JPCOLLEGEOFARTS&SCIENCE

(AUTONOMOUS)

(Run by DMI Sisters)

(Affiliated to Manonmaniam Sundaranar University –Tirunelveli)

Accredited by NAAC with "B++" Grade

2(f) status of UGCAct,1956 |ISO9001:2015 Certified Institution Ayikudy, Tenkasi District - 627852.

SYLLABUS

Bachelor of Electronics and Communication

Choice Based Credit System (CBCS)
(W.e.f. June 2026-2027)

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PROGRAMME OUTCOMES(PO) FOR UG PROGRAMME

The successful completion of the Electronics and Communication programme shall enable the students to:

PO1	**Disciplinary knowledge:** A comprehensive knowledge and understanding phenomena of one or more disciplines that form a part of an undergraduate programme of study
PO2	**Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others confidently share ones views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically and present complex information ina clear and concise manner to different groups.
PO3	**Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	**Problem solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO5	**Analytical reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	**Research-related skills:** A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and effect relationships; ability to plan, execute and report the results of an experiment or investigation
PO7	**Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team
PO8	**Scientific reasoning:** Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	**Reflective thinking:** Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.
PO10	**Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO11	**Self-directed learning:** Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion
PO12	**Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

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Regulations 2026–2027 for Undergraduate Programme

Learning Outcomes Based Curriculum Framework–(LOCF) model with Choice Based Credit System (CBCS)

Program: Bachelor of Electronics and Communication (EC)

(Applicable for the Students admitted during the Academic Year 2026-27 onwards)

Electronics and Communication

- The **Learning Outcome–based Curriculum Framework (LOCF)** has been implemented for the Electronics and Communication programme is designed to provide a strong foundation in core concepts along with practical exposure to modern technologies. It focuses on developing analytical abilities, problem-solving skills, and hands-on experience in areas such as embedded systems, communication networks, and electronic device design, preparing students for diverse career opportunities in theindustry.

Vision

To achieve excellence in Electronics and Communication through quality education, research Contributing to the emerging technologies and innovation to serve industry and society.

Mission

- To provide strong theoretical and practical knowledge in Electronics and Communication engineering aligned with current industry standards.
- To develop students analytical thinking, problem-solving abilities, and technical skills through hands-on learning and innovation.
- To prepare graduates for successful careers and lifelong learning, while promoting ethical values and professional responsibility.

Program Outcomes(POs)

The successful completion of the Electronics and Communication programme shall enables the students to:

PO1	**Disciplinary knowledge:** Acomprehensiveknowledgeandunderstandingphenomenaofoneormoredisciplines that form a part of an undergraduate programme of study
PO2	**Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others confidently share ones views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically and present complex information in a clear and concise manner to different groups.
PO3	**Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices,policiesandtheoriesbyfollowingscientificapproachtoknowledge development.
PO4	**Problem solving:** Capacity to extrapolate from what one has learned and apply their competencies to Solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO5	**Analytical reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety ofsources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	**Research-related skills:** A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and effect relationships; ability to plan, execute and report the results of an experiment or Investigation
PO7	**Cooperation/Teamwork:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the Interests of a common cause and work efficiently as a member of a team

PO8	**Scientific reasoning:** Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	**Reflective thinking:** Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.
PO10	**Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO11	**Self-directed learning:** Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion
PO12	**Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact Respectfully with diverse groups.

Program Specific Outcomes(PSOs)

PSO1	Apply fundamentals of electronics to design and analyze analog and digital electronic circuits.
PSO2	Design and develop communication systems using modern techniques in analog and digital communication.
PSO3	Utilize signal processing concepts for analysis and implementation of real-world systems.
PSO4	Apply embedded systems and microcontroller-based solutions for engineering applications.
PSO5	Use modern tools and technologies for innovation in electronics and communication engineering fields.

Credit Distribution for UG Programme

Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF)
Guideline Based Credit and Hours Distribution System
For all UG courses including Lab Hours

First Year – Semester-I

Part	List of Courses	Credit	No. of Hours
Part-1	Language–Tamil	3	5
Part-2	English	3	5
Part-3	Core Courses & Elective Courses [in Total]	11	14
Part-4	Skill Enhancement Course SEC-1	2	2
	Foundation Course	2	2
	NME	2	2
		23	**30**

Semester-II

Part	List of Courses	Credit	No. of Hours
Part-1	Language–Tamil	3	5
Part-2	English	3	5
Part-3	Core Courses &Elective Courses including laboratory [in Total]	11	14
Part-4	Skill Enhancement Course-SEC-2	2	2
	Skill Enhancement Course-SEC-3	2	2
	NME	2	2
		23	**30**

Second Year–Semester-III

Part	List of Courses	Credit	No. of Hours
Part-1	Language–Tamil	3	5
Part-2	English	3	5
Part-3	Core Courses &Elective Courses including laboratory [in Total]	11	14
Part-4	Skill Enhancement Course-SEC-4 (Discipline/Subject Specific)	2	2
	Skill Enhancement Course-SEC-5(Discipline/Subject Specific)	2	2
	Environmental Studies	2	2
		23	**30**

Semester-IV

Part	List of Courses	Credit	No. of Hours
Part-1	Language–Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses &Elective Courses including laboratory [in Total]	11	12

Part-4	Skill Enhancement Course-SEC-6(Discipline/Subject Specific)	2	2
	Skill Enhancement Course-SEC-7(Discipline/Subject Specific)	2	2
	Value Based Education	2	2
		23	**30**

Third Year-Semester-V

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project/Elective Based	22	28
Part-4	Internship/Industrial Visit/Field Visit	2	-
	Ability Enhancement Course	2	2
		26	**30**

Semester-VI

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project/Elective Based & LAB	23	28
Part-4	Ability Enhancement Course	2	2
Part-5	Extension Activity	1	-
		26	**30**

Total Credits: 144

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	11	11	11	11	22	23	91
Part IV	6	6	6	6	2	2	28
Part V	-	-	-	-	-	1	1
Total	23	23	23	23	26	26	**144**

* Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.

Part I–Tami l/ Other Languages
Part II - English
Part III–Core Papers, Electives and Project
Part IV–Environmental Studies, Value Based Education, Skill Enhancement Courses, Foundation Course and Internship, NME
Part V–Extension Activity

Curriculum

Semester–1									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours.	**Max. Marks**			
						CIA	**ESE**	**Total**	
26U1TL11	I	Language-I	Tamil–I	5	3	50	50	100	3
26U1HD11	I		Hindi–I						
26U1MY11	I		Malayalam–I						
26U1FR11	I		French-I						
26U2EN11	II	Language-II	English–I	5	3	50	50	100	3
26UCEC11	III	Core-I	Basic Electronic Devices	4	3	50	50	100	4
26UCECP1	III	Core-II	Basic Electronic Devices Lab	6	3	50	50	100	4
26UEEC11	III	EC- I	Introduction of C Language	4	3	50	50	100	3
26USECP1	IV	SEC- I	Programming in C Lab	2	3	50	50	100	2
26UFEC11	I	FC I	Foundation of Electronics and Computers	2	3	50	50	100	2
26UNEC11	IV	NME-I	Bio-Medical Electronics	2	3	50	50	100	2
Total				**30**				**800**	**23**

Semester–2									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours	**Max. Marks**			
						CIA	**ESE**	**Total**	
26U1TL21	I	Language-I	Tamil–II	5	3	50	50	100	3
26U1HD21	I		Hindi–II						
26U1MY21	I		Malayalam–II						
26U1FR21	I		French-II						
26U2EN21	II	Language-II	English–II	5	3	50	50	100	3
26UCEC21	III	Core-III	Digital Electronics	4	3	50	50	100	4
26UCECP2	III	Core-IV	Digital Electronics Lab	6	3	50	50	100	4
26UEEC21	III	EC- II	Introduction of Python Language	4	3	50	50	100	3
26USECP2	IV	SEC- II	Programming in Python Lab	2	3	50	50	100	2
26USECP3	IV	SEC- III	Computer Hardware	2	3	50	50	100	2
26UNEC21	IV	NME-II	Power Converters	2	3	50	50	100	**2**
Total				**30**				**800**	**23**

Semester–3									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours	**Max.Marks**			
						CIA	**ESE**	**Total**	
26U1TL31	I	Language–I	Tamil–III	5	3	50	50	100	3
26U1HD31	I		Hindi–III						
26U1MY31	I		Malayalam–III						
26U1FR31	I		French-III						
26U2EN31	II	Language–II	English–III	5	3	50	50	100	3
26UCEC31	III	Core–V	Electronic Circuits	4	3	50	50	100	4
26UCECP3	III	Core–VI	Electronic Circuits Lab	6	3	50	50	100	4
26UEEC31	III	EC- III	Mathematics for Electronics I	4	3	50	50	100	3
26UEEC32			Electronics for Competitive Exam.						
26USEC31	IV	SEC- IV	Applied Electrical Circuits	2	3	50	50	100	2
26USEC3P	IV	SEC-V	Arduino Programming Lab	2	3	50	50	100	2
26UEVS31	IV	Common	Environmental Studies	2	3	50	50	100	2
Total				**30**				**800**	**23**

Semester–4									
Course Code	**Part**	**Course category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours	**Max.Marks**			
						CIA	**ESE**	**Total**	
26U1TL41	I	Language–I	Tamil–IV	5	3	50	50	100	3
26U1HD41	I		Hindi–IV						
26U1MY41	I		Malayalam–IV						
26U1FR41	I		French-IV						
26U2EN41	II	Language–II	English–IV	5	3	50	50	100	3
26UCEC41	III	Core–VII	Linear Integrated Circuits	4	3	50	50	100	4
26UCECP4	III	Core–VIII	Linear Integrated Circuits Lab	6	3	50	50	100	4
26UEEC41	III	EC- IV	Mathematics for Electronics II	4	3	50	50	100	3
26UEEC42			Consumer Electronic Appliances						
26USEC41	IV	SEC–VI	Electronic Measurements and Instrumentation	2	3	50	50	100	2
26USEC42	IV	SEC-VII	Matlab	2	3	50	50	100	2
26UVBE41	IV	COMMON	Value based education	2	3	50	50	100	2
Total				**30**				**800**	**23**

Semester-5									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in hrs.	**Max.Marks**			
						CIA	**ESE**	**Total**	
26UCEC51	III	Core-IX	Microprocessor and Microcontroller	5	3	50	50	100	4
26UCEC52	III	Core-X	Communication Systems	5	3	50	50	100	4
26UCECP5	III	Core-XI	Microprocessor and Microcontroller Lab	6	3	50	50	100	4
26UCEC5P	III	Core-XII	Mini Project with Viva Voce	4	3	50	50	100	4
26UEEC51	III	Elective-V	Computer Networks	4	3	50	50	100	3
26UEEC52			Optical Display Devices						
26UEEC53	III	Elective-VI	VLSI Technology	4	3	50	50	100	3
26UEEC54			Mobile Communication						
26UFIK51	IV	Internship	Internship/Industrial Visit/Field Visit/Knowledge Updation Activity	-	-	50	50	100	2
26UAEC51	IV	AEC-I	Empowered Vocational English	2	3	50	50	100	2
Total				**30**				**800**	**26**

Semester–6									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours /Week**	**Examination**				**Credits**
					Duration in hrs.	**Max.Marks**			
						CIA	**ESE**	**Total**	
26UCEC61	III	Core–XIII	Optical Fiber Communication	5	3	50	50	100	4
26UCEC62	III	Core-XIV	IoT and its applications	5	3	50	50	100	4
26UCECP6	III	Core-XV	Communication and System Design Lab	6	3	50	50	100	4
26UCEC6P	III	Core-XVI	Major Project with Viva voce	4	3	50	50	100	5
26UEEC61	III	Elective-VII	Artificial Intelligence	4	3	50	50	100	3
26UEEC62			PCB Design						
26UEEC63	III	Elective-VIII	Embedded System with RTOS	4	3	50	50	100	3
26UEEC64			Power Electronics						
26UAEC61	IV	AEC-II	Design Thinking	2	3	50	50	100	2
26U5EA61	V	Common	Extension Activity	-				100	1
Total				**30**				**800**	**26**
Grand Total				**180**				**4800**	**144**

Internship (minimum of 30 hours): The students should submit certificate of attendance from the industry stating the nature of work done, duration and role played along with report (minimumof20 pages) at the end of V semester for external evaluation.

Industrial Visit/ Field Visit: A report based on the observation and learning outcome to be submitted (minimum of 10 pages) along with suitable evidences at the end of V semester for external evaluation.

Knowledge Updation Activity: A report to be submitted (minimumof10 pages) based on the study made along with the completion certificate stating the work done (MOOC/NPTEL) at the end of V semester for external evaluation.

Internship/Industrial Visit/Field Visit/Knowledge Updation Activity: Internal –50 Marks, External – 50 Marks

Project: Group Project report should be submitted for external evaluation. Internal – 50 Marks, External – 50 Marks

Extension Activity(NSS/NCC/YRC/ RRC/ Games and Sports/Youth Welfare Activities Outreach Programmes/Migration Awareness in the Tamil Nadu Education System): Individual report should be submitted at the end of VI semester for external evaluation.
External–100Marks

Ability Enhancement Compulsory Course: Empowered Vocational English and Design Thinking subjects are given to students.

Internal Marks–50Marks, External–50Marks

Semester-1

Semester–1									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours.	**Max Marks**			
						CIA	**ESE**	**Total**	
26U1TL11	I	Language-I	Tamil–I	5	3	50	50	100	3
26U1HD11	I		Hindi–I						
26U1MY11	I		Malayalam–I						
26U1FR11	I		French-I						
26U2EN11	II	Language-II	English–I	5	3	50	50	100	3
26UCEC11	III	Core-I	Basic Electronic Devices	4	3	50	50	100	4
26UCECP1	III	Core-II	Basic Electronic Devices Lab	6	3	50	50	100	4
26UEEC11	III	EC- I	Introduction of C Language	4	3	50	50	100	3
26USECP1	IV	SEC- I	Programming in C Lab	2	3	50	50	100	2
26UFEC11	IV	FC- I	Foundation of Electronics and Computers	2	3	50	50	100	2
26UNEC11	IV	NME-I	Bio-Medical Electronics	2	3	50	50	100	2
Total				**30**				**800**	**23**

FIRST YEAR – SEMESTER –I

CORE–I: BASIC ELECTRONIC DEVICES

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCEC11	4	0	0	I	4	4	50	50	100

Learning Objectives	
LO1	To explain energy band theory and the operation of intrinsic and extrinsic semiconductors.
LO2	To study the formation, characteristics, and applications of PN junction and special diodes.
LO3	To understand the construction, biasing methods, configurations, and analysis of BJT, FET, and Oscillators.

Prerequisites:

Unit	Contents	No. of Hours
I	**Semiconductor:** Atomic structure, Bohr's atom model – energy levels -energy bands –classification of solids and energy bands – forbidden energy gap–intrinsic and extrinsic semiconductors, P type and N type semiconductors–majority and Minority carriers	12
II	**Diodes**: Formation of PN Junction Diode-Forward Bias -Reverse Bias Condition –Characteristics-Clipping and Clamping. Zener Diode-VI Characteristics– Breakdown-Backward Diode–Varactor Diode	12
III	**BJT** :Introduction To Bipolar Junction Transistor–Construction-Transistor Biasing -Operation of NPN and PNP Transistor-CB, CE&CC Configuration-Bias Stability-Load Line-Method of Biasing :Fixed Bias-Collector to Base Bias–Voltage Divider Bias	12
IV	**FET:** FET Constructional features-working Principle, feature sand characteristics-JFET and MOSFET and their characteristics–enhancement and depletion type	12
V	**TRANSISTORSANDFEEDBACKAMPLIFIERS:** Conceptoffeedback,negativeandpositivefeedback,oscillators,StudyofHartley, Colpitts oscillators and crystal oscillator	12
TOTAL		**60**

CO	Course Outcomes
CO1	Understand semiconductor physics and differentiate P-type and N-type materials.
CO2	Analyze diode characteristics and their practical applications.
CO3	Analyze BJT operation, biasing techniques, and determine operating point using load line analysis.
CO4	Analyze FET operation, biasing techniques ,and determine operating point using load line analysis.
CO5	AnalyzeOscillatoroperation,biasingtechniques,anddetermineoperatingpointusingloadline analysis.

Textbooks

1	V.K.Mehta,"Principles of Electronics",S.Chand&Co.
2	B.L.Theraja,"Basic Solid-State Electronics",S.Chand&Co.

1.	SemiconductorPhysicsandDevices-BasicPrinciples|4th Edition.by**Donald.ANeamen**(2021)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weight age of course Contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

CORE–II: BASIC ELECTRONIC DEVICES LAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCECP1	0	0	6	I	**4**	6	**50**	**50**	**100**

Learning Objectives

LO1	To understand the colour coding of resistors and verify resistance values using measuring instruments.
LO2	To study the behavior of voltage sources and resistors in series, parallel and series–parallel combinations**.**
LO3	To analyze the V–I characteristics of PN junction diode and Zener diode

Prerequisites:

Contents

1. Measurement exercises using instruments such as the **Cathode Ray Oscilloscope (CRO)** and **Function Generator**.
2. Study of **Resistor Color Coding** and verification of resistance values.
   - Voltage Sources in Series, Parallel, and Series–Parallel Connections
   - Resistance in Series, Parallel, and Series–Parallel Connections
3. Determination of **V–I Characteristics of a PN Junction Diode**.
   Determination of **V–I Characteristics of a Zener Diode**.
4. Study of **Transistor Characteristics**:
   - Common Emitter (CE) Configuration
   - Common Base (CB) Configuration
   - Common Collector (CC) Configuration
5. **PCB Soldering Practice** and development of **Small Electronic Projects**.

Total: 90Hours

CO	Course Outcomes
CO1	Identify resistor values using color coding and verify them experimentally.
CO2	Analyze the behavior of voltage and resistance in series, parallel, and series–parallel circuit combinations.
CO3	Plot and interpret the V–I characteristics of PN junction and Zener diodes.
CO4	Examine the characteristics of transistors in CE, CB, and CC configurations.
CO5	Demonstrate the use of electronic measuring instruments and perform PCB soldering for basic electronic circuits.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

ELECTIVE COURSE–INTRODUCTION TO C LANGUAGE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC11	4	0	0	I	3	4	50	50	100

Learning Objectives	
LO1	Understand the basic concepts of programming languages, algorithms, flowcharts, and language translators.
LO2	Identify the fundamentals of C programming, including data types, variables, constants, operators, and expressions.
LO3	Develop C programs using decision-making and looping control statements.
LO4	Apply functions in C, including user-defined functions, recursion, and argument passing techniques.
LO5	Implement C programs using arrays, strings, structures, unions, pointers, and basic file handling operations.

Prerequisites:

Unit	Contents	No. of Hours
I	**INTRODUCTION**: Concept of Programming Languages-High Level, Low Level, Assembly Language–Concept of Algorithms and Flow Charts-**Language translators:** Assemblers, Compilers, Interpreters (Only concept and differences)	12
II	**DATA CONCEPTS**: Overview of C, Features of C Fundamentals-Character Set, Identifiers, Keywords, Data Types, Constants, Variables, Operators-Arithmetic, Logical, Relational, Unary, Assignment, Conditional and Bitwise Operators–expressions	12
III	**STATEMENTS**: Structure of C Program- Library Functions- Data input and output, Compilation and Execution of C Programs-Control Statements-IF Statement, IF…ELSE Statement, Nesting of IF…Else Statement – Operator – Switch Statement-Loop Controls–FOR, WHILE, DO-WHILE Loops, Break-Continue, Exit, GO...TO Statement.	12
IV	**FUNCTIONS**: The Need of a Function-definition-User Defined and Library Function- Prototype of a Function- Calling of a function- Function Argument – Passing arguments to function-Return Values–Nesting of Function-main ()-Command Line Argument-Recursion.	12
V	**ARRAYSANDSTRINGS**: Arrays-Single and Multi-dimensional arrays, Declaration and Initialization of arrays and strings, pointers and one-dimensional arrays-Structures-Definition, declaration of structure variables, accessingstructuremembersunions-Datafiles-openingandclosingadatafile, Creating a data file.	12
TOTAL		60

CO	Course Outcomes
CO1	Understand the basic concepts of the C programming language.
CO2	Gain knowledge of C data types and their applications.

CO3	Understand and apply various types of statements used in C programming.

CO4	Describe the need for functions in C programming.
CO5	Understand and apply arrays and strings in C programs.
Text Books	
1	E. Balaguruswami, Programming with C.TMH.
2	Byron Gottfried, Programming with C, Schaum's Outline Series, and TMH.
Reference Books	
1.	Dennis & Ritchie: "Programming in C".
2.	Brain Kernighan and Dennis M Ritchie, The C Programming language, PHI

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

SKILL ENHANCEMENTCOURSE (SEC-1)–PROGRAMMINGIN C LAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26USECP1	0	0	2	I	2	2	50	50	100

Learning Objectives	
LO1	Apply conditional logic to perform temperature conversion and determine whether a number is odd or even.
LO2	Sort numbers in descending order and identify the largest value.
LO3	Check whether a string is a palindrome and compute grades based on marks.
LO4	Arrange names in alphabetical order and verify whether a number is prime.
LO5	Calculate the sum of natural numbers and reverse a given number.

Prerequisites:

Contents

1. Convert temperature from Fahrenheit to Celsius and determine whether a given number is odd or even.
2. Sort a list of numbers in descending order and find the largest among three numbers.
3. Check whether a given string is a palindrome and prepare a mark sheet with grade calculation.
4. Sort a list of names in alphabetical order and verify whether a given number is prime.
5. Calculate the sum of natural numbers up to a given limit and reverse a given number.

Total Hours :30

CO	Course Outcomes
CO1	Understand the basic concepts and features of the C programming language.
CO2	Gain knowledge of C data types, variables, and constants.
CO3	Understand and apply various types of statements used in C programming.
CO4	Define, explain, and demonstrate the need for functions in C programs.
CO5	Understand and implement arrays and strings in C programming.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	3
CO2	3	3	1	2	2	3
CO3	3	3	1	3	2	3
CO4	3	2	1	2	2	3
CO5	3	2	1	2	2	3
Weightage of course contributed to each PSO	15	12	5	11	10	15

FOUNDATION COURSE (FC)-FOUNDATION OF ELECTRONICS AND COMPUTER

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UFEC11	2	0	0	I	2	2	50	50	100

Learning Objectives	
LO1	Understand the types, construction, characteristics, and applications of resistors, inductors, and Capacitors.
LO2	Apply the concepts of electromagnetic induction, capacitance and energy storage in electronic Components**.**
LO3	Identify different types of computer software, system architecture, and programming languages.
LO4	Understand the basic structure of programming, including modules, variables, parameters, and return values.
LO5	Develop problem-solving skills using algorithms, flowcharts, pseudo code, and basic Programming concepts.

Unit	Contents	No. of Hours
I	**RESISTORS AND INDUCTOR:** Types of Resistors: Fixed, Variable - Brief mention of their Construction and Characteristics - Color Coding of Resistors - Connecting Resistors in Series and Parallel-Problems	6
II	**TYPES OF INDUCTORS**: Fixed, Variable-Self and Mutual Inductance-Faraday's Law and Lenz's Law of Electromagnetic Induction-Energy Stored in an Inductor-Inductance in Series And Parallel- Problems	6
III	**PRINCIPLES OF CAPACITANCE** - Parallel Plate Capacitor-Permittivity-Definition of Dielectric Constant - Dielectric Strength-Energy Stored in Capacitor-Types of Capacitors: Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic: Construction and Application-Connecting Capacitors in Series and Parallel	6
IV	**COMPUTER SOFTWARE & LANGUAGES:** Type of Software's – System Architecture - Machine Language – Assembly Language-High Level Language-Object Oriented Languages **PROGRAMMING STRUCTURE**: Modules and their function-Local and Global variables Parameters-Return Values-Sequential Logic Structure.	6
V	**PROBLEM SOLVING CONCEPTS FOR THE COMPUTER:** Constant Variables- Data Types- Functions-Operators-Expressions and Equations-Organizing the Solution**:** Analyzing the problem-Algorithm-Flowchart-Pseudo code	6
	TOTAL	30

CO	Course Outcomes
CO1	Identify and explain the characteristics and applications of resistors, inductors, and capacitors
CO2	Analyze circuits involving series and parallel combinations of resistors, inductors, and Capacitors.
CO3	Understand the fundamentals of computer software, system architecture, and programming languages**.**

CO4	Apply programming structures such as modules, variables, parameters, and sequential logic
CO5	Design solutions to problems using algorithms, flowcharts, and pseudo code.
Text Books	
1	Basic and Applied Electronics-T.KBandyopadhyay,Books and Allied Pvt Ltd(2002)
2	B.L.Theraja,"Basic Solid-state Electronics .Chand&Co
3.	Pradeep K.Sinha and PritiSinha,(2004)—Computer Fundamentals, Sixth Edition, BPB Publications
Reference Books	
1	N.Bhargava,DCKulshreshthaandSCGupta,BasicElectronicsandlinearcircuits,Tata McGraw-Hill(2007).

MAPPINGTABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**2**	**3**	**2**	**2**
CO2	**2**	**3**	**2**	**3**	**2**	**2**
CO3	**2**	**3**	**2**	**2**	**3**	**1**
CO4	**1**	**2**	**2**	**1**	**3**	**2**
CO5	**2**	**2**	**2**	**1**	**3**	**3**
Weightage of course contributed to each PSO	**10**	**12**	**10**	**10**	**13**	**10**

NON-MAJOR ELECTIVEI (NME)-BIO-MEDICAL ELECTRONICS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UNEC11	2	0	0	I	2	2	50	50	100

Learning Objectives	
LO1	To understand the basic concepts of human physiology relevant to biomedical Measurements.
LO2	To study different types of bio electrodes used for physiological signal acquisition.
LO3	To compare micro, surface, needle, and reference electrodes.
LO4	To analyze electrode-tissue interface and signal pickup mechanisms.
LO5	To analyzed Diathermy and patient monitor

Unit	Contents	No. of Hours
I	**HUMAN PHYSIOLOGY:** Introduction to Human Physiology – Micro Electrodes–Skin Surface Electrodes –Needle Electrodes –Reference Electrodes.	6
II	**METERS&RECORDERS**: Digital Thermometer– Sphygmomanometer-Electronic Stethoscope-ECG –EEG-EMG	6
III	**TEST EQUIPMENT**: Cardiac Stress Test Equipment–Cardiotocography-Electro Oculography-Electro Retinography–Polysomnography-Spirometer- Blood Flow Meter-Vascular Doppler–Audiometer	6
IV	**OPERATION THEATRE EQUIPMENTS**: Boyles Apparatus-Upper Endoscope-Lower Endoscope-ENT Endoscope–Laparoscope	6
V	**DIATHERMY:** Diathermy- Surgical Diathermy-Microwave Diathermy – Multi parameter Patient Monitor.	6
	TOTAL	30

CO	Course Outcomes
CO1	Understandhumanphysiologicalsignalsandtheprinciplesofbioelectrodemeasurement
CO2	Describe the working principles and applications of basic physiological meters and recorders.
CO3	Explaintheoperationandclinicaluseofadvanced Biomedicaltestequipment.
CO4	Describe the functioning and safety aspect of operation theatre equipment.
CO5	Explain the principles and applications of diathermy and multi parameter patient monitoring Systems.

Text Books

1. Biomedical Instrumentation &Measurements– **R.Ananda Natarajan(PHI)**
2. Biomedical Instrumentation and Measurements–**Leslie Cromwell, FredWeibell, Erich A. Pfeiffer(PHI)**
3. Handbook of Biomedical Instrumentation–**R.S.Khandpur(TMH)**

Reference Books

1. **Principles of Applied Biomedical Instrumentation**–L.A.Geddes&L.E.Baker(Wiley)

2	**Introduction to Biomedical Equipment Technology**–JosephJ.Carr&JohnM.Brown(Wiley)

MAPPING TABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**2**	**3**	**2**	**2**
CO2	**2**	**3**	**2**	**3**	**2**	**2**
CO3	**2**	**3**	**2**	**2**	**3**	**1**
CO4	**1**	**2**	**2**	**1**	**3**	**2**
CO5	**2**	**2**	**2**	**1**	**3**	**3**
Weightage of course contributed To each PSO	**10**	**12**	**10**	**10**	**13**	**10**

Semester-2

Semester–2									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours	**Max Marks**			
						CIA	**ESE**	**Total**	
26U1TL21	I	Language-I	Tamil–II	5	3	50	50	100	3
26U1HD21	I		Hindi–II						
26U1MY21	I		Malayalam–II						
26U1FR21	I		French-II						
26U2EN21	II	Language-II	English–II	5	3	50	50	100	3
26UCEC21	III	Core-III	Digital Electronics	4	3	50	50	100	4
26UCECP2	III	Core Lab-IV	Digital Electronics Lab	6	3	50	50	100	4
26UEEC21	III	EC- II	Introduction of Python Language	4	3	50	50	100	3
26USECP2	IV	SEC- II	Programming in Python Lab	2	3	50	50	100	2
26USEC21	IV	SEC- III	Computer Hardware	2	3	50	50	100	2
26UNEC21	IV	NME-II	Power Converters	2	3	50	50	100	**2**
Total				**30**				**800**	**23**

FIRSTYEAR-SEMESTER– II
CORE COURSE (CC-3)–DIGITAL ELECTRONICS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCEC21	4	0	**0**	II	**4**	4	**50**	**50**	**100**

Learning Objectives	
LO1	Understand various number systems, base conversions, signed and unsigned number representations, and digital codes such as BCD and Gray code.
LO2	Study logic gates, digital logic families, Boolean algebra postulates, De Morgan's theorem, and Karnaugh maps for logic simplification.
LO3	Analyze and design arithmetic and combinational logic circuits such as adders, subtractors, multiplexers, decoders, encoders, and code converters.
LO4	Understand the working principles of latches, flip-flops, and different types of semiconductor memories.
LO5	Study the design and operation of counters and shift registers used in sequential digital systems.

Prerequisites:

Unit	Contents	No. Of Hours
I	**NUMBER SYSTEM AND CODES:** Decimal, Binary, Octal and Hexadecimal Number systems, base conversions. Representation of Signed and unsigned numbers, BCD code. Binary, Octal and Hexadecimal- BCD-Excess3 Gray code.	**12**
II	**DIGITAL LOGIC FAMILIES:** Fan-in, Fan out, Noise Margin, Power Dissipation, Figure of merit, Truth Tables of OR, AND, NOT, NOR, NAND, EX-OR, Universal gates, Basic postulates and fundamental theorems of Boolean algebra, Demorgan's Theorem. Karnaugh Maps: two, three and four Variable K-Map	**12**
III	**ARITHMETIC CIRCUITS:** Binary addition, Half and Full Adder- Half and Full subtractor, Binary Adder/Subtractor. Multiplexers, De-multiplexers, Decoders, Encoders. Parity checker.	**12**
IV	**LATCHES:** Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Edge triggering–Level triggering asynchronous ripple or serial counter – Asynchronous Up/Down counter– Synchronous counters–Synchronous Up/Down counters	**12**
V	**REGISTERS AND MEMORIES:** Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters -Memory devices-classification of memories–ROM–ROM organization-PROM–EPROM–EEPROM–EAPROM, RAM–RAM organization	**12**
TOTAL		**60**

CO	**Course Outcomes**
CO1	Describe the concepts and applications of number systems, base conversions, and digital codes.
CO2	Understand the principles and characteristics of digital logic families.

CO3	Explain the design and operation of arithmetic circuits used in digital systems.
CO4	Describe the working principles and applications of latches, registers, and semiconductor memories.
CO5	Elaborate on the characteristics and applications of digital logic families.
Text books	
1	Digital Principles &Applications–Albert Paul Malvino &Leach
2	Digital Fundamentals–Thomas Floyd–Prentice Hall
3	Digital Electronics-an introduction to Theory and Practice-William H.Gothmann Prentice Hall
Reference Books	
1	Digital Practice using Integrated Circuits–R.P.Jain and Anand
2	Fundamentals of Digital Circuits, Anand Kumar,2nd Edn,2009, PHIL Earning Pvt.Ltd.

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**2**	**2**	**2**	**2**
CO2	**2**	**3**	**2**	**2**	**2**	**2**
CO3	**2**	**3**	**3**	**3**	**2**	**2**
CO4	**2**	**3**	**2**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**2**	**2**	**2**
Weightage of course Contributed to each PSO	**12**	**14**	**11**	**11**	**10**	**10**

CORE COURSE (CC-4)–DIGITAL ELECTRONICSLAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCECP2	0	0	6	II	4	6	50	50	100

Learning Objectives

LO1	Study and verify the truth tables of basic logic gates and implement all logic gates using universal gates (NAND and NOR).
LO2	Verify De Morgan's Theorem and construct logic gates using discrete components.
LO3	Implement code converters, multiplexers, and demultiplexers using standard ICs such as IC 74153 and IC 74155.
LO4	Design and verify half adder, full adder, encoder, and decoder circuits using ICs such as IC 74147 and IC 7442, and validate the results using MATLAB simulation.
LO5	Verify the truth tables of half subtractor and full subtractor circuits, and study the operation of Master–Slave and JK flip-flops.

List of Exercises

1. Study and verify the truth tables of AND, OR, NOT, NAND, NOR, and XOR gates.
2. Design all logic gates using NAND gates and verify their truth tables.
3. Design all logic gates using NOR gates and verify De Morgan's Theorem.
4. Verify the truth tables of Half Adder and Full Adder circuits.
5. Verify the truth tables of Half Subtractor and Full Subtractor circuits.
6. Construct logic gates using discrete components and implement code conversion, Multiplexer (IC 74153), and Demultiplexer (IC 74155) circuits.
7. Verify the truth tables of code conversion circuits.
8. Verify the truth tables of Encoder (IC 74147) and Decoder (IC 7442) circuits.
9. Study the operation and characteristics of Master–Slave (M-S) and JK Flip-Flops.
10. Study the operation and characteristics of T Flip-Flop and D Flip-Flop circuits.

Total 90 hours

CO	Course Outcomes
CO1	Describe and verify the truth tables of basic logic gates.
CO2	Demonstrate the implementation of logic gates using NAND and NOR universal gates.
CO3	Construct and verify Boolean algebra theorems, including De Morgan's Theorem.
CO4	Design, implement, and verify Adder, Subtractor, Multiplexer, Encoder, and Decoder circuits.
CO5	Describe the operation of flip-flops and clock generation circuits using ICs.

MAPPINGTABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**3**	**2**	**3**	**3**
CO2	**3**	**3**	**2**	**2**	**3**	**3**
CO3	**3**	**2**	**2**	**3**	**3**	**2**
CO4	**3**	**2**	**3**	**3**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**2**
Weight age of course contributed to each PSO	**15**	**12**	**13**	**13**	**14**	**12**

ELECTIVE COURSE (EC-2) INTRODUCTION OF PYTHON LANGUAGE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC21	4	0	0	II	3	4	50	50	100

Learning Objectives		
LO1	Understand the fundamentals of the Python programming language.	
LO2	Learn Python data structures and their applications.	
LO3	Understand file handling and exception handling in Python programs.	
LO4	Understand and apply tuples, lists, and dictionaries in Python programming.	
LO5	Develop graphical user interface (GUI) applications using Python.	
Unit	**Contents**	**No. of. Hours**
I	**BASICS OF PYTHON PROGRAMMING:** Features of Python, variable sand identifiers, operators and expressions. Decision control Statements: Selection/Condition all branching statements, basic loop structures/iterative Statements, nested loops, break, Functions and Modules: function definition, function all, more on defining functions, Recursive Functions.	**12**
II	**DATA STRUCTURES: Strings:** Introduction, built-in string methods and functions, slice operation, String Module. Lists: Introduction, nested list, cloning lists, basic list operations, list methods. **Functional programming:** filter (), map (), reduce () function	**12**
III	**FILES AND EXCEPTIONS:** Read and writing files, pickling, and exceptions. Built-in and user-defined exceptions. OOPS Concepts: Introduction, classes and object, class method and self- argument, the int () method, class variables and object variables, public and private data members.	**12**
IV	**TUPLES:** Introduction, basic tuple operations, tuple assignment, tuples for returning multiple values, nested tuples, tuple methods and functions. **Set:** Introduction, Set operations. **Dictionaries:** Basic operations, sorting items, looping over dictionary, nested dictionaries	**12**
V	**GRAPHICALUSERINTERFACES**: Behavior of terminal- based programs and GUI-based programs, Coding simple GUI-based programs, other useful GUI resources. **GUI Programming:** Graphical User Interfaces, Using the inter Module, Organizing, Widgets with Frames, Button Widgets an Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons	**12**
TOTAL		**60**

CO	Course Outcomes
CO1	Gain knowledge of Python data types and variables.
CO2	Understand and apply file handling and exception handling techniques in Python programs.
CO3	Understand the basic concepts of the Python programming language.

CO4	Define, explain, and demonstrate the features and applications of Python programming.
CO5	Understand and apply tuples and develop GUI-based applications using Python.
Text Books	
1	Kenneth A.Lambert, The Fundamentals of Python: FirstPrograms,2011,Cengage Learning.
2	Think Python First Edition ,by Allen B.Downey, Orielly publishing
References Books	
1.	Reema Thareja,"Python programming using problem solving approach", Oxford University press.
2.	Allen Downey,"Think Python: How to think Like a Computer Scientist ",O "Reilly publications, 2ndEdition

MAPPINGTABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**3**	**2**	**3**	**3**
CO2	**3**	**3**	**2**	**2**	**3**	**3**
CO3	**3**	**2**	**2**	**3**	**3**	**2**
CO4	**3**	**2**	**3**	**3**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**2**
Weight age of course contributed to each PSO	**15**	**12**	**13**	**13**	**14**	**12**

SKILL ENHANCEMENT COURSE (SEC-2)–PROGRAMMING IN PYTHON LAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26USECP2	0	0	2	II	2	2	50	50	100

Learning Objectives	
LO1	Gain knowledge of basic control statements used in Python programming.
LO2	Examine the characteristics and applications of lists, strings, tuples, and dictionaries.
LO3	Identify and apply various types of functions in Python programs.
LO4	Understand file handling and exception handling techniques to extract and manage information effectively.
LO5	Interpret the importance of GUI programming and develop basic GUI applications using Python.

Unit	Contents	No. of Hours
I	Develop programs using control statements and loops, and calculate the electricity bill for domestic households.	6
II	Sort a list of numbers in ascending order and calculate the number of minutes in a year.	6
III	Develop programs using various string methods and operations.	6
IV	Sort a list of names in alphabetical order.	6
V	Develop a program for traversing and manipulating a dictionary.	6
TOTAL		30

CO	Course Outcomes
CO1	Apply various data types and conditional (if) statements in Python programs.
CO2	Understand and implement different looping statements and their characteristics.
CO3	Understand the working principles and applications of lists and strings in Python.
CO4	Design and implement programs using the **map()**, **filter()**, and **reduce()** functions.
CO5	Study and develop basic GUI applications using Python GUI frameworks.

MAPPINGTABLE						
CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	2
CO2	2	3	2	3	2	2
CO3	2	3	2	2	3	1
CO4	1	2	2	1	3	2
CO5	2	2	2	1	3	3
Weight age of course contributed to each PSO	10	12	10	10	13	10

NON-MAJOR ELECTIVE II (NME)–POWER CONVERTERS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UNEC21	2	0	0	II	2	2	50	50	100

Learning Objectives	
LO1	Understand the principles and performance of DC–ACPWM inverters and single-phase bridge inverters.
LO2	Analyze the operation and voltage control methods of single-phase and three-phase inverters, including Current source inverters.
LO3	Explain the concepts and working of resonant pulse inverters and zero current switching techniques.
LO4	Study zero voltage switching resonant converters and resonant DC link inverter operation.
LO5	Evaluate the working principles of phase-controlled converters including single-phase full and dual converters.

Unit	Contents	No. of. Hours
I	**DC–ACPWM INVERTERS**: DC–ACPWM inverters: Introduction– Principle of operation –performance parameters – Single phase bridge inverters.	6
II	**THREE PHASE INVERTERS**: Three-phase inverters – Voltage control of single-phase inverters – Voltage control of three phase inverters – Current source inverters.	6
III	**RESONANT PULSE INVERTERS:** Resonant pulse Inverters: Introduction – Series resonant inverters – Parallel resonant inverters – Zero current Switching resonant converter.	6
IV	**ZVS RESONANT CONVERTER**: Zero voltage switching resonant converter– Two quadrant ZVS resonant converter – resonant DC link inverter	6
V	**CONTROLLED CONVERTER:** Principle of phase-controlled converter operation – Single phase full converter – Single phase dual converter.	6
TOTAL		**30**

CO	Course Outcomes
CO1	Understand the operation and performance of DC–AC PWM inverters and analyze single-phase bridge inverter circuits.
CO2	Explain the working of three-phase inverters and apply different voltage control techniques for Single-phase and three-phase systems.
CO3	Analyze the principles and operation of current source inverters (CSI) and their applications.
CO4	Understandandevaluateresonantpulseinvertersandsoft-switchingtechniqueslikeZCSand ZVS converters.
CO5	Explaintheoperationofphase-controlledconverters,includingsingle-phasefullconvertersand Dual converters for controlled DC output.

Textbooks	
1	**M.H.Rashid**–*Power Electronics: Circuits, Devices and Applications*

2	**P. S.Bimbhra**–*Power Electronics*
3	**NedMohan,T.M.Undeland,W.P.Robbins**–*Power Electronics:Converters,Applications and Design*
Reference Books	
1	**Robert W.Erickson& Dragan Maksimović**–*Fundamentals of Power Electronics*
2	**PhilipT. Krein**–*Elements of Power Electronics*
3	**L.Umanand** –*Power Electronics: Essentials and Applications*

MAPPINGTABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**2**	**3**	**2**	**2**
CO2	**2**	**3**	**2**	**3**	**2**	**2**
CO3	**2**	**3**	**2**	**2**	**3**	**1**
CO4	**1**	**2**	**2**	**1**	**3**	**2**
CO5	**2**	**2**	**2**	**1**	**3**	**3**
Weightage of course contributed to each PSO	**10**	**12**	**10**	**10**	**13**	**10**

SKILL ENHANCEMENT COURSE (SEC-3)–COMPUTER HARDWARE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26USEC42	2	0	0	II	2	2	50	50	100

Learning Objectives	
LO1	Acquire knowledge on the concepts of computer hardware.
LO2	Describe the concept of memories, CPU and peripherals.
LO3	Discuss about power management in PC hardware system
LO4	Demonstrate PC drives and understand with latest device configurations.
LO5	Understand the latest hardware usage and architecture

Unit	Contents	No. of. Hours
I	**CPU:** CPU essentials–processor modes–modern CPU concepts–Architectural performance features	6
II	**MEMORY CONCEPT:** Essential memory concepts–memory organizations–Memory packages–modules–logical memory organizations–memory considerations–memory types–memory techniques.	6
III	**MOTHERBOARD:** Active motherboards – sockets and slots – IntelD850GB–Pentium4motherboard–expansions lots–form factor–upgrading a motherboard–chipsets–north bridge–south bridge	6
IV	**POWER SUPPLY:** Power supplies and power management concepts of switching regulation–potential Power problems–power management. The floppy drive magnetic storage– magnetic recording principles–data and disk organization–and hard drive	6
V	**DRIVES:** IDE drive standard and features–Hard drive Electronics–CDROM drive construction–CDROM electronics– DVD-ROM – DVD media	6
TOTAL		30

CO	Course Outcomes
CO1	Discuss the overall aspects of PC Hardware system
CO2	Familiarize with the recent technologies of computer drives.
CO3	Explain the hardware system and understand with the latest Device practices.
CO4	Understand very well about the computer mother board architectures and peripherals.
CO5	Understand the essentials of computer hardware's

Text books	
1	Stephen J.Bigelow, —Trouble Shooting, maintaining and Repairing PCs, Tata McGraw-Hill, NewDelhi, 2001.

2	Craig Zacker & Jon Rourke,—The complete reference: PC hardware, Tata McGraw Hill, NewDelhi, 2001.
3	MikeMcgrath,—JavaScriptǁ,DreamTechPress2006,1stEdition
Reference Books	
1.	Mike Meyers, Introduction to PC Hardware and Troubleshooting, TataMcGraw-Hill,NewDelhi,2003
2.	B.Govindarajulu,IBMPCandCloneshardwaretroubleshootingandMaintenance,Tata McGraw-Hill,NewDelhi,2002

MAPPING TABLE						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**2**	**3**	**2**	**2**
CO2	**2**	**3**	**2**	**3**	**2**	**2**
CO3	**2**	**3**	**2**	**2**	**3**	**1**
CO4	**1**	**2**	**2**	**1**	**3**	**2**
CO5	**2**	**2**	**2**	**1**	**3**	**3**
Weight age of Course contributed to each PSO	**10**	**12**	**10**	**10**	**13**	**10**

Semester-3

Semester–3									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours	**Max Marks**			
						CIA	**ESE**	**Total**	
26U1TL31	I	Language–I	Tamil–III	5	3	50	50	100	3
26U1HD31	I		Hindi–III						
26U1MY31	I		Malayalam–III						
26U1FR31	I		French–III						
26U2EN31	II	Language–II	English–III	5	3	50	50	100	3
26UCEC31	III	Core–V	Electronic Circuits	4	3	50	50	100	4
26UCECP3	III	Core–VI	Electronic Circuits Lab	6	3	50	50	100	4
26UEEC31	III	EC- III	Mathematics for Electronics I	4	3	50	50	100	3
26UEEC32			Electronics for Competitive Exam.						
26USEC31	IV	SEC- III	Applied Electrical Circuits	2	3	50	50	100	2
26USEC32	IV	SEC–IV	Foundation of Electronics and Computers	2	3	50	50	100	2
26UEVS31	IV	Common	Environmental Studies	2	3	50	50	100	2
Total				**30**				**800**	**23**

SECOND YEAR – SEMESTER – III

CORE–V: ELECTRONIC CIRCUITS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCEC31	**4**	0	0	III	**4**	**4**	**50**	**50**	**100**

Learning Objectives	
LO1	To understand the working principles of rectifiers, filters, and voltage regulators.
LO2	To study the fundamentals and operation of different types of amplifiers.
LO3	To analyze the performance and characteristics of power amplifiers
LO4	To understand the concept of feedback and its effect on amplifier performance.
LO5	To learn the principles and applications of oscillators and multi vibrators.

Pre-requisites:

Unit	Contents	No. of. Hours
I	Rectifier–Half wave rectifier, Full wave rectifier, Bridge rectifier, Inductor-Capacitor-L type filters-Ripple factor–Voltage regulator (Series type)-Introduction to IC fixed and variable IC723,78XX,79XX- Voltage regulators	**12**
II	Amplifiers-General principle of operation-Classification of amplifiers Classification of distortion (amplitudes, frequency, phase)-RC coupled amplifier-gain-frequency response-input and output impedance-multistage amplifiers - Formula value substitution Problems.	**12**
III	Introduction- Classification power amplifier-class A power amplifier-class A push pull amplifier-class B power amplifier- class B push pull amplifier–class C power amplifier-class C push pull amplifier-Power dissipation output power-Formula value substitution problems.	**12**
IV	Feedback-basic concepts-characteristics-effect of negative feedback-on gain-stability-distortion-bandwidth-analysis of voltage and current feedback amplifier circuits-formula value substitution problems.	**12**
V	Classification of oscillators-use of positive feedback-Barkhausen criterion for oscillators-Colpitts oscillator-Hartley oscillator-Wein bridge oscillators Phase shift oscillator. Frequency stability of oscillators-Multivibrators (Mono, Astable, Bi stable)-formula value substitution problems.	**12**
TOTAL		**60**

CO	**Course Outcomes**
CO1	Study the functional blocks of Power Supply.
CO2	Gain the knowledge of detailed Multistage Amplifiers.
CO3	Understand the Power amplifiers and various types of Power Amplifiers and its characteristics
CO4	Explain the principles and working feedback amplifiers Types of feedback and the scope of application.
CO5	Understand the basics of Oscillator and help the Students to understand the concept of Oscillator

Text books

1	R.S. Sedha, “Electronics Circuit”, S .Chand &Co.,
2	“ElectronicsdevicesandcircuitsS.SalivahananNSureshKumar2nd EditionMGHill

Reference Books

1	Electronics devices and circuits-An Introduction Allen Motter shed

2	Electronics devices and applications and integrated circuits-P.mathur.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

CORE–VI-ELECTRONIC CIRCUITS LAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCECP3	0	0	6	III	3	6	**50**	**50**	**100**

Learning Objectives	
LO1	Understand the working principle of rectifier circuits (Half-wave and Full-wave).
LO2	Verify basic electrical laws such as Ohm's Law and Kirchhoff's Laws through practical experiments
LO3	Design and test multivibrator circuits (Astable and Monostable) using BJT
LO4	Study and analyze oscillator circuits such as Colpitt's and Hartley oscillators.
LO5	Analyse and validate network theorems including: Thevenin's, Norton's, Superposition, Reciprocity, and Millman's Theorem

Prerequisites:

Contents

1. Half-wave rectifier and Full wave rectifier
2. Verification of Ohm's law
3. Verification of Kirchhoff's law
4. Astable, multivibrator using BJT
5. Hartley oscillator
6. Verification of Thevenin 's theorem
7. Verification of Norton 's Theorem.
8. Verification of Super position Theorem
9. Verification of Reciprocity Theorem.
10. Verification of Milliman's Theorem.
11. Verification of Maximum power transfer Theorem.

Total Hours:90

CO	Course Outcomes
CO1	Practice with active and passive components of Electronic circuit devices
CO2	Learn the evaluation methods of connection for Electronic circuit.
CO3	Understand the basic semiconductor components working principles and methodology used inside the laboratory Environment
CO4	Design, construct the electronic circuits and observe the Basics of Electronic component.
CO5	Study and compare Electronic circuit with components.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	3
CO2	3	3	1	2	2	3
CO3	3	3	1	3	2	3
CO4	3	2	1	2	2	3
CO5	3	2	1	2	2	3
Weightage of course contributed to each PSO	15	12	5	11	10	15

ELECTIVE COURSE–III MATHEMATICS FOR ELECTRONICS–I

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC31	**4**	0	0	III	**3**	**4**	**50**	**50**	**100**

Learning Objectives	
LO1	To understand the basic concepts of determinants and matrices and their applications.
LO2	To develop knowledge of complex numbers and complex functions.
LO3	To study probability and statistical methods for data analysis.
LO4	To apply differential calculus concepts in solving engineering problems.
LO5	To understand integral calculus techniques and their applications.

Prerequisites:

Unit	Contents	No.of Hours
I	**Determinants and Matrices:** Introduction-Determinants-Properties of Determinants-Laplace Expansions- Factor Theorem–Matrixes: Row & Column matrices–Square Matrix-Diagonal Matrix–Unit Matrix–Symmetric Matrix-Matrix Addition, Subtraction and Multiplication by a scalar–Multiplication by a Matrix	**12**
II	**Complex Analysis:** Complex numbers–Geometrical Interpretation-De Moivre's Theorem- Roots- Complex functions – Hyperbolic functions– Inverse Hyperbolic functions	**12**
III	**Probability and Statistics:** Probability – Permutation and Combination – Addition law of Probability – Multiplication law of Probability – Bayes Theorem – Random variable – Discrete Probability distribution – Continuous Probability distribution - Expectation-Variance-Standard Deviation-Binomial distribution- Poisson distribution	**12**
IV	**Differential Calculus:** Higher order differentiation and Leibnitz Rule for the derivative, Taylor's and Maclaurin's Theorems, Maxima/Minima, Concavity and convexity of functions	**12**
V	**Integral Calculus:** Beta and Gamma functions, Differentiation under the integral sign, double integrals, Triple integrals, Jacobian	**12**
TOTAL		**60**

CO	Course Outcomes
CO1	Analyze problem through the basic knowledge of mathematics.
CO2	Explain the concept of complex numbering electronics.
CO3	Apply the various techniques of probability in the real-world problem.
CO4	Remember the basic formula in differential calculus.
CO5	Understand and solve the various calculations through integral calculation.

Text books

1	Prof.S.Duraiandian and Dr.S.Udayabaskaran"AlliedMathematics1and2",S.Chand&Co.,
2	Higher Engineering Mathematics, B.S.Agarwal, Khanna publishers.

Reference Books

1	Advanced Engineering Mathematics, ErwinKreyszig, john-Wiely

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	3
CO2	3	2	2	2	3	2
CO3	3	3	3	3	2	2
CO4	3	2	2	2	2	3
CO5	3	3	2	2	3	2
Weightage of course contributed to each PSO	15	12	11	11	12	12

ELECTIVE COURSE–III ELECTRONICS FOR COMPETITIVE EXAM

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC31	**4**	0	0	III	**3**	**4**	**50**	**50**	**100**

Learning Objectives	
LO1	To understand the basic concepts of determinants and matrices and their applications.
LO2	To develop knowledge of complex numbers and complex functions.
LO3	To study probability and statistical methods for data analysis.
LO4	To apply differential calculus concepts in solving engineering problems.
LO5	To understand integral calculus techniques and their applications.

Prerequisites:

Unit	Contents	No. of. Hours
I	**Determinants and Matrices:** Introduction-Determinants-Properties of Determinants-Laplace Expansions- Factor Theorem–Matrixes: Row & Column matrices – Square Matrix-Diagonal Matrix – Unit Matrix – Symmetric Matrix – Matrix Addition, Subtraction and Multiplication by a scalar–Multiplication By a Matrix	**12**
II	**Complex Analysis:** Complex numbers–Geometrical Interpretation-De-Moivre's Theorem-Roots-Complex functions–Hyperbolic functions–Inverse Hyperbolic functions	**12**
III	**Probability and Statistics:** Probability – Permutation and Combination – Addition law of Probability – Multiplication law of Probability – Bayes Theorem – Random variable – Discrete Probability distribution – Continuous Probability distribution - Expectation-Variance-Standard deviation-Binomial distribution- Poisson distribution	**12**
IV	**DifferentialCalculus:**HigherorderdifferentiationandLeibnitzRuleforthe derivative,Taylor'sandMaclaurin'sTheorems,Maxima/Minima,Concavity and convexity of functions	**12**
V	**Integral Calculus:** Beta and Gamma functions, Differentiation under the integral sign, double integrals, Triple integrals, Jacobian	**12**
	TOTAL	**60**

CO	Course Outcomes
CO1	To analyze problems using the **basic knowledge of mathematics**.
CO2	To explain the concept of **complex numbers and their applications in electronics**.
CO3	To apply various **probability techniques** to real-world problems.
CO4	To recall and apply the **basic formulas of differential calculus**.
CO5	To understand and solve various problems using **integral calculus techniques**.

Text books	
1	Prof.S.Duraipandian and Dr.S.Udayabaskaran"Allied Mathematics 1and2",S.Chand&Co.,
2	Higher Engineering Mathematics,B.S.Agarwal,Khannapublishers.
Reference Books	
1	Advanced Engineering Mathematics,ErwinKreyszig,john-Wiely

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	3	2	2
CO2	3	3	3	3	2	2
CO3	3	3	3	2	2	3
CO4	3	3	3	3	3	2
CO5	3	3	2	3	2	2
Weightage of course contributed to each PSO	15	14	14	14	11	11

SKILL ENHANCEMENT COURSE (SEC-4)–APPLIED ELECTRICAL CIRCUITS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26USEC31	**2**	0	0	III	**2**	**2**	**50**	**50**	**100**

Learning Objectives	
LO1	To understand the characteristics of basic electrical components like resistors, capacitors, and inductors.
LO2	To apply fundamental circuit laws such as Ohm's Law, KVL, and KCL in circuit analysis.
LO3	To analyze electrical networks using various circuit theorems
LO4	To understand AC circuit fundamentals including waveform parameters and power calculations.
LO5	To study resonance and impedance behavior in RLC circuits.

Prerequisites:

Unit	Contents	No. of. Hours
I	**Circuit Components: Resistors**, Capacitors & Inductors in series and parallel – Factors covering the resistance of a Resistor, Capacitor & Inductor – Color coding of a Resistors–Energy stored in a Capacitor–Energy stored in a Inductor. Solved Problems.	**6**
II	**Circuit Laws:** Ohm's law-Kirchhoff's voltage law–Kirchhoff's current law–Current division–Voltage division–Series circuits–Parallel Circuits-Series & Parallel circuits – Open circuits – Short circuits.	**6**
III	**Theorems:** Super position theorem–Thevenin's theorem–Norton's theorem–Maximum power transfer theorem – Reciprocity theorem.	**6**
IV	**AC Circuit Basics:** Sinusoidal and Non-sinusoidal wave forms – Peak value – Peak to Peak value – Average value – RMS value – Periodandfrequencymeasurement–Powerfactor–Realpower–Reactivepower.	**6**
V	**Resonance:** Capacitive reactance – Inductive reactance – Impedance–RL and RC series and parallel–RLC series and parallel – Series resonance –Parallel resonance.	**6**
TOTAL		**30**

CO	Course Outcomes
CO1	To study the basic functions of circuit components and the colour coding of resistors.
CO2	To explain the concepts of basic circuit laws and theorems.
CO3	To understand and apply the formulas and principles of electrical circuit theorems.
CO4	To understand the fundamentals of AC circuits.
CO5	To analyze the basic concepts of resonance circuits**.**

Text books

1	*Basic Electrical Engineering* by D.P.Kothari and I.J. Nagrath

2	*Electrical Engineering Fundamentals* by Vincent DelToro
Reference Books	
1	*Engineering Circuit Analysis* by William H. HaytJr. and Jack E.Kemmerly

Mapping Table						
CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**2**	**2**	**2**	**2**
CO2	**2**	**3**	**2**	**2**	**2**	**2**
CO3	**2**	**3**	**3**	**3**	**2**	**2**
CO4	**2**	**3**	**2**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**2**	**2**	**2**
Weightage of course contributed to each PSO	**12**	**14**	**11**	**11**	**10**	**10**

SKILL ENHANCEMENT COURSE (SEC-4)-ARDUINO LAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26USEC3P	0	0	2	III	2	2	50	50	100

Learning Objectives	
LO1	To identify the Arduino board components and set up the development environment.
LO2	To write and execute basic Arduino programs.
LO3	To perform digital and analog input/output operations.
LO4	To interface sensors and control output devices.
LO5	To debug and implement simple Arduino-based projects.

Unit	Contents	No. of. Hours
I	**Introduction to Arduino** Overview of Arduino board and IDE Installation and setup of Arduino IDE	6
II	**Basic Programming** Writing and uploading a simple program LED Blinking using Arduino	6
III	**Sensor Interfacing** Temperature sensor(e.g.,LM35) Light sensor (LDR)	6
IV	**Communication** Serial communication using Arduino IDE Interfacing Arduino with computer	6
V	**Mini Project** Design and implement a simple Arduino-based application (ex Smart Light System/Temperature Monitor)	6
	TOTAL	30

CO	Course Outcomes
CO1	Understand the Arduino architecture and its basic components.
CO2	Develop and upload programs using the Arduino IDE.
CO3	Interface digital and analog input/output devices.
CO4	Integrate sensors and actuators in embedded systems.
CO5	Design and implement simple Arduino-based applications.

MAPPING TABLE

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	2

CO2	**2**	**3**	**2**	**3**	**2**	**2**
CO3	**2**	**3**	**2**	**2**	**3**	**1**
CO4	**1**	**2**	**2**	**1**	**3**	**2**
CO5	**2**	**2**	**2**	**1**	**3**	**3**
Weightage of course contributed to each PSO	**10**	**12**	**10**	**10**	**13**	**10**

COMMON- ENVIRONMENTAL STUDIES

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEVS31	2	0	0	III	2	2	50	50	100

Learning Objectives

LO1	To study the multidisciplinary nature of environmental studies, including the scope, importance, and sustainable management of natural resources such as forests, water, minerals, food, energy, and land.
LO2	To understand different types of eco systems, energy flow, ecological succession, food chains, food webs, and ecological pyramids.
LO3	To examine the levels of biodiversity, its distribution in India and globally, threats to biodiversity, and conservation strategies including in-situ and ex-situ methods.
LO4	To identify causes, effects, and control measures of various types of pollution, and to understand solid waste management and disaster management techniques.
LO5	To analyze social and environmental issues such as climate change, global warming, and population growth, along with environmental protection laws and sustainable development practices.

Prerequisites:

Unit	Contents	No. of. Hours
I	**THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES** Definition, scope and importance Natural resources and associated problems: a) Forest resources: Use and over-exploitation, deforestation, timber extraction, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, dams-benefits and problems, water conservation and watershed management. c) Mineral resources: Use and exploitation, environmental effects. d) Food resources: World food problems, changes, effects of modern agriculture, fertilizer-pesticide problems. e) Energy resources: Growing energy needs, renewables lion renewable energy sources, alternate energy sources. f) Land resources: Land as are source, land degradation, man-induced landslides, soil erosion and desertification.	**6**
II	**ECOSYSTEMS** a)Forest Ecosystem b) Grassland Ecosystem c)Desert ecosystem d)Aquatic Ecosystem (Ponds, rivers, oceans, estuaries) Energy flow in the ecosystem Ecological succession Food Chains, Food Webs and Ecological Pyramids.	**6**

III	**BIODIVERSITY AND ITS CONSERVATION** Introduction Definition: Genetic, species and ecosystem diversity. Biogeographically classification of India ,Values of Biodiversity, Biodiversity at global, national and local levels India as a mega-diversity nation, Hot-Spots of biodiversity Threats to biodiversity End angered and endemic species of India , Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity	**6**
IV	**ENVIRONMENTAL POLLUTION** Definition-Causes, effects and control measures of:- a)Air Pollution b)Water Pollution c)Soil Pollution d)Marine Pollution e)Noise Pollution f)Thermal Pollution Solid Waste Management, Disaster Management: Floods, earth quake, cyclone and landslides.	**6**
V	**SOCIAL ISSUES AND THE ENVIRONMENT** Climatic change, global warming, acid rain, ozone depletion. Wasteland reclamation Consumerism and Waste products, use and through plastics Environment Protection Act Air (Prevention and Control of Pollution) Act Water (Prevention and Control of Pollution) Act Wildlife Protection Act Forest Conservation Act Population Explosion - Family Welfare Programme Human Rights	**6**
TOTAL		**30**

CO	**Course Outcomes**
CO1	Students will be able to explain the scope and importance of environmental studies and analyze the use, over-exploitation, and conservation of natural resources.
CO2	Students will be able to describe ecosystem types, energy flow, ecological succession, and relationships such as food chains, food webs, and ecological pyramids.
CO3	Students will be able to assess biodiversity at different levels, identify threats ,and explain conservation methods including in-situ and ex-situ approaches.
CO4	Students will be able to identify various types of pollution, analyze their causes and effects, and suggest control measures along with waste and disaster management practices.
CO5	Students will be able to evaluate major environmental issues such as climate change and population growth, and understand environmental protection laws and sustainable practices.

Reference Books

1	G.S.Vijayalakshmi, A.G.Murugesan and N.Sukumaran.2006.Basics of Environmental Science, Manonmaniam Sundaranar University Publications, Tirunelveli , pp.160.
2	Agarwal.K.C.2001.Environmental Biology,Nidi Publications Limited, Bikaner
3	A.K.De.1999.Environmental Chemistry, Wiley Eastern Limited, India.

4	Jadhav,H.andBhosale,V.M.1995. Environmental Protection and Laws,Himalaya Publishing House, Delhi. pp284
5	Odum,E.P.1971.Fundamentals of Ecology,W.B.SaundersCo.,USA.pp.574.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**2**	**2**	**2**	**2**
CO2	**2**	**3**	**2**	**2**	**2**	**2**
CO3	**2**	**3**	**3**	**3**	**2**	**2**
CO4	**2**	**3**	**2**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**2**	**2**	**2**
Weightage of course contributedtoeachPSO	**12**	**14**	**11**	**11**	**10**	**10**

Semester-4

Semester–4									
Course Code	**Part**	**Course category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in Hours	**Max Marks**			
						CIA	**ESE**	**Total**	
26U1TL41	I	Language–I	Tamil–IV	5	3	50	50	100	3
26U1HD41	I		Hindi–IV						
26U1MY41	I		Malayalam–IV						
26U1FR41	I		French-IV						
26U2EN41	II	Language–II	English–IV	5	3	50	50	100	3
26UCEC41	III	Core–VII	Linear Integrated Circuits	4	3	50	50	100	4
26UCECP4	III	Core–VIII	Linear Integrated Circuits Lab	6	3	50	50	100	3
26UEEC41	III	EC–IV	Mathematics for Electronics II	4	3	50	50	100	4
26UEEC42			Consumer Electronic Appliances						
26USEC41	III	SEC–IV	Electronic Measurements and Instrumentation	2	3	50	50	100	2
26USEC42	IV	SEC–V	Matlab	2	3	50	50	100	2
26UVBE41	IV	COMMON	Value Based Education	2	3	50	50	100	2
Total				**30**				**800**	**23**

SECONDYEAR – SEMESTER – IV

CORE COURSE (CC-7)–LINEAR INTEGRATED CIRCUITS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCEC41	**4**	0	0	IV	**4**	**4**	**50**	**50**	**100**

Learning Objectives	
LO1	Learn the fundamental components and concepts of differential amplifiers**.**
LO2	Gain in-depth knowledge of input and output offset currents, voltages, and resistance**.**
LO3	Understand the basic concepts of slew rate and various types of filters**.**
LO4	Examine the principles and operation of adder-subtractor circuits and oscillators**.**
LO5	Understand the basics of trigger circuits, their operations and applications, and the functions of IC 555.

Prerequisites:

Unit	Contents	No. of Hours
I	Differential amplifiers–dual in put balanced output differential amplifier– current mirror–level translator–block diagram representation of typical OP amp– equivalent circuit of an OP amp–ideal voltage transfer curve.	**12**
II	Input offset voltage – input bias current – input offset current – total output offset voltage – input and output resistance – thermal drift – CMRR – voltage shunt and voltage series feedback amplifier.	**12**
III	FrequencyresponseofinitiallycompensatedOPamp–circuitstability–slew rate. Filters: Low pass filters–high pass filters–band pass filters–band reject filters.	**12**
IV	Adder – subtractor – integrator – differentiator – V to I and I to V converter. Oscillators: Principle – types – frequency stability – phase shift oscillator – Wien bridge oscillator – Square wave generator.	**12**
V	Comparator–Schmitt trigger–clipper and clamper–peak detector–zero crossing detector–IC555 functional block diagram– monostable operation– astable operation–applications.	**12**
TOTAL		**60**

CO	**Course Outcomes**
CO1	To study the basics of differential amplifiers and their characterization**.**
CO2	To gain knowledge of input and output offset currents, offset voltage, and resistance.
CO3	To understand the various types of frequency response of filters.
CO4	To explain the principles and operation of adder- subtractor circuits, different types of oscillators, and waveform generators.
CO5	To understand the concept of triggering, its operation and applications, and the fundamentals of linear integrated circuits**.**

Text books

1	RamkantA.Gayakward,"Operational Amplifiers and Linear Integrated Circuits"3rd

	Edition PHI.
2	D.Roychoudry and Shail Jain“Linear Integrated Circuits ”New Age Publications1999
Reference Books	
1	F.Couglin & Drison,“Operational Amplifiers and Linear Integrated Circuits”4rdEdition PHI(1992).
2	Denton J Daily,“Linear Integrated Circuits”McGrewHill1989

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	3
CO2	3	3	1	2	2	3
CO3	3	3	1	3	2	3
CO4	3	2	1	2	2	3
CO5	3	2	1	2	2	3
Weightage Of course contributed to each PSO	15	12	5	11	10	15

CORE COURSE (CC8)–LINEAR INTEGRATED CIRCUITS LAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCECP4	0	0	6	IV	4	6	**50**	**50**	**100**

Learning Objectives

LO1	To gain knowledge of linear integrated circuits and their applications.
LO2	To examine amplifiers and the characteristics of linear circuits.
LO3	To identify and analyze various oscillators and multivibrators using operational amplifiers (OP-AMPs)**.**
LO4	To develop free space programs for simulating electronic circuits such as multivibrators, oscillators, filters, ADCs, and DACs.
LO5	To understand the principles and implementation of data conversion techniques**,** including Analog-to-Digital Converters (ADC) and Digital-to-Analog Converters (DAC)**.**

Prerequisites:

Contents

1. Inverting and Non-inverting Amplifier
2. Instrumentation Amplifier
3. Integrator and Differentiator
4. Astable Multivibrator using OP-AMP
5. Monostable Multivibrator using IC555
6. High-pass and Low-pass Filters
7. Band-pass Filter using MATLAB
8. Digital-to-Analog Converter(DAC) using MATLAB
9. Analog-to-Digital Converter (ADC)using MATLAB
10. Design any one oscillator.

Total Hours:90

CO	Course Outcomes
CO1	To gain practical experience with oscillators and amplifiers.
CO2	To learn the fundamental concepts of linear circuits and their characteristics**.**
CO3	To understand the basic working principles of oscillators and multivibrators and apply appropriate methodologies in the laboratory environment.
CO4	To design and construct linear integrated circuits and observe their characteristics.
CO5	To study and compare the frequency responses of various filters

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	3
CO2	3	3	1	2	2	3
CO3	3	3	1	3	2	3
CO4	3	2	1	2	2	3
CO5	3	2	1	2	2	3
Weightage of course contributed to each PSO	15	12	5	11	10	15

ELECTIVE COURSE–IV MATHEMATICS FOR ELECTRONICS–II

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC41	4	0	0	IV	4	4	50	50	100

Learning Objectives	
LO1	To develop efficient algorithmic approaches for solving algebraic and transcendental equations.
LO2	To understand the concepts of numerical methods for solving matrix problems.
LO3	To understand the basic concepts of numerical integration and differentiation.
LO4	To find solutions for equally and unequally spaced data using interpolation methods.
LO5	To understand the numerical methods for solving first- and second-order ordinary differential equations.

Prerequisites:

Unit	CONTENT	No. of Hours
I	**Numerical solution of algebraic and transcendental equations**: Numerical solution of algebraic and transcendental equations: Bolzano's bisection method– Regular Falsi method – Newton-Raphson method	12
II	**Numerical solution of simultaneous linear algebraic equations:** Gauss elimination method-Gauss Jordane limination method–Gauss Seidel Iteration method–Gauss Jacobi iteration method	12
III	**Finite Difference Method:** Finite difference operator: Forward difference operator, backward difference operator, central difference operator, shift operator, average operator, and difference operator. Interpolation–Newton-Gregory forward and backward interpolation	12
IV	**Interpolation:** Newton's divided difference formula – Lagrange's interpolation formula for uneven intervals – Gauss interpolation formula. Numerical differentiation – Numerical Integration–Trapezoidal rule	12
V	**Numerical solutions of Ordinary differential equations of first and second order:** Simultaneous equations–Taylor series method–Picard's method. Euler"s method–Runge- Kutta method of second and fourth order.	12
TOTAL		60

CO	Course Outcomes
CO1	Understand numerical methods, equations, and their analysis for engineering applications.
CO2	Solve various types of matrix problems using iterative methods.
CO3	Recall and understand the concepts of various difference operators.
CO4	Develop algorithms for solving problems involving interpolation, numerical differentiation, and numerical integration.
CO5	Find solutions to first-order and second-order differential equations using numerical methods.

Text books	
🗁	Numerical Method in Science and Engineering, M.K.Venkataraman,National Publication Co,Chennai(2001)
🗁	Computer oriented Numerical Methods by V.Rajaram–PHI(P) Ltd.
Reference Books	
🗁	Introductory Methods of Numerical Analysis by S.S.Sastry,PHI learning2012

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	3
CO2	3	2	2	2	3	2
CO3	3	3	3	3	2	2
CO4	3	2	2	2	2	3
CO5	3	3	2	2	3	2
Weightage Of course contributed to each PSO	15	12	11	11	12	12

ELECTIVE COURSE–IV CONSUMER ELECTRONIC APPLIANCES

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC42	**4**	0	0	IV	**4**	**4**	**50**	**50**	**100**

Learning Objectives

LO1	Describe the basic concepts and working principles of microwave ovens**.**
LO2	Understand the basic concepts and working principles of washing machines**.**
LO3	Gain knowledge of air conditioners and refrigerators.
LO4	Develop knowledge of digital devices used in homes and offices**.**
LO5	Learn about digital access services such as LAN, MODEM

Prerequisites:

Unit	Contents	No .of Hours
I	**MICROWAVE OVENS:** Microwaves - Properties and generation Magnetrons, Waveguides microwave oven block diagram- LCD timer with alarm–Single chip controllers–Types of microwave ovens- microwave Cooking-Features and parts of microwave oven-Wiring andsafetyinstructions–Microwavecookware-OperatingProblemandsolutions.	**12**
II	**WASHING MACHINES:** Electronic controller for washing machines – Washing machine hardware washing cycle-hardwareandsoftwaredevelopment-Typesofwashingmachines-Fuzzylogic Washing machines-Features of Washing machines.	**12**
III	**AIR CONDITIONERS AND REFRIGERATORS:** Air Conditioning - Components of air conditioning systems-All water air conditioning systems -All air conditioning systems–Remote control buttons-Combination Systems-Unitary and central air conditioning systems-Split air conditioners-Refrigeration-Refrigerants-Refrigeration Systems-Domestic Refrigerators	**12**
IV	**HOME/OFFICE DIGITAL DEVICES:** Facsimile Machine –Basic fax machine operations-Group 3 fax machines- Xerographic copier, Process-Extensiontodynamiccopier-Digitalclocks-Blockdiagramofadigitalclock-LSI digital clock.	**12**
V	**DIGITAL ACCESS SERVICES:** ISDN-The Internet- LAN-Functions and networks–MODEM-Barcode Barcode Scanner and decoder-Bluetooth and Wireless enabled devices–Electronic Fund Transfer-Automated Teller Machines (ATMs)-Set-Top boxes- Digital cable TV	**12**
	TOTAL	**60**

CO	Course Outcomes
CO1	Identify various Consumer Electronic Applications.
CO2	Understand and associate various digitally designed instruments.

CO3	Choose the appropriate digital services
CO4	Acquire the knowledge of digital devices enhancement
CO5	Recommend the usage of alternate digital resources
Text books	
1	Consumer Electronics-S.P.Bali,Pearson Education,NewDelhi,2005.
2	Consumer electronics by Deepak Arora, Eagle Prakashan, Jalandhar.
Reference Books	
1	Consumer Electronics by Yagnik and Jain-Ishan Publication
2	Service manuals, BPB Publication, New Delhi

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**2**	**2**	**2**	**2**
CO2	**2**	**3**	**2**	**2**	**2**	**2**
CO3	**2**	**3**	**3**	**3**	**2**	**2**
CO4	**2**	**3**	**2**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**2**	**2**	**2**
Weightage of course contributed to each PSO	**12**	**14**	**11**	**11**	**10**	**10**

SKILL ENHANCEMENT COURSE(SEC)– ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Subject Code	L	T	P	S	Credits	Inst.Hours	Marks		
							CIA	External	Total
26USEC41	**2**	0	**0**	IV	2	2	**50**	**50**	**100**

Learning Objectives	
LO1	Learn the concepts of measurement, errors, systems of units, and measurement techniques**.**
LO2	Gain in-depth knowledge of measurement standards and their applications.
LO3	Understand the basic concepts of electromechanical indicating instruments and their characteristics**.**
LO4	Explain the basic principles of oscilloscopes and their block diagrams.
LO5	Understand the fundamentals of signal generation, signal analysis, and function generators.

Prerequisites:

Unit	Contents	No. of . Hours
I	Measurement and error: Definitions - Accuracy and precision-Significant Figures-Types of errors-statistical analysis. System of Units and Measurement: Fundamental and derived units – Systems of units – Electric and Magnetic units – International system of units – other system of units.	**6**
II	Standards of Measurement: Classifications of Standards – Standards for Mass, Length and Volume. Time and frequency Standards–Electrical Standards-Resistance Standards–voltage Standards – Capacitance Standards- Inductance Standards	**6**
III	Electromechanical Indicating Instruments: suspension galvanometer–Torque and deflection of the galvanometer (steady –state deflection)- PM, MC mechanism:(D'Arsonval Movement- core magnet construction- DC Ammeters:(Shunt resistor)- DC Voltmeters:(multiplier resistor, multirange voltmeter)- Multimeter.	**6**
IV	Oscilloscopes: Oscilloscopes block diagram–Cathode Ray Tube – CRT Circuits – Vertical Deflection system – Delay line – Multiple Trace – Horizontal Deflection system –Oscilloscope technique.	**6**
V	Signal Generation: Frequency synthesized signal generator – Function generator: Basic elements of Function generator–Spectrum Analyzers-Digital Storage oscilloscopes.	**6**
	TOTAL	**30**

CO	**Course Outcomes**
CO1	Study the basic measurement and error, system of units.

CO2	Gain the knowledge of Electrical standards (IEEE).

CO3	Understand the various types of electromechanical inducing instruments and their mechanism.
CO4	Explain the block diagram of oscilloscope and its functions
CO5	Understand the concept of signal generation and help the Studentstounderstandtheelectronicsinstrumentationandmeasurement.
Text books	
1	Albert D.Helfrick and William D.cooper,"Modern Electronic Instrumentation and Measurement Techniques",Pearson Edition-LPE.,
2	A.K.Sawhney" Electrical and electronic measurements and instrumentation", Dhanpatrai & co.,
Reference Books	
1	"Electrical and Electronics Measurements and Instrumentation engineering"Dr.N.K.Datta.,Books and Allied(P)ltd,since1960.
2	"Measurement systems Application and design" Earnest O.Doebelin.,Fourth Edition Tata McGraw-Hill publishing company ltd.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**3**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**2**
CO5	**3**	**3**	**2**	**3**	**2**	**2**
Weightage of course contributed to each PSO	**15**	**14**	**14**	**14**	**11**	**11**

SKIL ENHANCEMENT COURSE (SEC8)–MATLAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCECP4	0	0	4	IV	2	2	**50**	**50**	**100**

Learning Objectives

LO1	To introduce the fundamentals of MATLAB programming and its working environment.
LO2	To develop skills in matrix operations, arrays, functions, and data visualization using MATLAB.
LO3	To apply MATLAB for solving mathematical and engineering problems.
LO4	To develop MATLAB programs for numerical methods and data analysis.
LO5	To use MATLAB for simulation, plotting, and basic engineering applications.

Prerequisites:

Contents

1. Introduction to MATLAB and MATLAB Desktop
2. Command Window, Workspace, Editor and Current Folder
3. Variables, constants and data types
4. Arithmetic, relational and logical operators
5. Basic mathematical functions
6.Vectors and matrices
7.Creating and manipulating arrays
8.Matrix operations
9.Array operations
10. Indexing and accessing elements

Total Hours:30

CO	Course Outcomes
CO1	Understand the MATLAB environment and desktop interface, including the Command Window, Workspace, Editor, and Current Folder.
CO2	Apply variables, constants, data types, and basic mathematical functions to perform MATLAB computations.
CO3	Use arithmetic, relational, and logical operators to develop basic MATLAB expressions and programs.
CO4	Create, manipulate, and perform operations on vectors, matrices, and arrays using MATLAB.
CO5	Apply indexing and element-accessing techniques to analyze and manipulate MATLAB arrays and matrices.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**2**	**2**	**2**	**2**
CO2	**2**	**3**	**2**	**2**	**2**	**2**
CO3	**2**	**3**	**3**	**3**	**2**	**2**
CO4	**2**	**3**	**2**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**2**	**2**	**2**
Weightage of course contributed to each PSO	**12**	**14**	**11**	**11**	**10**	**10**

COMMON-VALUE BASED EDUCATION

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UVBE41	2	0	0	IV	2	2	50	50	100

Learning Objectives

LO1	To provide basic knowledge of the Indian Constitution and its framework.
LO2	To understand Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy**.**
LO3	To create awareness about human rights and their protection mechanisms**.**
LO4	To develop analytical skills regarding constitutional and human rights issues.
LO5	To promote the values of equality, justice, and democracy among student

Prerequisites:

Unit	Contents	No. of Hours
I	**Introduction to Indian Constitution** **Introduction**: Meaning and importance of Constitution - Historical background of Indian Constitution - Making of the Constitution (Constituent Assembly) - Salient features of Indian Constitution - Preamble – Meaning, Objectives and Values.	**6**
II	**Fundamental Rights and Duties** Fundamental Rights – Types and significance - Right to Equality, Freedom, Religion, Cultural & Educational Rights - Right to Constitutional Remedies - Fundamental Duties – Meaning and importance.	**6**
III	**Directive Principles of State Policy** MeaningandobjectivesClassificationofDirectivePrinciplesRelationship between Fundamental Rights and DPSP - Role in governance and welfare state.	**6**
IV	**Human Rights– Concepts and Development** Meaning and definition of Human Rights - Evolution of Human Rights - Universal Declaration of Human Rights (UDHR) - Types of Human Rights – Civil, Political, Economic, Social & Cultural	**6**
V	**Human Rights in India** Human Rights Protection Act, 1993- National Human Rights Commission(NHRC) – Structure and functions - Role of NGOs in Human Rights protection - Issues: Women, Children, Minorities & Environment - Contemporary Human Rights challenges in India.	**6**
	TOTAL	**30**

CO	Course Outcomes
CO1	Explain the structure and features of the Indian Constitution.
CO2	Identify and interpret Fundamental Rights and Duties.

CO3	Analyze the role of Directive Principles in governance.

CO4	Understand the concept and importance of Human Rights.
CO5	To create a congenial climate in the organization
Textbooks	
1	Durga DasBasu– *Introduction to the Constitution of India*
Reference Books	
1	V.N.Shukla–*Constitution of India*
2	M.Laxmikanth– *Indian Polity*
3	Upendra Baxi–*The Future of Human Rights*
4	H.O.Agarwal–*Human Rights*
5	P.M.Bakshi– *The Constitution of India*

Semester-5

Semester-5									
Course Code	**Par t**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in hrs.	**Max Marks**			
						CIA	**ESE**	**Total**	
26UCEC51	III	Core-IX	Microprocessor and Microcontroller	5	3	50	50	100	4
26UCEC52	III	Core-X	Communication Systems	5	3	50	50	100	4
26UCECP5	III	Core-XI	Microprocessor and Microcontroller Lab	6	3	50	50	100	4
26UCEC5P	III	Core-XII	Mini Project with Viva Voce	4	3	50	50	100	4
26UEEC51	III	Elective-V	Computer Networks	4	3	50	50	100	3
26UEEC52			Optical Display Devices						
26UEEC53	III	Elective-VI	VLSI Technology	4	3	50	50	100	3
26UEEC54			Mobile Communication						
26UFIK51	III	Internship	Internship/Industrial Visit/Field Visit/Knowledge Up dation Activity	-	-	-	-	100	2
26UAEC51	IV	AEC-I	Empowered Vocational English	2	3	50	50	100	2
Total				**30**				**800**	**26**

THIRD YEAR–FIFTH SEMESTER

CORE COURSE(CC-9)–MICROPROCESSOR AND MICROCONTROLLER

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCEC51	5	0	0	V	4	5	50	50	100

Learning Objectives	
LO1	To learn the fundamentals of microprocessors.
LO2	To gain in-depth knowledge of the basic concepts and functioning of microprocessors.
LO3	To understand the basic concepts and functions of the Programmable Peripheral Interface (PPI) and Direct Memory Access (DMA) Controller.
LO4	To examine the principles and operation of USART and understand the fundamentals of the 8051 microcontroller.
LO5	To develop programming knowledge of the 8085 microprocessor and 8051 microcontroller.

Prerequisites:

Unit	Contents	No. of Hours
I	**8085 ARCHITECTURE:** Architecture **of** 8085 – Instruction Set - Data Transfer – Arithmetic, Logical, Branching and I/O Instructions, Instruction types – Various Addressing modes – Timing Sequence – Instruction cycle – Machine cycle–Hall wait states–ALU–Mnemonic–Simple Assembly Language Program flowchart–Stack and Subroutines – Interrupts.	15
II	**8085 INTERFACING:** Peripheral device – Programmable Peripheral Interface(855) – Programmable Interrupt Controller(8259A)– SerialCommunicationInterface–DMAController(8257)–ADCInterfacing– Stepper Motor Interfacing-Key Board and Display Interface– USART.	15
III	**8051 MICROCONTROLLERS:** Intel 8051 Microcontroller – Block Diagram, pin out –oscillator and clock –Program Counter and Data pointer ,A and B registers, flags and program status word – Internal RAM – the Stack and Stack pointer –special functions registers–InternalROM– I/OPins,portsandcircuits–Externalmemory.Counters,Timers and Addressing Modes.	15
IV	**8051 INSTRUCTIONS:** Data exchanges – Logical operations – Byte level operation–Bit level logical operations–Rotate and swap operations – Arithmetic operations–Jump and call instructions–Jump and call program range–Jumps–Calls and subroutines Interrupts and return.	15
V	**8051 PROGRAMMING:** Assembly Language programming for 8051 Micro controller family – Programs 8–Bit addition – 8–Bit subtraction – 8-BitMultiplication–8-BitDivision-Greatestandsmallestnumberinan array – ascending and Descending –Interfacing Keyboard–Interfacing LED, LCD Display–A/D and D/A Interfacing.	15
TOTAL		**75**

CO	Course Outcomes
CO1	Learn the fundamental of Microprocessor and Microcontroller
CO2	Provide the in-depth knowledge of basics and functioning of MUP.
CO3	Understand the basic concepts of PPI, DMA Controller
CO4	Examines the principles and operations of USART and understand the basics of 8051

	Microcontroller.
CO5	Identify the notes on Programming knowledge of 8085and8051
Text books	
1	Microprocessor and Architecture Programming and Applications with 8085/8080. S.Ramesh Goankar, Wiley Eastern Limited (1986)
2	Microprocessor and Interfacing: Programming and Hardware, Douglas V. Hall, McGraw-Hill, New York(1988)
3	8051 Microcontroller Architecture,KennethJ.Ayala, Programming and Applications, Penram International Publishing.
Reference Books	
1	Microprocessor Principles and Application-2nd Edition,Gilmore–TataMcGraw–Hill

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**3**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**2**
CO5	**3**	**3**	**2**	**3**	**2**	**2**
Weightage of course contributed to each PSO	**15**	**14**	**14**	**14**	**11**	**11**

CORE–10: COMMUNICATION SYSTEMS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCEC52	**5**	0	0	V	**4**	**5**	**50**	**50**	**100**

Learning Objectives	
LO1	Learn the **fundamentals of communication systems**.
LO2	Gain in-depth knowledge of **amplitude modulation and its principles**.
LO3	Understand the **basic concepts and operation of AM transmitters**.
LO4	Examine the **principles and operation of vestigial sideband (VSB) transmission**.
LO5	Understand the **basic operation and functions of telephone communication systems**.

Prerequisites:

Unit	Contents	No. of Hours
I	**INTRODUCTION:** Communication systems–Modulation-need for modulation- bandwidth- Amplitude modulation theory- Frequency spectrum of AM-Mathematical representation of AM- USB & LSB - Power relation in the AM Wave - Frequency modulation – Theory of Frequency modulation and Phase Modulation- Frequency spectrum of FM - Mathematical representation of FM - Phase modulation – Inter system comparisons (Amplitude Modulation, Frequency Modulation and Phase Modulation).	**15**
II	**GENERATION OF AM:** Block diagram of AM transmitter – Solid state modulators (Grid Modulated class C amplifier - – Plate Modulated class C amplifier – Modulated Transistor amplifier) **RADIO RECEIVERS:** Tuned radio frequency receiver- super heterodyne receiver - **AM RECEIVERS**: RF Section and Characteristics-Sensitivity - Selectivity- - importance of IF - image frequency and its rejection-Mixer circuits–IF amplifiers -circuit explanation-simple diode detector	**15**
III	**GENERATION OF FM:** - FM Methods – Basic reactance modulator – Varactor diode modulator – Armstrong frequency modulation system. - Automatic gain control circuit - simple and delayed AGC-**FMRECEIVERS**: Comparison with AM receiver-Amplitude limiting-FM demodulators– Balanced slope detectors-Phase Discriminator-Radio detectors.	**15**
IV	**SIDEBAND TECHNIQUES: Evaluation** and Description of SSB - Suppression of carrier- Balanced modulator -Suppression of unwanted sideband(Filtering System, Phase Shift method and Third method)–System Evaluation and Comparison- Extensions of SSB Pilot carrier systems–ISB systems-Vestigial side band transmission.	**15**
V	**TELEPHONE SYSTEMS: Wire Telephony – Telephone circuits** - Telephone subscribers loop circuit - Pulse and tone signaling - Frequency assignments- Electronic telephone – Electronic subscriber' sline interface circuit–Two wire repeaters– Public telephone Network–Step by step switching–Crossbar switching–Trunk circuits– Private telephone Network.	**15**
TOTAL		**75**

CO	Course Outcomes
CO1	Study the basic of Communication systems and their Blocks.
CO2	Gain the knowledge of sensitivity and selectivity of receivers.

CO3	Understand the various types of Transmitters and Receivers
CO4	Explain the principles and operation and functions of Single side band transmission
CO5	Understand the concept of subscriber' sline interface circuit switching.
Text books	
1	Electronic Communication systems: Kennedy and Davis-Tata McGraw Hill.
2	Electronic communication: Roody andCoolen-PHI,4thEdition
Reference Books	
1	Electronic communication Systems: Wayne Tomasi - Pearson Edn.
2	Electronic and radio engineering Mathur

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

CORE–11 MICROPROCESSOR AND MICROCONTROLLER LAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCECP5	6	0	6	V	4	6	**50**	**50**	**100**

Learning Objectives

LO1	To learn the **fundamentals of microprocessor and microcontroller programming**.
LO2	To gain in-depth knowledge of the **basic concepts and functioning of microprocessors and microcontrollers**.
LO3	To understand the **basic concepts and operation of PPI and DMA controllers**.
LO4	To examine the **principles and operations of microprocessors** and understand the fundamentals of the **8051 microcontroller**.
LO5	To gain **experimental knowledge and practical skills in programming the 8085 microprocessor and 8051 microcontroller**.

Prerequisites:

Contents

1. MICROPROCESSORPROGRAMMING

Program for 8 Bit Addition and subtraction
Program for16 Bit Addition and subtraction
Program for 8Bit Multiplication and division
Programfor16BitMultiplicationand division

2. MICROPROCESSOR PROGRAMMING

Program for Square and Square root of a number

Program for Sorting and Searching

Program for Smallest and Largest number in an array.
Program for Reversing a String

3. MICROPROCESSORPROGRAMMING

Program for BCD to Binary,

Binary to BCD

4. MICROCONTROLLERPROGRAMMING

Array addition (multibyte)

Logical Operations –AND, OR, NOT
Decimal to ASCII and ASCII to Decimal.

5. MICROCONTROLLERPROGRAMMING

Ascending Order.

Descending Order Up /down Counter

6. MICROPROCESSORPROGRAMMING

Six letter word display. Rolling display

7. MICROCONTROLLERPROGRAMMING

Interfacing with LCD.

8. MICROCONTROLLER PROGRAMMING

Square wave generator Interfacing with ADC.

9. MICROPROCESSOR PROGRAMMING

Interfacing Matrix Keyboard Interfacing ADC Interfacing DAC Study of 8255chip and generation of

a) Square wave

b) Triangular wave

10. MICROCONTROLLER PROGRAMMING

Interfacing with DAC Digital Clock.

Total Hours:90

CO	Course Outcomes
CO1	To practice the **fundamentals of microprocessors** through laboratory experiments.
CO2	To practice the **fundamentals of microcontrollers** and their programming.
CO3	To implement and test **microcontroller interfacing programs**.
CO4	To implement **matrix keyboard interfacing with a microprocessor**.
CO5	To design and implement a **digital clock using a microcontroller**.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage ofcoursecontributedtoeachPSO	**15**	**12**	**5**	**11**	**10**	**15**

CORE 12-MINI PROJECT

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCEC5P	0	0	4	V	3	4	50	50	100

Learning Objectives	
LO1	To develop the **skills required to formulate and execute a technical project**.
LO2	To provide guidance on the **various tasks involved in project development and standard procedures**.
LO3	To provide guidance on the **procedures for product validation and cost-effectiveness analysis**.
LO4	To provide guidelines for **preparing a technical project report**.
LO5	To develop knowledge of the **basic principles and guidelines for documenting and presenting the project**.

Prerequisites:

Unit	Contents	No. of Hours
I	Formulate a real-world problem ,identify the requirement and develop the design solutions.	12
II	Identify technical ideas, strategies and methodologies.	12
III	Utilize the new tools, algorithms, techniques that contribute to obtain the solution of The project.	12
IV	Perform test and validate through conformance of the developed prototype and analysis the cost effectiveness.	12
V	Explain the acquired knowledge through preparation of report and oral presentations	12
TOTAL		60

CO	Course Outcomes
CO1	Develop problem-solving skills by applying programming logic to real-world tasks.
CO2	Implement mathematical and logical operations using efficient coding techniques.
CO3	Analyze and manipulate data using lists, strings, and numerical methods.
CO4	Design simple programs integrating multiple concepts like conditions and loops.
CO5	Demonstrate the ability to write optimized and concise code solutions.

ELECTIVE COURSE (5) –COMPUTER NETWORKS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC51	**4**	0	0	V	**3**	**4**	**50**	**50**	**100**

Learning Objectives	
LO1	Learn the basic knowledge of computer networks.
LO2	Provide the in-depth knowledge of OSI Model.
LO3	Understand the basic concepts of Data link layer.
LO4	Examine the working of Network layer and Transport layer.
LO5	Know the basics of Application layer and Switching.

Prerequisites:

Unit	Contents	No.of Hours
I	**INTRODUCTION:** Data Communications–Networks–Protocols and Standards–Network Topologies(Mesh, Star, Tree, Bus and Ring)– Transmission Modes–Categories of Networks (LAN, MAN, WAN)– Internetworks and Internet (Overview).	**12**
II	**THE OSI MODEL:** The OSI Model (Layered Architecture, OSI Layers) – Functions of Layers: Physical, Data Link, Network, Transport, Session, Presentation and Application (Basic Functions only) – TCP/IP Protocol Suite (Overview and comparison with OSI)–Analog and Digital Signals (Introduction).	**12**
III	**DATA LINK LAYER:** Design Issues – Flow and Error Control – ARQ Protocols (Stop-and-Wait, Sliding Window, Go-Back-N, Selective Repeat) – HDLC(Overview)–Point-to-Point Protocol(PPP) and PPP Stack(Basic Working).	**12**
IV	**NETWORK LAYER:** Design Issues–Routing Algorithms (Basic Concepts) – Congestion Control(Overview)–Internet working, Addressing and Routing – IP Addressing (Class full and Classless), Subnetting (Basics) – Network Layer Protocols: ARP, IPv4, IPv6 (Comparison), ICMP. **Transport Layer:** Process-to-Proless Delivery–UDP and TCP(Basic Functioning)–TCP Congestion Control(Concept)–Quality of Service(Introduction).	**12**
V	**APPLICATIONLAYER:** Client-Server Model – Socket Interface (Basic Concept) – Domain Name System (DNS) – Electronic Mail (SMTP) – File Transfer(FTP)–HTTP and WWW.**SWITCHING:** Circuit Switching(Basic Concept)–Packet Switching (Datagram and Virtual Circuit)–Message Switching.	**12**
	TOTAL	**60**

CO	**Course Outcomes**
CO1	To study the **basic concepts of different categories of computer networks and their applications**.
CO2	To gain knowledge of the **TCP/IP protocol suite and its role in Internet communication**.
CO3	To understand the **various types of Data Link Control protocols**.
CO4	To explain the **principles and operation of ARP, IPv4, ICMP, and IPv6**.
CO5	To understand the **concept and working of the Client–Server model**.

Text books

1 Behrouz A. Frozen, “Data Communications and Networking”, Tata McGraw-Hill,4thEd.

2	S.Tannenbaum,D.Wetherall,“Computer Networks”,Prentice Hall,Pearson,5thEd.
Reference Books	
1.	Larry Peterson Bruce Davie,“ Computer Networks: System Approach”, Fifth Edition, The Morgan Kaufmann Series in Networking-Publisher,2011.
2.	Thomas D. Nadeau, KenGray,“SDN: Software Defined Networks”,O“ReillyMedia,2013.

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributedto eachPSO	**15**	**12**	**5**	**11**	**10**	**15**

ELECTIVE COURSE (5)–OPTICAL DISPLAY APPLICATIONS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC52	4	0	0	V	4	4	50	50	100

Learning Objectives	
LO1	Learn the **fundamental components and concepts of thin-film technology**.
LO2	Gain in-depth knowledge of **thin-film deposition techniques**.
LO3	Understand the **basic concepts and applications of CCDs, CID, FLIR, and related technologies**.
LO4	Examine the **principles and operation of LEDs and LCDs**.
LO5	Understand the **basic operation and applications of auto stereoscopic 3D technology and volumetric display systems**.

Prerequisites:

Unit	Contents	No. of Hours
I	**THIN FILM TECHNOLOGY:** Thin film deposition techniques: Thermal evaporation, Electron beam evaporation, RF/DC sputtering (overview), Pulsed laser deposition. Thickness monitoring: Optical and Quartz crystal monitoring techniques. Inorganic Semiconductor TFT Technology (overview), Organic TFT Technology (introduction),Transparent Conductors. Patterning Processes: Photolithography (basic concept), Wet and Dry Etching (overview). Flexible Displays (introduction).	12
II	**OPTICAL TRANSMITTER AND RECEIVER:** Basic concepts of Optical Transmitters–Semiconductor LASER and LED characteristics (overview), Transmitter design (basic concept). OPTICAL RECEIVER: Basic concepts – p-n and PIN photo detectors, Avalanche photo detectors (concept), Receiver design(basic block diagram),Receiver noise and sensitivity (introduction).Optical amplifier (applications only). Photo transistors and Solar cells (overview).	12
III	**OPTICAL SENSORS:** Photometry and Radiometry (basic definitions), Radiation sources (overview). Detectors – Imaging and Non-imaging detectors (Thermal and Photon detectors–concepts only),Detector arrays (CCD–introduction)and their basic characteristics.	12
IV	**DISPLAY TYPES:** Inorganic Phosphors (basic concept), Cathode Ray Tubes (CRTs), Plasma Display Panels, LED Display Panels, Thin Film Electro luminescent Displays (overview), Organic Electro luminescent Displays(OLEDs),Liquid Crystal Displays(LCDs).	12
V	**EMERGING DISPLAYS:** Paper-like and Low Power Displays (overview), MEMS- based displays (introduction),3-DD is play concepts (overview), Holographic Display (introduction), Mobile Displays and Energy aspects (basic concepts	12
TOTAL		60

CO	Course Outcomes
CO1	Study the basic of Organic TFT Technology and Thin film deposition Techniques

CO2	Gain knowledge of the **characteristics of semiconductor injection lasers, LEDs, and transmitter design**.
CO3	Understand the **various types of detectors, including imaging and non-imaging detectors**.
CO4	Explain the **different types of display technologies**.
CO5	Understand the **concepts and applications of paper-like and low-power displays**.
Text books	
1	Principles of optics, Born and Wolf,SPIE mile stoneserieson-Design of optical coatings
2	Practical Design and Production of Optical Thin Films–Second Edition–Ronald Ron Wiley–CRC Press – 2002
Reference Books	
1.	Fundamental soft Space Systems by Vincent.Piscane,Oxford University Press,2005
2.	CCD arrays, Cameras & Displays-Gerald C Hoist1998 [2ndEd],JCD Publishing-SPIE Optical Engg. Press

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

ELECTIVE COURSE (6)– VLSI TECHNOLOGY

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC53	**4**	0	0	V	**3**	**4**	**50**	**50**	**100**

Learning Objectives	
LO1	Distinguish between **enhancement-mode and depletion-mode MOSFETs** and explain their working principles.
LO2	Evaluate the operation of **CMOS, nMOS, and basic bipolar logic circuits**, including inverters and transmission gates.
LO3	Describe the **steps involved in VLSI fabrication**, including lithography, diffusion, oxidation, and ion implantation.
LO4	Understand the **construction and characteristics of monolithic IC components**, such as resistors, capacitors, diodes, and transistors.
LO5	Design and analyze **simple CMOS-based digital circuits**, such as shift registers, comparators, and clock generators

Prerequisites:

Unit	Contents	No. of Hours
I	**INTRODUCTIONTOMOSFET:** Structure of MOSFET – Enhancement Mode MOSFET – Depletion Mode MOSFET –MOS Transistor Theory (basic concepts) –Figure of Merit –MOS Device Design Equations(overview)–Equivalent Circuits of MOSFETs–Basic Structure of CMOS.	**12**
II	**BASIC MOS, CMOS AND BIPOLAR LOGIC CIRCUITS:** Pass Transistor/Transmission Gate –nMOS Inverter –Pull-up and Pull-down Ratio (basic concept) – Different Forms of Pull-up – CMOS Inverter – BICMOS Inverter(overview)–Tristate Inverter–Differential Inverter (concept) – Bipolar Logic Circuits (overview) – DTL and ECL (introduction)– Integrated Injection Logic (concept).	**12**
III	**VLSI FABRICATION PROCESS:** Crystal Growth and Wafer Preparation – Epitaxy – Oxidation – Diffusion (constant source and limited source – basic concepts)-Ion Implantation – Lithography–Dielectric and Polysilicon Film Deposition–Etching–Metallization–Yield (overview).	**12**
IV	**FABRICATION OF TYPICAL IC COMPONENTS:** Monolithic Resistors– Monolithic Capacitors–Monolithic Diodes–Monolithic Transistors–Overview of MOSFET Technology–CMOS Technology (basic concepts).	**12**
V	**APPLICATION OF CMOS:** Increment/Decrement Circuit(concept)– Shift Registers (Left/Right, Serial/Parallel–overview)–Two-bit Comparator–Two Phase Non-Overlapping Clock Generator (basic concept).	**12**
TOTAL		**60**

CO	**Course Outcomes**
CO1	Explain the structure, operation, and characteristics of enhancement and depletion mode MOSFETs along with basic CMOS structure.

CO2	Analyze and compare MOS, CMOS, and bipolar logic circuits including inverters, Transmission gates, and basic logic families.
CO3	Describe key fabrication steps such as oxidation, diffusion, ionim plantation, lithography, and Metallization used in IC manufacturing.
CO4	Understand the construction and working of monolithic components like resistors, capacitors, diodes, and transistors using MOS/CMOS technology.
CO5	Design and analyze basic CMOS-based circuits such as shift registers, comparators ,and clock Generation circuits.
Textbooks	
1	**CMOS VLSI Design: A Circuits and Systems Perspective**–Covers CMOS circuits, MOSFET basics ,and VLSI system design.
2	**Microelectronics Circuits**–Explains fundamental MOSFET theory and electronic circuits.
3	**Basic VLSI Design**–Provides simple concepts of VLSI design and fabrication.
Reference Books	
1	**Principles of CMOS VLSI Design**–Detailed CMOS logic design and layout techniques.
2	**VLSI Design**–Syllabus-oriented VLSI concepts with examples.
3	**Digital Integrated Circuits: A Design Perspective**–Advanced CMOS digital circuit design concepts.

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

ELECTIVE COURSE (6) –MOBILECOMMUNICATION

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC54	4	0	0	V	3	4	50	50	100

Learning Objectives	
LO1	To identify the **basic components, cell structure, and operation of cellular communication systems**.
LO2	To understand **co-channel and non-co-channel interference** and their impact on system performance.
LO3	To interpret **antenna types, sectorization, and handoff processes** in mobile communication systems.
LO4	To describe the **working principles of 2G and 3G systems**, including GSM, CDMA, and TDMA.
LO5	To explain advanced concepts such as **intelligent cells, AIN, SS7, and future mobile communication systems**.

Prerequisites:

Unit	Contents	No. of Hours
I	**CELLULAR MOBILE SYSTEM:** Introduction to Cellular Mobile System – Performance criteria – Operation of Cellular Systems – Hexagonal Cell concept – Analog and Digital Cellular Systems – Concept of Frequency Channels – Co-channel Interference Reduction Factor (basic concept) – Desired C/I ratio(overview)–Cell Splitting–Basic components of Cellular System.	12
II	**CO-CHANNEL INTERFERENCE:** Introduction to Co-Channel Interference – Co-Channel Measurement (basic idea) – Antenna System Design (overview) – Antenna parameters and their effects – Diversity Receiver (concept) – Non Co-channel Interference (types) – Signal Reflection in different terrains (overview)–Basic Path Loss Models–Antenna Height Gain–Point-to-Point Propagation Model (basic form).	12
III	**ANTENNAS AND HAND OFF:** Omni-directional and Directional Antennas – Sectorization – Space Diversity – Minimum Separation of Cell Site Antennas – Channel Assignment (basic concepts) – Channel Borrowing – Handoff(types and concept)–Dropped Calls (basic idea)–Micro Cells–Cell Splitting(overview).	12
IV	**2G AND 3G NETWORKS:** Second and Third Generation Wireless Networks (overview) – WLL – Bluetooth – GSM (architecture overview) – IS-95 (basic concept)–DECT(introduction)–Multiple Access Schemes: TDMA and CDMA(basic concepts).	12
V	**INTELLIGENT CELL CONCEPT:** Intelligent Cell Concept – Advanced Intelligent Network(overview) –SS7and ISDN(basic idea) –AIN for Mobile Communication–Asynchronous Transfer Mode(concept)–Future Public Land Mobile Telecommunication System(overview).	12
	TOTAL	60

CO	Course Outcomes
CO1	Explain the **concept, structure, and operation of cellular mobile systems**, including frequency reuse and cell design.
CO2	Evaluate **co-channel and non-co-channel interference, antenna parameters, and basic radio propagation models**.

CO3	Describe **antenna types, sectorization, channel assignment, and handoff mechanisms** in cellular networks.
CO4	Explain the **architecture and working principles of 2G and 3G systems**, including GSM, CDMA, and TDMA.
CO5	Understand **advanced communication systems**, including Intelligent Networks, SS7, ATM, and future mobile communication systems.
Text books	
1	W.C.Y. Lee,“ Mobile Cellular Telecommunications”,2nd Edition, Tata McGraw Hill,2006.
2	GordonL.Stuber,"Principles of Mobile Communications",2nd Edition, Springer International, 2000.
Reference Books	
1.	Theodore.S.Rapport,"Wireless Communications",3rd Edition, Pearson Education,2003
2.	Lee,“ Wireless and Mobile Communications",3rd Edition,McGraw-Hill,2006.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

ABILITY ENHANCEMENT COURSE –EMPOWERED VOCATIONAL ENGLISH

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UAEC51	2	0	0	V	2	2	50	50	100

Learning Objectives

LO1	To build **self-confidence among students** by developing interpersonal, team management, and leadership skills.
LO2	To equip aspiring learners with the **skills required to become effective young managers**.
LO3	To enhance **communication skills** for professional and workplace environments.
LO4	To foster **strategic thinking and problem-solving skills** through advanced writing and presentation techniques.
LO5	To develop **professional etiquette and corporate-ready competencies** for modern business environments

Prerequisites:

Unit	Contents	No. of Hours
I	Communication Skills, Current English Usage, Aptitude and Attitude, Team Building and Leadership, Psychological Tests, Effective Resume Writing	**6**
II	Précis Writing , Essay Writing, Goal Setting, Conflict Management, Appearing for an Interview, Myths regarding Group Discussion	**6**
III	Debates, Presentation for Small and Large Groups, Prioritization, Time Management , Stress Interview, Prerequisites of a Group Discussion	**6**
IV	Marketing and Business Presentations, Report Writing, Cross-Cultural Communication, Lateral Thinking, Qualities of a Candidate for an Interview, Generating Ideas for Discussion	**6**
V	Telephone Etiquette, Email Etiquette, Concepts of Leadership, Insights from Great Leaders, Mock Interview, Mock Group Discussion	**6**
	TOTAL	**30**

CO	Course Outcomes
CO1	Students will demonstrate **strong interpersonal and leadership skills** in team settings.
CO2	Learners will apply **effective communication strategies** using current English language practices.
CO3	Graduates will prepare **professional résumés** and demonstrate interview-ready writing skills.
CO4	Participants will **manage conflicts, set goals, and deliver effective presentations**.
CO5	Individuals will demonstrate **professional telephone and email etiquette**, along with refined leadership skills.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	3	2	2	2	2
CO3	2	3	3	3	2	2
CO4	2	3	2	2	2	2
CO5	3	3	2	2	2	2
Weightage of course Contributed to each PSO	12	14	11	11	10	10

Semester-6

Semester–6									
Course Code	**Par t**	**Course Category**	**Course Name**	**Hours /Week**	**Examination**				**Credits**
					Duration in hrs.	**Max Marks**			
						CIA	**EXT**	**Total**	
26UCEC61	III	Core–XIII	Optical Fiber Communication	5	3	50	50	100	4
26UCEC62	III	Core-XIV	IoT and its applications	5	3	50	50	100	4
26UCECP6	III	Core-XV	Communication and System Design Lab	6	3	50	50	100	4
26UCEC6P	III	Core-XVI	Major Project with Viva voce	4	3	50	50	100	5
26UEEC61	III	Elective-VII	Artificial Intelligence	4	3	50	50	100	3
26UEEC62			PCB Design						
26UEEC63	III	Elective-VIII	Embedded system With RTOS	4	3	50	50	100	3
26UEEC64			Power Electronics						
26UAEC61	IV	AEC-II	Design Thinking	2	3	50	50	100	2
26U5EA61	V	Common	Extension Activity	-	-	-	-	100	1
Total				**30**				**800**	**26**

THIRD YEAR–VI

CORE COURSE (CC-13)–OPTICAL FIBER COMMUNICATION

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCEC61	**5**	0	0	VI	**4**	**5**	**50**	**50**	**100**

Learning Objectives	
LO1	Learn about **various optical fiber modes, configurations, and signal degradation factors**.
LO2	Gain in-depth knowledge of **optical detectors and their applications in optical communication systems**.
LO3	Understand the **basic concepts of optical waveguides and various signal degradation factors**.
LO4	Examine the **principles and operation of various optical source materials, LED structures, and quantum-well devices**.
LO5	Identify and understand the **basic components of fiber-optic communication networks**.

Prerequisites:

Unit	Contents	No. of Hours
I	**THIN FILM TECHNOLOGY**: Thin film deposition techniques thermal/electron beam evaporation, RF/DC sputtering, Ion beam sputtering, pulsed laser beam deposition. Thickness monitoring: Optical and quartz micro-balance techniques monitoring techniques. Display Glasses, Inorganic Semiconductor TFT Technology, Organic TFT Technology, Transparent Conductors, Patterning Processes: Photo lithography for Thin Film LCD, Wet Etching, Dry Etching; Flexible Displays	**15**
II	**OPTICAL TRANSMITTER:** Basic concepts, characteristics of semiconductor injection LASER, LED, transmitter design and **OPTICAL RECEIVER:** Basic concepts, p-n and pin photo detectors, Avalanche photo detectors, MSM photo detector, receiver design, receiver noise, receiver sensitivity, optical amplifier and its applications. Photo transistors, solar cells, CCDs, IR and UV Detectors.	**15**
III	**OPTICAL SENSORS:** Photometry and Radiometry, Radiation Sources and characteristics. Detectors-Imaging and non-imaging (Thermal detectors, Photon detectors, Detector arrays: CCDs, CID, and FLIR etc.) and their Characteristics	**15**
IV	DISPLAY TYPES: Inorganic Phosphors, Cathode Ray Tubes (CRTs), Vacuum Florescent Displays, Filed Emission Displays; Plasma Display Panels, LED Display Panels; In organic Electroluminescent Displays: Thin Film Electro Luminescent Displays, AC Powder Electroluminescent Displays; Organic Electroluminescent Displays (OLEDs), Liquid Crystal Displays (LCDs)	**15**
V	**EMERGING DISPLAYS:** Paper like and Low Power Displays: Colorant Transposition Displays, MEMSbaseddisplays,3-DDisplays, 3-D Cinema Technology, Auto Stereoscopic 3-D Technology, Volumetricand3-DVolumetricDisplayTechnology,Holographic3-DTechnology;Mobile Displays, Energy Aspects of Mobile Display Technology.	**15**
TOTAL		**75**

CO	**Course Outcomes**

CO1	Study the basic of Organic TFT Technology and Thin film deposition techniques
CO2	Gain the knowledge of characteristics of semiconductor injection LASER, LED ,transmitter design

CO3	Understand the various types Detectors-Imaging and non-imaging
CO4	Explain the types of display
CO5	Understand the concept of Paper like and Low Power Displays
Text books	
1	Principles of optics, Born and Wolf, SPI Emile stone series on- Design of optical coatings
2	Practical Design and Production of Optical Thin Films–Second Edition–Ronald Ron Wiley – CRC Press – 2002
Reference Books	
1	Fundamentals of Space Systems by Vincent L. Piscane, Oxford University Press,2005
2	CCDarrays,Cameras&Displays-GeraldCHoist1998[2ndEd],JCD Publishing-SPIE Optical Engg. Press

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

CORE COURSE (CC-14)–IOTAND ITS APPLICATIONS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCEC62	5	0	0	VI	4	5	50	50	100

LO1	Analyze the **Internet of Things and** applications
LO2	Analyze the **design principles and communication technologies** used in IoT/M2M systems.
LO3	Explain **web communication protocols**, such as CoAP, HTTP, and REST, for connected devices.
LO4	Apply **Internet connectivity and data-handling concepts**, including IP addressing, data acquisition, and data analytics.
LO5	Develop **basic IoT applications using the Arduino IDE**, sensors, and interfacing modules.

Prerequisites:

Unit		
I	**Internet of Things:** An Overview – IoT Definition – IoT Vision – Smart and Hyper connected Devices – IoT Conceptual Framework – IoT Architecture View – Technology behind IoT (Server-end Technology) – Major Components of IoT System – APIs and Device Interfacing Components – Platforms and Integration Tools – Popular IoT Development Boards – Role of RFID in IoT Applications – Wireless Sensor Networks – M2M Communication and M2M Architecture – Example: Smart Home.	**15**
II	**Design Principles and Connected Devices:** Introduction – IoT/M2M Systems Layers and Design Standardization (Modified OSI Model for IoT/M2M Systems, ITU-T Reference Model, ETSI M2M Domains) – Wireless Communication Technologies (NFC, Bluetooth BR/EDR and BLE, ZigBee, Wi-Fi, RF Modules, GPRS).	**15**
III	**Design Principles and Connected Devices:** Web Communication Protocols for Connected Devices (Constrained Application Protocol – COAP)–Web Connectivity for Connected Devices using Gateway–SOAP –REST– HTTP– REST ful Services –Web Sockets.	**15**
IV	**Internet Connectivity Principles:** Internet Connectivity – IP Addressing in IoT – Media Access Control – Application Layer Protocols (HTTP, HTTPS, FTP, Telnet)–Data Acquiring, Storage and Organizing–Data Processing and Analytics–Data Analytics Architecture and Stack.	**15**
V	**Applications of IoT:** Introduction to Arduino IDE – Writing Code in Sketch, Compiling, Debugging and Uploading to Arduino Board – Role of Serial Monitor –Embedded 'C' Language Basics – Working of Digital and Analog Pins in Arduino Platform – Interfacing LED, Button, Sensors(DHT,LDR,MQ135,IR)–Displaying Data on LCD–Interfacing Keypad– Serial Communication – Interfacing HC05 (Bluetooth Module) – Interfacing Relay Module to Control 220V AC Supply.	**15**
TOTAL		**75**

CO	Course Outcomes
CO1	To explain the **fundamental concepts, architecture, and enabling technologies of the Internet of Things (IoT)**.
CO2	To analyze **IoT communication models and standards**.

CO3	To apply **web communication protocols** in connected devices.
CO4	Understand IoT internet connectivity and data analytics architecture.

CO5	Design and implement basic IoT applications using Arduino and sensors.
Text books	
1	Internet of Things: A Hands-On Approach–Arshdeep Bahga &Vijay Madisetti, Universities Press.
2	The Internet of Things: Enabling Technologies, Platforms, and Use Cases – Pethuru Raj& Anupama C. Raman, CRC Press.
Reference Books	
1	Designing the Internet of Things– Adrian McEwen & Hakim Cassimally ,Wiley.
2	Building the Internet of Things–Maciej Kranz,Wiley.

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

CORE COURSE(CC-15)–COMMUNICATION AND SYSTEM DESIGN LAB

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UCECP6	**0**	0	**6**	VI	4	6	**50**	**50**	**100**

Learning Objectives	
LO1	To understand the **working principles of modulation and demodulation techniques** used in analog and digital communication systems.
LO2	To perform experiments on **pulse modulation and digital communication systems** and analyze their outputs.
LO3	To design and construct **regulated power supply circuits** for various voltage requirements.
LO4	To interface and use **electronic sensors**, such as LDR, thermistor, and photodiode, in practical applications.
LO5	To build simple **electronic systems**, such as burglar alarms, temperature switches, and audio amplifiers.

Prerequisites:

Contents

1. Amplitude Modulation and Demodulation
2. Frequency Modulation and Demodulation
3. Pulse Modulation – PAM, PWM, and PPM; Pulse Code Modulation (PCM)
4. Digital Modulation and Demodulation – ASK, PSK, QPSK, and FSK
5. PLL and Frequency Synthesizer
6. Design and Construction of a Fixed-Voltage Power Supply
7. Design and Construction of a Dual Power Supply
8. Design and Construction of a Switching Power Supply
9. Design and Construction of a 1.5 V to 12 V Power Supply Using a Multitap Transformer
10. Design and construction of Burglar alarm using L.D.R
11. Design and construction of Temperature switch using Thermistor
12. Design and construction of Light sensitive switch using Photodiode.
13. Design and construction of Audio amplifier using LM 380.

Total Hours:90

CO	**Course Outcomes**
CO1	Apply the principles of **analog modulation and demodulation**, such as amplitude and frequency modulation, in practical circuits.
CO2	Analyze and implement **pulse and digital modulation techniques**, including PAM, PWM, PPM, ASK, PSK, QPSK, and FSK.
CO3	Design and test **phase-locked loop (PLL) and frequency synthesizer circuits** for communication applications.
CO4	Construct and evaluate **power supply circuits**, including fixed, dual, switching, and variable power supplies.
CO5	Develop and implement **electronic application circuits**, such as alarms, switches, and audio amplifiers, using sensors and integrated circuits.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	3
CO2	3	3	1	2	2	3
CO3	3	3	1	3	2	3
CO4	3	2	1	2	2	3
CO5	3	2	1	2	2	3
Weightage of course contributed to each PSO	15	12	5	11	10	15

ELECTIVE COURSE(7) –ARTIFICIAL INTELLIGENCE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC61	4	0	0	VI	3	4	50	50	100

Learning Objectives	
LO1	Learn the basic knowledge of Agents and environments.
LO2	Provide the in-depth knowledge of Searching methods of AI.
LO3	Understand the basic concepts of logical agent.
LO4	Examine the working of classical planning
LO5	Know the basics of learning for classification.

Prerequisites:

Unit	Contents	No.of Hours
I	**Artificial Intelligence**: AI – Foundations of Artificial – History of Artificial Intelligence - Intelligence agents: Agents and Environments - Good behavior: The concept of rationality - The nature of Environments - The structure of agents (Agent Programs, Simple reflex agents and Model based reflex agents) – Problem Solving: Problem solving agents (Well-defined problems and solutions And Formulating Problems) -Example Problems– Heuristic functions.	12
II	**Beyond Classical Search**: Local Search Algorithms and Optimization Problems - Local Search in Continuous Spaces – Online Search Agents and Unknown Environments. Adversarial Search: Games – Optimal Decisions in Games– Alpha-Beta Pruning–Imperfect Real time Decisions–Partially Observable Games	12
III	**Logical Agents:** Knowledge based Agents – The Wumpus World – Logic – Propositional Logic: A Very Simple Logic (Syntax, Semantics, A simple knowledge base) – Effective Propositional Model Checking – Agents Based on Propositional Logic (A hybrid agent, Logical state estimation). First-Order Logic: Representation Revisited-Syntax and Semantics of first- order logic- Knowledge Engineering in first-order logic	12
IV	**Classical Planning:** Definition of Classical Planning – Algorithms for Planning as State Space Search – Planning Graph – Other Classical Planning Approaches. Planning and Acting in the Real World: Time, Schedules and Resources– Hierarchical Planning– Multi Agent Planning.	12
V	**Learning**: Form of Learning– Supervised Learning–Learning Decision Model (The Decision tree representation and Inducing trees from Examples)–	12

	Artificial Neural Networks–Practical Machine Leaning. Robotics: Robot Hardware–Robotic Perception–Planning to Move–Moving- Robot Software Architectures – Application Domains	
	TOTAL	**60**

CO	**Course Outcomes**
CO1	Explain AI foundations, intelligent agents, and problem-solving methods
CO2	Apply search techniques and adversarial search strategies.
CO3	Analyze logical agents and knowledge representation methods.
CO4	Understand classicalplanning and multi-agent system
CO5	Implement basic machine learning models and understand robotics applications.

Text books	
1	Artificial Intelligence: A Modern Approach–Stuart Russell & Peter Norvig, Pearson Education.
2	Artificial Intelligence–Elaine Rich & Kevin Knight, McGraw Hill.
Reference Books	
1.	Artificial Intelligence: Foundations of Computational Agents–David L. Poole & Alan K. Mack worth, Cambridge University Press. Machine Learning–Tom M. Mitchell, McGraw Hill.
2.	Introduction to Artificial Intelligence and Expert Systems–Dan W. Patterson, PHI Learning.

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**1**	**2**	**2**	**3**
CO2	**3**	**3**	**1**	**2**	**2**	**3**
CO3	**3**	**3**	**1**	**3**	**2**	**3**
CO4	**3**	**2**	**1**	**2**	**2**	**3**
CO5	**3**	**2**	**1**	**2**	**2**	**3**
Weightage of course contributed to each PSO	**15**	**12**	**5**	**11**	**10**	**15**

ELECTIVE COURSE (7)– PCB DESIGN

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC62	4	0	0	VI	3	4	50	50	100

Learning Objectives	
LO1	Understand the **fundamentals of PCB technology**, including PCB structure, components, types, and advantages.
LO2	Explain **PCB design and artwork generation techniques**, including manual layout, laminates, and image transfer methods.
LO3	Analyze **PCB manufacturing processes**, such as plating, etching, drilling, and mechanical operations.
LO4	Understand the **construction and applications of flexible and rigid-flex PCBs**, along with soldering techniques and rework methods.
LO5	Evaluate the **environmental and safety aspects of PCB manufacturing**, including pollution control, recycling, and safe handling of chemicals

Prerequisites:

Unit	Contents	No.of Hours
I	Analyze PCB manufacturing processes such as plating, etching, drilling, and mechanical operations. Understand the construction and applications offlexible and rigid-flex PCBs, along with soldering techniques and rework methods.	12
II	Evaluate environmental and safety aspects in PCB manufacturing, including pollution control, recycling, and safe handling of chemicals.	12
III	**PLATING, ETCHING AND MECHANICAL OPERATIONS: Plating**– Electroplatingprocess–Techniques–Commonproblems.**Etching**–Solutions and chemistry –Equipment and techniques–Typical problems. **Mechanical Operations** – Cutting – Punching – Drilling.	12
IV	**FLEXIBLE PCB'S AND SOLDERING:** Flexible & Rigid-Flex PCB's**–** Construction–Advantages–Applications. Soldering–Theory–Materials– Hand and mass soldering –Post-solder cleaning –Rework and repair.	12
V	**ENVIRONMENTAL CONCERNS:** Pollution in PCB Industry **–** Wastewater – Air pollution – Toxic chemicals**.** Control & Recycling **–** Water recycling – Recovery techniques –Environmental standards. Safety Precautions**–**Handling Toxic chemicals–Work place safety	12
TOTAL		**60**

CO	Course Outcomes
CO1	Explain PCB fundamentals, classification, and manufacturing process
CO2	Understand art work preparation and image transfer techniques
CO3	Analyze plating, etching, and mechanical fabrication processes.
CO4	Describe flexible PCBs and soldering techniques
CO5	Identify environmental concerns and safety practices in PCB industry.

Text books

1	Printed Circuit Boards: Design, Fabrication, and Assembly– R.S.Khandpur,McGrawHill Education.
2	PrintedCircuitBoardDesignTechniquesforEMCCompliance–MarkI.Montrose,IEEE Press.

Reference Books

1.	Handbook of Printed Circuit Manufacturing–Raymond H.Clark, McGraw Hill.
2.	Flexible Printed Circuits–Joseph Fjelstad, Electro chemical Publications.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	3
CO2	3	3	1	2	2	3
CO3	3	3	1	3	2	3
CO4	3	2	1	2	2	3
CO5	3	2	1	2	2	3
Weightage of course contributed to each PSO	15	12	5	11	10	15

ELECTIVE COURSE(8) –EMBEDDED SYSTEMS AND RTOS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UECA62	**4**	0	0	VI	**3**	**4**	**50**	**50**	**100**

Learning Objectives	
LO1	Learn the fundamental and study about the basics of Embedded systems.
LO2	Provide the in-depth knowledge of buses and networks.
LO3	Understand the basic concepts of driver devices.
LO4	Examine the principles and operations of Embedded software
LO5	Know the basics of trigger, operations and function soft the RTOS

Prerequisites:

Unit	Contents	No. of Hours
I	**INTRODUCTION TO EMBEDDED SYSTEMS:** Embedded systems – Applications in real-life devices – Processors and other hardware units – Software embedded in systems – Example embedded systems – System-on-Chip (SoC) and VLSI integration	**12**
II	**DEVICES AND BUSES FOR DEVICE NETWORK:** I/O devices – Timer and counting devices – Serial communication (I2C, CAN, USB)–Parallel communication (PCI, PCI-X, High- Speed Buses) Simple Examples of device networks.	**12**
III	**DEVICE DRIVERS AND INTERRUPT SERVICING:**Device drivers– Parallel and serial port drivers–Timer drivers–Interrupt servicing mechanism– Context switching, deadlines, and interrupt latency–Simple examples of interrupt handling.	**12**
IV	**EMBEDDED SOFTWARE DEVELOPMENT USING IDE:** Introduction to IDE – Embedded programming in C and Assembly – Creating projects, adding files, building, debugging and simulating–Uploading software to target system–Basic trouble shooting tips.	**12**
V	**REAL TIME OPERATING SYSTEM (RTOS):** Basic concepts of RTOS–Real-time general- purpose OS–Interrupt handling– Task scheduling–Embedded system design issues–Use of emulator, target system, and software tools–Simple case studies for better.	**12**
	TOTAL	**60**

CO	**Course Outcomes**
CO1	Explain embedded system architecture and applications.
CO2	Understand device interfacing and communication buses.
CO3	Analyze device drivers and interrupt handling mechanisms.
CO4	Describe RTOS concepts, scheduling techniques, and real-time design issues.
CO5	Describe RTOS concepts, scheduling techniques, and real-time design issues.

Text books

1	Embedded Systems: Architecture, Programming and Design–RajKamal, McGraw Hill Education.
2	Real-Time Concepts for Embedded Systems– QingLi & Caroline Yao,CMP Books.

Reference Books

1	Embedded Systems: Real-Time Interfacing to Arm Cortex-Microcontrollers–Jonathan W. Valvano,CreateSpace.
2	The µC/OS-II Real-Time Kernel–JeanJ. Labrosse, CMPBooks.3.
3	ProgrammingEmbeddedSystems inCandC++–MichaelBarr &AnthonyMassa,O'Reilly

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	3
CO2	3	3	1	2	2	3
CO3	3	3	1	3	2	3
CO4	3	2	1	2	2	3
CO5	3	2	1	2	2	3
Weightage of course contributed to each PSO	15	12	5	11	10	15

CORE COURSE (CC-15) –MAJOR PROJECT

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
26UCEC6P	**MAJOR PROJECT**	**Core Course16 (CC-16)**	0	**0**	**4**	**-**	**5**	**4**	**50**	**50**	**100**

Learning objectives		
LO1	To develop skills to formulate a technical project.	
LO2	To give guidance on the various task soft the project and standard procedures.	
LO3	To give guidance on the various procedures for validation of the product and analyze the cost Effectiveness.	
LO4	To provide guidelines to prepare technical report of the project.	
LO5	Knowthebasicsofprovideguidelinestoprepare technicalreportoftheproject.	
	Details	**No. of Hours**
I	Formulate areal-world problem, identify the requirement and Develop the design solutions.	12
II	Identify technical ideas, strategies and methodologies.	12
III	Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.	12
IV	Perform test and validate through conform acne of the developed Proto type and analyze the cost effectiveness.	12
V	Explain the acquired knowledge through preparation of report and oral presentations	12
	Total	60

ELECTIVE COURSE (8)– POWER ELECTRONICS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
26UEEC64	4	0	0	VI	3	4	50	50	100

Learning Objectives	
LO1	Learn the fundamental and study about the basics ofpowerdevices.
LO2	Provide the in-depth knowledge of DIAC and TRIAC.
LO3	Understand the basic concepts of choppers.
LO4	Examine the principles and operations of DC motors.
LO5	Know the basics of trigger, operations and functions of the welding.

Prerequisites:

Unit	Contents	No. of Hours
I	**POWER DEVICES**: Need for semiconductor power devices, Power diodes, enhancement of reverse blocking capacity (concept only), Introduction to Thyristor family. Silicon Controlled Rectifier (SCR): structure, V–I characteristics, turn-on and turn- off characteristics, basic ratings ,factors affecting characteristics (brief), gate-triggering concept, basic protectioncircuits and snubber circuit (overview).	12
II	**DIAC AND TRIAC**: Basic structure, working and V–I characteristics of DIAC and TRIAC, application of DIAC as a triggering device for TRIAC (concept). Insulated Gate Bipolar Transistor (IGBT): basic structure and I–V characteristics only. Power MOSFETs: operation modes and switching characteristics (overview). Power BJT: saturation, quasi-saturation state and second breakdown (brief).	12
III	**CHOPPERS**: Basic chopper circuit, types of choppers–step-down and step-up choppers, operation of DC chopper using self-commutation (concept only). Application of SCR: SCR as a static switch, phase-controlled rectification – single phase half wave, full wave and bridge rectifier switch inductive and non-inductive loads (basic operation);AC voltage control using SCR and TRIAC as a switch	12
IV	**D.C MOTORS:** Motor principle, comparison of motor and generator action. AC motors–induction motors (basic working), speed control (introductory idea), synchronous motors (concept only), relays–characteristics and applications (overview).	12
V	**WELDING:** Welding – resistance welding and seam welding (basic concept), induction heating – principle only, high voltage DC transmission –introduction, fan regulator using TRIAC, electromechanical machines – principle of operation, thyristor based speed control of DC and AC motors (block diagram level).	12
TOTAL		**60**

CO	Course Outcomes
CO1	Explain operation and characteristics of power semiconductor devices.

	Analyze switching characteristics of DIAC, TRIAC, MOSFET, IGBTand BJT.

CO3	Understand operation of choppers &controlled rectifiers.
CO4	Describeworkingprinciplesofelectricmotorsandbasicspeedcontrolmethods.
CO5	Identify industrial applications of power electronics such as welding, heating and motor drives.
Textbooks	
1	Power Electronics: Circuits, Devices and Applications–Muhammad H. Rashid, Pearson Education.
2	Power Electronics–P.S. Bimbhra, Khanna Publishers.
Reference Books	
1	Power Electronics: Converters, Applications, and Design–Ned Mohan, ToreUndeland& William Robbins, Wiley.
2	Modern Power Electronics and ACDrives–BimalK.Bose, Pearson

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**2**	**2**	**2**	**3**
CO2	**3**	**2**	**2**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**2**	**2**
CO4	**3**	**2**	**2**	**2**	**2**	**3**
CO5	**3**	**3**	**2**	**2**	**3**	**2**
Weightage of course Contributed to each PSO	**15**	**12**	**11**	**11**	**12**	**12**

ABILITY ENHANCEMENT COURSE–DESIGN THINKING

Subject	L	T	P	S	Credits	Inst.	Marks

Code						Hours	CIA	External	Total
26UAEC61	**2**	0	0	VI	**2**	**2**	**50**	**50**	**100**

Learning Objectives	
LO1	To recall and describe the key concepts, stages, and principles of Design Thinking.
LO2	To explain the importance of empathy, ideation, and proto typing in solving user-entered problems.
LO3	To apply Design Thinking methods such as brain storming, empathy mapping, and SCAMPER to real-world problems.
LO4	To analyze user needs and problem statements using observation and structured frameworks.
LO5	To design innovative solutions and develop prototypes based on insights gained through the Design Thinking process.

Prerequisites:

Unit	Contents	No. of Hours
I	**Introduction to Design Thinking** Introduction to Design Thinking, Essential Design Thinking Skills, Core Principles of Design Thinking, Foundations of Design Thinking, Building an Effective Design Thinking Team, Discussion of Problems From IT sector.	**6**
II	**Design Thinking Phases** Stages of Design Thinking, Role of observation in understanding product and process challenges, Preparation of AEIOU and other canvases with defined problem statement, Exploring Design Thinking innovations, Understanding the Role of Design Thinking in Product and Process Innovation, Double Diamond model and its applications.	**6**
III	**Design Thinking Techniques** Understanding, listening and Empathizing Techniques, exploring observation methods, Utilizing a structured, open-ended approach for effective communication, Ideation Labs, Brainstorming techniques for idea generation, Applying innovation to poster creativity, Application SCAMPER technique to support Problem Statement	**6**

IV	**Proto typing Methods** Methods and Tools for Design Thinking Practice; Empathize: Ask five why questions, Empathy map, storytelling, critical items diagram, mind map, journey map; Ideate: Brainstorming, 2x2 matrix, Need-Approach-Benefit-Competition (NABC) Methods; Prototype: Exploration map, Minimum Viable Product (MVP), Feasibility Testing, Viability Testing, A/BTesting, Sustainability Verification, Collect Feedback, Iterate and Improve, PDC canvas versioning	**6**

V	**Case Studies** Quick-Commerce Applications – Food and Grocery Delivery (eg. Swiggy, Instamart), Uber, OLA, Rapido, E-Commerce Applications – Online Shopping (e.g. Amazon), Online Publishing (e.g. Canva), Online Ticket Booking (e.g. BookMyShow), Fintech apps (eg. Google Pay, Razor pay etc.)	**6**
	TOTAL	**30**

CO	**Course Outcomes**
CO1	Understand the fundamental principles and importance of Design Thinking in fostering innovation, Ethics and its relevance.
CO2	Apply systematic problem identification, problem framing, articulation, and problem-solving Approaches in the context of Design Thinking
CO3	Analyze and evaluate different tools and methodologies used in Design Thinking ,such as observation, ethno graphicre search and mind mapping to gain in sights into users' needs
CO4	Develop and refine product concepts by preparing product development canvases(PDC)that considerproductexperience,functions,features,andsustainabledevelopmentofthecomponents
CO5	Createafinalworkingprototypeforprojectswithlimitations,documentingthefunctionalityand features, viability, sustainability, scalability, cost and resource utilization for the product

Open-source software and websites	
➢	Google Workspace: Docs, Sheets and Slides
➢	Google Jamboard
➢	Mind-mapping tools:Wise mapping,Freeplane,Semantik
Reference Books	
➢	Soni,Pavan.DesignYourThinking:TheMindsets,ToolsetsandSkillSetsforCreativeProblem-solving. Penguin Random House India Private Limited, 2020
➢	TimBrown,ChangebyDesign:HowDesignThinkingTransformsOrganizationsandInspires Innovation, HarperCollins e-books (2009)
➢	Liedtka, Jeanne, Randy Salzman, and Daisy Azer. Design thinking for the greater good: Innovationin the social sector. Columbia University Press, 2019

➢	B.K. Chakravarthy, Design Technology and Innovation, SWAYAMNPTEL(Online)
➢	B.K.Chakravarthy, Innovation by Design,SWAYAM NPTEL(Online)
➢	Nina Sabnani, Understanding Design, SWAYAM NPTEL(Online)
Note: Activities are to be performedinateam size of 3-4students.Reportis to be prepared based on these activities	
➢	Brainstorm and explore various problems in IT field. Select an appropriate problem, draft a Problem Statement and get it approved for performing further activities.
➢	Design AEIOU canvas
➢	Design Empathy map

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**3**	**2**	**2**	**2**	**2**	**3**
CO2	**3**	**2**	**2**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**2**	**2**
CO4	**3**	**2**	**2**	**2**	**2**	**3**
CO5	**3**	**3**	**2**	**2**	**3**	**2**
Weightage of course Contributed to each PSO	**15**	**12**	**11**	**11**	**12**	**12**