. Set up workflow rules, Create workflow approvals 3. Setup workflow tasks & Email Alerts & Field Updates 4. Time-dependent workflows, Plan Approaches using workflow 5. Use the approval wizard standard vs. jump start 		

MODULE NO.07	Data Handling and Processing in Salesforce.com Cloud	4 HOURS
<ol style="list-style-type: none"> 1. Define Workflow 2. Identify the considerations for Data Processing 3. Analyze tools and use cases for managing data 4. Exporting data and Regular Backup 5. External ID and Unique Fields 6. Import Data 7. Apex Data loader 8. Import Wizard and Data Loader and compare the features, Update, Upsert operations, Delete and Hard Delete records 9. Transfer record ownership 		
MODULE NO.08	Reports and Dashboards	4 HOURS
<ol style="list-style-type: none"> 1. Create a report 2. Customize a report 3. Identify the impacts of Sharing Model on Reports 4. Create and Modify dashboards 5. Analyze the capabilities of Custom Report Types 		
MODULE NO.09	Declarative Vs Programmatic Approach in Salesforce.com	4 HOURS
<ol style="list-style-type: none"> 1. Introduction to Programmatic customization in Salesforce.com 2. Overview of Apex Programming 3. Overview of Apex Triggers 4. Lightning Component Bundle 5. Introduction to Lightning Design System 		

MODULE NO.10	Application Lifecycle and Project Management in Salesforce.com	4 HOURS
<ol style="list-style-type: none"> 1. Know Milestones in application life cycle 2. Sandbox strategy and type of sandboxes 3. Preparing the change sets 4. Deployment using change set 5. Managed package Vs Un-managed package 		
MODULE NO.11	Introduction to AppExchange and Trailhead	4 HOURS
<ol style="list-style-type: none"> 1. AppExchange Overview 2. Finding and Selecting an App 3. Installing an App 4. Trailhead overview 5. Enrolling for training module 6. Getting Certified industry demands and certification path for beginner 		
MODULE NO.12	Final Assignment and Project Prototype	4 HOURS
<ol style="list-style-type: none"> 1. Final Assignment 2. Project Prototyping 3. Discussion and Query resolution 		

REFERENCE BOOK

1. [www.salesforce.com](https://mita0e5-dev-ed.my.salesforce.com) (<https://mita0e5-dev-ed.my.salesforce.com>)
2. Thomas Erl, Zaigham Mahmood, Ricardo Puttini, Cloud Computing Concepts, Technology & Architecture; Prentice Hall
3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Mastering Cloud Computing Foundations and Applications Programming; Elsevier, 1st Edition.

 MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABUS		
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)	
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Project Evaluation	
		COURSE CODE	ET470	
		COURSE CREDITS	4	
RELEASE DATE : 01/07/2022		REVISION NO	0.0	

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

<p>COURSE OBJECTIVES :</p> <p>ET470.CEO.1: To understand how to carry out performance evaluation and comparative analysis in appropriate form.</p> <p>ET470.CEO.2: To know about standard industry practices.</p> <p>ET470.CEO.3: To become familiar with the steps involved in identifying and selecting a good platform to present the work done.</p>
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<p>COURSE OUTCOMES :</p> <p>The students after completion of the course will be able to,</p> <p>ET470.CO.1: Interpret findings, compare them with results in the literature, identify weaknesses and limitations, and propose improvements.</p> <p>ET470.CO.2: Make use of standard industry practices.</p> <p>ET470.CO.3: Decide appropriate platform for presenting the work done.</p>

COURSE ABSTRACT

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

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

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

GUIDELINES

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

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

ASSESSMENT and EVALUATION

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

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

Note:

- Report should be prepared in $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$.
- External examiner for Review 2 and Final Demo should be allocated same group.
- Report will be jointly evaluated by External examiner and Internal examiner.

REFERENCES

1. Eng-Choon Leong et al, "Guide To Research Projects For Engineering Students", CRC press, Apple Academic Press Inc. ISBN: 9781482238778, 9781482238778.
2. Michelle Reid, "Report Writing (Pocket Study Skills)", Second Edition, Macmillan Education.
3. Leslie Lamport, "A Document Preparation System $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$: User's Guide and Reference Manual", Pearson, 2011.

GUIDELINES
For
SUMMER INTERNSHIP PROGRAM (SIP)
2022 MAY
(For Academic Year: 2022-2023)

Prepared by

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Verified and Released by

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Introduction:

The Maharashtra Academy of Engineering & Education Research (MAEER) established in 1983 is a renowned educational trust having its registered office in Pune. It has sixty-five institutions imparting quality education up to the doctoral level in various disciplines.

MIT Academy of Engineering (MIT AOE) was established in the year 1999 under the MAEER. Today, it is an autonomous institute affiliated to the Savitribai Phule Pune University (SPPU), and is approved by the All India Council for Technical Education (AICTE) and accredited by the National Accreditation and Assessment Council (NAAC) with 'A' grade. MIT AOE offers undergraduate and post-graduate programs in diverse engineering disciplines. The National Board of Accreditation (NBA) had accredited all undergraduate programs offered by MIT AOE. .

MIT AOE recognizes the academic and professional value of student engagement outside the traditional classroom. In order to provide the students a platform to obtain hands-on industrial experience that would help them improve their career trajectory, MIT AOE offers a Student Internship Program (SIP).

The main aim of SIP is to assist all B.TECH students to obtain internships at various centers of excellence in the academia and the industry or to promote them for life skills internship as applicable. The ultimate goal is to imbue students with professionalism and networking capabilities using internships as a tool for providing comprehensive practical experience. Using SIP, MIT AOE students will enhance their academic and professional skills, making themselves more marketable in today's competitive world. The students can harness this lucrative opportunity to apply the knowledge they acquired all through the academic career in the professional realm.

Key objectives of SIP:

- To help students gain hands-on professional work experience prior to their graduation.
- To provide students possible opportunities to learn, understand and sharpen the real-time technical, managerial and life skills required at the job.
- To instill qualities like confidence, maturity, responsibility, and social skills necessary for personal and professional growth.
- To familiarize students to the business environment, which cannot be simulated in the classroom; thus creating competent professionals for the industry.
- To expose students to state-of-the-art facilities, equipment and professional practices in their respective trades.
- To help students develop their own job search tools, networking capacities, and interview skills.
- To expose them to the current technological developments relevant to the subject area of training.
- To create conditions conducive to quest for knowledge and its applicability on the job.
- To provide the experience in writing Technical reports/projects.
- To expose students to the engineer's responsibilities and ethics.

Scope and Structure of SIP:

SIP is offered to *entrants* of SY B.TECH (after semester II), TY B.TECH (after semester IV) and final year B.TECH (after semester VI) that meet the eligibility criteria stated below:

- ❑ SY B.TECH and TY B.TECH *entrants* should apply for 3 to 4 weeks' duration internships during June-July of every academic year. For these internships, *REGULAR* credits will not be awarded (non-Credit Based Internship). Although *REGULAR* credits are not awarded, but the internship is *compulsory* for all the

students. After successful completion of the internship, a student will be awarded with 3 *EXTRA* credits and it will be incorporated / reflected in *Additional Grade Card (AGC)*. Student has to work for 120 hours minimum as an Intern during the said period. **(Compulsory Internship)**

- ❑ Final year B.TECH *entrants* should apply for 4 to 6 weeks' duration internships during June-July of every academic year. For this internship, *REGULAR* credits will be awarded. (Credit Based Internship - 4 Credits). This internship is compulsory for all the entrants of final year B.TECH. Awarded credits will be considered for the calculation of final year CGPA and will be reflected in *Regular Grade Card*. Student has to work for 160 hours minimum as an Intern during the said period. **(Compulsory Internship)**
- ❑ Final year B.TECH students may apply for 5-6 months (18 – 26 weeks) semester-long Industry Internship under SIP in their VIII semester for Project Work. Equivalent credits will be awarded for the semester long internship. **(Optional Internship)**

The scope of SIP is limited to identifying internship opportunities and assisting MIT AOE students to apply for such positions. However, any financial liability, including but not limited to, travel, accommodation, insurance etc. incurred as direct or indirect consequence of such a position is the sole responsibility of the student and his/her guardians.

Student eligibility criteria:

Students applying for internships must meet the following criteria:

- After completion of second academic semester, FY B.TECH students (SY B.TECH entrants) of all schools are eligible to apply for 3 to 4 weeks' duration internships under SIP. Those students involved in / appearing for remedial term will be waived-off from internship. All other eligible students have to complete the internship as stated in the scope of SIP.
- After completion of fourth academic semester, SY B.TECH students (TY B.TECH entrants) of all schools are eligible to apply for 3 to 4 weeks' duration internships under SIP. Those students involved in / appearing for remedial term will be

waived-off from internship. All other eligible students have to complete the internship as stated in the scope of SIP.

- After completion of sixth academic semester, TY B.TECH students (final year B.TECH entrants) of all schools are eligible to apply for 4 to 6 weeks' duration internships under SIP. All students have to complete the internship successfully as stated in the scope of SIP. **However, students who fail to earn the 4 credits for any reason, shall be required to earn the same at a later instant of time to be eligible for the award of degree.**
- Final Year B.TECH students with no live backlog and having a CGPA of 6.75 and above are eligible to apply for semester-long internships in Industry with credit transfer scheme as stated in scope of the SIP. However, final decision shall be taken based on the merit of the case, approved by the selected panel.
- The student is expected to be in good physical and mental health.

Rules for application to SIP:

Students applying to the SIP are required to adhere the following rules:

- Students must complete an undertaking (Annexure – I) to abide by the rules and regulations of the institution / industry they are applying to.
- Students must obtain academic and school clearances to ensure completion of prerequisite courses or other requirements as a part of their application to SIP.
- Students must submit a well formatted CV, requisite form (Annexure – II), financial declaration, if any, along with the undertaking stated above to the Internship Coordinator through Faculty Mentor before April 30 of every year.
- Last date for completing all relevant formalities pertaining to SIP is 15 days prior to the start of the internship.
- Within the first week of the internship, students are required to submit their supervisor's contact information (email address and phone number) to the Faculty Mentor and Internship Coordinator.
- **During the internship, students must submit brief fortnightly report duly signed by their supervisor (scanned soft copy) to the Faculty Mentor.**

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

Role of the Faculty Mentor and Internship Coordinator / Director – T&P:

The Faculty Mentor and Internship Coordinator / Director-T&P will:

- Ensure compliance of all SIP policies and procedures and strive to maintain the integrity of SIP.
- Assist students in securing internship positions and documenting potential opportunities for future use.
- Evaluate and approve student goals, objectives and expected learning outcomes for the internship.
- Monitor the student progress by contacting the student and his/her supervisor a minimum of two times during the internship period. The first contact should be initiated during the first week of the internship. The second contact should take place during last week of the internship.
- **Contacting with the students every alternate week through Google meet / MS Teams and maintaining the reports of the activity done by the students.**
- At the conclusion of the internship, the student has to submit a detailed report based on his/her internship experience and present the work in front of the panel formed at school level.

Role of student during internship:

- Actively participate in the internship process by utilizing appropriate resources and maintaining regular contact with the faculty mentor and Internship Coordinator / Director – T &P.
- Develop learning objectives consistent with their interests, skills, and goals, both academic and career related.

- Follow all policies and procedures described in this document, including timely submission of application and evaluation material to the faculty mentor and Internship Coordinator / Director – T &P.
- Conduct themselves in a professional manner as representatives of MIT AOE.
- Provide feedback and suggestions about internship program policies and procedures.
- The internship is to be physical and in extremely special cases, a virtual / Work from Home type internships can be taken with prior approval.
- The students will be informed about the various opportunities that come from various sources such as AICTE, Intern Shala, any other sources identified by Director / Dean – CR / Team of CR / School Deans / FTPO coordinators.
- If students are not able to get such opportunities, then they can be given specific work by their Mini Project guides / Minor Project guides through work from home concept. But the assigned work must be equivalent to the minimum duration as specified above. In such cases, the school Deans must form a team to identify the specific works that can be assigned to the students.
- The Institute coordinator can provide any support through email for the organizations, in case they need official communication from the Institute.
- All assessment for the summer internships can be done during the Sep 2022 by the team of members formed by the school deans along with the FTPO and CR team.

DEADLINES:

The last date to get the internships will be 31 May 2022 and the Internship period is from 15 May 2022 to 31 July 2022.

ANNEXURE – I

UNDERTAKING FORMAT

I, Mr. /Ms.....,
 Programme:....., School :, student of **MIT Academy of Engineering (MIT AOE)**, permanent resident of

Phone No: (Give permanent home address with telephone no.), do hereby undertake on this the..... (Day), of..... (Month)..... (Year), the following

1. I, hereby, declare that, the entries made by me in the Application Form are complete and true to the best of my knowledge and based on valid records.
2. I, hereby, promise to abide by the admissible rules and regulations, concerning discipline, attendance, etc. of the Institute (MIT AOE), and also to follow the Code of Conduct prescribed by the Institute / Industry in which I am going to take the internship.
3. I, hereby undertake to maintain the name of the Institute in high levels during my period as intern in whichever Institute / Industry I am given an opportunity to undergo technical training.
4. I, hereby declare that I will maintain confidentiality and not disseminate / share any information related to the Institute / Industry to third parties.
5. I, hereby undertake to be responsible for maintaining the security of properties belonging to the Institute / Industry.

Date: _____

Place: _____

Signature of Student: _____

ANNEXURE – II**Application for Internship Program**

Sr. No.	Particulars		
1	Name of the applicant (in bold letters)		
2	Gender		
3	Class & School		
4	Date of Birth & Age (as on date)		
5	Roll Number & PRN		
6	Address for correspondence with mobile / telephone number and email-id		
7	Name & address of the Institute / Industry		
8	Core Domain of Institute / Industry		
9	Contact details Supervisor / HR Mobile / Telephone number and email-id		
10	Period of internship	3-6 weeks	18-26 weeks
11	Total number of credits proposed to internship (if applicable)		

Signatures

Student	School Internship Coordinator
Approved by:	
Dean – School of _____ Engineering	MIT AOE Seal
Date:	

ANNEXURE – III

REQUEST LETTER FROM INSTITUTE TO INTERNSHIP PROVIDER

To

.....

Subject: Request for 03/04/06 weeks’ industrial training for B.TECH degree program

Dear Sir,

Our students have undergone internship training in your esteemed organization in the previous years. I acknowledge the help and the support extended to our students during the training.

OR

(For first time industry) As per AICTE mandates, internship is now a compulsory competent of education for all technical education students.

In view of the above, I request your good self to allow our following _____students for undertaking practical training in your esteemed organization. Kindly accord your permission and give at least one-week time for students to join training after confirmation.

Roll No.	Name	PRN	Year	Discipline

A positive communication will be highly appreciated.

With warm regards,

Yours sincerely,

Coordinator – SIP

ANNEXURE IV

REPORTING LETTER OF STUDENT

To

.....

.....

Subject: Reporting letter of student to Institute / Industry

Dear Sir,

Kindly refer your letter / e-mail dated. on the above cited subject. As permitted by your good self, the following students will undergo Institute / Industrial Internship in your esteemed organization under your guidance.

Roll. No.	Name of Students	PRN	Year & Discipline

You are requested to evaluate the student’s performance on the basis of grading i.e. Excellent, Very Good, Satisfactory and Non-Satisfactory on the below mentioned factors. The performance report may please be forwarded to the undersigned on completion of training in a sealed envelope.

Sr. No.	Name of Students	Evaluation Ranking
1	Attendance and general behavior	
2	Relation with workers and supervisors	
3	Initiative and efforts in learning	
4	Knowledge and skills improvement	
5	Contribution to the organization	

Your efforts in this regard will positively enhance knowledge and practical skills of the students and your cooperation will be highly appreciated. The students will abide by the rules and regulation of the organization and will maintain a proper discipline with keen interest during their Internship. The students will report to you on along with a copy of this letter.

Yours sincerely,
 Coordinator – SIP

ANNEXURE – V

SUPERVISOR EVALUATION OF INTERN

Student Name: _____ Date: _____

Work Supervisor: _____ Title: _____

Institute/Industry: _____

Dates of Internship: From _____ To _____

Please evaluate your intern on following factors: (Tick ✓)

Parameters	Needs improvement	Satisfactory	Good	Excellent
Professionalism and Behavior				
Cooperation with co-workers and supervisors				
Interest in work				
Learning ability				
Emphasis on high-quality work				
Readiness to take responsibility				
Use of technical knowledge and expertise				
Display of creativity/originality				
Problem Analysis				
Communication				
Punctuality				
Time Management Skills				

Overall performance of student intern (circle one):

(Needs improvement / Satisfactory / Good / Excellent)

Signature of Institute / Industry supervisor

ANNEXURE VI : RUBRICS FOR THE EVALUATION OF SIP

Item	Mark for item					
	2-3	4-5	6	7	8	9-10
A. Professional skills 30%						
1.1. Initiative and creativity	Student shows no initiative or new ideas at all.	Student picks up some initiatives and/or new ideas suggested by others (e.g. supervisor), but the selection is not motivated.	Student shows some initiative and/or together with the supervisor develops one or two new ideas on minor parts of the project.	Student initiates discussions on new ideas with supervisor and develops one or two own ideas on minor parts of the project.	Student has his own creative ideas.	Innovative methods and analysis of information/data. Possibly the idea for the project has been formulated by the student.
1.2 Insight in functioning of another organization	Student shows no insight in functioning of the organization.	Student shows no insight in functioning of the organization.	Student is able to draw an organization chart of the organization.	Student is able to indicate the position of the team within the organization as a whole.	Student is able to indicate the responsibilities of the different units within the organization.	Student knows how changes are realized in the organization.
	Student doesn't ask for help from the internship provider in case it is necessary.	Student doesn't ask for help from the internship provider in case it is necessary.	Student gets things (e.g. receiving information, organizing material facilities, etc.) done within the team only via internship supervisor.	Student is able to get some things (e.g. receiving information, organizing material facilities, etc.) done within the team. If necessary, the student asks for help of the supervisor to get things done within the team.	Student is able to get things (e.g. receiving information, organizing material facilities, etc.) done within the team independently.	Student is able to independently implement changes that affect the whole team.
1.3 Adaptation capacity	Student doesn't adapt and gives an impression of apathy or is often involved in disputes or arguments.	Student doesn't adapt and gives an impression of apathy or is often involved in disputes or arguments.	Student knows the do's and don't in the new work environment.	Student accepts how things go within the new work environment.	Student is able to adapt to the new work environment.	Student adapts easily to the work environment within the limits of his personal values.
1.4 Commitment and perseverance	Student is not motivated. Student escapes work and gives up regularly	Student has little motivation. Tends to be distracted easily. Has given up once or twice	Student is motivated at times, but often, sees the work as a compulsory task. Is distracted from work now and then.	The student is motivated. Overcomes an occasional setback with help of the supervisor.	The student is motivated and/or overcomes an occasional setback on his own and considers the work as his "own" project.	The student is very motivated, goes at length to get the most out of the project.
1.5 Independence	The student can only perform the work properly after repeated detailed instructions and with direct help from the supervisor.	The student needs frequent instructions and well-defined tasks from the supervisor and the supervisor needs careful checks to see if all tasks have been performed.	The supervisor is the main responsible for setting out the tasks, but the student is able to perform them mostly independently	Student selects and plans the tasks together with the supervisor and performs these tasks on his own	Student plans and performs tasks mostly independently, asks for help from the supervisor when needed.	Student plans and performs tasks independently and organizes his sources of help independently.

1.6 Handling supervisor's comments and development skills	Student does not pick up suggestions and ideas of the supervisor	The supervisor needs to act as an instructor and/or supervisor needs to suggest solutions for problems	Student incorporates some of the comments of the supervisor, but ignores others without arguments	Student incorporates most or all of the supervisor's comments.	Supervisor's comments are weighed by the student and asked for when needed.	Supervisor's comments are critically weighed by the student and asked for when needed, also from other staff members or students.
	Knowledge and insight of the student (in relation to the prerequisites) is insufficient and the student is not able to take appropriate action to remedy this	There is some progress in the professional skills of the student, but suggestions of the supervisor are also ignored occasionally.	The student is able to adopt some skills as they are presented during supervision	The student is able to adopt skills as they are presented during supervision and develops some skills independently as well.	The student is able to adopt new skills mostly independently, and asks for assistance from the supervisor if needed.	The student has knowledge and insight on a academic level, i.e. he explores solutions on his own, increases skills and knowledge where necessary.
	No learning outcomes formulated.	Learning outcomes formulated, but no progress in any of them.	On some of the personal learning outcomes the student shows some progress.	On all of the personal learning outcomes the student shows some progress.	On some of the personal the student shows major progress and on others some progress is shown.	On all personal learning outcomes the student has shown major progress.
1.7. Time management	No time schedule made.	No realistic time schedule.	Mostly realistic time schedule, but no timely adjustment of time schedule if necessary.	Realistic time schedule, with some adjustments if necessary (but not enough or not all in time) in times only.	Realistic time schedule, with if necessary timely adjustments of times only.	Realistic time schedule, with if necessary timely adjustments of both time and tasks.
	Final version of internship report or presentation more than 50% of the nominal period overdue without a valid reason (force majeure)	Final version of internship report or oral presentation at most 50% of the nominal period overdue (without a valid reason).	Final version of internship report or oral presentation at most 25% of nominal period overdue (without valid reason)	Final version of internship report or oral presentation at most 10% of nominal period overdue (without valid reasons)	Final version of internship report or oral presentation at most 5% of nominal period overdue (without good reasons)	Final version of internship report or oral presentation finished within planned period (or overdue but with good reason and finished within reasonable time).
B. Report internship 30%						
2.1 Formulation goals, framework project	No goals and framework of project.	Formulation of goals and framework of project is not clear.	Formulation of goals and framework of project is clear, but link between tasks and goals is not clear. Framework of project does not fit with the object of the internship project.	Formulation of goals and framework of project is clear, but link between tasks and goals is not always clear.. Framework of project does not fit with all aspects of the internship project.	Formulation of goals and framework of project is clear.	Clear formulation of goals and framework of project. Both are well linked with all aspects of the internship project.
2.2. Theoretical underpinning, use of	No discussion of underlying theories.	There is some discussion of underlying theories, but the description shows serious errors.	Student has found the relevant theories, but the description has not been tailored to the project at	Student has found the relevant theories, and has been partially successful in tailoring	Student has found the relevant theories, makes a synthesis of those, and has been	Clear, complete and coherent overview of relevant theories. Exactly tailored to the project at hand.

literature			hand or shows occasional errors.	the description to the project at hand. Few errors occur.	successful in tailoring the description to the project at hand.	
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	No relevant literature in reference list except for those already suggested by the supervisor	Only a couple of relevant literature references in the reference list.	Some relevant literature in reference list but also significant body of irrelevant literature.	Relevant literature in reference list but some references are less relevant.	Used literature is relevant for the goal of the project. An occasional reference may be less relevant.	Used literature is relevant for the goal of the project.
2.3. Use of methods and processing data	No description of methods and analysis of the information/data.	Insufficient information on methods and insufficient analysis of the information.	Some aspects of the project regarding methods and analysis of information are described insufficiently. Used methods and analysis of data/information are not always appropriate.	Description of methods and analysis of information/data is lacking in a number of places. Used methods and analysis of data/information mostly appropriate.	Description of methods and analysis of information/data is mostly complete, but there are lacking some details. Used methods and analysis of data/information are appropriate.	Description of methods used and analysis of the information is appropriate, complete and clear.
2.4. Reflection on results	No reflection on the results of internship project. Discussion only touches trivial or very general points of criticism.	Student identifies only some possible weaknesses and/or points at weaknesses which are in reality irrelevant or non-existent.	Student indicates most weaknesses in the results, but does not weigh their impact on the main results relative to each other.	Student indicates most weaknesses in the results and is able to weigh their impact on the main results relative to each other.	Student indicates all weaknesses in the results and weighs them relative to each other. Furthermore, (better) alternatives for the methods used are indicated.	Student is not only able to identify all possible weaknesses in the results, but is also able to indicate which weaknesses affect the outcome of the internship project most.
2.5. Conclusions and discussion	No link between goals, results and conclusions.	Conclusions are drawn, but in many cases only address part of the goals. Conclusions merely repeat results or conclusions are not substantiated by results.	Conclusions are linked to the goals, but not all goals are addressed. Some conclusions are not substantiated by results or merely repeat results.	Most conclusions well-linked to goals and substantiated by results. Conclusions mostly formulated clearly but some vagueness in wording.	Clear link between goals and conclusions. All conclusions substantiated by results. Conclusions are formulated exact.	Clear link between goals and conclusions. Conclusions substantiated by results. Conclusions are formulated exact and concise. Conclusions are grouped/ordered in a logical way.
	No discussion about the added value of the project for the organization.	Student assigns irrelevant aspects of the project as added value for the project for the organization.	Student only reflects on trivial aspects of his project for the organization and does not relate this to the goals of the organization.	Student is able to identify the added value of his project for the organization, but does not relate this to the goals of the organization.	Student is able to identify the added value of his project for the organization and relates this to the goals of the organization.	Student is able to identify the added value of his project and relates this to the goals of the organization. In addition, the student is able to indicate the added value of his project for the society as a whole.
2.6. Fluency of language and writing skills	Internship report is badly structured. In many cases information appears in wrong locations. Level of detail is inappropriate	Main structure incorrect in some places, and placement of material in different chapters illogical in many places. Level of detail varies	Main structure is correct, but lower level hierarchy of sections is not logical in places. Some sections have overlapping functions	Main structure correct, but placement of material in different chapters illogical in places. Level of detail inappropriate in a number of	Most sections have a clear and unique function. Hierarchy of sections is mostly correct. Ordering of sections is mostly logical.	Well-structured: each section has a clear and unique function. Hierarchy of sections is correct. Ordering of sections is logical. All

	throughout.	widely (information missing, or irrelevant information given).	leading to ambiguity in placement of information. Level of detail varies widely (information missing, or irrelevant information given).	places (irrelevant information given).	All information occurs at the correct place, with few exceptions. In most places level of detail is appropriate.	information occurs at the correct place. Level of detail is appropriate throughout.
	Formulations in the text are often incorrect/inexact inhibiting a correct interpretation of the text.	Vagueness and/or inexactness in wording occurs regularly and it affects the interpretation of the text.	The text is ambiguous in some places but this does not always inhibit a correct interpretation of the text.	Formulations in text are predominantly clear and exact. Internship report could have been written more concisely.	Formulations in text are clear and exact, as well as concise.	Textual quality of the internship report is such that it could be acceptable for a peer-reviewed journal.
2.7 Defense of the report	Student is not able to defend/discuss his internship reports. He does not master the contents.	The student has difficulty to explain the subject matter of the internship project.	Student is able to defend his internship project. He mostly masters the contents of what he wrote, but for a limited number of items he is not able to explain what he did, or why.	Student is able to defend his internship project. He masters the contents of what he wrote, but not beyond that. Is not able to place thesis in scientific or practical context.	Student is able to defend his internship project, including indications how the work could have been done better. Student is able to place thesis in either scientific or practical context.	Student is able to freely discuss the contents of the internship project and to place the internship project in the context of current scientific literature and practical contexts.

C. Self reflection on internship 10%						
3.1 Report on self-reflection	Is not able to describe an event or situation in which he was involved and that relates to a formulated learning outcome.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome but unable to distinguish between the event description and the description of the personal emotions involved.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, but unable to formulate personal points of improvement and related actions in a future situation	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, and able to formulate personal points of improvement and related actions in a future situation	Is able to analyze objectively most events or situations in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate plan for improved functioning in a new situation. Shows the ability in at least one case to implement the formulated plan for improved functioning	Is able to analyze objectively any event or situation in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate and implement a plan for improved functioning in a new situation.
3.2 Reflection on the internship	Is not able to describe an event or situation in which he was involved and that relates to a formulated learning outcome.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome but unable to distinguish between the event description and the description of the personal emotions involved.	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, but unable to formulate personal points of	Is able to describe at least one event or situation in which he was involved and that relates to a formulated learning outcome, properly distinguishing between the event description and the personal emotions involved, and able to formulate personal points of	Is able to analyze objectively most events or situations in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate plan for improved functioning in a new	Is able to analyze objectively any event or situation in which he was involved and that relates to formulated learning outcomes, derive improvements for a future situation and formulate and implement a plan for improved functioning in a new situation.

			improvement and related actions in a future situation	improvement and related actions in a future situation	situation. Shows the ability in at least one case to implement the formulated plan for improved functioning	
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D. Presentation (30%)						
4.1. Presentation: Graphs, PowerPoint	Presentation has no structure.	Presentation has unclear structure.	Presentation is structured, though the audience gets lost in some places.	Presentation has a clear structure with only few exceptions.	Presentation has a clear structure. Mostly a good separation between the main message and side-steps.	Presentation clearly structured, concise and to-the-point. Good separation between the main message and side-steps.
	Unclear lay-out. Unbalanced use of text, graphs, tables or graphics throughout. Too small font size, too many slides.	Lay-out in many places insufficient: too much text and too few graphics (or graphs, tables) or vice versa.	Quality of the layout of the slides is mixed. Inappropriate use of text, tables, graphs and graphics in some places.	Lay-out is mostly clear, with unbalanced use of text, tables, graphs and graphics in few places only.	Lay-out is clear. Appropriate use of text, tables, graphs and graphics.	Lay-out is functional and clear. Clever use of graphs and graphics.
4.2. Oral presentation and defense	Spoken in such a way that majority of audience could not follow the presentation.	Presentation is uninspired and/or monotonous and/or student reads from slides: attention of audience not captured	Quality of presentation is mixed: sometimes clear, sometimes hard to follow.	Mostly clearly spoken. Sometimes monotonous in some places.	Clearly spoken in such a way that I keeps audience's attention.	Relaxed and lively though concentrated presentation. Clearly spoken in such a way that I keeps audience's attention.
	Language and interest of audience not taken into consideration at all.	Language and interest of audience hardly taken into consideration.	Language and interest of presentation at a couple of points not appropriately targeted at audience.	Language and interest of presentation mostly targeted at audience.	Language and interest of presentation well-targeted at audience. Student is able to adjust to some extent to signals from audience that certain parts are not understood.	Take-home message is clear to the audience. Language and interest of presentation well-targeted at audience. Student is able to adjust to signals from audience that certain parts are not understood.
	Bad timing (way too short or too long).	Timing not well kept (at most 30% deviation from planned time).	Timing not well kept (at most 20% deviation from planned time).	Timing is OK (at most 10% deviation from planned time).	Presentation finished well in time.	Presentation finished well in time.
	Student is not able to answer questions.	Student is able to answer only the simplest questions	Student answers at least half of the questions appropriately..	Student is able to answer nearly all questions in an appropriate way.	Student is able to answer all questions in an appropriate way, although not to-the-point in some cases.	Student is able to give appropriate, clear and to-the-point answers to all questions.

ANNEXURE VII : REPORT OF EVALUATION

to be submitted by School Deans to CoE

MIT Academy of Engineering

School of _____

Class : FY / SY / TY

Date of Evaluation : _____

Roll No	Name of student	PRN	Criteria A 30%	Criteria B 30%	Criteria C 10%	Criteria D 30%	TOTAL MARKS

Dean

School of _____

ANNEXURE – VIII

INTERNSHIP REPORT FORMAT

**STUDENT INTERNSHIP PROGRAM (SIP)
REPORT**

Name of the Institute / Industry
(Where you have completed your Internship Training)
(Bold, 16 font, Times New Roman style)

Submitted By

Name of the student

Exam Seat No.

PRN No.

SCHOOL OF _____

MIT ACADEMY OF ENGINEERING
ALANDI (D), PUNE

CERTIFICATE

This is to certify that the “**Student Internship Program (SIP)**” report submitted by _____ PRN _____ is work done by him/her and is submitted during _____ academic year.

Faculty Mentor
(Name)

School - Internship Coordinator
(Name)

School Dean



(Name)

Internship certificate provided by the internship institution

ACKNOWLEDGEMENT

(Name of student)

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	Topic	Page No.
1.	Introduction	
	1.1	1
	1.2	
2.	Internship Discussion	
	2.1	
	2.2	
3.	Conclusion	
4.	Bibliography	

1) **Introduction** includes brief description of the Organization/ Institute. The starting and ending dates of your internship. The scope of the work completed during the internship. It may include background information necessary to understand the work completed during the internship.

2) **Internship discussion** should include report of the work carried out in Organization / Institute. It may contain:

☐ **Problem / Project / Opportunity** the student got in the Institute/ Organization.

☐ **Learning Experience** should include:

- a) **Knowledge acquired:** Briefly describe the knowledge you gained through your training experience and relate this knowledge to what you learned in specific courses.
- b) **Skills learned:** Describe the skills and any career-specific abilities that you gained during your internship.
- c) **Observed attitudes and gained values:** Describe the manners, mindsets or values that you found and you perceive as important, in your training program, for a successful career (e.g. hard work, dependability, honesty, etc.)

- d) **The most challenging task performed:** Describe the best and the most challenging mission that was assigned to you during your internship, how you performed it, and how you overcame challenges while performing it.
- 3) **Conclusion:** Summarize your overall experience in the internship keeping in mind the tasks performed and your learning experience.
- 4) **Bibliography:** Provide all the sources that you have used for data collection /project execution/ report preparation (books, articles, reports).
- 5) **Plagiarism Report:** Attach a plagiarism report at the end of the report. (Acceptable range: 1-20%)


1. **Paper Size:** A- 4 size paper. Each page should be numbered.

2. Margins:

1. **Top** : 1" (1 inch=2.54cm)
2. **Bottom** : 1.15" (2.86cm)
3. **Left** : 1.4"
4. **Right** : 0.6"

3. **Line Spacing:** 1.5 line

4. The report should be between 15-20 pages (exclusive of references, title pages, table of contents) and spiral bonded with one side printing.
5. Use single in-space in footnotes (if required).
6. Standard formal level of English should be used.
7. Deadline for Final Submission of the report must be strictly adhered to.

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering			COURSE SYLLABI (2019 – 2023)			
	SCHOOL OF ELECTRICAL ENGINEERING			W.E.F	AY: 2022 - 2023 (Rev. 2019)		
FINAL YEAR BACHELOR OF TECHNOLOGY				COURSE NAME		Process Automation	
				COURSE CODE		ET462	
				COURSE CREDITS		4	
RELEASED DATE : 01/07/2022				REVISION NO		1.0	

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET462.CEO.1: To give the students a comprehension of Process Control Instrumentation Design.

ET462.CEO.2: To give the students a comprehension of the relation between Instrumentation and controller design in industrial applications.

ET462.CEO.3: To make the students able to analyze the control loops and to achieve the control actions with different Controllers

ET462.CEO.4: To impart the role of PLC in industry automation.

ET462.CEO.5: To expose various control techniques employed in process automation.

COURSE OUTCOMES :

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

ET461.CO.1: Describe process control principles

ET461.CO.2: Solve issues related to efficient controller design.

ET461.CO.3: Explore Advance Process Automation Techniques.

ET461.CO.4: Utilize knowledge of PLC programming for Process Automation.

ET461.CO.5: Design GUI for process industry using LABVIEW Software.

THEORY COURSE CONTENT		
UNIT 1	Introduction	7 HOURS
Basic Principle of Process Automation, Block Diagram of process control. Process characteristics, Control system Parameters, Control system Evaluation, Evaluation Criteria, Analog and Digital Processing, Process Control Drawings, Comparison of Pneumatic & Electro pneumatic control system.		
UNIT 2	Process Controllers	8 HOURS
Controller modes, Electronic controllers, Pneumatic controllers, Hydraulic controllers, Realization of controllers using Operational amplifier circuits. Feed forward controller, Tuning of PID controllers: Ziegler Nichols Method, Frequency Response Method		
UNIT 3	Final Control Operation	7 HOURS
Signal conversion: Analog signals, Digital signals, Pneumatic signal, Actuators: Electrical actuators, Pneumatic actuators, Hydraulic actuators, Control element: Mechanical, Electrical, Fluid Valves, Principle of control valve, Characteristics of Valve, selection of control valve, Different types of control valves and their applications		
UNIT 4	Discrete state process control	8 HOURS
Definition, Characteristics of the system, Relay controllers and Ladder Diagram Elements & Examples, Programmable Logic controllers (PLCs): Functions of PLC, Advantages, Architecture, PLC Operation, Scan time, Types, selection of PLC, Interfacing Input and Output devices with PLC, Ladder Programming, and PLC based automated systems.		
UNIT 5	Computers in Instrumentation	10 HOURS
Direct digital control systems, Distributed control systems (DCS): Introduction, DCS flow sheet symbols, architecture of DCS controller, DCS communication, DCS supervisory computer tasks, Features and advantages of DCS. Supervisory control and Data acquisition (SCADA): SCADA introduction, elements of SCADA, Features of SCADA, and MTU- functions of MTU, RTU Functions of RTU, and Applications of SCADA. Types of Recorders and their working, Introduction to Virtual Instrumentation (LABVIEW).		

PRACTICAL:		
MODULE NO.01		6 HOURS
<ol style="list-style-type: none"> 1. Study of Differential Pressure Transmitter and its application for flow measurement. 2. Measurement of level using DPT. 3. Study and Calibration of I/P converter, P/I converter 4. Study of Control valve & plot installed characteristics of Control valve 		


MODULE NO.02		6 HOURS
<p>1. Study & verification of different control actions (P, I, D, PI, PD, PID) for step input.</p> <p>2. Tuning of PID controller for temperature/pressure control loop.</p>		
MODULE NO.03		6 HOURS
<p>LabVIEW based practical</p> <p>1. Study of ON-OFF control mode for temperature control process.</p> <p>2. Tuning of PID controller for level/flow control loop.</p>		
MODULE NO.04		6 HOURS
<p>RS Logix based PLC practical's</p> <p>1. PCL based case studies</p>		

TEXT BOOK

1. Curtis Johnson, Process Control Instrumentation Technology; 8th Edition, Pearson Education, 2013,
2. S.K Singh, Industrial Instrumentation and Control, Third Edition, McGraw Hill companies.2009, ISBN: 9780070262225
3. N.A. Anderson, Boca Ratan, Instrumentation for Process measurement and control, Radnor Pennsylvania, CRC Press, 03rd Edition,1998, ISBN :9780849398711

REFERENCE BOOK

1. K. Krishna Swamy, Process Control; New Age International Publishers,2005,ISBN: 9788122416695
2. K. Astram, T Haggland, PID Controllers, Theory, Design and Tuning;2nd Edition
3. Bela G. Liptak , Instrument and Automation Engineers' Handbook: Process Measurement and Analysis, Fifth Edition - Two Volume Set Hardcover 4 October 2016 , ISBN :9781466559325

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)		
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)	
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	ASIC Design	
		COURSE CODE	ET491	
		COURSE CREDITS	3	
RELEASED DATE : 01/07/2022		REVISION NO	1.0	

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET491.CEO.1: To introduce the concepts of application specific IC design
 ET491.CEO.2: To provide exposure to the power and design considerations
 ET491.CEO.3: To introduce static timing analysis at various stages of system design

COURSE OUTCOMES :


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

ET491.CO.1: Describe the design methodology for an ASIC and recall the design considerations
 ET491.CO.2: Perform preliminary power computations for basic cells
 ET491.CO.3: Construct timing models for a standard combinational cell
 ET491.CO.4: Correlate the design flow for physical design and synthesis

THEORY COURSE CONTENT		
UNIT 1	Introduction to ASIC Design	6 HOURS
Types of ASIC, abstraction levels, ASIC design flow logic design and physical design, FPGA design flow, Combinational logic design elements, RTL design examples		
UNIT 2	Design considerations	8 HOURS
Timing parameters, metastability, clock skew, slack, clock latency, area for the design, speed requirements, power requirements, design constraints, synchronous design considerations, on-chip variations.		
UNIT 3	Power considerations	10 HOURS
<p>Power analysis in ASICs: Power Dissipation in Digital Designs, The switching activity, Power Computation for Basic Cells and Macros, power analysis</p> <p>Low power implementation: Technology Node and Library Trade-Off, Library Selection, Clock Gating, Gate-Level Power Optimization Techniques</p>		
UNIT 4	Introduction to static timing analysis	10 HOURS
<p>STA at different phases, CMOS logic gates, Standard cells, modelling of CMOS cells, switching waveform, propagation delay, Min and Max Timing Paths, Clock Domains, operating conditions, timing models - standard cell library, timing models - Combinational Cells,</p> <p>STA-Case study</p>		
UNIT 5	Physical design	6 HOURS
Physical Design Flow, Floor Planning and Power Planning, Clock Tree Synthesis, Place and Route, Back Annotation, Signoff STA and Layout, Case study		

TEXT BOOK
<ol style="list-style-type: none"> 1. Vaibbhav Taraate, ASIC Design and Synthesis -RTL Design Using Verilog, Springer, ISBN 978-981-33-4641-3, 2021. 2. Rakesh Chadha and J. Bhasker, An ASIC Low Power Primer Analysis, Techniques and Specification, Springer, ISBN 978-1-4614-4270-7 ISBN 978-1-4614-4271-4 (eBook) DOI 10.1007/978-1-4614-4271-4, 2013. 3. J. Bhasker and Rakesh Chadha, Static Timing Analysis for Nanometer Designs A Practical Approach, springer, ISBN 978-0-387-93819-6, e-ISBN 978-0-387-93820-2, 2009.

REFERENCE BOOK
<ol style="list-style-type: none"> 1. Vikram Arkalgud Chandrasetty, VLSI Design A Practical Guide for FPGA and ASIC Implementations, Springer, ISSN 2191-8112, e-ISSN 2191-8120, ISBN 978-1-4614-1119-2, e-ISBN 978-1-4614-1120-8 DOI 10.1007/978-1-4614-1120-8, 2011. 2. Michael John Sebastian Smith, Application Specific Integrated circuits, ISBN 0-201-50022-1, Addison Wesley Longman, Inc. Text copyright, 1997.

 MIT (An autonomous Institute Affiliated to SPPU)	Academy of Engineering		COURSE SYLLABI (2019 – 2023)	
	SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME		Network Security
		COURSE CODE		ET492
		COURSE CREDITS		3
RELEASED DATE : 01/07/2022			REVISION NO 1.0	

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

- ET492.CEO.1: To acquaint the students with taxonomy and terminology of the Computer Networking area
- ET492.CEO.2: To Articulate the cryptography techniques used in network security
- ET492.CEO.3: To Understand Various Encryption mechanisms for secure data transmission and management of key required for encryption
- ET492.CEO.4: To Understand authentication requirements and study various authentication mechanisms.
- ET492.CEO.5: Discuss various security parameters related to network.

COURSE OUTCOMES :

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

- ET492.CO.1: Interpret basics of computer network technology.
- ET492.CO.2: Articulate the cryptography techniques used in network security.
- ET492.CO.3: Understand Various Encryption mechanisms for secure data transmission.
- ET492.CO.4: Understand authentication requirements and mechanisms.
- ET492.CO.5: Explain various security parameters related to network.


THEORY COURSE CONTENT		
UNIT 1	Basics of Computer Network	6 HOURS
<p>Introduction, Data communications: components, data representation (ASCII, ISO etc.), direction of data flow (simplex, half duplex, full duplex); Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN, WAN). Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.</p>		
UNIT 2	Introduction to Cryptography	8 HOURS
<p>Threats in Networks, Introduction to the Concept of Security, Cryptographic Techniques- Symmetric and Asymmetric Key, Cryptographic Algorithms-One-Time Pads, The Vernam Cipher, Data Encryption Standard (DES) Algorithm, Advanced Encryption Standard (AES) Algorithm</p>		
UNIT 3	Introduction to Public key Cryptography	8 HOURS
<p>Public Key Infrastructure (PKI): Digital Signature Properties of Digital Signature, Public Key Protocol; Need and Principles of Public Key Cryptosystems, RSA algorithm and Diffie-Hellman key exchange algorithm. Certificates: Certificate Authorities, Secure Socket Layer (SSL) SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) Features, Components.</p>		
UNIT 4	Introduction to Authentication	6 HOURS
<p>Authentication Requirements, Message Authentication Codes, Hashes, MD5 & SHA, User Authentication: Password, Certificate based & Biometric Authentication, Kerberos.</p>		
UNIT 5	Network Security	6 HOURS
<p>Introduction: Need for Security, Security Attacks, Services and Mechanisms, Network Security. Firewalls, IP Security, VPN, Intrusion Detection, Web Security.</p>		
UNIT 6	Web security	8 HOURS
<p>Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction. Introduction to OWASP & Guidelines to address OWASP in any Web application. E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management. Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls.</p>		

TEXT BOOK

1. Andrew S. Tenenbaum, Computer Networks, PHI, ISBN 81-203-2175-8.2.
2. Kurose & Ross, Computer Networking: A top Down Approach featuring the Internet. 3rd edition, Pearson Education,ISBN-9788131790540
3. Behrouz A. Forouzan, Cryptography & Network Security, PHI 4th Edition
4. Cryptography and Network Security: Principles and Practice, 6th Edition, William Stallings, 2014, Pearson, ISBN13:9780133354690.

REFERENCE BOOK

1. Stallings Williams, Cryptography and Network Security: Principles and Practice, 3rd edition, Prentice Hall PTR.,2003.
2. Behrouz A. Forouzan, "Data Communications and networking",5thEdition,TataMcGraw-Hill, Publications, ISBN: 0 07 058408 7.
3. Holger Karl and Andreas Willing, Protocols and Architectures for Wireless Sensor Networks, Wiley India , ISBN:9788126533695
4. Wenbo Mao, "Modern Cryptography, Theory & Practice", Pearson Education.
5. Christof Paar, Jan Pelzl, Understanding Cryptography, Springer-Verlag Berlin Heidelberg
6. Matt Bishop, "Computer Security", Pearson Education.
7. Atul Kahate, Cryptography and Network Security, McGraw Hill.
8. Kizza, J. M. (2013). Guide to computer network security. London: Springer.

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)		
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)	
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Signal Detection and Estimation Techniques	
		COURSE CODE	ET493	
		COURSE CREDITS	3	
RELEASED DATE : 01/07/2022		REVISION NO	1.0	

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET493.CEO.1: To understand the mathematics and physics of Information Theory
 ET493.CEO.2: To understand various channel coding techniques
 ET493.CEO.3: To study the features of various error control codes
 ET493.CEO.4: To design encoder and decoder for different codes

COURSE OUTCOMES :

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


ET493.CO.1: Analyze the relation between information theory and channel coding
 ET493.CO.2: Describe real life applications based on fundamental theory
 ET493.CO.3: Design encoder and decoder for linear, cyclic codes
 ET493.CO.4: Design encoder and decoder for convolution codes
 ET493.CO.5: Analyze the performance coding and error control techniques

THEORY COURSE CONTENT		
UNIT 1	Information Measures	8 HOURS
Discrete Source models Memoryless and Stationary, Mutual Information, Self-Information, Conditional Information, Average Mutual Information, Entropy, Entropy of the block, Conditional Entropy, Information Measures for Analog Sources, Coding Techniques		
UNIT 2	Linear Block Codes for Error Correction	8 HOURS
Introduction to Error Correcting Codes, Basic Definitions, Matrix Description of Linear Block Codes, Equivalent Codes, Parity Check Matrix, Decoding of a Linear Block Code, Syndrome Decoding, Error Probability after Coding (Probability of Error Correction), Perfect Codes, Hamming Codes, Optimal Linear Codes		
UNIT 3	Cyclic Codes	8 HOURS
Introduction to Cyclic Codes, Polynomials The Division Algorithm for Polynomials, A Method for Generating Cyclic Codes, Matrix Description of Cyclic Codes, Fire Code, Golay Codes, Cyclic Redundancy Check (CRC) Codes		
UNIT 4	BCH Codes	8 HOURS
Introduction to BCH Codes, Primitive Elements, Minimal Polynomials, Generator Polynomials in Terms of Minimal Polynomials, Some Examples of BCH Codes, Decoding of BCH Codes, Reed-Solomon Codes, Implementation of Reed-Solomon Encoders and Decoders Nested Code		
UNIT 5	Convolutional Codes	6 HOURS
Introduction to Convolutional Codes, Tree Codes and Trellis Codes, Polynomial Description of Convolutional Codes (Analytical Representation), Notions for Convolutional Codes, The Generating Function, Matrix Description of Convolutional Codes, Viterbi Decoding of Convolutional Codes, Distance Bounds for Convolutional Codes, Performance Bounds, Known Good Convolutional Codes, Turbo Codes, Turbo Decoding 792.14 C		

TEXT BOOK
<ol style="list-style-type: none"> 1. Ranjan Bose, Information Theory, Coding and Cryptography, 2nd Edition, TMH, 2008 (ISBN: 9780070669017) 2. H. V. Poor, An Introduction to Signal Detection and Estimation, 2nd edition, Springer, 1994. 3. S. M. Kay, Fundamentals of Statistical Signal Processing: Detection Theory, Prentice Hall PTR, 1998. 4. S. M. Kay, Fundamentals of Statistical Signal Processing: Estimation Theory, Prentice Hall PTR, 1993. 5. H. L. Van Trees, Detection, Estimation and Modulation Theory, Part I, John Wiley, 1968. 6. D. L. Melsa and J. L. Cohn, Detection and Estimation Theory, McGraw Hill, 1978. 7. L. L. Scharf, Statistical Signal Processing: Detection, Estimation, and Time Series Analysis, Addison-Wesley, 1990. 8. V. K. Rohatgi and A. K. M. E. Saleh, An Introduction to Probability and Statistics, 2nd edition, Wiley, 2000.

REFERENCE BOOK

1. J. H. van Lint, Introduction to Coding Theory, Springer, 2008, (ISBN: 9788181288400)
2. Shu Lin and Daniel J. Costello, Error Control Coding, 2nd Edition, Pearson, 2004 (ISBN: 9788131734407)

 Academy of Engineering (An autonomous Institute Affiliated to SPPU)		COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Biomedical Engineering
		COURSE CODE	ET494
		COURSE CREDITS	3
RELEASED DATE : 01/07/2022		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ET494.CEO.1: To study the anatomy and bio-signals related to various human body systems.

ET494.CEO.2: To explain the working of Biomedical measuring, Life-saving, and Diagnostic Instruments.

ET494.CEO.3: To study the significance and details of Electric Safety, Ethics, and Standards while designing Biomedical instruments.

ET494.CEO.4: To get the overview and applications of Smart Instrumentation and E-connected Healthcare systems.

COURSE OUTCOMES :

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

ET494.CO.1: Elaborate the origin of various bio-signals and the electrodes used to measure them.

ET494.CO.2: Illustrate the working of various biomedical measurements, Life savings, and Diagnostic Instruments.

ET494.CO.3: Relate the necessity of Electric Safety, Ethics, and Standards while designing Biomedical instruments.

ET494.CO.4: Correlate the need for Smart medical devices with the current requirements.

ET494.CO.5: Discover the opportunities for the development of E-connected Healthcare Systems.

THEORY COURSE CONTENT		
UNIT 1	Human Anatomy & Bio-signals	6 HOURS
<p>Structure of cells, Physiological systems of the Body, Anatomy of the Nervous System, Anatomy of the Cardiovascular System. Bio-signals: Action & Resting potential, Propagation of action potential, Bioelectric Potentials / Bio-signals - ECG, EEG, EMG. Electrode Theory.</p> <p>Self-Study: ERG, EOG, EGG, Types of Electrodes.</p> <p>Case Study: Integration and interaction between different human body systems such as Respiration-Circulatory-Digestive-Urinary systems interaction</p> <p>Charts, anatomical and working models for better understanding of anatomy and functioning of the Human body system.</p>		
UNIT 2	Biomedical Instruments and measurements	10 HOURS
<p>Introduction of Biomedical Instrumentation, Biometrics, Components of Man-Instruments System, ECG: Amplifiers, Electrodes & Leads, Einthoven Triangle, ECG Block diagram. Correlation of heart disorders with ECG. Angioplasty. EEG: Measurement, 10-20 Electrode System. Correlation of brain disorders with ECG. Blood Pressure: indirect methods and direct methods. Respiration Rate measurement.</p> <p>Self-Study: Body Temperature measurement Digital thermometer and IR Thermometer.</p> <p>Case Study: Camera Pill The latest technique of endoscopy</p> <p>ECG, EEG, EMG Electrodes, measurement, and interpretation.</p> <p>Measurement of Blood Pressure using sphygmomanometer/ Digital BP Instrument.</p>		
UNIT 3	Life savings and diagnostic instruments	7 HOURS
<p>Life-Saving devices/ methods - Pacemakers, Defibrillators, Ventilators, CPR (Cardio-Pulmonary Resuscitation). Medical imaging modalities Ultrasound, X-ray, CT-scan, MRI, Angiography</p> <p>Self-Study: ICU monitoring instruments, Kidney Dialysis</p> <p>Case study: fMRI</p> <p>To measure the drip rate using an IR sensor detector while giving Saline / IV (Intravenous Therapy) fluids.</p> <p>Lifesaving first-aid procedure - Cardiopulmonary resuscitation (CPR)</p> <p>Demonstration of working of Defibrillator machine on dummy object.</p>		
UNIT 4	Electric Safety, Ethics, and Standards	5 HOURS
<p>Physiological effects of Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention. Grounding and Shielding. Calibration of Biomedical instruments. Biomedical Ethics. Medical Standards - OHSAS 18001 / ISO 45001, ISO 13485,</p> <p>Self-study: ISO 14001, ISO 50001: ISO 14001</p> <p>Case study: Cases of Medical Ethics</p>		


UNIT 5	Smart Instrumentation	5 HOURS
<p>Healthcare 4.0 in line with Industry 4.0 Overview, necessity, technologies Smart and wearable medical devices IoMT (overview, architecture, and application)</p> <p>Robotic surgery Overview and applications</p> <p>Self-Study: Nanorobotics - Overview and applications in the medical field.</p> <p>Case study: Smart Prosthetics</p>		
UNIT 6	E-connected Healthcare System	5 HOURS
<p>IT Healthcare, Biotelemetry system, Telemedicine system, M-healthcare system</p> <p>Self-Study: e-Pharmacy</p> <p>Case Study: Tele-ambulance, eICU</p>		
<p>Industrial Visit:</p> <p>Visit a Healthcare organization or Biomedical Industry to get real-world exposure to Biomedical instruments.</p>		

TEXT BOOK

1. L. Cromwell, F. J. Weibell and E. A. Pfeiffer, Biomedical Instrumentation and Measurements, Pearson Education, 2nd edition, ISBN: 81-317-0315-0.
2. R. S. Khandpur, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2nd edition, ISBN: 02-07-047355-2

REFERENCE BOOK

1. G. S. Sawhney, Fundamentals of Biomedical Engineering, New Age International, 2007, ISBN-13: 978-81-224-2549-9
2. J. Enderle, S. Blanchard, and J. Bronzino, Introduction to Biomedical Engineering, Elsevier Academic Press Series, 2nd edition, Indian Reprint ISBN-13: 978-81-312-0002-5.
3. Markkula Center for Applied Ethics, Cases in Medical ethics, at Santa Clara University, Mar 1, 2005. Available online at: <https://www.scu.edu/ethics/focus-areas/bioethics/resources/cases-in-medical-ethics-student-led-discussions/> [Accessed on 1st Nov. 2022]
4. D. Jude Hemanth (Editor), J. Anitha (Editor), George A. Tsihrintzis (Editor), Internet of Medical Things: Remote Healthcare Systems and Applications (Internet of Things)
5. Joel Rodrigues, Sandra Sendra Compte and Isabel Dez, e-Health Systems- Theory and Technical Applications, 1st Edition
6. Jingshan Li & Pascale Carayon (2021) Health Care 4.0: A vision for smart and connected health care, IISE Transactions on Healthcare Systems Engineering, 11:3, 171-180, DOI: 10.1080/24725579.2021.1884627

 Academy of Engineering (An Autonomous Institute Affiliated to Savitribai Phule Pune University)		COURSE SYLLABUS	
SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Capstone Portfolio
		COURSE CODE	ET480
		COURSE CREDITS	4
RELEASE DATE : 01/07/2022		REVISION NO	0.0

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

PREREQUISITE : NIL

COURSE OBJECTIVES :

ET480.CEO.1: Improve individual perspectives to find solutions at different scales

ET480.CEO.2: Identify the capstone work, formulate the methodology along with a significant collection of artifacts and outcomes.

ET480.CEO.3: Synthesize a reflective report to effectively communicate and explore findings.

ET480.CEO.4: Create a professional portfolio that technically, graphically and verbally describes pertinent achievements and the progressive growth during the program.

COURSE OUTCOMES :

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

ET480.CO.1: Portray individual skill for solving the problem. (L4)

ET480.CO.2: Showcase the best techniques and suitable methodology. (L5)

ET480.CO.3: Cognize the significance of report and comprehend its reflections. (L4)

ET480.CO.4: Assimilate digital and visual literacies. (L5)

COURSE ABSTRACT

Capstone work is an individual, self-identified project that focuses on technical/non-technical issues. Capstone work requires taking risks, high productivity, strong design research, quick turnaround times, creating an advanced design. A Digital portfolio is an integrative collection of work that draws together skills gained from across the taught phase of the program. It comprises a structured set of papers that enabled application and critical reflection. It is an amalgamation of both written and visual content that draws out the evolution of thinking around the ways in which design, social constructs, and emerging technologies intercept. It exposed process, critical thinking, as well as final artifacts, concepts, and its contents articulated in depth. The student enables to learn powerful new methods to promote his online self-design profile. It will help to established a professional voice by writing a personal design philosophy and a reflective article for the Linked In profile page. The opportunity to choose the project, formulate solution, negotiate deliverable, work individually, and present digitally is what makes the Capstone portfolio unique.

Capstone portfolio is divided into two section

- a) Capstone work
- b) Digital Portfolio

CAPSTONE WORK

Individual student can choose the topic from one of the below capstones to carry out the work during the entire semester

1. Technical Capstone

- Industry identified problem
- Institute identified problem
- Urban city identified problems
- Rural Development
- Environmental related problems
- Student Conceived problems
- Satisfactory solution to Open ended problems
- Innovative Design stemming from Student/Faculty
- Product Development
- App/ Software Development
- Multidisciplinary approach to existing problem
- Modeling/Optimization/Analysis study

2. Writing Intensive Capstone

- Design
- Literature Survey
- Commercial Survey
- Social media Survey
- Idea/ Design Philosophy
- Research Methodology
- Consultancy Project work
- Collaborative Project work
- Laboratory/Digital classroom
- Manage/lead any Event/activity

3. General Capstone

- State of art
- Creating YouTube channel
- Design Blog/Forum
- Challenges and Prospect of Technology (Engineering)
Education in Primary and Secondary Schools
- Market Statistics

DIGITAL PORTFOLIO

Individual student should create their own digital portfolio by using the standard professional platforms/blogs based on the record during their entire Under Graduate program. Digital portfolio should be professional, amalgamation of technical, written, graphical/Visual content and Verbal culmination of the skills and knowledge that students have developed over their under graduate program.

1. Process Portfolio
2. Show case Portfolio
3. Hybrid Portfolio

GUIDELINES

1. Individual student will work for Capstone work for entire semester.
2. Individual student will create their own digital portfolio.
3. Individual student should choose the title of the capstone work with approval from the Supervisor and School Dean
4. Student should work on the topic approved with all necessary information, evidences and the measurable outcomes.
5. Student will have to write the graduation book on the capstone work.
6. Students have to follow the guidelines of plagiarism for graduation book.
7. If Student perceive exemplary achievement it can consider as capstone work review 2. This will ensure the competency of students which they have learn during their undergraduate program. However supervisor can take stand if the capstone work is remarkable, he/she may ask to write a small report for the record. However supervisor can take stand if the capstone work is good, he/she may ask to write one small report.
 - Published Article in Scopus Index Journal
 - Approved Research Proposal
 - Winner for Design Competitions/Tech fest/ Workshop
 - Winner for State/National/International Event (Technical/Non-technical)
 - Valid score in Competitive exams (GATE/CAT/GRE-TOEFL/IELTS)
8. Capstone work and Digital portfolio need to be reviewed by supervisor and one faculty of same department to ensure whether student have followed all the guideline and work is appropriate and worth for evaluation.
9. Final examination will be conducted in the presence of Jury.


ASSESSMENT and EVALUATION

The Jury will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the Capstone work supervisor. Assessment shall be done jointly by the supervisor and jury members.

1. Capstone work Review 1 (25 Marks)
2. Capstone work Review 2 (25 Marks)
3. Creating Digital Portfolio (50 Marks)
4. Graduation book (25 Marks)
5. Final Demonstration (25 Marks)

REFERENCES

1. <https://design.berkeley.edu/>
Berkeley M.Des. University of California, U.S.
2. <https://design.gatech.edu/>
Georgia Institute of Technology, College of Design Atlanta, U.S.
3. <https://www.apus.edu/>
American Public University
4. <https://msu.edu/>
Michigan State Universitys US
5. <https://www.cranfield.ac.uk>
Cranfield University, Shrivenham Swindon UK
6. <https://my.bulbapp.com/personalized-learning/assessment-infographic-blog/>
7. <https://edtechjeffco.weebly.com>
8. <https://www.invisionapp.com/inside-design/10-portfolio-websites-to-show-off-your-design-work/>

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

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP405.CEO.1: To study the basic concepts of economics
 HP405.CEO.2: To use the practical applications of economic feasibility
 HP405.CEO.3: To understand the concept of banking and features
 HP405.CEO.4: To illustrate the financial planning and saving options

COURSE OUTCOMES :


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

HP405.CO.1: Relate the basic concepts of engineering economics
 HP405.CO.2: Apply the economic viability of firm/organization under different market conditions
 HP405.CO.3: Explain the bank structures and its schemes
 HP405.CO.4: Execute the effective way of financial budget and skills

THEORY		
UNIT 1	Introduction to Economics	6 HOURS
<p>Economic issues and concepts; How economist work, Theory of demand and supply; meaning, Determinants, Equilibrium between demand and supply; Elasticity of demand; Price elasticity; Income elasticity; Cross elasticity, Characteristics of an Indian economy, Concepts of foreign trade, Goods and Services Tax (GST), Globalization, Liberalization, Privatization, Global market indices, Foreign Direct Investment (FDI).</p> <p>Case studies: Housing market, General raw products/fuel market, Electronic devices, Startups, etc.</p> <p>Further readings: Introduction to Crypto-currency, Impact and analysis in the foreign market.</p>		
UNIT 2	Micro Economics and Macro Economy	6 HOURS
<p>Revenue concepts, Cost concepts, Short run and long run cost concepts and curves, Opportunity cost. Markets; meaning, types of markets and their characteristics, National Income (NI); meaning, stock and flow concept, NI at current price, NI at constant price, Gross National Product (GNP), Gross Domestic Product (GDP), Net National Product (NNP), Net Domestic Product (NDP), Personal income, Disposal income, Inflation: meaning, types, causes, measures to control.</p> <p>Case studies: Economics network, Economic influences of COVID-19 pandemic, etc.</p>		
UNIT 3	Capital Cost Estimation and Economic Viability Study	5 HOURS
<p>Typical capital cost component, Cost Index (CI), Typical operating cost components, Classes of cost estimates, Cost estimation by applying factors, Detailed cost estimation method, Financial viability calculation (Payback period, Break-even point, Internal rate of return (IRR) and Net present value (NPV); numerical), Cash flow diagrams, Profitability criteria – Project evaluation and index.</p> <p>Case studies: Detailed spreadsheet of product cost, Determination of project cost, Net profit/loss, etc.</p>		
UNIT 4	Introduction to Banking & Money Market	5 HOURS
<p>Banking; meaning, types, functions, Commercial banks- Instruments in operation of an account, Central bank- Reserve Bank of India (RBI); its functions, Concepts and influences- Cash Reserve Ratio (CRR), Bank rate, Repo rate, Reverse repo rate, Statutory Liquidity Ratio (SLR), Introduction to money and capital market, Introduction to fiscal policy- meaning and tools.</p> <p>Further readings: Retail banking, Demonetization, Banking management, etc.</p>		
UNIT 5	Financial Literacy and Planning	6 HOURS
<p>Importance of financial planning, literacy and budgeting, Savings related products, Insurance related products, Pension, Retirement and estate planning, Borrowing related products, Basic and advanced investing, Government schemes for various savings and investment options, Tax savings options.</p> <p>Case studies: Shore Financial, Real life examples, Goal-Planning, etc.</p> <p>Self studies: Protect your family financial and retirement planning.</p>		

REFERENCE BOOKS

1. N G. Mankiw: Economics: Principles of Economics, Cengage Learning (2003), ISBN: 1305585127.
2. J. Bradfield, Introduction to the Economics of Financial Markets, Oxford University Press, New York (2007), ISBN: 9780195310634.
3. F. Vega-Redondo, Economics and the theory of games, Cambridge University Press (2003), ISBN: 9780521775908.
4. C. S. Park, Fundamentals of Engineering Economics, Prentice Hall (2003), ISBN: 9780130307910.
5. D. E. O'Connor, The Basics of Economics, Greenwood Publisher (2004), ISBN: 9780313325205.
6. V. V. Mahajani, S. M. Mokashi, Chemical Project Economics, Macmillan India Ltd. (2005), ISBN: 1403928142.

 Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	2022 - 2023 (Rev. 2019)
FINAL YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Psychology
	COURSE CODE	HP406
	COURSE CREDITS	2
RELEASE DATE : 01/07/2022	REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP406.CEO.1: To introduce the basic concept of Psychology.

HP406.CEO.2: To explain how learning and conditioning occurs in everyday life through both nature and nurture factors.

HP406.CEO.3: To know the main schools of thought and prime contributors to the theory of workplace motivation.

HP406.CEO.4: To develop insight into one's own and others behavior and underlying mental processes.

HP406.CEO.5: To develop Positive Psychology interventions to increase personal well-being.

COURSE OUTCOMES :

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

HP406.CO.1: Explain the basic concepts of Psychology.

HP406.CO.2: Apply the concept of conditioning in day to day life.

HP406.CO.3: Explain the main schools of thought and prime contributors to the theory of workplace motivation.

HP406.CO.4: Demonstrate effectively the personality traits in regular life.

HP406.CO.5: Employ Positive Psychology interventions to increase personal well-being.

THEORY		
UNIT 1	Basics of Psychology	6 HOURS
Meaning, Nature, Objective of Psychology, Learning: meaning, classical conditioning, operant conditioning; Attention and Perception: definition, types of attention, determinants of attention.		
UNIT 2	Social Interactions	6 HOURS
Conformity, Compliance, Obedience, Stereotypes, Attitudes: nature, characteristics, attitude formation and attitude change; Prejudice and Discrimination- characteristics and types of prejudice, development and maintenance of prejudice and discrimination, manifestation of prejudice, methods of reducing prejudice and discrimination.		
UNIT 3	Need and Motivation	6 HOURS
Meaning; extrinsic and intrinsic motivation, Vroom's Expectancy Theory of Motivation, Herzberg's Motivators and Hygiene Factors, Maslow's Hierarchy of Needs.		
UNIT 4	Self and Identity	6 HOURS
Meaning and Need, Erik Erikson's Stages of Psychosocial Development, Carl Rogers' Theory of Personality, Thomas Harris's Transactional Analysis, Johari Window, SWOT .		
UNIT 5	Positive Psychology	4 HOURS
Introduction to Positive Psychology; From Learned Helplessness to Learned Optimism, 'Building the Skill of Gratitude, VIA Classification of Character Strengths and Virtues, Identifying and Using Your Signature Strengths, Resilience and Optimism, Cognitive Strategies to Increase Optimism and Resilient Thinking, Managing Anxiety and Increasing Positive Emotions .		

TEXT BOOK
<ol style="list-style-type: none"> 1. S. Ciccarelli, J. Noland White, Psychology 4th Edition, Pearson Publisher, ISBN-13:9780208972241. 2. Robert A. Baron, Introduction to Psychology 3rd Edition, Pearson Education Company, ISBN-10:0536813906. 3. Stephen P. Robbins, Timothy. A. Judge, Organizational Behavior 15th Edition, Pearson Education Inc., ISBN-10:0-13-283487-1. 4. Robert. A. Baron, Nyla. R. Branscombe, Social Psychology 13th Edition, Pearson Education India, ISBN-13:978-9332569911.

REFERENCE BOOK

1. Kathleen M. Galotti, Cognitive Psychology 2nd Edition, SAGE Publications India Pvt. Ltd. ISBN:978-93-515-0277-7.
2. Robert S. Feldman, Understanding Psychology 10th Edition, McGraw Hill Education (India) ISBN:10: 1-25-900305-1.
3. Elliot Aronson, Timothy D. Wilson, Robin M. Akert, Social Psychology 8th Edition, Pearson Education, ISBN:9788131730898.
4. Calvin S. Hall, Gardner Lindzey, John B. Campbell, Theories of Personality 4th Edition Choudhary Press, Delhi, ISBN: 978-81-265-1092-4.