

**Kolhapur Institute of Technology's
COLLEGE OF ENGINEERING (AUTONOMOUS)
Gokul Shirgaon, Kolhapur**



KOLHAPUR INSTITUTE
OF TECHNOLOGY'S
**COLLEGE OF
ENGINEERING**
(AUTONOMOUS),
KOLHAPUR

Curriculum Structure

(As Per NEP guidelines)

For

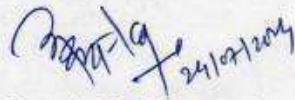
B. Tech E&TC Engineering

Academic Year 2024-2025

Under Graduate Programme




Dr. Y. M. Patil
Head of Department


Dr. A. R. Thorvat
Dean Academics

B. Tech. in Electronics & Telecommunication Engg.**w.e.f. A.Y: 2024-25 (S.Y.B. Tech)****SEMESTER-III**

Sr. No.	Category	Course Code	Course Name	L	T	P	Hrs./ Week	Credits	Evaluation Scheme			
									Component	Marks		
										Max	Min. for passing	
1	PC	UETPC0301	Analog Circuits	3	1	-	4	4	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
2	PC	UETPC0302	Differential Equations and Integral Transforms	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
3	PC	UETPC0303	Digital System Design	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
4	PC	UETPC0304	Electronics Instrumentation & Measurement	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
5	VE	UETVE0305	Environmental Studies	2	-	-	2	2	ISE	50	20	20
6	HSSM	UETEM0306	Engineering Management	2	-	-	2	2	ESE	50	20	20
7	PC	UETPC0331	Analog Circuits Laboratory	-	-	2	2	1	ISE	25	10	
									ESE(POE)	50	20	
8	PC	UETPC0332	Digital System Design Laboratory	-	-	2	2	1	ISE	25	10	
									ESE(POE)	25	10	
9	PC	UETPC0333	Electronics Instrumentation & Measurement- Laboratory	-	-	2	2	1	ISE	25	10	
10	OJT	UETIL0371	Mini Project-I	-	-	2	2	1	ISE	50	20	
11	MM	UETMM03**	Multidisciplinary Minor-I	2	-	-	2	2	ESE	100	40	
			Total:				27	23	Total Marks: 800 Total Credit: 23			

SEMESTER-IV

Sr. No.	Category	Course Code	Course Name	L	T	P	Hrs./ Week	Credits	Evaluation Scheme			
									Component	Marks		
										Max	Min for Passing	
1	PC	UETPC0401	Network Analysis	2	-	-	2	2	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
2	PC	UETPC0402	Signals and Systems	2	-	-	2	2	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
3	PC	UETPC0403	Analog & Digital Communication	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
4	PC	UETPC0404	Linear Integrated Circuits	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
5	PC	UETPC0405	Electromagnetic Engineering	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
6	VE	UETVE0406	Constitution of India	2	-	-	2	2	ISE	50	20	
7	PC	UETPC0431	Analog & Digital Communication Laboratory	-	-	-	2	1	ISE	25	10	
									ESE(POE)	25	10	
8	PC	UETPC0432	Linear Integrated Circuits Laboratory	-	-	2	2	1	ISE	25	10	
									ESE(POE)	25	10	
9	OJT	UETIL0471	Mini Project-II	-	-	2	2	1	ISE	25	10	
10	VS	UETVS0433	Electronics Computer Aided Design (E-CAD)	-	-	2	2	1	ISE	25	10	
11	CC	UETCC0434	Co-Curricular Activities-II	-	-	2	2	1	ISE	50	20	
12	MM	UETMM04**	Multidisciplinary Minor-II			-	3	3	ESE	100	40	
				Total:			28	23	Total Marks: 850 Total Credit: 23			

*: Program Elective, ~: Open Elective

B. Tech. Electronics & Telecommunication Engg.

AY: 2025-26 (TY B. Tech)

SEMESTER-V

Sr. No.	Category	Course Code	Course Name	L	T	P	Hrs. / Week	Credits	Evaluation Scheme			
									Component	Marks		
										Max	Min for passing	
1	PC	UETPC0501	Microcontrollers	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
2	PC	UETPC0502	Control Systems	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
3	PC	UETPC0503	Digital Signal Processing	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
4	PEC	UETPE05*	Program Elective-I	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
5	OE	UETOE05~	Open Elective-I	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
6	AE	UETAE0531	Business Communication and Value Science	-	-	2	2	1	ISE	50	20	
7	PC	UETPC0532	Microcontrollers Laboratory	-	-	2	2	1	ISE	25	10	
									ESE(POE)	25	10	
8	PC	UETPC0533	Digital Signal Processing Laboratory	-	-	2	2	1	ISE	25	10	
									ESE(OE)	25	10	
9	VS	UETVS0534	Model Based Design Laboratory	-	-	2	2	1	ISE	25	10	
10	CEP	UETIL0571	Object Oriented Programming	-	-	2	2	1	ISE	25	10	
11	MM	UETMM05**	Multidisciplinary Minor-III	3	-	-	3	3	ESE	100	40	
Total:							28	23	Total Marks: 800 Total Credit: 23			

*: Program Elective, ~: Open Elective

SEMESTER-VI

Sr. No.	Category	Course Code	Course Name	L	T	P	Hrs. / Week	Credits	Evaluation Scheme			
									Component	Marks		
										Max	Min for Passing	
1	PC	UETPC0601	Embedded System	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
2	PC	UETPC0602	VLSI Design	2	-	-	2	2	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
3	PC	UETPC0603	Computer Networks	2	-	-	2	2	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
4	PEC	UETPE06*	Program Elective-II	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
5	OE	UETOE06~	Open Elective-II	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
6	HSSM	UETEM0604	Advanced Data Structure	2	-	-	2	2	ESE	50	20	
7	PC	UETPC0631	Embedded System Laboratory	-	-	2	2	1	ISE	25	10	
									ESE(POE)	25	10	
8	PC	UETPC0632	VLSI Design Laboratory	-	-	2	2	1	ISE	25	10	
									ESE(OE)	25	10	
9	PC	UETPC0633	Computer Networks Laboratory	-	-	2	2	1	ISE	25	10	
10	FP	UETIL0671	Industrial Automation	-	-	2	2	1	ISE	25	10	
11	CC	UETCC0634	Co-Curricular Activities-III	-	-	2	2	1	ISE	50	20	
12	MM	UETMM06**	Multidisciplinary Minor-IV	3	-	-	3	3	ESE	100	40	
				Total:			28	23	Total Marks: 850		Total Credit: 23	

*: Program Elective, ~: Open Elective

B. Tech. Electronics & Telecommunication Engg.

AY: 2026-27 (Final Year B. Tech)

SEMESTER-VII

Sr. No.	Category	Course Code	Course Name	L	T	P	Hrs. / Week	Credits	Evaluation Scheme		
									Component	Marks	
										Max	Min for Passing
1	PC	UETPC0701	Mobile Communication Network	3	-	-	3	3	ISE1	10	40
									MSE	30	
									ISE2	10	
									ESE	50	
2	PC	UETPC0702	Power Electronics	3	-	-	3	3	ISE1	10	40
									MSE	30	
									ISE2	10	
									ESE	50	
3	PC	UETPC0703	RF & Microwave Engineering	3	-	-	3	3	ISE1	10	40
									MSE	30	
									ISE2	10	
									ESE	50	
4	PEC	UETPE07*	Program Elective-III	3	-	-	3	3	ISE1	10	40
									MSE	30	
									ISE2	10	
									ESE	50	
5	OE	UETOE07~	Open Elective-III	2	-	-	2	2	ISE1	10	40
									MSE	30	
									ISE2	10	
									ESE	50	
6	PC	UETPC0731	RF & Microwave Engineering Laboratory	-	-	2	2	1	ISE	25	10
									ESE(OE)	25	10
7	PC	UETPC0732	Power Electronics Laboratory	-	-	2	2	1	ISE	25	10
									ESE(POE)	25	10
8	RM	UETIL0771	Project-I	-	-	8	8	4	ISE	50	20
									ESE(OE)	50	20
9	MM	UETMM07**	Multidisciplinary Minor-V	3	-	-	3	3	ESE	100	40
Total:							29	23	Total Marks: 800 Total Credit: 23		

*: Program Elective, ~: Open Elective

SEMESTER-VIII

Sr. No.	Category	Course Code	Course Name	L	T	P	Hrs. / Week	Credits	Evaluation Scheme			
									Component	Marks		
										Max	Min for Passing	
1	PEC	UETPE08*	Program Elective-IV	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
2	PEC	UETPE08*	Program Elective-V	3	-	-	3	3	ISE1	10	20	40
									MSE	30		
									ISE2	10		
									ESE	50		
3	OJT	UETIL0871	Internship	-	-	12	12	6	ISE-I	75	30	
									ISE-II	75	30	
4	RM	UETIL0872	Project -II	-	-	8	8	4	ISE	50	20	
									ESE(OE)	50	20	
5	CC	UETCC0831	Co-Curricular Activities-IV	-	-	2	2	1	ISE	50	20	
Total:							28	17	Total Marks: 500 Total Credit: 17			

*: Program Elective, ~: Open Elective

Program Electives:*PROGRAM ELECTIVE-I**

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETPE0511	Antenna and Wave Propagation	3	0	0	3	3
2	UETPE0512	Probability Theory and Stochastic Processes	3	0	0	3	3
3	UETPE0513	Electronic System Design	3	0	0	3	3
4	UETPE0514	Computer Architecture & Organization	3	0	0	3	3

PROGRAM ELECTIVE -II

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETPE0611	Operating System	3	0	0	3	3
2	UETPE0612	Automotive Electronics	3	0	0	3	3
3	UETPE0613	Biomedical Instrumentation	3	0	0	3	3
4	UETPE0614	Embedded Linux	3	0	0	3	3

PROGRAM ELECTIVE -III

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETPE0711	Information Theory & coding	3	0	0	3	3
2	UETPE0712	Mechatronics	3	0	0	3	3
3	UETPE0713	Multimedia Engineering	3	0	0	3	3
4	UETPE0714	Optical Fiber communication	3	0	0	3	3
5	UETPE0715	Digital TV and Multimedia	3	0	0	3	3

PROGRAM ELECTIVE-IV

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETPE0811	Digital Image Processing	3	0	0	3	3
2	UETPE0812	Cyber security	3	0	0	3	3
3	UETPE0813	CMOS VLSI	3	0	0	3	3
4	UETPE0814	Real Time Systems	3	0	0	3	3

PROGRAM ELECTIVE- V

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETPE0815	System on Chip	3	0	0	3	3
2	UETPE0817	Cryptography & Network Security	3	0	0	3	3
3	UETPE0818	Machine Learning	3	0	0	3	3

~ Open Elective Courses

OPEN ELECTIVE -I

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UILOE0522	Global Marketing Management	3	-	-	3	3
2	UILOE0531	Ethics in Engg practices	3	-	-	3	3
Total:						6	6

OPEN ELECTIVE-II

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UILOE0622	Engineering Econometrics	3	-	-	3	3
Total:						3	3

OPEN ELECTIVE-III

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UILOE0724	Industrial Instrumentation	2	-	-	2	2
Total:						2	2

A. Bucket-I: Multidisciplinary Minor in Cyber Security

****Multi disc. minor**

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETMM0341	Information Theory for Cyber Security	2	-	-	2	2
2	UETMM0441	Data Encryption	3	-	-	3	3
3	UETMM0541	Steganography & Digital Watermarking	3	-	-	3	3
4	UETMM0641	Security Assessment & Risk Analysis	3	-	-	3	3
5	UETMM0741	Database security & Access Control	3	-	-	3	3
Total:						14	14

B. Bucket-II: Multidisciplinary Minor in Computer Vision

****Multi disc. minor**

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETMM0342	Computer Graphics	2	-	-	2	2
2	UETMM0442	Machine Learning	3	-	-	3	3
3	UETMM0542	Deep Learning	3	-	-	3	3
4	UETMM0642	Image Processing	3	-	-	3	3
5	UETMM0742	Pattern Recognition & Computer Vision	3	-	-	3	3
Total:						14	14

C. Bucket-III: Multidisciplinary Minor in Robotics & Automation

****Multi disc. minor**

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UELMM0341	Introduction to Robotics & Automation	2	-	-	2	2
2	UELMM0441	Sensors in Automation	3	-	-	3	3
3	UELMM0541	Microprocessor & Real Time Embedded Systems	3	-	-	3	3
4	UELMM0641	Artificial Intelligence in Robotics	3	-	-	3	3
5	UELMM0741	Applications of Robotics & Automation	3	-	-	3	3
Total:						14	14

D. Emerging Minor in Sensor Technology

Emerging area minor							
Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETMN0361	Sensor Technology : Physics, Fabrication and Circuits	3	1	-	4	4
2	UETMN0461	Micro-sensor circuits	3	1	-	4	4
3	UETMN0561	Sensors & Sensor Circuits	3	1	-	4	4
4	UETMN0661	Electric Vehicle Sensors	3	1	-	4	4
5	UETMN0761	Industrial Sensors	2	-	-	2	2
Total:						18	18

E. B.Tech. (Hons) in IOT.

Emerging specialization minor							
Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETHN0351	DBMS in Cloud	3	1	-	4	04
2	UETHN0451	Python for Cloud Computing	3	1	-	4	04
3	UETHN0551	IOT Architecture and Protocols	3	-	-	3	03
4	UETHN0651	Design of IOT Devices	3	1	-	4	04
5	UETHN0751	Data Analytics and Security of IOT	3	-	-	3	03
Total:						18	18

Exit Courses

A. After First Year:

The candidate should pass any two suitable skill based courses to qualify for Certification.

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETEX0291	Consumer Electronics	4	-	-	4	4
	UETEX0292	Radio Engineering	4	-	-	4	4
2	UETEX0293	Electronics Servicing and Maintenance of photo copy machine	4	-	-	4	4
3	UETEX0294	Electronic Materials & Components	4	-	-	4	4
Total:							12

B. After Second Year:

The candidate should pass following skill based courses to qualify for Diploma.

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETEX0491	Data Communication and Networking	3	-	-	3	3
2	UETEX0492	Electronics Servicing and Maintenance	3	-	-	3	3
3	UETEX0493	Industrial Training	2	-	-	2	2
Total:							8

C. After Third Year:

The candidate should pass following skill based courses to qualify for B. Voc

Sr. No.	Course Code	Course Name	L	T	P	Hrs. / Week	Credits
1	UETEX0691	Advanced Mobile Communication	3	-	-	3	3
2	UETEX0692	Cyber Security	3	-	-	3	3
3	UETEX0693	Internship	2	-	-	2	2
Total:							8

**KIT's College of Engineering (Empowered
Autonomous), Kolhapur Department: Electronics &
Telecommunication Engg.**

AY:2025-26

**Semester-V
Syllabus**

Title of the Course: Microcontrollers Course Code: UETPC0501								L	T	P	Credit		
								3	-	-	3		
Course Pre-Requisite: Number system, logic gates, digital system design, memory types													
Course Description: Basic introduction to microcontroller based systems design, development and implementation. It includes microcontroller architecture, programming, I/O Interfacing, Interrupt management and other related topics.													
Course Objectives: 1. Describe the architecture of 8051 and PIC 16f877 microcontroller 2. Analyze the instruction set of 8051 PIC 16f877 microcontroller 3. Understand the peripherals and its programming 8051 and PIC 16f877 microcontroller 4. Understand using peripherals to build a useful system													
Course Learning Outcomes: 1. Explain von Neumann architecture, Harvard architecture, CISC & RISC architecture of microcontrollers. 2. Demonstrate ON CHIP resources of SOC. 3. Develop assembly language programs. 4. Carry out Interfacing of microcontrollers with off chip resources. 5. Design small applications with KEIL micro vision & MPLAB IDE Tools													
CO	After the completion of the course the student should be able to							Bloom's Cognitive					
								level	Descriptor				
CO1	Explain von Neumann architecture, Harvard architecture, CISC & RISC architecture of microcontrollers.							II	Understanding				
CO2	Develop assembly language programs.							II	Understanding				
CO3	Demonstrate ON CHIP resources.							III	Applying				
CO4	Carry out Interfacing of microcontrollers with off chip resources.							III	Applying				
CO5	Design small applications with KEIL micro vision & MPLAB IDE Tools							VI	Creating				
CO-PO Mapping:													
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1	2			1								1	1
CO2	2											1	
CO3	1	2	3	2						2		2	1
CO4	2	2	3							2		1	
CO5	2	2	3	2	2					3		3	1
Assessments:													
Teacher Assessment:													
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.													
Assessment								Marks					
ISE 1								10					
MSE								30					
ISE 2								10					
ESE								50					
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% Weightage for course content (nor													

mally last three modules) covered after MSE.	
Course Contents:	
Unit 1:--- 8 BIT MICROCONTROLLER -8051: Introduction to Microcontrollers, Architecture, Functional pin description, Memory organization (Internal and External memory concept), Introduction to ON CHIP resources. External Program and Data memory interface , Comparison between different family members.	8 Hrs.
Unit 2:---PROGRAMMING OF 8051 Addressing modes, Instruction set, Assembly language programming, Assembler directives	7 Hrs.
Unit 3:--- ON CHIP RESOURCES,PROGRAMMING Port structure and operation, Timer/Counters(Internal architecture of different modes and programming),Serial port and its operating modes(hardware details of mode-1 only).	8Hrs.
Unit 4:--- Interrupts & Hardware Interfacing with 8051 Timers, serial port, Interrupts, Interfacing of Keypad, Seven Segment display, ADC, DAC, Stepper motor, LCD to 8051. Introduction to Embedded C Programming.	8 Hrs.
Unit 5:--- INTRODUCTION TO PIC MICROCONTROLLER-16F877 Architecture, RESET options, Watch DOG timer, Memory organization, Instruction set and assembly language programming.	7 Hrs.
Unit 6:--- ON CHIP RESOURCES OF PIC 16F877 Overview of I/O Ports (internal structure of PORT A only) ,Timers, CCP, ADC , Interrupt structure.	8Hrs.
Textbooks: 1. "The 8051 microcontroller and embedded systems using assembly and c",--By M A Mazidi and J G Mazidi, R D McKinlay-Pearson Education 2. "The 8051 Microcontroller "--By I Scott Mackenzie and R C W Phan,4th edition ,Pearson education 3. Design with PIC microcontroller By J B Peatman, Pearson education. 4. "The 8051Microcontroller-Architecture, programming & applications"-K. J. Ayala	
Reference Books: 1. Intel Handbook on 8 Bit and 16-bit embedded controllers PIC microchip Midrange MCU family reference manual. 2. "microcontrollers theory and Applications"-By Ajay Deshmukh-TATA McGraw Hill	

Title of the Course: Control Systems											L	T	P	Credit
Course Code: UETPC0502											3	-	-	3
Course Pre-Requisite: Student should have clear understanding of Linear differential equations, Differential equations and its solution, and Laplace transform, Signals & Systems, basic Electrical circuits.														
Course Description: Control system is offered as the core course at the fifth semester of E&TC Engineering undergraduate programmer. This course intends to build the competency in the students to design mathematical model of mechanical & Electrical system & check the stability of system in time domain and frequency domain. In addition, syllabus of this course is included in competitive exams like GATE.														
Course Objectives:														
1. To provide an introduction and basic understanding of different control system components.														
2. To develop time & frequency domain analysis.														
3. To analyze & compare different control systems.														
4. To understand the concept of stability & state space variables.														
Course Learning Outcomes:														
CO	After the completion of the course the student should be able to										Bloom's Cognitive level		Descriptor	
CO1	Apply knowledge of mathematics, science, and engineering to design, analyze and control the different systems.										III	Apply		
CO2	Analyze the systems in time domain and frequency domain.										III	Analyze		
CO3	Analyze the behaviour of closed loop systems using root locus, Routh Hurwitz, Bode and Nyquist.										III	Analyze		
CO4	Describe state variables & Design various compensators in frequency domain.										III	Describe		
CO-PO Mapping:														
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2	
CO1	2	3												
CO2		3												
CO3		2												
CO4					2								1	
Assessments :														
Teacher Assessment:														
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.														
Assessment											Marks			
ISE 1											10			
MSE											30			
ISE 2											10			
ESE											50			
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.														
MSE: Assessment is based on 50% of course content (Normally first three modules)														
ESE: Assessment is based on 100% course content with30%-40% Weightage (Normally first three modules) for syllabus covered up to MSE and 60-70% Weightage for course content (normally last three modules) covered after MSE.														
Course Contents:														

Unit 1:--- Introduction of Feedback control system Need & classification of control system, Effects of feedback, Mathematical models – (Mechanical & Electrical systems) , Transfer function of electrical and Mechanical systems, Differential equations, Block diagram algebra – Block diagram reduction, Representation by Signal flow graph using Mason’s gain Formula.	8 Hrs.
Unit 2:--- Time Response Analysis Introduction of Standard test signals – Time response of first & second order systems – Design specifications of 2nd order system & error compensation, Characteristic Equation of Feedback control systems, Transient response of second order systems – Time domain specifications, Steady state response – Steady state errors and error constants.	8 Hrs.
Unit 3:-- Stability Analysis In S-Domain The concept of stability – Routh’s stability criterion – qualitative stability and conditional stability – limitations of Routh’s stability. Root Locus Technique: The root locus concept – construction of root loci-effects of adding poles and zeros to $G(s)$ $H(s)$ on the root locus.	8 Hrs.
Unit 4:--- Frequency Response Analysis Introduction, correlation between time & frequency domain ,-Bode plots, Determination of Frequency domain specifications and transfer function from the Bode Plot – Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability Criterion, Nyquist plot & stability analysis, effect of addition of poles & zeros on bode plots.	7 Hrs.
Unit 5:--- State Variable Analysis and Design Concept of state, state variables & state model State-space representation, computation of the state transition matrix, transfer function from the state model, controllability of linear system, observability of linear system.	7 Hrs.
Unit 6:--- Classical Control Design Techniques Compensation techniques –Lag, Lead, and Lead-Lag Controllers design in frequency Domain, Introduction of PID controller. Introduction to Digital controller.	7 Hrs.
Textbooks: 1. “Control Systems Engineering”, I.J. Nagrath, M.Gopal ,5 th Edition, New Age International Publication 2. “Control Systems Engineering”, R. Anandanatarajan, P. Ramesh Babu, Scitech Publications 3 rd Edition, Scitech Publication, 2009. 3. “Control system Engineering”, A. Ananadkumar, PHI publication 2 nd edition.	
Reference Books : 1. “Control System Principles and Design”, M. Gopal, Tata McGraw Hill 3 rd Edition 2. “Automatic Control Systems”, S. Palani, Anoop K. Jairath, Ane books Pvt.Ltd. 3. “Control System Engineering”, Dr. Rajeev Gupta, Wiley Precise Publication 4. “Modern Control Engineering”, Eastern Economy, K. Ogata, 4 th Edition.	

Title of the Course: Digital Signal Processing Course Code:UETPC0503								L	T	P	Credit		
								3	-	-	3		
Course Pre-Requisite: signals and systems, sampling theory, Fourier analysis etc.													
Course Description: This course provides an introduction to digital signal processing. In this course, a detailed examination of basic digital signal processing operations including sampling/reconstruction of continuous time signals, Fourier transforms will be given. The discrete Fourier transform (DFT) and fast Fourier transform (FFT) will be studied. Finally, we will examine time and frequency domain techniques for designing and applying infinite impulse response (IIR) and finite impulse response (FIR) digital filters. Concepts Of Multirate Digital Signal Processing will also be discussed.													
Course Objectives: The course aims to 1. Apply the concept of FFT algorithms to compute DFT 2. Design FIR filter using various window method, frequency sampling. 3. Design IIR filter using impulse invariant, bilinear transform 4. Understand DSP Processors and Concepts Of Multirate Digital Signal Processing													
Course Learning Outcomes:													
CO		After the completion of the course the student should be able to						Bloom' Cognitive level		Descriptor			
CO1		Demonstrate DFT and FFT						II		Applying			
CO2		Design and implement IIR and FIR filters						V		Designing			
CO3		Explain architecture of DSP processors						II		Understanding			
CO4		Explain multirate DSP						II		Understanding			
CO-PO Mapping:													
CO-PO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1	2	1	1	1	1	1		1		1			
CO2	1	2	1	3	1					1	1	2	
CO3	1	3	2	2	1	1			1	2	1	1	
CO4	1	1	2	1									
Assessments :													
Teacher Assessment:													
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.													
Assessment								Marks					
ISE 1								10					
MSE								30					
ISE 2								10					
ESE								50					
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with60-70% Weightage for course content(normally last three modules) covered after MSE.													
Course Contents:													
Unit 1: Discrete Fourier Transform & FFT Algorithms: Overview of DFT , Fast Convolution. Overlap Save and Overlap add algorithm. Relationship between DTFT, DFT and ZT. FFT Algorithms – Radix 2: DIT-FFT and Radix 2: DIF.												8Hrs.	

Unit 2: FIR Filter Design : Characteristics of FIR Filters. Properties of FIR Filters.FIR Design using Windowing Technique [Rectangular Window, Hamming Window and Hamming Window]FIR Design using Kaiser Window.FIR Design using Frequency Sampling Technique.	8 Hrs.
Unit 3: IIR Filter Design: Introduction to IIR Filters, IIR Filter Designing using Impulse Invariant method and Bilinear Transformation method, Characterstics of Butterworth filters, Chebyshev filters and elliptic filters, Butterworth filter design.	7 Hrs.
Unit 4: Realization of filter Introduction, Basic realization blocksdiagram.FIR realization- Direct Form (Non-linear phase and Linear phase), FIR filter realization in cascade form and parallel form. IIR realization- Direct form I and II, Cascade and parallel realization.	8 Hrs.
Unit 5:DSP processors Introduction to DSP processor 67XX, Introduction to TMS320C67XX Architecture, Functional Units, pipelining, Registers, Addressingmodes.	7 Hrs.
Unit 6:Multi-rate digital signal processing : Concept of Multirate digital signal processing, Sampling rate conversion by a non integer factor, Design of two stage sampling rate converter, application of multirate signal processing.	7 Hrs.
Textbooks: 1. “Digital Signal Processing – Principles, Algorithms &Applications”, John G. Proakis & Dimitris G.Manolakis ,4 th Edition, Pearson Education / Prentice Hall, 2007. Reference Books : 1. “Digital Signal Processing”, Emmanuel C..Ifeachor, & Barrie.W.Jervis , 2 nd Edition, Pearson Education / Prentice Hall, 2002. 2 .“Digital Signal Processing – A Computer Based Approach”, Sanjit K. Mitra ,Tata Mc GrawHill,2007. 3. “Discrete-Time Signal Processing”, A.V.Oppenheim, R.W. Schafer and J.R. Buck,8th IndianReprint, Pearson, 2004. 4. “Digital Signal Processing”, Andreas Antoniou ,Tata Mc Graw Hill, 2006.	

Title of the Course : Business Communication and Value Science Code: UETAE0531							L	T	P	Credit	
							-	-	2	1	
Course Pre-Requisite: Basics of Communication Skills, LSRW Skills, Grammar etc.											
Course Description: This practical course is designed to build essential communication, emotional, and professional skills among undergraduate engineering students. Through engaging and hands-on activities, role plays, reflections, and presentations, students will enhance their self-awareness, emotional intelligence, intercultural sensitivity, teamwork, and workplace readiness.											
Course Objectives: By the end of this course, students will be able to:											
1. Conduct self-assessments to identify personal strengths and areas for growth. 2. Develop life skills like empathy, resilience, and interpersonal communication. 3. Understand and apply soft skills and ethics in real-life contexts. 4. Demonstrate professional communication in interviews, group tasks, and presentations. 5. Enhance employability quotient through resume writing, group discussion, and mock interviews. 6. Apply emotional intelligence and cross-cultural communication in workplace scenarios.											
Practice leadership, motivation, and storytelling techniques for professional success.											
Course Learning Outcomes:											

In Semester Evaluation for 50 Marks: Assessment will be based on: Practical performance, Presentations, Group Discussions, Interviews, Assignments, Quizzes, Demonstrations, etc.	
Course Contents:	
Practical 1: Self-Awareness and SWOT Understanding personal traits. SWOT and TOWS analysis. Presentation on self-strengths and surviving in the VUCA world. Reflection journal submission.	02 Hrs.
Practical 2: Soft Skills and Workplace Ethics Introduction and importance of Soft Skills. Checklist on Soft Skills and action plan for improvement. Peer discussion on ethical challenges: Participants will read case studies, discuss, and list the soft skills. Participants will attempt a quiz based on different soft skills & workplace ethics.	02 Hrs.
Practical 3: Assertive Communication and Positive Attitude Positive self-talk, attitude, and goal setting. Checklist on Positive self-talk, Positive Attitude and Self-Esteem, Goal setting, right attitude Assertiveness Self-assessment Test: https://www.psychologytoday.com/intl/tests/personality/assertiveness-test	02 Hrs.
Practical 4: Employability Quotient 1: Employment Correspondence Drafting resume, cover letter, and professional email. Formatting, tone, and clarity practice.	02 Hrs.
Practical 5: Employability Quotient 2: Workplace Expectations Open discussion on the topic, "Employers' expectations and the need for new skill sets for the changing workforce trends." The focus is on raising learning and adaptability from an employment perspective. A detailed checklist is provided to the participants to match their skills and employers' expectations.	02 Hrs.
Practical 6: Employability Quotient 3: Group Dynamics Participants will be engaged in a group discussion activity to harness effective communication skills, self-confidence, assertive self-expression, teamwork and constructive exchange of ideas and thoughts.	02 Hrs.
Practical 7: Employability Quotient 4: Interview Techniques Mock interviews with peer and faculty feedback. Tips on etiquette, articulation, and handling stress.	02 Hrs.
Practical 8: Professional Presentation Skills Participants will prepare and deliver a presentation on their technical projects/mini-projects. The focus will be on body language, voice modulation, team coordination, engagement with the audience, time management, slide design/visuals, and technical depth.	02 Hrs.
Practical 9: Emotional Intelligence Strategies to hone EI. Video screening and discussion. Extempore based on EI topics. Peer feedback. EQ test and reflection.	02 Hrs.

Practical 10: Motivation and Leadership Participants are given a few case studies/video samples to understand motivation. Participants will talk about their favourite leader and motivation from their life.	02 Hrs.
Practical 11: Cross- cultural Communication Techniques to facilitate cross-cultural communication. Participants will be provided with a set of case scenarios to analyse cross-cultural communication. Participants will present and submit a case study based on cross-cultural communication in a group.	02 Hrs.
Practical 12: Storytelling for Business Create and present a technical story—emphasis on narrative, engagement, and audience connection	02 Hrs.
Textbooks: 1. Dryden, W. & Constantinou, D. (2004). Assertiveness Step by Step. Sheldon Press. 2. Goleman, D. (2006). Emotional Intelligence. Bloomsbury Publishing. 3. Northouse, P. G. (2021). Leadership: Theory and Practice. Sage Publications. 4. Maslow, A. H. (1943). A Theory of Human Motivation. 5. Raman, M. & Sharma, S. (2013). Communication Skills. Oxford University Press	
Online Resources: 1. Ted Talk: How to Speak So That Others Want to Listen- https://www.youtube.com/watch?v=eIho2S0ZahI 2. TEDx talk by Adam Galinsky: How to speak up for yourself- https://www.ted.com/talks/adam_galinsky_how_to_speak_up_for_yourself?language=en 3. https://www.youtube.com/watch?v=FFjGGZecO04 4. Steve Jobs: Connecting the dots- https://news.stanford.edu/2005/06/14/jobs-061505/	

Title of the Course: Microcontrollers Laboratory Code: UETPC0532										L	T	P	Credit
										-	-	2	1
Course Pre-Requisite: KEIL microvision software, MPLAB IDE, C programming													
Course Description: Basic introduction to microcontroller based systems design, development and implementation. It includes microcontroller architecture, programming, I/O Interfacing, Interrupt management and other related topics.													
Course Objectives: 1. Understand the architecture of 8051and PIC 16f877 microcontroller 2. Understand the instruction set of 8051& PIC 16f877 microcontroller 3. Understand the peripherals and its programming 8051and PIC 16f877 microcontroller 4. Understand the embedded C language 5. Understand using peripherals to build a useful system													
Course Learning Outcomes: 1.Demonstrate ON CHIP resources of soc 2.Develop assembly language & embedded c programs 3.Carry out Interfacing of microcontrollers with off chip resources. 4.Design small applications with KEIL micro vision & MPLAB IDE Tools													
CO	After the completion of the course the student should be able to								Bloom’s Cognitive				
									level	Descriptor			
CO1	Demonstrate ON CHIP resources of soc								II	Understanding			
CO2	Develop assembly language & embedded cprograms								III	Applying			
CO3	Carry out Interfacing of microcontrollers withoff chip resources.								V	Evaluating			
CO4	Design small applications with KEIL microvision & MPLAB IDE Tools								VI	Creating			
CO-PO Mapping:													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2											1	
CO2	1		3							2	2	2	1
CO3	2	2	3							2	2	1	
CO4	2	2	3	2	2					2	3	3	1
Assessments :													
Teacher Assessment:													
One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having50%, and 50% weights respectively.													
								Assessment		Marks			
								ISE		25			
								ESE (POE)		25			
ISE are based on practical performed/ Quiz/ Mini-Project assigned/ Presentation/ Group Discussion/ Internal oral etc.													
ESE: Assessment is based on Practical and oral examination													
Course Contents:													
Experiment No. 1:--- Assembly language programming. Aim and Objectives: Understand the instruction set of 8051 Outcomes: Develop assembly language Theoretical Background: 8051 architecture & instruction set of 8051Experimentation: Based on keil microvision software Results and Discussions: -- Conclusion:												02 Hrs.	
Experiment No. 2:--- Port programming Aim and Objectives: Understand the architecture of 8051 Outcomes: Demonstrate ON CHIP resources of soc Theoretical Background: 8051 architecture												02 Hrs.	

Experimentation: Based on keil microvision software Results and Discussions: -- Conclusion:	
Experiment No. 3:--- Port programming Aim and Objectives: Understand the architecture of 8051 Outcomes: Demonstrate ON CHIP resources of soc Theoretical Background: 8051 architecture & instruction set of 8051 Experimentation: Based on keil microvision software Results and Discussions: -- Conclusion:	02 Hrs.
Experiment No. 4:---Timer programming Aim and Objectives: Understand the peripherals and its programming 8051(Timmersection) Outcomes: Demonstrate ON CHIP resources of soc Theoretical Background: 8051 architecture & instruction set of 8051 Experimentation: Based on keil microvision software Results and Discussions: -- Conclusion	02 Hrs.
Experiment No. 5:---Serial port programming Aim and Objectives: Understand the peripherals and its programming 8051(Serial communication section) Outcomes: Demonstrate ON CHIP resources of soc Theoretical Background: 8051 architecture & instruction set of 8051 Experimentation: Based on keil micro vision software Results and Discussions: -- Conclusion	02 Hrs.
Experiment No. 6:--- LED interfacing Aim and Objectives: Understand the OFF chip peripherals and its programming Outcomes: Demonstrate Off CHIP resources of soc Theoretical Background: Port structure of 8051 ,current sink & current source ca-pacity of port pins Experimentation: Based on 89V51RD2 development kit. Results and Discussions: -- Conclusion	02 Hrs.
Experiment No. 7:--- 7 Segment displays interfacing with 8051. Aim and Objectives: Understand the off chip peripherals and its programming. Outcomes: Demonstrate Off CHIP resources of soc Theoretical Background: Types of 7 segment displays, various interfacing tech-niques of 7 seg. displays Experimentation: Based on 89V51RD2 development kit. Results and Discussions: -- Conclusion	02 Hrs.
Experiment No. 8:--- LCD interfaces with 8051. Aim and Objectives: Understand the off chip peripherals and its programming . Outcomes: Demonstrate Off CHIP resources of soc Theoretical Background: Types of LCD displays, various interfacing techniques of LCD displays Experimentation: Based on 89V51RD2 development kit. Results and Discussions: -- Conclusion	02 Hrs.
Experiment No. 9:-- Assembly language programming OF pic 16f877 - Aim and Objectives: Understand the instruction set of PIC 16F877 Outcomes: Develop assembly language program Theoretical Background: PIC 16F877 architecture & instruction set. Experimentation: Based on MPLAB IDE software. Results and Discussions: --	02 Hrs.

Conclusion	
Experiment No. 10----- Assembly language programming of PIC 16f877 - Aim and Objectives: Understand the instruction set of PIC 16F877 Outcomes: Develop assembly language programs Theoretical Background: PIC 16F877 architecture & instruction set. Experimentation: Based on MPLAB IDE software. Results and Discussions: -- Conclusion	02 Hrs.
Experiment No. 11:-- Port programming of PIC 16f877 - Aim and Objectives: : Understand the on chip peripherals and its programming of PIC 16F877 Outcomes: Develop assembly language programs Theoretical Background: PIC 16F877 architecture & instruction set. Experimentation: Based on MPLAB IDE software. Results and Discussions: -- Conclusion	02 Hrs.
Experiment No.12:-- 7 segment display interfacing with pic 16f877 -Aim and Objectives: Understand the peripherals and its programming pic 16f877 Outcomes: Demonstrate Off CHIP resources of soc Theoretical Background: PIC 16F877 architecture & instruction set. Experimentation: Based on 16F877 development kit. Results and Discussions: -- Conclusion	02 Hrs.
Textbooks: 1. "The 8051 microcontroller and embedded systems using assembly and c",--By M A Mazidi and JG Mazidi, R D McKinlay-Pearson Education 2. "The 8051 Microcontroller "-By I Scott Mackenzie and R C W Phan,4th edition ,Pearson education. 3. "Design with PIC microcontroller", By J B Peatman, Pearson education. 4. "The 8051Microcontroller-Architecture,programming & applications"-K. J. Ayala	
Reference Books : 1. Intel Handbook on 8 Bit and 16 bit embedded controllers PIC microchip Midrange MCU family reference manual. 2. "Microcontrollers theory and Applications"-By Ajay Deshmukh-TATA McGraw Hill.	

Title of the Course: Digital Signal Processing Laboratory Course Code: UETPC0533	L	T	P	Credit
	-	-	2	1

Course Pre-Requisite: Signals and systems, Fourier analysis etc.

Course Description:

This lab-oriented course provides the basics of DFT and its properties, Design of digital filters (FIR & IIR), Study of TMS320C67XX, Concepts Of Multirate Digital Signal Processing will also be discussed. Experiments using MATLAB and TMS Processor

Course Objectives: The course aims to

1. Apply the concept of FFT algorithms to compute DFT
2. Design FIR filter using various window method, frequency sampling.
3. Design IIR filter using impulse invariant, bilinear transform
4. Study of DSP Processors
- 5 Study of Multirate Digital Signal Processing

Course Learning Outcomes:		

CO	After the completion of the course the student should be able to	Bloom' Cognitive	
		level	Descriptor
CO1	Demonstrate and implementation of DFT and FFT	II	Applying
CO2	Design and implement IIR and FIR filters	V	Designing
CO3	Study of DSP processors	II	Understanding
CO4	Understand of multirate DSP	II	Understanding

CO-PO Mapping:									
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[illegible]

Assessments :

Teacher Assessment:

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 25%, and 50% weights respectively.

Assessment	Marks
ISE	25
ESE(OE)	25

ISE are based on practical performed/ Quiz/ Mini-Project assigned/ Presentation/ GroupDiscussion/ Internal oral etc.

ESE: Assessment is based on oral examination

Course Contents:	
Experiment No. 1:--- Aim: Generation of discrete time sequence.	02 Hrs.
Experiment No. 2:--- Aim: Study of Convolution and correlation of signals.	02 Hrs.
Experiment No. 3:--- Aim: Computation of DFT & IDFT using standard formula	02 Hrs.
Experiment No. 4:--- Aim: Computation of circular convolution and Linear Convolution	02 Hrs.
Experiment No. 5:--- Aim: Computation of autocorrelation and crosscorelation	02 Hrs.

Experiment No. 6:--- Aim: Design of FIR filter using windowing method	02 Hrs.
Experiment No. 7:--- Aim: Design of FIR filter using frequency sampling method	02 Hrs.
Experiment No. 8:--- Aim: Design of IIR filter using impulse invariance method/ bilinear transformation method	02 Hrs.
Experiment No. 9:--- Aim: Experiment on DSP Processor TMS320C67XX	02 Hrs.
Experiment No. 10:--- Aim: Experiment on Study of multirate DSP	02 Hrs.
Textbooks: 1. “Digital Signal Processing – Principles, Algorithms & Applications”, John G. Proakis & Dimitris G. Manolakis, 4 th Edition, Pearson Education / Prentice Hall, 2007. Reference Books: 1. “Digital Signal Processing”, Emmanuel C. Ifeachor, & Barrie W. Jervis, 2 nd Edition, Pearson Education / Prentice Hall, 2002. 2. “Digital Signal Processing – A Computer Based Approach”, Sanjit K. Mitra, , Tata McGrawHill, 2007.	

Title of the Course: Model Based Design Laboratory	L	T	P	Credit
Course Code:UETVS0534	-	-	2	1

Course Pre-Requisite: Electronics Instrumentation, Control system basics, Programming basics

Course Description: This course is designed to understand concepts in Development methodologies in MBD using methods like Waterfall, V model, iterative and incremental, Spiral.
The industry standard simulation tools like MATLAB and Simulink will be used to model basic systems like motor, generators PID controllers etc. The Automotive subsystems will be discussed and simulated. Few models previously designed will be tested on real time targets like Arduino.

Course Objectives:

1. To understand the concepts of Model based systems design
2. To understand MATLAB/ SCILAB programming Applications
3. To understand, design and model various automotive control systems using Simulink/ SCILAB.
4. To develop test strategy for model evaluation
5. To understand automotive systems and develop models for the same

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Illustrate Development methodologies in MBD	II	Understanding
CO2	Develop models of system in design	III	Applying
CO3	Evaluate performance of models	V	Evaluating
CO4	Testing of systems model developed.	IV	Analyzing

CO-PO Mapping:

CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1			2		1								-
CO2	3						1					3	3
CO3				2									3
CO4							2			1			3

The faculty should publish sufficient number of Design problems based on syllabus contents. The students should implement the designed problems throughout the semester.

Teacher Assessment:.

ISE is based on Lab assignment/declared test/quiz/seminar/Group Discussions etc.

ESE: Assessment based on Lab assignments demonstration in oral examination.

Assessment	Marks	Minimum Passing Marks
ISE	25	10

Course Contents:

Unit 1: Introduction to model based design: Work flow of model based design (MBD), Need of MBD, Core concepts of MBD, Development methodologies in MBD: Waterfall, V model, iterative and incremental, Spiral.	-
Unit 2: Introduction to MATLAB, Simulink and SIMSCAPE tool boxes. An overview of MATLAB, Numeric, cell and structure array, Functions and files, Programming with MATLAB.. Creating and simulating model, Modelling programming construct, modelling discrete system, Modelling continuous system, Solver selection, developing model hierarchy, modelling conditionally executing algorithms, combining models into diagrams, creating library.	-
Unit 3: Model Based Design for a small system - Motor Model, Generator Model, Controller Model, modelling using state flow.	-

Unit 4: Explore the system response using different control methods. Tune the system, Explore system limitations, understand and refine models, Generating and Applying a PID Controller in Simulink.	-
Unit 5: Study of modeling and simulation of the automotive systems.	-
Unit 6: Real time simulations on a Simple target (like ARDUINO)	-
Textbooks: 1. Managing Model based design, Roger Aarensrup, Mathworks Inc 2. Introduction to MATLAB for Engineers, William J Palm, Mc Graw Hill 3. Using Simulink and State flow in Automotive Applications, Mathworks Inc	
References: 1. “Automotive Electronics Handbook”, Ronald K Jurgen, 2nd Edition, McGraw-Hill, 1999. 2. “Automotive Electricity and Electronics”, James D Halderman PHI Publication 2005. 3. “Electric and Hybrid Vehicles: Design Fundamentals”, Iqbal Husain CRC Press, 2003. 4. Process control CD Johnson	
Unit wise Measurable students Learning Outcomes: 1. Students should be able understand concepts of Model based design. 2. Students should be able to simulate motor generator models use in automotive industry 3. Students should be able to develop models atleast 2 models using state flow 4. Students should be able evaluate performance of models 5. Students should be able test models 6. Students should be able simulate models on real time target hardware platform	

Outcomes: After the completion of the experiments the student should be able to write declaration of class and should explain types of defining functions in class
Experiment No. 3:--- Aim and Objectives: To Study Constructor and destructor. Outcomes: After the completion of the experiments the student should be able to explain syntax and types of different constructors and destructor
Experiment No. 4:--- Aim and Objectives: To Study destructor. Outcomes: After the completion of the experiments the student should be able to explain syntax of destructor
Experiment No. 5:--- Aim and Objectives: To Study Function Overloading. Outcomes: After the completion of the experiments the student should be able to explain function overloading
Experiment No. 6:--- Aim and Objectives: To Study Operator Overloading. Outcomes: After the completion of the experiments the student should be able to explain operator overloading
Experiment No. 7:--- Aim and Objectives: To Study Concept of Friend function. Outcomes: After the completion of the experiments the student should be able to explain definition and declaration of friend function
Experiment No. 8:--- Aim and Objectives: To Study Inheritance. Outcomes: After the completion of the experiments the student should be able to explain importance and various types of Inheritance in OOP.
Experiment No. 9:--- Aim and Objectives: To Study Polymorphism. Outcomes: After the completion of the experiments the student should be able to explain concept of Polymorphism
Experiment No. 10:--- Aim and Objectives: Mini project based on any engineering application. Outcomes: After the completion of the experiments the student should be able to explain concept of OOP
Textbooks: 1. E Balgurusamy – Object oriented programming with C++ –, IIIrd Edition- Tata Mc- Graw Hill Publication 2. Rajesh K.Shukla- Object – Oriented Programming in C++ ‘WILEY, INDIA . Reference Books: 1. Schildt – The Complete Reference C++ – IIIrd Edition - Tata McGraw Hill Publication 2. D Ravichandran.- Programming with C++ –IIInd Edition- Tata McGraw Hill Publication 3. RohitKhurana- Object oriented programming with C++ –second edition-Vikas publication

PROGRAM ELECTIVE-I

Title of the Course: Antenna & Wave Propagation Course Code: UETPE0511											L	T	P	Credit	
											3	-	-	3	
	Course Pre-Requisite: Analog Communication Systems, Network Analysis, Electromagnetic Engineering.														
	Course Description: Antennas and propagation effects play a crucial, even though often overlooked, role in RF systems. In practice, the design of a working system such as mobile phone networks, Wi-Fi, RFID, Satellite communication and GPS require a good understanding of these components. This course teaches the fundamentals of antenna and wave propagation and shows the application in practical examples. The course covers the theory of radiation, fundamental antenna parameters and concepts, broadband and frequency independent antennas such as aperture antennas (e.g. horns) micro-strip antennas, then measurement of antenna parameters & At last wave propagation and radar systems														
	Course Objectives: The course should enable the students to: 1. Be Proficient in the radiation phenomena associated with various types of antennas and understand basic terminology and concepts of antennas along with emphasis on their applications. 2. Describe radar systems and explain how they are used to detect remote objects 3. Understand the various methods involved in the antenna measurements 4. Justify the propagation of the waves at different frequencies through different layers in the existing layered free space environment structure.														
CO	After the completion of the course the student should be able to									Bloom's Taxonomy					
										level		Descriptor			
CO1	Calculate and compare performance parameters like HPBW, FNBW, directivity, VSWR, input impedance, gain of different antennas.									III		Calculate, Compare			
CO2	Design and analysis broadband & Frequency Independent Antennas and measurement of antenna parameters									IV		Design			
CO3	Describe radar systems and explain how they are used to detect remote objects									II		Describe, Explain			
CO4	Understand the wave propagation mechanism at different frequencies									II		Understand			
	CO-PO Mapping:														
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2		
CO1	3	2	2	1											
CO2	2	1	3	2								2	2		
CO3	1	2	3	1						2					
CO4	1							1		1					

Assessments :**Teacher Assessment:**

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weight age for course content (normally last three modules) covered after MSE.

Course Contents:**Unit 1:--- Fundamentals of Antenna**

Basic antenna radiation mechanism (single & double wire), parameters- radiation resistance, pattern, beam area, radiation intensity, beam efficiency, directivity, gain and resolution, antenna aperture, effective height, radio communication link, field from oscillating dipole, field zones, shape impedance consideration. Introduction to antenna array

08 Hrs.

Unit 2:--- Broadband & Frequency Independent Antenna

Broadband & Frequency Independent Antenna: Broadband basics, infinite and finite biconical antennas, directional biconicals, conical, disk cones and bowties, the frequency-independent concept: Rumsey's principle, the Illinois story, the frequency independent planar log-spiral antenna, frequency independent conical-spiral antenna, the log periodic antenna, the composite yagi-uda corner-log-periodic array.

07 Hrs.

Unit 3:--- Antenna Measurements & Microstrip Antenna

Antenna measurement: Antenna ranges, Radiation pattern, Gain measurements, Directivity measurements, Radiation efficiency, Impedance measurements, MICROSTRIP Antenna - Introduction, Basic characteristics, Feeding methods, basic types – rectangular, circular & transmission line model.

08 Hrs.

Unit 4:--- Ground Wave Propagation

Plane earth reflection, space wave and the surface wave, elevated dipole antennas above a plane earth, wave tilt of the surface wave, spherical earth propagation, troposphere wave.

06 Hrs.

Unit 5:--- Ionospheric Propagation

The ionosphere, effective permittivity and conductivity of an ionized gas, reflection and refraction of the waves by the ionosphere, regular and irregular variations of ionosphere, attenuation factor, sky wave transmission calculations, effect of earth magnetic field, wave propagation in ionosphere, Faraday rotation and measurement of total electron content, other ionosphere phenomena.

08 Hrs.

Unit 6:--- Radar System

Fundamentals, RADAR performance factors, basic pulsed radar system, antennas and scanning, display methods, pulsed radar systems, moving target indication, radar beacons, CW Doppler radar, frequency modulated CW radar, phase array radars, planar array radars. Introduction to Smart Antenna.

08 Hrs.

Textbooks:

1. Antenna for all Application-John D Kraus, third edition-TMH publication
2. Antenna Theory-Constantine A. Balanis -Third edition-Wiley Publication
3. Electromagnetic Waves and Radiation Systems- Jordan and Balmain PHI publication
4. Electronics Communication System – Kennedy Davis- 4th edition TMH publication

Reference Books:

- 1] Antennas and Wave Propagation–G. S. N. Raju (Pearson)
- 2] Foundations of Antenna Theory and Techniques – Vincent F. Fusco(Pearson)

Title of the Course: Probability Theory and Stochastic Processes Course Code: UETPE0512										L	T	P	Credit	
										3	-	-	3	
Course Pre-Requisite: Basic understanding engineering mathematics, probability theory, calculus theory.														
Course Description: This Course aims to study Probability Theory and Stochastic Processes in details. It also includes Stochastic Processes-Temporal Characteristics as well as Spectral Characteristics along with its response.														
Course Objectives: The course should enable the students to: 1. This gives basic understanding of random signals and processes sing 2. Utilization of Random signals and systems in Communications and Signal Processing areas. 3. To know the Spectral and temporal characteristics of Random Process. 4. To Learn the Basic concepts of Noise sources														
CO	After the completion of the course the student should be able to									Bloom's Taxonomy				
										level	Descriptor			
CO1	To introduce students the basic methodology of “probabilistic thinking” and apply it to problems.									III	Apply			
CO2	To understand basic concepts of Probability theory and Random Variables, how to deal with multiple Random Variables.									II	Understand			
CO3	To understand the difference between time averages statistical averages									II	Understand			
CO4	To apply sums and integrals to compute probabilities, and expectations for and Stochastic Processes.									III	Apply			
CO-PO Mapping:														
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2	
CO1	2	2				2							2	
CO2	2	3	2			2								
CO3	3	3	3	2			2	2						
CO4	2	3	2		3			2				2		
Assessments : Teacher Assessment: Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.														
Assessment									Marks	Minimum for Passing				
ISE 1									10	20				
MSE									30					
ISE 2									10					
ESE									50	20				
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with60-70% weight age for coursecontent (normally last three modules) covered after MSE.														
Course Contents:														

Unit 1: Probability and Random Variable Probability: Set theory, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, and Independent Events, Bernoulli's trials. The Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable	08 Hrs.
Unit 2: Distribution and density functions and Operations on One Random Variable Distribution and density functions: Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Exponential Gaussian, Rayleigh and Conditional Distribution, Methods of defining Conditioning Event, Conditional Density function and its properties, problems. Operation on One Random Variable: Expected value of a random variable, function of a random variable, moments about the origin, central moments, variance and skew, characteristic function, moment generating function, transformations of a random variable, monotonic transformations for a continuous random variable, non monotonic transformations of continuous random variable, transformations of Discrete random variable	07 Hrs.
Unit 3: Multiple Random Variables and Operations on Multiple Random Variables Multiple Random Variables: Vector Random Variables, Joint Distribution Function and Properties, Joint density Function and Properties, Marginal Distribution and density Functions, conditional Distribution and density Functions, Statistical Independence, Distribution and density functions of Sum of Two Random Variables and Sum of Several Random Variables, Central Limit Theorem - Unequal Distribution, Equal Distributions.	08 Hrs.
Unit 4: Stochastic Processes-Temporal Characteristics: The Stochastic process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Statistical Independence and concept of Stationary: First-Order Stationary Processes, Second-Order and Wide-Sense Stationary, Nth-Order and Strict-Sense Stationary, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions and its properties, Gaussian Random Processes. Linear system Response: Mean and Mean-squared value, Autocorrelation, Cross-Correlation Functions	06 Hrs.
Unit 5: Stochastic Processes-Spectral Characteristics: The Power Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum and Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.	08 Hrs.
Unit 6: Spectral characteristics of system response: power density spectrum of response, cross power spectral density of input and output of a linear system.	08 Hrs.
Textbooks: 1 Probability, Random Variables & Random Signal Principles -Peyton Z. Peebles, TMH, 4th Edition, 2001. 2. Probability and Random Processes-Scott Miller, Donald Childers, 2Ed, Elsevier, 2012	
Reference Books: 1. Theory of probability and Stochastic Processes-Pradip Kumar Gosh, University Press 2. Probability and Random Processes with Application to Signal Processing - Henry Stark and John W. Woods, Pearson Education, 3rd Edition.	

Unit 1: Electronic system classification: Consumer, Industrial, Military, System reliability: Bath tub curve, Majors taken to improve reliability at component and product level, Important characteristics and performance parameters of Op-amp, TTL and CMOS Integrated circuits and interfacing with each others. System performance Matrix and Design matrix.	08 Hrs.
Unit 2: Analog hardware design: Design of signal conditioning circuits: V to I (4-20 ma current loop), I to V (4-20ma to 0 to 4 Vol.), Gain offset circuit, Analog signal conditioning for RTD, Thermocouple, Load cell, Solid State relay, Optical coupled SSR, Design of instrumentation amplifier, On-Off, Proportional and PID controller, PID controller tuning method.	08 Hrs.
Unit 3: : Digital hardware design: Interpretation of important specification of ADC-DAC, Design of ant aliasing filter for ADC , DAC, Consideration for selecting voltage reference for ADC-DAC, Seven segment LED static-dynamic, Factors affecting choice of microcontroller, Touch screen interface: capacitive touch.	08 Hrs.
Unit 4: Design of biomedical system: Specification development, signal conditioning and interfacing of 1 ECG, 2 Pulse-oximeter, 3 Blood sugar measurement.	08 Hrs.
Unit 5: Design of switch mode power supply: SMPS topologies step down step up, Negative, Fly-back, High frequency ferrite core transformer design, Selection of ferrite core, SMPS controller ICs: 3524, Design of SMPS for industrial applications: battery charger, microcontroller power supply (+5, + - 12V, +24V), Design should include selection of power devices and filter design.	08 Hrs.
Unit 6: EMI EMC legislation and standards: Introduction to EMC, compatibility, scope of EMC, EMF and human health, EMC directives, Emission measuring instruments, Equipment layout and grounding, PCB layout.	05 Hrs.
Textbooks: 1) TTL Manual Fairchild 2) CMOS manual Philips 3) Electronic Product design Kaduskar, Wiley, 2nd edition 4) <i>Instrumentation</i> devices and systems /by C S Rangan, G R Sarma and V S V Mani Tata McGraw Hill Publishing Company. 5) <i>Franco's "Design with Operational Amplifiers and Analog Integrated Circuits, 3e"</i> is intended for a design 6) EMC for product designers, Tim Williams, Elsevier, fourth edition 7) Switching and linear power supply, Power converter design, Abraham pressman, Hayden book company.	
Reference Books: 1) Analog signal processing by Pallas- Areny Wiley india 2) Medical instrumentation application and design Webster wiley india 3rd edition 3) Introduction to electromagnetic compatibility Clayton R Paul, Wiley, 2nd Edition 4) Fundamentals of industrial instrumentation Barua, Wiley india, 1st edition 5) Instrumentation for engineers and scientists John D Turner, Matyn Hill Oxford University, 1st edition	

Title of the Course: Computer Architecture and Organization	L	T	P	Credit
Course Code: UETPE0514	3	-	-	3

Course Pre-Requisite: Knowledge of basic functional units of Computer. Digital Design

Course Description:

Study basic and core concepts in Computer organization and advanced architectures.

Course Objectives:

1. To understand the structure, function and characteristics of computer architecture..
2. To design of the various functional units and components of computers.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Explain the organization of basic computer and its function, instruction types and data formats.	II	Understanding
CO2	Design arithmetic unit and control unit.	VI	Creating
CO3	Evaluate cost, performance measures of computer system and design trade-offs.	V	Evaluating
CO4	Analyze memory organization and memory management of computer system	IV	Analyzing

CO-PO Mapping:

CO	1	2	3	4	5	6	7	8	9	10	11	PSO 1	PSO 2
CO1	1	1			1							1	
CO2	1	2			1							1	
CO3	2	2										1	
CO4	2	1	1									1	

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Unit 1:History of Computer architecture and Design Methodology

Introduction and History, I AS Computer architecture, IBM 360 model, stack passed computer and polish notation. Design levels: Gate level and register level, processor level, programmable logic devices, performance measurement.

7 Hrs.

Unit 2: Processor Basic

CPU organization fundamental, Data representation, Basic formats, Floating point numbers, Instruction sets: Instruction formats, Instruction type, Programming consideration, Introduction to RISC and CISC.

8 Hrs.

Unit 3: Arithmetic Unit Design. Fixed point arithmetic: Byte and word, Adders, Subtracters, And Multipliers: Booth's algorithm, Robertson's algorithms, combinational array multiplier. 32/64 bit floating point arithmetic :(IEEE 754 format), introduction to pipeline processing.	8 Hrs.
Unit 4: Control Design Introduction, Hard wired control, Micro programmed control, GCD processor Design, Design of Control unit for accumulator based CPU, DMA controller, control unit design, Micro Instruction format, Interrupt and Branch, Micro Instruction processing, Instruction sequencing and Interruption	8 Hrs.
Unit 5: Memory Organization Memory Systems, Multilevel memories, Address Translation, Memory allocation schemes FIFO, LRU, OPT, etc. Virtual Memory, Cache memory.	8 Hrs.
Unit 6: IO and System Control Processor programmed I/O architecture, DMA architecture, Interrupt I/O hardware. PCI Bus Architecture.	7 Hrs.
Textbooks: 1. "Computer Architecture and Organization" , J.P. Hayes .McGraw Hill publication	
Reference Books: 2."Computer Organization", Hamacher Zaki, McGraw Hill publication	

KIT's College of Engineering (Autonomous), Kolhapur

Department: Electronics & Telecommunication Engg.

AY:2025-26

Semester-VI

Syllabus

Title of the Course: Embedded System	L	T	P	Credit
Course Code: UETPC0601	3	-	-	3

Course Pre-Requisite: Digital electronics, Study of 8 bit microcontroller architecture and assembly language programming, Basics of C programming, Programming resources on microcontroller SOC

Course Description:

The main focus of the course is to study architecture of 32 bit microprocessors used in modern SOC. writing effective Assembly language and C codes to design and program embedded system with due consideration to meet performance metrics like low power design, meeting compliances for Embedded system. All above mentioned concepts should be practiced on ready to use hardware platform and integrated development environment for programming.

Course Objectives:

To impart the concepts and architecture of Embedded systems and to make the students capable of designing Embedded systems. To illustrate the architecture and programming of Industry popular 32-bit Microcontroller, ARM7, Cortex M3

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Illustrate facts and innovative ideas practiced in Industry standard 32-bit ARM7TDMI architecture	II	Illustrate
CO2	Demonstrate ARM ISA programming	III	Evaluate
CO3	Validate resources of SOC by programming embedded C using super loop method Practice Serial data communication: inter IC / system	V	Validate
CO4	Compare Industry standard 32-bit Cortex M3 architecture with ARM 7 TDMI	V	Compare
CO5	Develop applications by RTOS programming	VI	Develop

CO-PO Mapping:

CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1	1	3	1	2					1			2	2
CO2	1	3	1	2								2	3
CO3		2	2	2								2	3
CO4								3				2	2
CO5	1	3	2	2								2	3

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on Lab assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.	
Course Contents:	
Unit 1: INTRODUCTION TO ARM PROCESSOR ARM Design philosophy, ARM Core data flow model, registers, operating modes, pipeline, exceptions, interrupts & the vector table, ARM processor families	08 Hrs.
Unit 2: ARM INSTRUCTION SET Conditional execution. Branch and Load/Store, software interrupt instruction, program status register instruction, review of Thumb instruction set. Exception handling schemes.	08 Hrs.
Unit 3: ARM7TDMI-S MICROCONTROLLER LPC 2148 Features, LPC 214X Device Information, Block Diagram, Memory Maps, Memory Acceleration Module-Block Diagram & Operation, System Control Block(SCB)-Register Description, Fosc. Selection Algorithm, external interrupt logic, phase locked loop, power control, Reset- Block Diagram & RSI register.	08 Hrs.
Unit 4: LPC 2148 ON CHIP RESOURCES Features, Block diagram and SFR planning: Pin connect block, GPIO, UART & Architecture, I2C, SPI, Timer, PWM, ADC, DAC, Vectored interrupt controller, features of on chip USB	08 Hrs.
Unit 5: Cortex-M3 Architecture Registers, General Purpose Registers, Stack Pointer, Link Register, Program Counter, Special Registers, Operation Mode, Exceptions and Interrupts, Vector Tables, Stack Memory Operations, Reset Sequence Pipeline, Block Diagram, Bus Interfaces on Cortex-M3, I-Code Bus, D-Code Bus, System Bus, External PPB and DAP Bus.	06Hrs.
Unit 6: INTRODUCTION TO RTOS Architecture of kernel, task and task scheduler, ISR, shared data and re-entrancy, Semaphores, Mutex, Mailboxes and Pipes, Message Queues, Timers, Memory Management.	06 Hrs.
Textbooks: 1. “ARM System Developer's Guide – Designing and Optimizing System Software”, Andrew N Sloss, Dominic Symes, Chris Wright ,2006, Elsevier. 2. The Definitive Guide to the ARM Cortex-M3, Joseph Yiu, Second Edition, Elsevier Inc. 2010. 3. LPC214x USER MANUAL By Philips/ NXP semiconductor 4. Embedded/Real Time Systems Concepts, Design and Programming Black Book, Prasad, KVK	
Reference Books: 1. “ARM System-on-Chip Architecture”, Steve Furber 2 nd Edition, Pearson Education 2. Cortex-M series-ARM Reference Manual 3. Cortex-M3 Technical Reference Manual (TRM) 4. “ARM Architecture Reference Manual”, David Seal 2001 Addison Wesley, England; Morgan Kaufmann Publishers 5. STM32L152xx ARM Cortex M3 Microcontroller Reference Manual 6.”ARM assembly language: fundamentals and Technique” William Hohel 7. ARM Architecture Reference Manual By: ARM 8. ARM7TDMI Technical Reference Manual Revision: r4p1 By: ARM 9. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.	

Title of the Course: VLSI Design	L	T	P	Credit									
Course Code: UETPC0602	2	--	-	2									
Course Pre-Requisite: Digital Electronics													
Course Description: This course covers the design of digital systems using VHSIC Hardware Description Language (Vreilog) and implementation using Field Programmable Gate Arrays (FPGAs) and CPLDs. This technology allows rapid prototyping and system realizations by enabling design reuse and simplifying custom circuit design. The design tools are first introduced and used to implement Register level digital circuits and applications.													
Course Objectives:													
1. To study HDL based design approach using Verlog.													
2. To learn VLSI design flow for implementing Behavioral /RTL/gate level architectures on FPGA.													
3. To explain features and capabilities of HDL to simulate, synthesize and test digital logic modules.													
4. To Design Control unit and implementation using FSM description using HDL.													
6. To comprehend importance of testability in logic circuit design													
Course Learning Outcomes:													
Upon successful completion of this course, the student will be able to													
	CO	After the completion of the course the student should be able to			Bloom's Cognitive								
					level	Descriptor							
	CO1	Model digital circuit with HDL, simulate, synthesis			III	Applying							
	CO2	Construct Registor level combinational logic circuits and simulate it for functional verification			VI	Creating							
	CO3	Design implement the algorithmic FSM using HDL			VI	Creating							
	CO4	Determine the test strategies by making use of various testing techniques for VLSI designs.			V	Evaluating							
CO-PO Mapping:													
CO -PO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1	2	2	3	2	3				1		1	3	3
CO2	2	3	3	3	3						1	3	3
CO3	2	3	3	3	3						1	3	3
CO4	1	2	1								1	1	1
Assessments :													
Teacher Assessment:													
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.													
Assessment							Marks						
ISE 1							10						
MSE							30						
ISE 2							10						
ESE							50						

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first two modules) ESE: Assessment is based on 100% course content with 60-70% Weightage for course content (normally last three modules) covered after MSE.	
Course Contents:	
Unit 1:--- Introduction to Verilog: Introduction to verilog, Need of HDL, VLSI Design flow, Features and capabilities of Verilog, Level of abstraction, Gate-level, dataflow, behavioral, and RTL (Register Transfer Level), Data Types: wire, reg, integer, time, real, bit, logic, etc. Operators: Arithmetic, relational, logical, bitwise, etc. Lexical Conventions: Keywords, identifiers, comments, etc. System Tasks and Compiler Directives: \$display, \$write, \$finish, etc. Modules and Module Instances, Ports, Hierarchical Design	8 Hrs.
Unit 2:--- VHDL Modeling: Verilog Test bench, Concurrent & Sequential constructs , Combinational logic using data flow and behavioural modeling (Adder, subtractor, Encoder, Decoder, multiplexer, De multiplexer, Tristate buffer, Parity generator & checker, Comparator) sequential logic (flip flops, shift registers and counters)	8 Hrs.
Unit 3:--- Sequential circuit Design sing Verilog: Impediments to synchronous design, clock jitter, skew, gating the clock, asynchronous inputs, synchronizer failure Wait statement, delays- Inertial delay & Transport delay, FSM, VHDL implementation of counter using FSM, Sequence detector, Bus Arbiter,	8 Hrs.
Unit 4:PLD and Testing: Testing: Fault models, Path sensitizing, Sequential circuit test, design for testability, Built-in self test(BIST), Test pattern generation, JTAG & Boundary scan, Programmable Logic Devices: Features and architecture of CPLD, FPGA	8 Hrs.
Textbooks: 1. <i>The Designer’s Guide to VHDL</i> , by Peter J. Ashenden, 3 rd Ed, Morgan Kaufmann Publishers, 2008, ISBN: 9780120887859 2. <i>Verilog HDL –Samir Palnitkar-Pearson Education</i>	
References: 1. “Introduction to VLSI Systems”, Carver Mead – Lynn Conway, BS Publications. 2. “Digital integrated circuits- A design perspective”, Jan Rabaey, Anantha C, 2nd edition, PHI. 3. FPGA based system design Wayne Wolf, Pearson Education 4. Charles H. Roth, “Digital systems design using VHDL”, PWS.	

Title of the Course: Computer Networks	L	T	P	Credit
Course Code: UETPC0603	2	-	-	2

Course Pre-Requisite: Basics of Analog & Digital Communication System

Course Description: This course provides an introduction to Computer Networking. This Course deals with different types of topologies, Models, Functions of layers, protocols and algorithms of layers. It also discusses TCP/IP Protocol suite.

Course Objectives: The course aims to

1. Introduce various topologies, types, devices and layered models in computer networking.
2. Expose the students to the design issues, standards and protocols at various layers.
3. Discuss the TCP/IP protocol suite.

Course Learning Outcomes: Upon successful completion of this course, the student will be able to

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Distinguish between various network topologies, types, OSI and TCP/IP models.	IV	Describe
CO2	Explain the various roles, characteristics, and protocols of the physical layer and data link layer.	II	Analyze
CO3	To Understand the concepts of protocols, network interfaces, Routing algorithms and design/performance issue's in networks.	II	Analyze
CO4	Analyze the various roles, characteristics and protocols of transport and application layer.	IV	Describe

CO-PO Mapping:

CO	1	2	3	4	5	6	7	8	9	10	11	PSO 1	PSO 2
CO1	3	3	2	1	1	1						1	
CO2	2	3	3	1	1	1							1
CO3	1	2	2	2	1	1						1	1
CO4	2	2	3	1	1	1							

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Unit 1:--- Introduction: Computer Networks, OSI & TCP/IP Reference models, Network devices: Hub, Bridge, Repeaters, Switch (Layer 2 & Layer 3), Router & Gateway, Addressing: Physical addresses, Logical addresses, Port Addresses	5 Hrs.
Unit 2:--- Physical Layer: Wired and Wireless transmission media, Switching, Circuit Switching, Packet Switching	5 Hrs.
Unit 3:-- Data Link Control: Design Issues, Framing, Flow Control, Sliding Window Protocols, HDLC. Medium Access Control Sub layer: ALOHA, Slotted ALOHA, CSMA, CSMA/CD	5 Hrs.
Unit 4:--- Network Layer: Routing Algorithms- shortest path, distance vector routing, link state routing, congestion prevention policies- leaky bucket and token bucket algorithm, IP protocol. other networks layer protocol – ARP, RARP	5 Hrs.
Unit 5:--- TCP Protocol Suite: Transport Layer Protocols: TCP, UDP, subnetting	5 Hrs.
Unit 6:--- Supporting Protocols and security Domain Name System, FTP, TELNET, DHCP, Cryptography – Public and Private key	5 Hrs.
Textbooks: 1. Computer Networks Andrew S. Tanenbaum, Fourth Edition, PEARSON 2. Data Communication and Networking, Fifth Edition, Behrouz A. Forouzan, TMH 3. TCP/IP Protocol Suite, Fourth Edition, Behrouz A. Forouzan, MGH 4. T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall	
Reference Books: 1. Computer Networking with Internet Protocols and Technology, William Stallings, 2008 2. Computer Networking A top down approach, James F. Kurose, Person, Fifth Edition 3. “An Engineering Approach to Computer Networking” , S. Keshav, Pearson Education 4. “Computer Networks and Internet/TCP-IP”, D. Comer, Prentice Hall	

Title of the Course: Advanced Data Structure												L	T	P	Credit				
Course Code:UETEM0604												2	-	-	2				
Course Pre-Requisites: Student should have engineering background of C,C++ and basic of data structure.																			
Course Description: This course covers Introduction to Linear Data structure, Linked List and its applications. It explains non-Linear data structures Viz. Tress and Graphs in depth. This course also covers Hashing																			
Course Objectives:																			
1. To use & manipulate several core data structures																			
2. To Understand design and implementation of basic data structures and algorithms.																			
3. To use various data structures effectively in different applications																			
4. To learn the theory of trees and graphs																			
Course Learning Outcomes:																			
CO	After the completion of the course the student should be able to											Bloom's Cognitive							
												level	Descriptor						
CO1	Identify Linear and Non Linear data structures											I	Identify						
CO2	Apply appropriate algorithm to perform operations on Linear and Non Linear data Structures.											III	Apply						
CO3	Analyze complexity issues of algorithms.											III	Analyze						
CO4	Select appropriate data structure to organize digital data.											I	Select						
CO-PO Mapping:																			
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2						
CO1	1					2			3										
CO2		2	3		1		1				1	2							
CO3				3		1		2		1			2						
CO4			1																
Assessments:																			
Teacher Assessment:																			
.																			
<table><tr><td>Assessment</td><td>Marks</td></tr><tr><td>ESE</td><td>50</td></tr></table>																Assessment	Marks	ESE	50
Assessment	Marks																		
ESE	50																		
ESE: Assessment is based on 100% course content weightage for course.																			
Course Contents:																			
Unit 1: Stacks, Queues and Linked List													8 Hrs.						
Stack- Definition, operations and Algorithms representations using array Queue- Definition, operations, Types of Queue Circular Queue, Priority Queues applications representation using array, Linked List and its Types-Singly Linked List, Circular Linked List, Doubly Linked List																			
Unit 2: Trees													8Hrs.						
Basic terminology, binary tree and its representation, binary tree traversal methods, binary search tree, AVL tree, B tree, B+ tree, Heaps and its operations, M-way Search Tree.																			
Unit 3: Graph													7 Hrs.						
Graph Terminologies, Representation of the Graph- Adjacency Matrix and Adjacency List, Graph Traversal Techniques, BFS and DFS, Warshall's Algorithm, Shortest Path Algorithm.																			
Unit 4: Hashing													7 Hrs						
Hashing – concept, hashing methods, hash collision, hash collision resolution methods.																			
Textbooks:																			
1. Data Structure using C- A. M. Tanenbaum, Y. Langsam, M. J. Augenstein (PHI)																			
2. Data Structures- A Pseudo code Approach with C – Richard F. Gilberg and Behrouz A. Forouzon, Cengage Learning, Second Edition.																			
3. Schaum's Outlines Data Structures – Seymour Lipschutz (MGH), Tata McGraw-Hill																			
Reference Books:																			
1. Fundamentals of Data Structures – Horowitz, Sahni CBS India 2. An introduction to data structures with Applications- Jean-Paul Tremblay, Paul. G. Soresan, Tata McGraw Hill International Editions, Second Edition																			

Title of the Course: Embedded System Laboratory Course Code: UETPC0631										L	T	P	Credit
										-	-	2	1
Course Pre-Requisite: Basic knowledge of C programming													
Course Description: The main focus of the course is to practice ARM ISA. Writing effective Assembly language and C codes to design and program embedded system with due consideration to meet performance metrics like low power design, meeting compliances for Embedded system. All above mentioned concepts should be practiced on ready to use hardware platform and integrated development environment for programming													
Course Objectives: The objective is to practice concepts and architecture of Embedded systems and to make the students capable of designing Embedded systems. To achieve this, the programming of Industry popular 32-bit Microcontroller, ARM7, Cortex M3 is covered in detail													
Course Learning Outcomes:													
CO	After the completion of the course the student should be able to								Bloom's				
									level		Descriptor		
CO1	examine ARM ISA by Solving engineering computational problems								VI		Creating		
CO2	Experiment with resources of LPC2148 by programming embedded C using super loop method								VI		Creating		
CO3	Practice philosophy of environment friendly embedded systems design by reducing system power consumption and RF emission								VI		Creating		
CO4	Develop Embedded system applications by RTOS programming								VI		Creating		
CO-PO Mapping:													
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1	1	3	1	2					1			2	2
CO2	1	3	1	2					1			2	3
CO3								3				2	3
CO4		2	2	2								2	2
Assessments :													
Teacher Assessment: One component of ISE and one ESE: end semester examination having 50 % weight for each. ISE is based on practical performed/ Quiz/ Lab assignment/ presentation/ group discussion/ Internal oral etc.													
ESE: Assessment is based on practical and oral examination													
								Assessment		Marks			
								ISE		25			
								ESE (POE)		25			
Course Contents:													
Experiment No. 1:- Study of ARM assembly language programming: Develop function to perform following operations. a. 64 bit Addition. b. 64 bit subtraction. c. Logical Operation. d. 32 bit Multiplication. e. Comparison of two numbers. f. Finding factorial of a number using lookup table. g. Add series of 16 bit numbers. h. Nested Call. i. Use of SW1. Aim and Objectives: Study ARM ISA Outcomes: Students will be able to program ARM ISA Theoretical Background: ARM7 architecture. Experimentation: Programming Results and Discussions: RJ(Refer Journal) Conclusion: RJ												02 Hrs.	

Experiment No. 2: . Programming GPIO using ARM SOC LPC2148 a. Flashing LED b. Read key and activate relay. Aim and Objectives: Practice GPIO Outcomes: RJ Theoretical Background:RJ Experimentation: Results and Discussions: RJ Conclusion: RJ	02 Hrs.
Experiment No. 3:--- Programming GPIO using ARM SOC LPC2148. a. Tone generation. b. Generation of sequence for stepper motor control. Aim and Objectives: Practice GPIO Outcomes: RJ Theoretical Background: RJ Experimentation:RJ Results and Discussions: RJ Conclusion:RJ	02 Hrs.
Experiment No. 4:--- Programming ARM SOC LPC2148: Phase Locked Loop (PLL) for clock scaling . Aim and Objectives: Outcomes: RJ Theoretical Background: RJ Experimentation: RJ Results and Discussions:RJ Conclusion: RJ	02 Hrs.
Experiment No. 5:--- Programming ARM SOC LPC2148: Memory Acceleration Module for improving performance. Aim and Objectives: Outcomes: Practice performance scaling Theoretical Background: RJ Experimentation:RJ Results and Discussions:RJ Conclusion:RJ	02 Hrs.
Experiment No. 6:--- Programming ARM SOC LPC2148: Power Saving Mode. Aim and Objectives: Practice performance scaling Outcomes:RJ Theoretical Background: RJ Experimentation: RJ Results and Discussions:RJ Conclusion:RJ	02 Hrs.
Experiment No. 7:--- Programming ARM SOC LPC2148: System Peripheral – ADC DAC. Aim and Objectives: Practice ADC/ DAC Outcomes: RJ Theoretical Background: RJ Experimentation: RJ Results and Discussions: RJ Conclusion: RJ	02 Hrs.
Experiment No. 8:--- Programming ARM SOC LPC2148: System Peripheral – UART 0. Aim and Objectives: Programming UART for desired baud rate and parity Outcomes: RJ Theoretical Background:RJ Experimentation: RJ Results and Discussions: RJ Conclusion: RJ	02 Hrs.
Experiment No. 9:--- Programming ARM SOC LPC2148: System Peripheral – Vectored Interrupt Controller. Aim and Objectives: Outcomes: Handling interrupts in C Theoretical Background: RJ Experimentation: RJ Results and Discussions:RJ	02 Hrs.

Conclusion: RJ	
Experiment No. 10:--- Programming ARM SOC LPC2148: Applications with RTOS to demonstrate: Scheduling algorithms, Events, Timers, Semaphore-Mutex . Aim and Objectives: RTOS based Application development Outcomes: RJ Theoretical Background: RJ Experimentation: RJ Results and Discussions: RJ Conclusion: RJ	02 Hrs.
Textbooks: 1"ARM assembly language: fundamentals and Technique" by William Hohel. 2. LPC214x USER MANUAL By Philips/ NXP semiconductor 3. Embedded/Real Time Systems Concepts, Design and Programming Black Book, Prasad, KVK	
Reference Books: 1. ARM Architecture Reference Manual By: ARM 2. ARM7TDMI Technical Reference Manual Revision: r4p1 By: ARM	

Title of the Course: VLSI Design Laboratory Course Code:UETPC0632	L	T	P	Credit
	-	-	2	1

Course Pre-Requisite: Digital Electronics

Course Description: This lab-oriented course covers the design of digital systems using VHSIC HardwareDescription Language (VHDL), Verilog and its implementation on Field Programmable Gate Arrays (FPGAs).

Course Objectives:

1. To understand working of Xilinx ISE and CPLD and FPGA boards.
2. To understand working of ModelSim simulator.
3. To Design & implement digital circuits using Verilog
4. To implement combinational, sequential and FSM design using Verilog..

Course Learning Outcomes:

Upon successful completion of this course, the student will be able to

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Create Digital Design projects using Xilinx ISE and Modelsim simulator	V	Applying
CO2	Synthesize and simulate digital logic design using Verilog descriptions	VI	Creating
CO3	Implement digital system design using FPGA and CPLD	VI	Creating

CO-PO Mapping:

CO -PO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1	2	2	3	3	3						1	3	3
CO2	2	3	3	3	3						1	3	3
CO3	2	3	3	3	3						1	3	3

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), and one End Semester Examination (ESE) having 50% and 50% weights respectively.

Assessment	Marks
ISE	25
ESE(OE)	25

ISE 1 and ISE 2 are based on Lab assignment/ test/quiz/seminar/Group Discussion/ Oral etc. : ESE: Assessment is based on Practical, Oral Examination.	
Course Contents:	
Experiment No. 1:--- Aim: Simulate and Implement the full adder and full subtractor (Structural/Data flow / Behavioral Modeling).using Verilog. Objectives: To implement the functions of full adder and full subtractor. Outcomes: Functional verification of full adder and full subtractor. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02 Hrs.
Experiment No. 2:--- Aim: Simulate and Implement the following combinational logic designs using Verilog (Multiplexer, De-multiplexer, decoder) Objectives: To implement combinational logic designs using Verilog. Outcomes: Functional verification of combinational logic designs. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02 Hrs.
Experiment No. 3:--- Aim: : Simulate and Implement 4-bit Binary up down counter(Asynchronouscounter with clear and synchronous set). using Verilog Objectives: To implement 4-bit Binary up down counter on FPGA. Outcomes: Functional verification of 4-bit Binary up down counter. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02 Hrs.
Experiment No. 4:--- Aim: Simulate and Implement 4-bit universal shift register using Verilog Objectives: To implement 4-bit universal shift register using Verilog Outcomes: Functional verification of 4-bit Binary up down counter using Verilog. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02 Hrs.
Experiment No. 5:--- Aim: Write a Verilog code for 4-Bit BCD up-down Counter with asyn. reset and synchronous clock enable. Objectives: To implement 4-Bit BCD up-down Counter on FPGA. Outcomes: Functional verification of 4-Bit BCD up-down Counter. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02 Hrs.
Experiment No. 6:--- Aim: Write Verilog code to display messages on the given seven-segment displayinterface. (use exp. 5th entity as component and display output on seven-segment display) Objectives: To implement seven-segment display interface. Outcomes: Functional verification of seven-segment display interface. Theoretical Background: Experimentation:	02 Hrs.

Results and Discussions: Conclusion:	
Experiment No. 7:--- Aim: Design and simulate sequence detector and using Verilog Objectives: To Design and simulate sequence detector and using Verilog Outcomes: To Design and simulate sequence detector and using Verilog Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02 Hrs.
Experiment No. 8:--- Aim: Write a Verilog code for sequence detector and arbiter. Objectives: To implement sequence detector and arbiter. Outcomes: Functional verification of sequence detector and arbiter. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02 Hrs.
Experiment No. 9:--- Aim: Write a Verilog code to implement FIFO. Objectives: To implement FIFO on FPGA. Outcomes: Functional verification of FIFO. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02 Hrs.
Experiment No. 10:--- Aim: Write a Verilog code for 8 bit general purpose ALU. Objectives: To implement 8 bit general purpose ALU. Outcomes: Functional verification of ALU. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02 Hrs.
Textbooks: 1. Fundamentals of Digital Logic with Verilog design, Tata-Mcgraw Hill-Stephen Brown and Zvonko Vranesic. 2. Xilinx ISE user manual 3. Modelsim User manual	
References: 1. "Principals of Digital System Design using Verilog, Cengage Learning-Roth John. 2. Charles H. Roth, "Digital systems design using Verilog", PWS. 3. Data sheets of FPGA and CPLD, board manuals	

Title of the Course: Computer Networks Laboratory Course Code: UETPC0633		L	T	P	Credit								
		-	-	2	1								
Course Pre-Requisite: Basics of Analog & Digital Communication System													
Course Description: Computer networking refers to interconnected computing devices that can exchange data and share resources with each other. These networked devices use a system of rules, called communications protocols, to transmit information over physical or wireless technologies. Some of the key reasons include: Resource sharing: Networks enable multiple users to share resources such as printers, data storage devices, and other hardware and software resources. This can help to reduce costs, increase efficiency, and improve productivity.													
Course Objectives: 1. Introduce various topologies, types, devices and layered models in computer networking. 2. Expose the students to the design issues, standards and protocols at various layers. 3. Discuss the TCP/IP protocol suite. 4. Study of packet tracer													
Course Learning Outcomes:													
CO	After the completion of the course the student should be able to	Bloom's Cognitive level		Descriptor									
CO1	Study of different network, Topology and physical mediums	I		Describe									
CO2	Configure different types of networking devices	III		Analyze									
CO3	Analyze different protocol Header formats	III		Analyze									
CO4	Configure different protocol servers	I		Describe									
CO-PO Mapping:													
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1	3		2		1	1						1	
CO2			3	1	1	1	3			2			1
CO3	1			2				3			2	1	1
CO4			3	1	1	2	3		2				
Assessments :													
Teacher Assessment: One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.													
		Assessment		Marks									
		ISE		25									
ISE are based on practical performed/ Quiz/ Mini-Project assigned/ Presentation/ Group Discussion/ Internal oral etc. ESE: Assessment is based on oral examination													
Course Contents:													
Experiment No. 1:--- Aim and Objectives: Study of different types of Network cables and Practically implements the cross-wired cable and straight through cable using clamping tool. Outcomes: Knowledge about physical mediums Experimentation: IJ Results and Discussions: IJ Conclusion: IJ												2Hrs.	

Experiment No. 2:--- Aim and Objectives: Study of basic network command and Network configuration commands. Outcomes: Knowledge about networking commands Experimentation: IJ Results and Discussions: IJ Conclusion: IJ	2Hrs.
Experiment No. 3:--- Aim and Objectives: Configuration of various types of LAN Outcomes: Knowledge about LAN Configuration Experimentation: IJ Results and Discussions: IJ Conclusion: IJ	2Hrs.
Experiment No. 4:--- Aim and Objectives: Performing an Initial Switch Configuration Outcomes: Knowledge about switch configuration Experimentation: IJ Results and Discussions: IJ Conclusion: IJ	2Hrs.
Experiment No. 5:--- Aim and Objectives: Performing an Initial Router Configuration Outcomes: Knowledge about Router configuration Experimentation: IJ Results and Discussions: IJ Conclusion: IJ	2Hrs.
Experiment No. 6:--- Aim and Objectives: Configuring RIP Outcomes: Knowledge about RIP Experimentation: IJ Results and Discussions: IJ Conclusion: IJ	2Hrs.
Experiment No. 7:--- Aim and Objectives: Configuring a DHCP Server Outcomes: Knowledge to configure DHCP Theoretical Background: IJ Experimentation: IJ Results and Discussions: IJ Conclusion: IJ	2Hrs.
Experiment No. 8:--- Aim and Objectives: Configuring a FTP Server Outcomes: Knowledge to configure FTP Experimentation: IJ Results and Discussions: IJ Conclusion: IJ	2Hrs.
Experiment No.9 :--- Aim and Objectives: Configure network Topology using Distance vector Routing protocol	2Hrs.

Outcomes: Knowledge about Distance vector Routing protocol Theoretical Background: IJ Experimentation: IJ Results and Discussions: IJ Conclusion: IJ	
Experiment No. 10:--- Aim and Objectives: Configure network Topology using Link State vector Routing protocol Outcomes: Knowledge about Link State vector Routing protocol Theoretical Background: Experimentation: Results and Discussions: Conclusion:	2Hrs.
Textbooks: 1. Computer Networks Andrew S. Tanenbaum, Fourth Edition, PEARSON 2. Data Communication and Networking, Fifth Edition, Behrouz A. Forouzan, TMH 3. TCP/IP Protocol Suite, Fourth Edition, Behrouz A. Forouzan, MGH 4. "Telecommunication Switching System and Networks", T. Viswanathan, Prentice Hall	
References: 1. Computer Networking with Internet Protocols and Technology, William Stallings, 2008 2. Computer Networking A top down approach, James F. Kurose, Person, Fifth Edition 3. "An Engineering Approach to Computer Networking", S. Keshav, Pearson Education 4. "Computer Networks and Internet/TCP-IP", D. Comer, Prentice Hall	

Title of the Course: Industrial Automation Course Code:UETIL0671		L	T	P	Credit								
		-	-	2	1								
Course Pre-Requisite A basic understanding of electrical circuits, industrial automation concepts, familiarity with programming languages or logic diagrams													
Course Description: This lab-oriented course covers in-depth basic elements of a PLC include input modules or points, a Central Processing Unit (CPU), output modules or points, and a programming device. The type of input modules or points used by a PLC depends upon the types of input devices used. Some input modules or points respond to digital inputs, also called discrete inputs, which are either on or off. Other modules or inputs respond to analog signals.													
Course Objectives: This course aims to provide students with hands-on experience in programming and utilizing Programmable Logic Controllers (PLCs) to design and implement control systems for industrial applications, including learning basic PLC components, ladder logic programming, interfacing with sensors and actuators, troubleshooting techniques, and applying PLCs in real-world scenarios across different industrial setting													
Course Learning Outcomes: Upon successful completion of this course, the student will be able to													
CO	After the completion of the course the student should be able to		Bloom’s Cognitive										
			level	Descriptor									
CO1	To explain and apply the concept of electrical ladder logic, its history, and its relationship to programmed PLC instruction.		V	Applying									
CO2	Synthesize and simulate to use of timer, counter, and other intermediate programming functions.		VI	Creating									
CO3	Implement, design and program basic PLC circuits for entry-level PLC applications		VI	Creating									
CO-PO Mapping:													
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1	2	2	3	3	3				1		1	3	3
CO2	2	3	3	3	3						1	3	3
CO3	2	3	3	3	3						1	3	3
Assessments: Teacher Assessment:													
						Assessment		Marks					
						ISE		25					
ISE are based on Lab assignment/ test/quiz/seminar/Group Discussion/Oral etc													
Course Contents:													

ExperimentNo.1:--- Aim: Introduction to PLC trainer & its installation with PC Objectives: To get Familiarization on PLC trainer kit Outcomes: Introduction of PLC, its installation with PC, hardware components, building various blocks and determine no. of digital inputs/outputs & analog inputs/outputs. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02Hrs.
ExperimentNo.2:--- Aim: Implementation of Logic GATES Using PLC trainer Kit Objectives: To implement AND,OR, EX-OR, EX-NOR logic gates test the truth table with PLC software. Outcomes: Verification of logic gates truth table using PLC software. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02Hrs.
ExperimentNo.3:--- Aim: Interfacing of Lamp and Button with PLC for ON & OFF operation Objectives: To build Ladder diagram for various lamp ON/OFF operation. Outcomes: Functional verification of Lamp and Button with PLC for ON & OFF operation Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02Hrs.
ExperimentNo.4:--- Aim: Write and implementation of simple ladder logic program using timer 1) On delay timer 2) Off delay timer Objectives: To study the ON and OFF Delay Timer operation using PLC Software. Outcomes: Functional verification of ON Delay Timer to make the Delay operation in processes Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02Hrs.

ExperimentNo.5:--- Aim: Write and implementation of simple ladder logic program using UP and DOWN counter Objectives: To study about the UP and DOWN Counter operation using PLC Software. Outcomes: Functional verification of UP and DOWN Counter operation using PLC software. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	02Hrs.
ExperimentNo.6:--- Aim: Write and implement ladder logic program to ON-OFF the DC motor using PLC. Objectives: To measure speed of the motor using Opto coupler sensor and monitor as per requirement. Outcomes: Functional verification of ON-OFF operation of DC motor using PLC Theoretical Background: Experimentation: Results and Discussions: Conclu sion:	02Hrs.
Experiment No.7:--- Aim: To study about conveyor control system using PLC Objectives: To give feedback based on presence of object at the end position of conveyor. Outcomes: Functional verification of conveyor control system Theoretical Background: Experimentation: Results and Discussions: Conclusion:	2Hrs.
Experiment No.8:--- Aim: Write a program for PWM GENERATOR using PLC Objectives: To Implement Pulse Width Modulation in PLC using Ladder Diagram programming language. Outcomes: Functional verification of PWM GENERATOR using PLC Theoretical Background: Experimentation: Results and Discussions: Conclusion:	2Hrs

Experiment No.9:--- Aim : Write a program to configure Human Machine Interface (HMI) Objectives: To establish Communication of PLC with HMI for monitoring and controlling. Outcomes: Creating applications/screens in HMI. Theoretical Background: Experimentation: Results and Discussions: Conclusion:	2Hrs
Experiment No.10:--- Aim: Write a program for SPEED CONTROL OF DC MOTOR Objectives : To understand how to ON-OFF operation of DC motor using PLC Outcomes: Functional verification of SPEED CONTROL OF DC MOTOR Theoretical Background: Experimentation: Results and Discussions: Conclusion:	2Hrs
Recommended Books: 1) Programmable Logic Controller by Job Dan Otter; P.H. International, Inc, USA 2) Introduction to PLCs by Gary Dunning. McGraw Hill 3) Module on PLCs and their Applications by Rajesh Kumar, NITTTR Chandigarh 4) Programmable Logic Controller and Microcontrollers by Gurpreet Kaur and SK Sahdev by Uneek Publications, Jalandhar 5) Module on “Allen Bradlag PIC (SLC 500), Institution set-1, by Rajesh Kumar, NITTTR, Chandigarh 6) Module on “PLC Applications based on SLC 5/03” By Rajesh Kumar, NITTTR Chandigarh	

PROGRAM ELECTIVE-II

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.	
Course Contents:	
Unit 1: FUNDAMENTALS OF OS AND SYSTEM SOFTWARE Overview of all system software Operating system, OS services and system calls, multitasking, multiprogramming, time sharing, buffering, spooling, architecture of Unix OS, Introduction to Unix Kernel	7 Hrs.
Unit 2: PROCESS AND THREAD MANAGEMENT Concept of process and threads , process states process management context switching , interaction between processes and OS , multithreading	8 Hrs.
Unit 3: CONCURRENCY CONTROL Concurrency and race conditions, mutual exclusion requirements , s/w and h/w solutions, semaphores, monitors, classical IPC problem and solutions, Dead locks - characterization , detection , recovery, avoidance and prevention.	8 Hrs.
Unit 4: MEMORY MANAGEMENT Memory partitioning , swapping, paging, segmentation, virtual memory - Concepts, Overlays, Demand paging, Performance of demand paging , page replacement algorithm, Allocation algorithms	7 Hrs.
Unit 5: I/O SYSTEMS Principles of I/O hardware - I/O devices - device controller - direct memory access Principles of I/O software – Goals - interrupt handlers - device drivers- device independent I/O software secondary-storage structure - Disk structure - Disk scheduling - Disk Management - Swap-space management - Disk reliability - Stable storage implementation	7 Hrs.
Unit 6: Unix File System Internal Representation of Unix File system,- Inodes, structure of a regular file, directories, conversion of a path name to inode, superblock, allocation of disk blocks , system calls for File system	8 Hrs.
Textbooks: 1. “The Design of the Unix Operating System”, Maurice J. Bach ,PHI	
Reference Books: 1. “ Operating Systems” II nd Edition, . Achyut S. Godbole ,Tata Mc Graw Hill. 2. “Operating System: Internals & Design Principles”, William Stallings, Prentice Hall of India. 3. ”Understanding Operating System” IV th Edition, Flynn & Metioes, Thomsan publication. 4. “ Operating System Concepts”, Silberschatz& Galvin ,VII th Wiley 2000. 5. ” Operating Systems, Concept & Design, MilmanMilenkovic 6. “ Operating Systems” II nd Edition, P.balkrishna Prasad ,SciTech Publication 7. “ Operating Systems” Cengage Learning (India Edition), Flynn /McHoes	

Title of the Course: Automotive Electronics					L	T	P	Credit						
Course Code: UETPE0612					3	-	-	3						
Course Pre-Requisite: Electronics Instrumentation, Control system basics														
Course Description: This course is designed to understand concepts in automotive electronics namely Power train, EV power train, control systems, sensors interfacing, safety systems and onboard diagnostics. Students will be able to correlate concepts learned in electronics engineering to modern automobiles designs.														
Course Objectives:														
1. To understand the concepts of Automotive Electronics systems & subsystems														
2. To understand EV mechanisms and subsystems														
3. To Explain various sensors and actuators used in automotive														
4. To describe various communication systems, wired and wireless protocols used in vehicle networking														
5. To understand automotive Safety standards,														
6. To understand vehicle on board and off board diagnostics														
Course Learning Outcomes:														
</														

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% Weightage for course content (normally last three modules) covered after MSE.	
Course Contents:	
Unit 1:--- I.C. Power-train: Engine types and their operations: Engine Operating Cycles, Engine Components, Spark Ignition Engine Operation, Examples of Spark-Ignition Engines, Compression-Ignition Engine Operation. Basic Automotive System, System Components, Evolution of Electronics in Automotive. Fuel control system, Ignition control system. Emission control Vehicle braking fundamentals, Antilock systems, Variable assist steering and steering control, Controls for Lighting, Wipers, Air conditions/Heating.	09 Hrs.
Unit 2:--- Electric Vehicle Drive-trains: Hybrid and Electric power train. Control techniques used in hybrid system, Alternators, battery technology and charging systems, Special Control Schemes: Battery operated electric vehicles, EV subsystems, introduction to various electric drive train topologies, power flow control in electric drive-train topologies, Configuration and controllers for BLDC Motor drives, PMSM drives, induction motor drives, drive system efficiency	07 Hrs.
Unit 3:--- Automotive sensors and Actuators: sensors : Accelerometers, wheel speed sensors, brake pressure sensors, Seat occupancysensor, Engine speed, Steering wheel angle, Vehicle speed sensor, Throttle position sensor, Turbine speed sensor, Temperature sensor, Mass air flow (MAF) rate sensor, Exhaust gas oxygen concentration sensor, Throttle plate angular position sensor, Crankshaft angular position/RPM sensor, Manifold Absolute Pressure (MAP) sensor, Differential exhaust gas pressure sensor, Actuators: Solenoids, various types of electric motors, and piezoelectric force generators, Examples for actuators: Relays, solenoids and motors. Sensors in Airbag system, Chassis Control systems, Automatic transmission control system	08Hrs.
Unit 4:--- Automotive Communication Systems: Automotive Buses: CAN, LIN, Flex Ray, Recent trends in Automotive buses (Such as, MOST, IE, IELLI, D2B, and DSI)	07 Hrs.
Unit 5:--- Safety Systems in Automobiles: Safety in Automotive: Safety norms and standards. Passenger comfort and security systems A) Active Safety Systems: ABS, TCS, ESP, Brake assist etc B) Passive Safety Systems: Airbag systems, Advanced Driver Assistance Systems (Lane Departure Warning, Collision Warning, Pedestrian Protection, Headlights Control) C) Functional Safety: Need for safety systems, safety concept, safety process for product life cycle, safety by design, validation.	08Hrs.
Unit 6:--- Automotive Diagnostics: Basic wiring system and Multiplex wiring system, Preliminary checks and adjustments, Self-diagnostic system. Fault finding and corrective measures, Electronic transmission checks and Diagnosis, Diagnostic procedures and sequence, On board and off board diagnostics in Automobiles, OBDII, Concept of DTCs, DLC, MIL, Diagnostic tools, Diagnostic protocols: KWP2000 and UDS.	08 Hrs.

Textbooks:

1. Internal Combustion Engines Fundamentals by J B Heywood, McGraw-Hill
2. Williams. B Ribbens, “Understanding Automotive Electronics”, 6th Edition, 2003, Elsevier Science, Newness Publication
3. Robert Bosch, “Automotive Electronics Handbook”, John Wiley and Sons, 2004.
4. C. Mi, M. A. Masrur and D. W. Gao “Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives”, John Wiley & Sons, 2011
5. S. Onori, L. Serrao and G. Rizzoni “Hybrid Electric Vehicles: Energy Management Strategies”, Springer, 2015

Reference Books:

1. Ronald K Jurgen, “Automotive Electronics Handbook”, 2nd Edition, McGraw-Hill, 1999.
2. James D Halderman, “Automotive Electricity and Electronics”, PHI Publication 2005.
3. Iqbal Husain, “Electric and Hybrid Vehicles: Design Fundamentals”, CRC Press, 2003.
4. Tom Denton, “Advanced Automotive Diagnosis”, 2nd Edition, Elsevier, 2006.
5. M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, “Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design” CRC Press, 2004
6. T. Denton, “Electric and Hybrid Vehicles” Routledge, 2016

Unit 1:--- Fundamentals of Medical Instrumentation 1.1 Fundamentals of medical instrumentation: Sources of biomedical signals, Block diagram of medical instrumentation system, Medical transducers: Body temperature, Blood pressure, respiration rate, 1.2. Classification of Medical instruments based on: Application - (diagnostic, therapeutic, Imaging, analytical) , Physiological parameter and bio- potential , Biological system, Different departments in the hospital Unit	8 Hrs.
Unit 2:--- Electro–Physiological measurements 2.1 Electro- cardiograph(ECG) machine : ECG block diagram , Bipolar and unipolar leads, Phono-cardiograph 2.2 Electro- encephalograph (EEG):10-20 electrode placement system EEG readout device 2.3 Electro- myograph (EMG) machine. 2.4 Bio-feedback Instrumentation	8 Hrs.
Unit 3:-- Non-electrical parameter measurements Measurement of blood pressure, Cardiac output, Heart rate, Heart sound Pulmonary function measurements, Plethysmography, Blood Gas analyzers : pH of blood, finger-tip oximeter, Standard HL7	8 Hrs.
Unit 4:--- Medical Imaging Generation, Characteristics, Block diagram/Circuit diagram, Working of X-ray machine. CT-Scan machine, MRI, Ultrasound, Echo-cardiograph, Colour Doppler ultrasound machine.	7 Hrs.
Unit 5:--- Surgical & Therapeutic Instruments Block diagram, Working of Electro-surgery machine (cautery), Hemo-dialysis machine, Muscle stimulator, Defibrillator Machine Unit	7 Hrs.
Unit 6:--- PATIENT SAFETY: Electric shock hazards , Leakage currents , Safety Codes for Electro medical Equipment, Electrical Safety Analyzer, Test instruments for checking safety parameters of biomedical equipment	7 Hrs.
Textbooks: 1. Handbook of biomedical instrumentation, R. S. Khandpur, Tata McGraw Hill, New Delhi 2. Biomedical instrumentation measurements, Lesli P Cromwell, Fred J. Weibell, Erich A. Pfeiffer, PHI Learning, New Delhi 3. Medical instrumentation application & design, John G. Webster, John Wiley and Sons, New Delhi	
Reference Books: 1. Principles of Applied Bio-Medical Instrumentation, L.A. Geddes and L.E.Baker John Wiley & Sons, 1975 2. Bio-Medical Instrumentation and Measurements, Leslie Cromwell, Fred J.Weibell, Pearson Education, 2002	

Title of the Course: Embedded Linux											L	T	P	Credit
Course Code:UETPE0614											3	-	-	3
Course Pre-Requisite: Embedded System Programming in C														
Course Description: This Course aims to develop the basic concepts of Super loop programming, RTOS programming, programming on Embedded Linux platform and develop application on embedded Linux.														
Course Objectives:														
To develop understanding for selecting platform for embedded system programming specific to application in design. To develop understanding of Embedded Linux architecture, file system and boot sequence of Embedded Linux To develop understanding of board support package of embedded Linux. To develop understanding of embedded storage system using MTD To develop understanding of Drivers for embedded Linux To study Beagle Bone Black and Raspberry Pi as platform and develop applications on the same														
Course Learning Outcomes:														
CO	After the completion of the course the student should be able to										Bloom's Cognitive			
											level	Descriptor		
CO1	Familiarity of the embedded Linux development model.										IV	Analyze		
CO2	Understand and create Linux BSP for a hardware platform.										II	understand		
CO3	Develop and debug applications and drivers in embedded Linux.										II	understand		
CO4	Develop applications on standard hardware platform										III	Apply		
CO-PO Mapping:														
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2	
CO1	2	2				2					2	2	1	
CO2	2	3	2			2						2	2	
CO3	3	3	3	2			2	2				3	2	
CO4	2	3	2		3		2	2	2			3	3	
Assessments :														
Teacher Assessment:														
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.														
Assessment												Marks		
ISE 1												10		
MSE												30		
ISE 2												10		
ESE												50		
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.														
MSE: Assessment is based on 50% of course content (Normally first three modules)														
ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.														
Course Contents:														
Unit 1: Review of super loop and RTOS programming, Need of embedded Linux, Embedded Linux Versus Desktop Linux, Embedded Linux Distributions and porting												8 Hrs.		
Unit 2: Architecture of Embedded Linux, Linux Kernel Architecture: HAL, Memory manager, Scheduler, File System, I/O and Networking subsystem, IPC, User space, Linux Start-Up Sequence.												8 Hrs.		
Unit 3: Board Support Package: Inserting BSP in Kernel Build Procedure, The Boot Loader Interface, Memory Map, Interrupt Management, Timers, UATRS, Power management												8 Hrs.		
Unit 4: Embedded Storage: MTD, Architecture, Drivers, Embedded File System												8 Hrs.		
Unit 5: Introduction to Raspberry PI hardware platform, Programming hardware resources of above boards using programming languages												7 Hrs.		

Unit 6: Introduction to Beagle Bone hardware platform, Programming hardware resources of above boards using programming languages	7Hrs.
Textbooks: 1. “Embedded Linux System Design and Development”, P Raghvan, Amol Lad, SriramNeelakandan ,Auerbach Publications 2. “Exploring BeagleBone: Tools and Techniques for Building with Embedded Linux”, Derek Molloy, Wiley, 1st Edition, 2014. 3. “Exploring Raspberry Pi”,Derek Molloy ,Wiley, 1st Edition, 2016	
Reference Books: 1. “Building Embedded Linux Systems”, Karim Yaghmour, O'Reilly & Associates 2. “Embedded Linux Primer: A Practical Real World Approach”, Christopher Hallinan, Prentice Hall, 2nd Edition, 2010. 3. Mastering Embedded Linux Programming.	

Open Elective-I

Title of the Course: Global marketing management Course Code: UILOE0522											L	T	P	Credit
											3	-	-	3
Course Pre-Requisites: Student should have background of principles of marketing.														
Course Description: The course aims at making the students aware about applying principles of marketing in the perspective of the global business activities, marketing in international business and global culture, ethics, beliefs and forces transforming the international business today. The course would develop a general perspective about managing international business both in operational as well as strategic context.														
Course Objectives: 1 To explain the various ways a company can expand globally 2 Describe how companies in global industries pursue competitive advantage 3 Compare and contrast single-country marketing strategy with global marketing strategy (GMS) 4 Explain the stages a company goes through as its management orientation evolves from domestic and ethnocentric to global and geocentric. 6 Discuss the driving and restraining forces affecting global marketing management														
Course Learning Outcomes:														
CO	After the completion of the course the student should be able to										Bloom's Cognitive			
											level	Descriptor		
CO1	Analyze global environment for marketing										4	Understand		
CO2	Design marketing mix for global marketing										3	Analyze		
CO3	Plan segmentation and targeting for global marketing										3	Create		
CO4	Understand trade blocks and international policy										2	Create		
CO-PO Mapping:														
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2	
CO1		3				2								
CO2			3											
CO3				3										
CO4			3											
Assessments :														
Teacher Assessment:														
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.														
Assessment										Marks				
ISE 1										10				
MSE										30				
ISE 2										10				
ESE										50				
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.														
Course Contents:														
Unit 1: Introduction to Global Marketing Meaning, Definition and importance of Global Marketing. Factors affecting Global Marketing. Difference between Domestic and Global Marketing												4 Hrs.		
Unit 2: Global Environmental Analysis Political Legal Regulatory Environment, Socio- cultural Environment, Economic Environment, Technical Environment.												6Hrs.		
Unit 3: Global Marketing Mix												8 Hrs.		

Global Product Strategy, Global Pricing, Place and Promotion, Market Entry, Trading Companies, Licensing, Franchising, FDI, Mergers and Acquisitions.	
Unit 4: Segmentation Targeting and Positioning Segmentation- Demographic, Psychographic, Behavioral and Ethnic Targeting Strategy- Standardized Global Strategy, Concentrated Global Strategy and Differentiated Global Strategy Positioning: Attribute and Benefits, Quality and Price, Use and User	8 Hrs
Unit 5: Trade Blocks WTO, ASEAN, NAFTA, European Union	4 Hrs
Unit 6: India's International Policy and Impact on Economy Government measures and export incentives, Exim policy, ECGC services Balance of trade/payments, Services export from India,	6 Hrs
Textbooks: 1. Global Marketing, 9e, J. Keegan Warren, C. Green Mark 2. Global Marketing Management— Keegan W.J Gautam Datta Pearson 3. New Import Export Policy - Nabhi Publications 4. Export Marketing Khurana PK Galgotia	
References: 1. Global Marketing Management – Keegan W.J., Bhargava N. K., Pearson Education 2. Global Marketing Management – Lee K., Carter S., Oxford University	
Unit wise Measurable students Learning Outcomes: U1: Able to define basic terminologies associated with Global marketing U2: Able to analyze product specific global environment U3: Able to undertake research on 4Ps of marketing specific to country U4: Able to undertake research on segmentation and targeting specific to country U5: Understand trade blocks U6: Understand GoI's International Policy	

Title of the Course: Ethics in Engg. practices
Course Code: UETOE0531

Course Pre-Requisites:- Basic understanding of Business Management.

Course Description:

Engineering as a profession is meant to serve the public by strictly adhering to codes of conduct and placing paramount the health, safety and welfare of public. However it raises few conflicting questions like : who is the public? Does it include future generation? Who decides what is best for public? Do engineers have managerial and technical responsibilities? What is the acceptable risk? Do Engineers have responsibilities towards the environment also? Engineering ethics is the study of moral issues and decisions confronting individuals and organizations engaged in engineering and the study of related questions about the moral ideals, character, policies and relationships of people and corporations involved in technological activity. To prepare students for their professional responsibilities as Engineers. To help them recognize and think through ethically significant problem situations that are common in Engineering and to evaluate the existing ethical standards for ENGINEERING Practice.

Course Objectives:

1. To understand Ethical Reasoning and Engineer Ethics Professional Practice in Engineering.
2. To design Ethics as Design - Doing Justice to Moral Problems.
3. To describe Central Professional Responsibilities of Engineers.
4. To understand Computers, Software, and Digital Information.
5. To describe Rights and Responsibilities Regarding Intellectual

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		level	Descriptor
CO1	Understand Ethical Reasoning and Engineer Ethics Professional Practice in Engineering	I	Understand
CO2	Design Ethics as Design - Doing Justice to Moral Problems.	II	Design
CO3	describeCentral Professional Responsibilities of Engineers and Rights and Responsibilities Regarding Intellectual	I	Describe
CO4	Understand Computers, Software, and Digital Information	I	Understand

CO-PO Mapping:

CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1			2		1	1			1	3			
CO2					2				2	1		1	
CO3					2					3			1
CO4									2	3		1	1

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE1	10
MSE	30
ISE2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Unit 1:-Ethics in Engineering: Understanding basic concepts Ethics- Engineering Ethics- Engineering as Profession – Difference between occupation and professions- Professional Ethics - Codes of Ethics in Engineering profession- Moral dilemmas and moral autonomy in Engineering profession	7 Hrs.
Unit 2:-Engineering as Social Experimentation Engineering as experimentation-Engineers as responsible Experimenters-A balanced outlook on Law	8 Hrs.
Unit 3:-Social Impact of Technology and Engineering Ethos of science and engineering- Ethical leadership in engineering and society, social responsibility of scientist/ researchers, Intellectual property and society, Cross cultural issues in engineering research.	7 Hrs.
Unit 4:-Major Issues in Engineering Ethics Ethics and Environment- Ethics and sustainable engineering- Computer ethics- Analyzing ethical problems in research- Ethics in collaborative research- Engineers as expert consultants and advisors- Corporate Social Responsibility (CSR).	8Hrs.
Unit 5:- Safety, Responsibilities and Rights Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.	8 Hrs.
Unit 6:- Global Issues Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.	7 Hrs.
Text Books: 1. Mike W. Martin and Roland Schinzinger, —Ethics in Engineering, Tata McGraw Hill, New Delhi, 2003. 2. Govindarajan M, Natarajan S, Senthil Kumar V. S, —Engineering Ethics, Prentice Hall of India, New Delhi, 2004.	
Reference Books: 1. Govindarajan M, Natarajan S, Senthil Kumar V.S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004 2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009	

Open Elective-II

Title of the Course: Engineering Econometrics										L	T	P	Credit
										3	-	-	3
Course Code: UILOE0622													
Course Pre-Requisite: Industrial Management													
Course Description: In modern age of technology, signals and systems play vital roles. It is auditcourse in electronics and telecommunication field with diverse applications in area of entrepreneurship. These courses focus on all aspects about Engineering Economics.													
Course Objectives :													
• Train the student to cost estimation of component. • To Provide Knowledge about value Engineering. • To know about cash flow. • To solve problem on depreciation.													
Course Learning Outcomes:													
CO	After the completion of the course the student should be able to									Bloom's Taxonomy			
										Level	Descriptor		
CO1	To explain basic of Economics for Engineering									II	Explain		
CO2	To Know value Engineering for Engineering Economics									I	Know		
CO3	To provide Knowledge of cash flow									I	Knowing		
CO4	To analyze the problem of Replacement, maintenance anddepreciation									III	Analyzing		
CO-PO Mapping:													
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1	1	1				3					2		
CO2	1	1				3					2		
CO3	1	1				3							
CO4	1	1				2						1	2
Assessments :													
Teacher Assessment:													
Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.													
Assessment										Marks			
ISE1										10			
MSE										30			
ISE2										10			
ESE										50			
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.													
MSE: Assessment is based on 50% of course content (Normally first three modules)													
ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.													
Course Contents:													
Unit 1: Introduction to Economics: Introduction to economics, flow in anEconomy, law of supply and demand, scope of engineering economics, element of costs, marginal costs, marginal revenue, sunk cost, opportunity cost, elementary economic analysis.												9 Hrs.	
Unit 2: Value Engineering: Make or buy decision, value engineering functions and aims, value engineering procedure, Interest formulae and their applications, single payment compound amount factor, equal payment series sinking fund and worth factor with examples												9 Hrs.	
Unit 3: Cash Flow :Methods of comparison of alternatives, present worth method (Revenue dominated cash flow diagram), future worth method (Revenue dominated cash												9 Hrs.	

flow diagram, cash dominated cash flow diagram), Annual equivalent method, Rate of return method –Examples all methods.	
Unit 4: Replacement and maintenance Analysis: Introduction , Types of Maintenance, Types of replacement problem, Determination of economic life of an asset, Replacement of an asset with a new asset, Capital Recovery with return and concept of challenger and defender.	9 Hrs.
Unit 5: Depreciation: Introduction , Straight line method of depreciation, Declining balance method of depreciation, Sum of the year digits method of depreciation, Sinking fund method of depreciation, Service output method of depreciation.	9 Hrs.
Textbooks: 1. Panneer Selvam R. “Engineering Economics”, Prentice Hall of India Ltd, 2001. 2. Smith, G.W. “Engineering Economics”,Lowa State Press 1973.	
Reference Books: 1. Park C.S., “Contemporary Engineering Economics”, Prentice Hall of India Ltd, 2002. 2. Newman, D.G. and Lavelle, J.P., Engineering Economics” and Analysis”, Engineering Press,2002.	

MULTIDISCIPLINARY MINOR-III

A. BUCKET-I: MULTIDISCIPLINARY MINOR IN CYBER SECURITY

Title of the Course: Steganography & Digital Watermarking Course Code:UETMM0541											L	T	P	Credit				
											3	-	-	3				
Course Pre-Requisites: Digital signal processing, linear algebra, basic cryptography concepts.																		
Course Description: This course explores the techniques of embedding and hidden information within digital media like images, audio, and video, where the embedded data remains imperceptible to the naked eye while still being retrievable by authorized users. .																		
Course Objectives: This course will cover the concept of security, types of attack experienced, encryption and authentication for deal with attacks, what is data compression, need and techniques of data compression.																		
Course Learning Outcomes:																		
CO	After the completion of the course the student should be able to										Bloom's Cognitive							
											level	Descriptor						
CO1	To develop an understanding of digital watermarking and steganography basics, various approaches, characteristics and application domains.										II	Develop						
CO2	To apply digital watermarking as an authentication tool for distribution of content over the Internet and steganography techniques for covert communication.										III	Apply						
CO3	To understand the basics of the counter measures like steganalysis for assessing the data hiding methods.										I	Understand						
CO4	To enable to evaluate and choose appropriate data hiding technique based on a multitude of security factors.										III	Evaluate						
CO-PO Mapping:																		
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2					
CO1		3			3							1						
CO2		2																
CO3	2		2										1					
CO4	3					2			1	1								
Assessments :																		
Teacher Assessment:																		
<table><tr><td>Assessment</td><td>Marks</td></tr><tr><td>ESE</td><td>100</td></tr></table>															Assessment	Marks	ESE	100
Assessment	Marks																	
ESE	100																	
ESE: Assessment is based on 100% course content.																		
Course Contents:																		
Unit 1: Steganography Overview, History, Methods for hiding (text, images, audio, video, speech etc) Issues: Security, Capacity and Imperceptibility, Steganalysis: Active and Malicious Attackers, Active and passive steganalysis.													7 Hrs.					
Unit 2:--- Frameworks for secret communication: pure Steganography, secret key, public key steganography, Steganography algorithms - adaptive and non-adaptive.													8 Hrs.					

Unit 3:- Steganography techniques Substitution systems, Spatial Domain, transform domain techniques, spread spectrum, Statistical steganography, Cover Generation and cover selection, (Tools: EzStego, FFEncode, Hide 4 PGP, Hide and Seek, S Tools etc.)	7 Hrs.
Unit 4 : Detection: Detection, Distortion, Techniques: LSB Embedding, LSB Steganalysis using primary sets, Texture based.	8 Hrs.
Unit 5:- Digital Watermarking: Introduction Difference between Watermarking and Steganography, History, Classification (Characteristics and Applications), Types and techniques (Spatial-domain, Frequency-domain, and Vector quantization-based watermarking), Attacks and Tools (Attacks by Filtering, Remodulation, Distortion, Geometric Compression, Linear Compression etc.), Watermark security & authentication.	8 Hrs.
Unit 6:- Recent Updates Recent trends in Steganography and digital watermarking techniques. Case study of LSB Embedding, LSB Steganalysis using primary sets.	7 Hrs.
Textbooks: 1. Peter Wayner, “Disappearing Cryptography–Information Hiding: Steganography & Watermarking”, Morgan Kaufmann Publishers, New York, 2002. 2. Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, TonKalker, “Digital Watermarking and Steganography”, Margan Kaufmann Publishers, New York, 2008.	
Reference Books: 1. Information Hiding: Steganography and Watermarking-Attacks and Countermeasures by Neil F. Johnson, ZoranDuric, Sushil Jajodia. 2. Information Hiding Techniques for Steganography and Digital Watermarking by Stefan Katzenbeisser, Fabien A. P. Petitcolas.	

B. BUCKET-II: MULTIDISCIPLINARY MINOR IN COMPUTER VISION

Title of the Course: Deep Learning Course Code:UETMM0542											L	T	P	Credit				
											3	-	-	3				
Course Pre-Requisites: Introduction to Machine Learning																		
Course Description: In this course we will learn about the building blocks used in these Deep Learning based solutions. Specifically, we will learn about feedforward neural networks, convolutional neural networks, recurrent neural networks and attention mechanisms. We will also look at various optimization algorithms such as Gradient Descent, Nesterov Accelerated Gradient Descent, Adam, AdaGrad and RMSProp which are used for training such deep neural networks.																		
Course Objectives: 1. Understand the fundamentals of deep learning 2. Analyze and evaluate deep learning models 3. Explore advanced deep learning architectures 4. Apply deep learning techniques to real-world problems.																		
Course Learning Outcomes:																		
CO	After the completion of the course the student should be able to										Bloom's Cognitive							
											level	Descriptor						
CO1	Understand the fundamentals of deep learning										I	Understand						
CO2	Analyze and evaluate deep learning models										II	Analyze						
CO3	Explore advanced deep learning architectures										IV	Understand						
CO4	Apply deep learning techniques to real-world problems.										III	Apply						
CO-PO Mapping:																		
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2					
CO1		3			3							1						
CO2		2																
CO3	2		2										1					
CO4	3					2		1	1									
Assessments :																		
Teacher Assessment:																		
<table><tr><td>Assessment</td><td>Marks</td></tr><tr><td>ESE</td><td>100</td></tr></table>															Assessment	Marks	ESE	100
Assessment	Marks																	
ESE	100																	
ESE: Assessment is based on 100% course content.																		
Course Contents:																		
Unit 1:- Introduction To Deep Learning Overview of deep learning and its applications: Introduction to Deep Learning, A brief history, Need of Deep Learning, Applications of Deep Learning,Neural networks and their Architecture: ANN Intuition, Components of NN Architecture, Types of NN- Supervised - ANN, CNN, RNN, Unsupervised - SOM, AE, BM Activation functions and their properties: Sigmoid, Hyperbolic Tangent (tanh) Function, Rectified Linear Unit (ReLU), Leaky ReLU, Softmax													6 Hrs.					
Unit 2:--- Feedforward Neural Networks and Optimization Multilayer perceptron (MLP):Architecture of MLP with Feedforward, Error Functions-Mean Squared Error (MSE), Binary Cross-Entropy, Categorical Cross-Entropy (CCE), Backpropagation algorithm: Difficulty of Training Deep Neural Networks, Regularization techniques: Early													8 Hrs.					

Stopping, Drop Out Optimization algorithms: Adagrad, Adam	
Unit 3:- Convolution Neural Networks (CNNs) CNN architecture and components Convolution operation, pooling, flattening, ReLU Layer, Pooling, Flattening, Softmax and Cross Entropy, Transfer learning with CNNs	6 Hrs.
Unit 4 : Recurrent Neural Networks (RNNs) Basics of sequence modeling,RNN architectures (LSTM, GRU),Word embeddings and attention mechanisms	7 Hrs.
Unit 5:- Autoencoders Autoencoders -Introduction, Sparse, Denoising, Contractive Autoencoder, Stacked and Deep Autoencoder	8 Hrs.
Unit 6:- Advanced Deep Learning Generative Adversarial Networks (GANs) Variational Autoencoders (VAEs) Basics of reinforcement learning: Q-learning and value iteration	7 Hrs.
Textbooks: 1. Deep Learning with Python by Francois Chollet, Manning Publications 2. Dive into Deep Learning, Aston Zhang, Zachary C. Lipton, Mu Li, And Alexander J.Smola	
Reference Books: 1.Deep Learning by Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press Book Andreas Muller. 2. “Introduction to Deep Learning: A Practitioner's Approach by Josh Patterson and Adam Gibson Rajiv Chopra, Machine Learning, Khanna Book Publishing 2021	

MULTIDISCIPLINARY MINOR-IV

A. BUCKET-I: MULTIDISCIPLINARY MINOR IN CYBER SECURITY

Title of the Course: Security Assessment & Risk Analysis											L	T	P	Credit	
Course Code: UETMM0641											3	-	-	3	
Course Pre-Requisite: Basic cryptography concepts and cyber security concepts.															
Course Description: This course provides a comprehensive understanding of security assessment and risk analysis in software and enterprise environments. It covers key security principles, threat modeling, risk management frameworks, and cryptographic techniques. The course also explores emerging trends like Zero Trust security and AI-driven risk analysis.															
Course Objectives: This course aims to equip students with the knowledge and skills to assess security risks, implement mitigation strategies, and integrate security into software development. It focuses on threat modeling, risk management frameworks, cryptographic techniques, and enterprise security best practices to enhance system resilience.															
Course Learning Outcomes:															
CO	After the completion of the course the student should be able to										Bloom's Cognitive				
											level	Descriptor			
CO1	To Understand various aspects and principles of software security.										II	Understand			
CO2	To Identify and analyze the risks associated with s/w engineering and use relevant models to mitigate the risk.										III	Identify			
CO3	Illustrate the various security algorithms to implement for secured computing and computer network										II	Understand			
CO4	Explain different security frameworks for different types of systems including electronic systems										II	Explain			
CO-PO Mapping:															
CO	1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2		
CO1	3					1		1		2		3			
CO2		3				2		1		3		3			
CO3		3				3		1		3		3			
CO4		2				3		1		2		3			
Assessments:															
Teacher Assessment:															
ESE: Assessment is based on 100 marks.															
Course Contents:															
Unit 1:- Computer Security Defining computer security, the principles of secure software, trusted computing base, etc, threat modelling, advanced techniques for mapping security requirements into design specifications. Secure software implementation, deployment and ongoing management.													8Hrs.		
Unit 2: Frameworks for secret communication:															

pure Steganography, secret key, public key steganography, Steganography algorithms – (HUGO, WOW, and S-UNIWARD) adaptive and non-adaptive.	8 Hrs.
Unit 3:- Software Assurance Model Identify project security risks & selecting risk management strategies, Risk Management Framework, Security Best practices/ Known Security Flaws, Architectural risk analysis, Security Testing & Reliability (Penn testing, Risk-Based Security Testing.	8 Hrs.
Unit 4:- Software Security in Enterprise Business Identification and authentication, Enterprise Information Security, Symmetric and asymmetric cryptography, including public key cryptography, data encryption standard (DES), advanced encryption standard (AES), algorithms for hashes and message digests.	8 Hrs.
Unit 5:-Authentication Authentication schemes, access control models, Kerberos protocol, public key infrastructure (PKI), protocols specially designed for e-commerce and web applications, firewalls and VPNs.	7 Hrs.
Unit 6:-Security development frameworks Security issues are associated with the development and deployment of information systems, including Internet-based e-commerce, e-business, and e-service systems.	7Hrs.
Textbooks: W. Stallings, Cryptography and network security: Principles and practice, 5 th Edition, Upper Saddle River, NJ: Prentice Hall., 2011. 2. C. Kaufman, r. Perlman, & M. Speciner, Network security: Private communication in a public world, 2 nd Edition, Upper Saddle River, NJ:Prentice Hall, 2002. 3. C. P. Pfleeger, S. L. Pfleeger, Security in Computing, 4 th Edition, Upper Saddle River, NJ:Prentice Hall, 2007.	
References: 1. T. M. Merkow, & J. Breithaupt, Information security: Principles and practices. Upper Saddle River, NJ:Prentice Hall, 2005. 2, Gary McGraw, Software Security: Building Security In, Addison-Wesley, 2006	

B. BUCKET-I: MULTIDISCIPLINARY MINOR IN COMPUTER VISION

Title of the Course: IMAGE PROCESSING Course Code: UETMM0642										L	T	P	Credit	
										3	-	-	3	
Course Pre-Requisite: Signals and systems, Digital Signal Processing.														
Course Description: This course intends to provide the fundamentals and different levels of processing of digital images. The course introduces the steps and components of image processing, how images are acquired, sampled, quantized and the relationship between pixels. In image enhancement and restoration both spatial and frequency domain techniques are utilized. Segmentation techniques explained with edge detection and morphological processing. This course also addresses the compression techniques and standards for efficient storage.														
Course Objectives: 1. To describe basic concepts of digital image processing. 2. To describe and implement various methods for image enhancement and recognition. 3. To explain concept of image segmentation and compression.														
Course Learning Outcomes:														
CO	After the completion of the course the student should be able to									Bloom's Cognitive				
										Level	Descriptor			
CO1	Describe basic concepts of digital image processing.									I	Explain			
CO2	Describe and implement various methods for image enhancement and recognition									II	Describe			
CO3	Design various methods for image enhancement and recognition									III	Design			
CO4	Compare different image compression methods.									II	Compare			
CO-PO Mapping:														
Course Outcomes														
		1	2	3	4	5	6	7	8	9	10	11	PSO1	PSO2
CO1		2											1	
CO2		3	2		2	2				1			1	
CO3		2	2	2		2	1			1			1	
CO4		2	3	2	2	2	1			1		1	1	
Assessments :														
Teacher Assessment:														

Image sensing and acquisition, Basic concept of sampling and quantization, Representations of digital image. Spatial and gray level resolution. Metric & topological properties of digital image, color fundamentals, color models.	
Unit 2:--- Image enhancement in spatial domain : Gray level transformation function: image negation, Log transformation, power law transformation, Piecewise linear transformation functions, Histogram equalization, Enhancement using arithmetic / Logic operation.	7 Hrs.
Unit 3:--- Image filtering : Basics of spatial filtering, smoothening, sharpening, Gradient and Laplacian filter, Filtering in frequency domain: basic properties, filtering in frequency domain.	7 Hrs.
Unit 4:--- Morphological image processing : Dilation & erosion, opening and closing operation, Hit- or –miss transformation, Morphological algorithms: Boundary extraction, region filling, thinning and thickening.	8 Hrs.
Unit 5:--- Image segmentation: Detection of discontinuities: Point detection, line detection, edge detection, Sobel, Prewitt, Laplacian mask for edge detection, Thresholding, Region based segmentation: region growing, region splitting and merging.	8 Hrs.
Unit 6:--- Image compression : Fundamentals, coding redundancy, interpixel redundancy, fidelity criteria, lossless predictive coding, Lossy predictive coding, DCT compression, JPEG 2000 standard.	8 Hrs.
Textbooks: 1. Digital Image Processing - Rafael C Gonzalez, Richard E. Woods: Pearson Publication 2. Fundamentals of Digital Image Processing - Anil K. Jain 3. Digital Image Processing and Analysis- B. Chanda , D. Dutta Majumder	
Reference Books: 1. Digital Image Processing - S. Jayraman, S Esakkirajan, Veerakumar: MGH 2. Digital Image Processing using Matlab - Rafael C Gonzalez. 3. Fundamentals of Digital Image Processing - S. Annadurai, R. Shanmugalakshmi: Pearson Publication 4. Digital Image Processing –Pratt 5. Image Processing Analysis and Machine vision - Milan Sonka, Vaclav Hlavac: Thomson	

Exit Courses

Title of the Course: Advanced Mobile Communication Course Code: UETEX0691		L	T	P	Credit
		3	-	-	3
Course Pre-Requisites: Basics of communication Systems.					
Course Description: This Course is to expose the students to the most recent technological developments in Mobile communication systems. The Course considers basic protocols adapted in Mobile. The Course provides various multiple access techniques and Standards in Cellular mobile Communication					
Course Objectives:					
Course Learning Outcomes:					
CO	After the completion of the course the student should be able to	Bloom's Cognitive			
		level	Descriptor		
CO1	Understand the concepts of Mobile Communication	I	Understand		
CO2	Analyze basic protocols adapted in Mobile network and transport layer	II	Analyze		
CO3	Analyze Support for Mobility in Mobile Communication	II	Analyze		
CO4	Evaluate Security issues in wireless systems.	IV	Evaluate		
Assessments :					
Teacher Assessment:					
		Assessment	Marks		
		ESE	100		
ESE: Assessment is based on 100% course content.					
Course Contents:					
Unit 1:- Introduction to Mobile Communication 6Hrs. Mobile and Personal Communication, mobile and wireless devices, Specialized packet and mobile radio networks, circuit switched data services on cellular networks, packet switched data services on cellular networks				7 Hrs.	
Unit 2:--- Wireless LAN 9Hrs. Introduction, Infrared radio transmission infrastructure and adhoc networks, Detailed study of IEEE 802.11, HIPER LAN, Bluetooth, Wireless ATM				8Hrs.	
Unit 3:- Mobile Network Layer 5Hrs. Mobile IP, DHCP(DynamicHostControlProtocol), Mobile adhoc networks.				7Hrs.	
Unit 4:- Mobile Transport Layer 7Hrs. Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and Selectiveretransmission and recovery, Transaction oriented TCP, TCP over 2.5/3G wireless networks.				7 Hrs.	

Unit 5:- Support for Mobility 7Hrs. Files ystems,WWW, Wireless application protocol, i-mode, SyncML,WAP2.0.	7 Hrs.
Unit 6:- Security issues in wireless systems 6Hrs. Need for wireless security, Attacks on wireless networks, security services, WEP, VPN.	7 Hrs.
Text Books: 1. Mobile Communications :Jachen Schiller (AddisonWesty) 2. Wireless Networks by P. Nicopolitidis, M. S. Obaidat, G. I. Papadimitriou, A. S. Pomportsis ; Wiley Pub.	
Reference Books: 1. D. Bertsekas and R. Gallagar, Data Networks, 2/e, PHI, 1992. 2. J.F. Kurose and K. W. Ross: Computer Networking, A Top-Down Approach, 4/e, Pearson/Addison Wesley, 2008. 3. BEHROUZ A. FOROUZAN, Data Communications and Networking, 2nd Edition, Tata McGraw-Hill, New Delhi, 2003	

Title of the Course: Cyber Security		L	T	P	Credit
Course Code: UETEX0692		3	-	-	3
Course Pre-Requisite: Web Technology, Software skills. operating systems					
Course Description: The cyber security course syllabus is designed to focus on risk management, network security, security operations, software development, and also on practical applications of cyber security. The goal of the course is to educate students about the importance of cyberspace, alongside different legal and social challenges associated with it. Also learn about different legal remedies offered to citizens under the Information Technology Act.					
Course Objectives: The course aims to 1. Understand Cyber security. issues and challenges 2. Study of Cyber crime and Cyber law 3. Digital Devices Security , Tools and Technologies for Cyber Security 4. E-Commerce security, Digital Devices Security					
Course Learning Outcomes: Upon successful completion of this course, the student will be able to					
CO	After the completion of the course the student should be able to	Bloom’s Cognitive			
		Level	Descriptor		
CO1	To Understand Issues and challenges of cyber security	Comprehension	Describe		
CO2	To Study of Cyber crime and Cyber law	Comprehension	Describe		
CO3	To Understand Types of Social media, Social media platforms for cyber security	Comprehension	Describe		
CO4	To Study E-Commerce security, Digital Devices Security and best practices	Comprehension	Describe		
Assessments : Teacher Assessment: Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.					
Assessment		Marks			
ESE		100			
Course Contents:					
Unit 1:--- Introduction to Cyber security. Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance Internet society, Regulation of cyberspace, Concept of cyber security.					6 Hrs.
Unit 2:--- Issues and challenges of cyber security. Basic checklist, privacy and security settings for popular Social media platforms, Reporting and redressal mechanism for violations and misuse of Social media platforms, legal aspects and best practices for the use of Social media platforms.					6 Hrs.

Unit 3:--- Cyber crime and Cyber law Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime.	8 Hrs.
Unit 4:---. Social Media Overview and Security Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies	8 Hrs.
Unit 5:--- E - Commerce and Digital Payments Definition of E- Commerce, Main components of E-Commerce, Elements of ECommerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), eWallets.	6 Hrs.
Unit 6:---. Digital Devices Security , Tools and Technologies for Cyber Security End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software,	8 Hrs.
Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.	
Textbooks: Text Books 1. Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010. 2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)	
References: 1. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001) 2. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd. 3. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers. 4. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd. Fundamentals of Network Security by E. Maiwald, McGraw Hill.	

Course Code	Course Name	L	T	P	Hrs./Week	Credits
UETEX0693	Internship	2	-	-	2	2

Kolhapur Institute of Technology's

COLLEGE OF ENGINEERING (EMPOWERED AUTONOMOUS),

KOLHAPUR

Department of Electronics and Telecommunication Engineering

Exit Course after Third Year B.Tech

Internship Policy

Index

Sr.No.	Content
1.	Introduction
2.	Objectives
3.	Mode of Execution
4.	Guidelines for students
5.	General Internships Recommendations
6.	Evaluation of Internship

1. Introduction

Internship is an integral part of the academic curricula. Its satisfactory completion is a mandatory requirement for getting degree after third year E & Tc . Further, considering the curriculum structure approved by the college, multiple internships modes are possible, and are assigned academic credits within the curricula. The general structure of the internship requires the students to undertake an immersive assignment within the assigned organizations for a limited period. The internship offers the students an opportunity to gain hands-on industrial or organizational exposure; to integrate the knowledge and skills acquired through the coursework; interact with professionals and other interns; and to improve their presentation, writing, and communication skills.

The internship will benefit students by getting real time industry experience and exposures, exploring the career opportunities, add values, skills, and experience to their CV and learn company culture.

2. Objectives

Internships are educational and career development opportunities, providing practical experience in a field or discipline. They are structured, short-term, supervised placements often focused around particular tasks or projects with defined timescales. An internship may be compensated, non-compensated. The internship has to be meaningful and mutually beneficial to the intern and the organization.

Following are the intended objectives:

- To expose the students to industrial environment (viz. various materials, processes, products and their applications along with relevant aspects of quality control which cannot be simulated in the classroom) for application of existing engineering knowledge in industrial situations
- To provide possible opportunities to learn and sharpen the real time technical and managerial skills required for professional career
- Understand the social, environmental, economic and administrative considerations that influence the working environment [PO 6, 7]
- To expose students to the engineer's responsibilities and ethics[PO8]
- To get acquainted with the working styles of industries at different hierarchy and learn to work in a team [PO 9]
- To gain experience in all types of professional communications (viz. pre- internship applications, during internships people skills and documentation skills and post internship reports/projects writing skills) [PO 10]
- To demonstrate the impact of the internship on their lifelong learning and professional development [PO 11]
- To provide the linkages of future job/research opportunities to students in the organization [PO 11]

3. Mode of Execution

Under exit after third year B.Tech Internship will be treated as separate entity. Students Tenure of this project will be for max 1 Month. Internship activity will be commenced from ESE of 6th semester for maximum period of 1 month. This internship should be preferably aligned with domain area.

Steps and timeline to be followed as a guideline for Internship

Step. No.	Description of Activity	Timeline
1	Student will start identifying Industrial organizations for Internship of respective students aligned with Domain area	Before end of 6 th semester
2	Finalizing organization for Internship of respective students and keep records of the same	Before end of 6 th semester
3	Necessary documentation will be maintained Faculty Guides as per Internship Policy of Department.	Before end of 6 th semester
4	Students will start internship	After end of 6 th semester
5	after end of 6 th semester examination for minimum period of 1 months	Semester examination
6	Report and Presentation	After end of internship

4. Guidelines for students

1. All the students for exit mode after third year B. Tech need to go for internship for minimum of 1 month.
2. Students can take mini projects, assignments, case studies by discussing it with concerned authority from industry and can work on it during internship.
3. All students should compulsorily follow the rules and regulations as laid by industry.
4. Every student should take prior permissions from concerned industrial authority if they want to use any drawings, photographs or any other document from industry.
5. Student should follow all ethical practices and SOP of industry.
6. Students have to take necessary health and safety precautions as laid by the industry.
7. Student should contact his /her academic Faculty from college on weekly basis to communicate the progress.
8. Each student has to prepare internship report in consultation with the academic guide.

5. General Internships Recommendations

- An internship is a great opportunity to learn in industrial environment without being an

employee of the company. Students are advised to set their goals prior to starting their internship and focus on completing them during the internship.

- If a student joins a very large organization to do an internship, he must use the opportunity to learn about the activities performed in the various departments by doing short stints in each of them. This experience will help provide him the big-picture in better understanding the career prospects in relation to his ambitions.
- Attitude and mind-set play a great role in the learning process. Do tackle all tasks given with enthusiasm and positive attitude.
- Interns must avoid negativity and never ignore a chance offered to them to learn more about a concept, technology, industry or company.
- Interns must be inquisitive and try to gain maximum knowledge and exposure.
- Interns shall identify a good mentor within the company and take initiative to execute new projects where one can make a difference to the company.
- Interns should enjoy during the internship and leave with tangible accomplishments.
- The intern will maintain a regular internship schedule determined by the Intern and his/her Project Head.
- Interns shall view an internship as a bridge between college and the work place. Do use for their full advantage while undergoing internship: - The intern must demonstrate honesty, punctuality and a willingness to learn during the internship program.
- The intern will obey the policies, rules and regulations of the Company and comply with the Company's business practices and procedures.

6. Evaluation of Internship:

ISE –I: (Internship 25 marks)

Evaluators	Marks
Faculty	25

ISE–II:(Internship 25 marks)

Evaluators	Marks
Industry Mentor	25