B.Sc. (ELECTRONICS AND COMMUNICATION)

SYLLABUS

FROM THE ACADEMIC YEAR

2024-2025 ONWARDS

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

(As per TANSCHE Compliance Common Syllabus Template)

Contents

The learning outcomes-based approach implies that the outcomes are identified and considered according to the ground-work of plans. Course contents, learning activities and assessment types are designed to be consistent with the achievement of desired learning outcomes. The learning outcomes are in terms of knowledge, professional attitude, work ethics, critical thinking, self-managed learning, and adaptability, problem solving skills, communication skills, inter personal skills and group works. At the end of a particular course/program, assessment is carried out to determine whether the desired outcomes are being achieved. This outcome assessment provides feedback to ensure that element in the teaching and learning environment are acting in concert to facilitate the nurturing of the desired outcomes. The expected learning outcomes are used as reference points that would help formulate graduate attributes, qualification descriptors, programmes learning outcomes and course learning outcomes which in turn help not only in curriculum planning and development, but also in delivery and review of academic programmes.

The overall objectives of the learning outcomes-based on the curriculum framework, these are: Help formulate graduate attributes, qualification descriptors, program learning outcomes and course learning outcomes that are expected to be demonstrated by the holders of qualification. Enable prospective students, parents, employers and others to understand the nature and level of learning outcomes or attributes a graduate of a programme should be capable of demonstrating on successful completion of the programme of study. Maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility. Provide higher education institutions an important point of reference for designing teaching-learning strategies, assessing student learning level, and periodic review of programme and academic research.

The emerging trends in electronics are a program that needs to develop a specialized skill set among the graduates to cater the need for industries. In recent years, electronic science has made unprecedented growth in terms of new technologies, new ideas and principles. The research organizations and industries that work in this frontier area are in need of highly skilled and scientifically oriented manpower. This manpower can be available only with flexible, adaptive and progressive training programs and a cohesive interaction among the research organizations, academicians and industries. The key areas of study within the subject area of electronic science comprises of: Semiconductor devices, Analog and digital circuit design, Microprocessors & microcontrollers, Communication techniques, IOTs for Electronics, artificial intelligence, embedded systems, machine learning, computer hard wares, computer coding/programming skills in high/low level languages, etc.

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	**B.Sc. ELECTRONICS AND COMMU ICATION**
Programme Code:	
Duration:	**3Years (UG)**
Programme Outcomes:	**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 shareone's 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 ; analyse 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; analyse 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 analyse interprets and draws conclusions from quantitative/qualitative data ; and critically evaluates 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. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 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. **PO 13: Moral and ethical awareness/reasoning**: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to ones work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and

	sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO 15: Lifelong learning:** Ability to acquire knowledge and skills, how to learn, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/ deskilling.
Programme Specific Outcomes:	**PSO4:** Analytical & Scientific Reasoning: Apply scientific methods, collect and analyze data, test hypotheses , evaluate evidence, apply Statistical techniques and use computational models. **PSO5:** Research related skills: Formulate research questions, conduct literature reviews, design and execute research studies, communicate research findings and collaborate in research projects. **PSO6:** Self-directed & Lifelong Learning: Set learning goals, manage their own learning, reflect on their learning, adapt to new contexts, seek out new knowledge, collaborate with others and to continuously improve their skills and knowledge, through ongoing learning and professional development, and contribute to the growth and development of their field.

PO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
PO1	✓					
PO2		✓				
PO3			✓			
PO4				✓		
PO5					✓	
PO6						✓

2. Highlights of the revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, lab and project with viva-voce examinations, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application-oriented content wherever required.
- The core subjects include latest developments in the education and scientific, advanced programming packages allied with the discipline topics, practical training, devising statistical models and algorithms for providing solutions to industry or real-life situations. The curriculum also facilitates peer learning with advanced statistical topics in the final semester, catering to the needs of stakeholders with aptitude.
- Thegeneralterm,"problemsolving"skillsareincludedasmandatorycomponentsinthe "Training for competitive examinations" course at the final semester.
- The curriculum is designed so as to strengthen the industry academic interface and provide more job opportunities for the students.
- The Internship during the second-year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- A practical and project with viva-voce components are enabling the student with application of concept all knowledge to practical situations. The state of art technologies in conducting a scientific and systematic way is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.

Value additions in the revamped curriculum:

Semester	Newly introduced Components	Outcome/Benefits
I	**Foundation Course** To ease the transition of learning from higher secondary to higher education, providing an over view of the pedagogy of learning literature and analyzing the world through the literary to an perspective.	➢ Impart confidence among the students ➢ Create interest for the subject
I, II, III, IV	**Skill Enhancement papers** (Discipline centric/Generic/Entrepreneurial)	➢ Industry ready graduates ➢ Skilled human resource ➢ Students are equipped with essential skills to make them employable
		➢ Training on language and communication skills enable the student's gain knowledge and exposure in the competitive world.
		➢ Discipline centric skill willing prove the technical know- how of solving real life problems.
III,IV,V&VI	Elective Papers	➢ Strengthening the domain knowledge ➢ Introducing the stake holders to the State-of Art techniques from the streams of multi- disciplinary, cross disciplinary and inter disciplinary nature ➢ Emerging topics in higher education/industry/communication net work/health sector etc. are introduced with Hands-on training.

IV	Elective papers	➢ Exposure to industry molds students into solution providers ➢ Generates Industry ready graduates ➢ Employment opportunities enhanced
V	Elective papers	➢ Self-learning is enhanced ➢ Application of the concept to real situation is conceived resulting Intangible outcome
VI	Elective papers	➢ Enriches the study beyond the course. ➢ Developing a research frame work and presenting them independent and Intellectual id as effectively.
Extra Credits: For Advanced Learners/Honors degree		➢ To cater to the needs of peer learners/research aspirants
Skills acquired from the Courses	Knowledge, Problem solving, Analytical Ability, Professional competency, Professional communication and Transferrable skill	

Credit Distribution for UG Programmes

Sem I	Credit	H	Sem II	Credit	H	Sem III	Credit	H	Sem IV	Credit	H	Sem V	Credit	H	Sem VI	Credit	H
Part1. Language – Tamil	3	6	Part.1. Language – Tamil	3	6	Part.1. Language– Tamil	3	6	Part.1. Language – Tamil	3	6	5.1 Core Course– CCIX	4	5	6.1Core Course– CC XIII	4	5
Part. 2 English	3	6	Part. 2 English	3	4	Part.2 English	3	6	Part. 2 English	3	6	5.2Core Course– CC X	4	5	6.2 Core Course – CC XIV	4	5
1.3 Core Course– CCI	5	5	2..3 Core Course– CCIII	5	5	3.3Core Course – CC V	4	4	4.3 Core Course – CCVII Core Industry Module	4	4	5.3. Core Course CC - XI	4	5	6.3 Core Course– CC XV	4	5
1.4 Core Course – CCII	3	4	2.4 Core Course – CC IV	3	4	3.4 Core Course – CC VI	4	4	4.4 Core Course – CC VIII	4	4	5.4. Core Course/ Mini Project with viva-voce CC - XII	2	5	6.4Core Course/ Major Project with viva-voce CC - XVI	4	5

1.5 Elective I Generic/ Discipline Specific	5	5	2.5 Elective II Generic/ Discipline Specific	5	5	3.5 Elective III Generic/ Discipline Specific	4	4	4.5 Elective IV Generic/ Discipline Specific	4	4	5.5 Elective V Generic/ Discipline Specific	3	4	6.5 Elective VII Generic/ Discipline Specific	3	4
1.6 Skill Enhancement Course SEC-1	2	2	2.6 Skill Enhancement Course SEC-2	1	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	2	2	4.6 Skill Enhancement Course SEC-5	2	2	5.6 Elective VI Generic/ Discipline Specific	3	4	6.6 Elective VII Generic/ Discipline Specific	3	4
1.7 Skill Enhancement - (Foundation Course)	2	2	2.7 Skill Enhancement Course – SEC-3	1	2	3.7 Naan Muthalvan	2	2	4.7 Naan Muthalvan	2	2	5.7 Naan Muthalvan	2	2	6.7 Naan Muthalvan	2	2
			2.8 Naan Muthalvan	2	2	3.8 E.V.S.	2	2	4.8 V.B. .E	2	2	5.8 Internship /Industrial Visit / Field	1		6.8 Extension Activity	1	-
	23	**30**		**23**	**30**		**24**	**30**		**24**	**30**		**25**	**30**		**25**	**30**
Total– 142 Credits																	

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	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses[in Total]	13	14
Part-4	Skill Enhancement Course SEC-1	2	2
	Foundation Course	2	2
		23	**30**

Semester-II

Part	List of Courses	Credit	No. of Hours
Part-1	Language–Tamil	3	6
Part-2	English	3	4
Part-3	Core Courses & Elective Courses including laboratory[in Total]	13	14
Part-4	Skill Enhancement Course - SEC-2	1	2
	Skill Enhancement Course-SEC-3 (Discipline/Subject Specific)	1	2
	Naan Muthalvan	2	2
		23	**30**

Second Year–Semester-III

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]	12	12
Part-4	Skill Enhancement Course-SEC-5 (Discipline/Subject Specific)	2	2
	Naan Muthalvan	2	2
	E.V.S	2	2
		24	**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]	12	12
Part-4	Skill Enhancement Course - SEC-6 (Discipline/Subject Specific)	2	2
	Naan Muthalvan	2	2
	V.B.E	2	2
		24	**30**

Third Year-Semester-V

Part	List of Courses	Credit	No.of Hours
Part-3	Core Courses including Project/Elective Based	20	28
Part-4	Naan Muthalvan	2	2
	Internship/Industrial Visit /Field Visit	1	-
		23	**30**

Semester-VI

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project/Elective Based & LAB	22	28
Part-4	Naan Muthalvan	2	2
	Extension Activity	1	-
		25	**30**

Consolidated Semester wise and Component wise Credit distribution

Parts	SemI	Sem II	Sem III	Sem IV	SemV	SemVI	TotalCredits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	17	15	14	14	19	22	92
Part IV	-	2	2	4	4	2	22
Part V	-	-	-	-	-	1	2
Total	23	23	24	24	23	25	**142**

*****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.

Methods of Evaluation-Theory		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Evaluation-Practical		
Internal Evaluation	Lab performance, attendance, record note book maintenance, model practical examination	50 Marks
External Evaluation	End Semester Examination with viva-voce	50 Marks
	Total	100 Marks
Methods of Assessment		
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or Overview	
Application(K3)	Suggest idea/concept with examples, suggest formulae, Solve problems, Observe, Explain	
Analyze(K4)	Problem-solvingquestions,finishaprocedureinmanysteps,Differentiate	
	Between various ideas, Map knowledge	
Evaluate(K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations	

Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System For B.Sc (Electronics and Communication)

Semester I

Part	Specification	Courses	Credit	Hours per Week (L/T/P)
Part I	Language	Tamil	3	6
Part II	Language	English	3	6
Part III	Core 1	Basic Electronic Devices	5	5
	Core 2	Basic Electronics Devices Lab	3	4
	Elective Course 1 (Generic)	Introduction of C Language	5	5
	SEC 1	Programming in C Lab	2	2
	Foundation Course	Foundation of Electronics and Computers	2	2
	Total		23	30

Semester II

Part	Specification	Courses	Credit	Hours per Week (L/T/P)
Part I	Language	Language – Tamil	3	6
Part II	Language	English	3	4
Part III	Core 3	Digital Electronics	5	5
	Core 4	Digital Electronics Lab	3	4
	Elective Course 2 (Generic)	Introduction of Python Language	5	5
	SEC 2	Programming in Python Lab	1	2
	SEC 3	Computer Hardware	1	2
	Naan Mudhalvan	As per TN Govt. Guidelines	2	2
	Total		23	30

Semester III

Part	Specification	Courses	Credit	Hours per Week (L/T/P)
Part I	Language	Tamil	3	6
Part II	Language	English	3	6
Part III	Core 5	Electronic Circuits	4	4
	Core 6	Electronic and Electrical Circuits Lab	4	4
	Elective Course 3 (Generic)	Mathematics for Electronics I / Electronics for Competitive Exams	4	4
	SEC 4	Applied Electrical Circuits	2	2
	Naan Mudhalvan	As per TN Govt. Guidelines	2	2
Part IV	EVS	Environmental Studies	2	2
	Total		24	30

Semester IV

Part	Specification	Courses	Credit	Hours per Week (L/T/P)
Part I	Language	Tamil	3	6
Part II	Language	English	3	6
Part III	Core 7	Linear Integrated Circuits	4	4
	Core 8	Linear Integrated Circuits Lab	4	4
	Elective Course 4 (Generic)	Mathematics for Electronics II / Consumer Electronic Appliances	4	4
	SEC 5	Electronic Measurements and Instrumentation	2	2
	Naan Mudhalvan	As per TN Govt. Guidelines	2	2
Part IV	VBE	Value Based Education	2	2
	Total		24	30

Semester V

Part	Specification	Courses	Credit	Hours per Week (L/T/P)
Part III	Core 9	Microprocessor and Microcontroller	4	4
	Core 10	Optical Fiber Communication	4	4
	Core 11	Microprocessor and Microcontroller Lab	4	6
	Core 12	Mini Project	2	6
	Elective Course 5 (Domain Specific)	Digital Communication / Digital Signal Processing	3	4
	Elective Course 6 (Domain Specific)	Mobile Communication / Micro Wave and Radar	3	4
	Naan Mudhalvan	As per TN Govt. Guidelines	2	2
Part IV	Internship/ Industrial Visit/ Field Visit	Internship/ Industrial Visit/ Field Visit	1	-
	Total		23	30

Semester VI

Part	Specification	Courses	Credit	Hours per Week (L/T/P)
Part III	Core 9	Communication Systems	4	4
	Core 10	IoT and its applications	4	4
	Core 11	Communication and System Design Lab	4	6
	Core 12	Major Project	4	8
	Elective Course 7 (Domain Specific)	Robotics and Automations / PCB Design	3	3
	Elective Course 8 (Domain Specific)	VLSI Technology / Satellite Communication	3	3
	Naan Mudhalvan	As per TN Govt. Guidelines	2	2
Part V	Extension Activity	NSS/NCC/YRC	1	-
	Total		25	30

Credit Distribution for B.Sc., Electronics

S.No	Part	Course Details	Credit
1	III	Core	62
2		Elective Generic/ Discipline Specific Elective	30
3	I&II	Language & English (Lang – 4x3=12 Eng– 4x3=12)	24
4	IV&V	EVS(1x2)	2
5		Value Education(1x2)	2
6		Extension Activity(1x1)	1
7		• Skill Enhancement Course • Internship/Industrial Visit/Field Visit (1x1=1 credits) • Foundation Course • Naan Muthalvan	8 1 2 10
			142

Remarks: English Soft Skill Two Hours will be handled by English Teachers (4+2 = 6 hours for English).

SEMESTER - I

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	BASIC ELECTRONIC DEVICES	**Core Course–1 (CC-1)**	**5**	**0**	**-**	**-**	**5**	**5**	**25**	**75**	**100**

Course objectives

CO1	Learn the fundamental components of passive electronic devices.
CO2	Provide the in-depth knowledge of basic semiconductors.
CO3	Understand the basic concepts of semiconductor sand its characteristics
CO4	Examines the principles and operations of transistors and understand the basics of UJT and SCR characteristics
CO5	Know the basics of FETs and MOSFET components

UNIT	Details	No .of Hours	Course Objectives
I	Type of resistors – color code –construction of various types of resistors (carbon composition, carbon film, wire-wound etc.)– power ratings-capacitors(ceramic, mica polystyrene electrolytic)–fixed and variable capacitors	15	CO1

II	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	15	CO2
III	PN junction- Biasing a PN junction – forward and reverse biasing – PN junction diode: characteristics -static and dynamic resistance - diode rectifiers: Half wave and Full wave rectifier – Bridge rectifier –clippers and clampers - Zener diode– Characteristics-voltage regulation using Zener diode	15	CO3
IV	Bipolar transistor – UJT – Common Base, Common Emitter & Common Collector configurations and their characteristics – transistor biasing methods- Transistor as switch, amplifier– SCR	15	CO4
V	FET Constructional features-working Principle, feature sand characteristics - JFET and MOSFET and their characteristics – enhancement and depletion type	15	CO5
	Total	75	

Course Outcomes		
Course Outcomes	On completion of this course, students can able to	
CO1	Study the basic semiconductor devices and their Characterization.	PO5, PO6, PO10
CO2	Gain the knowledge of detailed functions of semiconductors.	PO10
CO3	Understand the various types of semiconductor devices Behaviors, different types of semiconductors	PO11
CO4	Explain the principles and working mechanism of different Types of semiconductors and the scope of application.	PO4, PO11
CO5	Understand the concept of device functionalities and help the Students to understand the basic electronic devices	PO4, PO11
Text Books		
1	V.K.Mehta, “Principles of electronics”, S.Chand & Co.,	
2	B.L.Theraja,“Basic Solid-State Electronics”,S.Chand & Co.,	
References Books		
1	SemiconductorPhysicsandDevices-BasicPrinciples|4th Edition.by**DonaldA. Neamen**(2021)	
Web Resources		
1	https://www.electronics-tutorials.ws/diode/diode_1.html	
2	https://www.electronicshub.org/types-of-semiconductor-devices/	
3	https://www.britannica.com/technology/semiconductor-device	
Methods of Evaluation		
Internal	Continuous Internal Assessment Test	25 Marks
	Assignments	

Evaluation	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ,True/False,Shortessays,Conceptexplanations,shortsummaryoroverview	
Application (K3)	Suggestidea/conceptwithexamples,suggestformulae,solveproblems,Observe, Explain	
Analyse(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge	
Evaluate (K5)	Longer essay / Evaluation essay ,Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations	

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	BASIC ELECTRONIC DEVICES LAB	**Core Course 2 - Practical 1 (CC-2)**	**-**	**-**	**4**	**-**	**3**	**4**	**50**	**50**	**100**

Course Objectives

CO1	Gain knowledge of electronics components
CO2	Examine the current & voltage characteristics of semiconductor devices
CO3	Identify the various device parameters from I-V characteristics
CO4	Extract important information from the graphical plots of device characteristics
CO5	Interpret the experimental data to understand the behavior of the device

UNIT	Details	No. of Hours	Course Objectives
I	PN Junction diode and Zener diode Characteristics	8	CO1
II	Bipolar Junction Transistor(BJT) Characteristics(Input and Output) – Common Base (CB);BJT Characteristics (Input and Output)– Common Emitter(CE); BJT Characteristics	8	CO2
	(Input and Output)–Common Collector (CC); Measurement of stability factor of self-biasing method ;Measurement of stability factor of fixed-biasing method		
III	Field Effect Transistor (FET) characteristics	8	CO3
IV	Photoconductivity measurements of LDR, Photodiode characteristics, Phototransistor characteristics	8	CO4
V	UJT and SCR characteristics	8	CO5
	Total	40	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Practice with active and passive semiconductor devices	PO4, PO7, PO8, PO9, PO11
CO2	Learn the semiconductor device characteristics.	PO4, PO7, PO8, PO9
CO3	Understand the basic semiconductor components working principles and methodology used inside the laboratory Environment	PO4,PO7,PO8, PO9, PO11
CO4	Design, construct the electronic circuits and observe the Characteristics.	PO4, PO7, PO8, PO9
CO5	Study and compare semiconductor device characterization	PO4,PO7,PO8, PO9
Text Books		
1	V.K.Mehta, "Principles of electronics",S.Chand & Co	
2	B.L.Theraja,"Basic Solid-state electronics",S.Chand & Co	
References Books		
1	Semiconductor Physics and Devices- Basic Principles, 4thEdition.by**DonaldA. Neamen** (2021)	
Web Resources		
1	https://www.electronics-tutorials.ws/diode/diode_1.html	
2	https://www.electronicshub.org/types-of-semiconductor-devices/	
3	https://www.britannica.com/technology/semiconductor-device	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	50Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	50Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ,True/False,Shortessays,Conceptexplanations,shortsummaryoroverview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate Between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				M			L	M	L		M
CO2				S			L	L	L		
CO3				S			M	M	L		M
CO4				S			M	L	L		
CO5				S			M	L	L		

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	INTRODUCTION OF C LANGUAGE	**Elective – 1 (ELE-1)**	**0**	**5**	**-**	**-**	**5**	**5**	**25**	**75**	**100**

Course objectives	
CO1	Understand the basic C programming language
CO2	Learn data structures and concepts
CO3	Know the statements of C-program
CO4	Understand functions, pointers and structures Use arrays, pointers and strings to the C-program

UNIT	Details	No. of Hours	Course Objectives
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)	15	CO1
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	15	CO2
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.	15	CO3
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.	15	CO4
V	**ARRAYS AND STRINGS**: Arrays -Single and Multi- dimensional arrays, Declaration and Initialization of arrays and strings, pointers and one-dimensional arrays-Structures- Definition, declaration of structure variables, accessing structure members unions -Data files-opening and closing a data file, Creating a data file.	15	CO5
	Total	75	

Course Outcomes		
Course Outcomes	On completion of this course, Student scan able to:	
CO1	Study the concept of basic C-programming language.	PO5, PO6, PO10
CO2	Gain the knowledge of data types.	PO10
CO3	Understand the various types of statements	PO11
CO4	Define, Explain and Need of a function	PO4, PO11
CO5	Understand the Arrays and Strings of C-program	PO4, PO11
Text Books		
1	E.Balaguruswami, Programming with C,TMH.	
2	Byron Gottfried, Programming with C, Schaum‟s Outline Series, TMH.	
	References Books	
1	Mahapatra, Thinkingin C,PHI.	
2	Brain W Kernighan and Dennis M Ritchie, The C Programming language, PHI	
3	Dennis &Ritchie:“ Programming in C”.	
	Web Resources	
1	www.cprogramming.com	
2	https://archive.nptel.ac.in/courses	
3	www.programmersheaven.com	

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	

Application (K3)	Suggestidea/conceptwithexamples,suggestformulae,solveproblems,Observe, Explain
Analyze(K4)	Problem-solvingquestions,finishaprocedureinmanysteps,Differentiatebetween Various ideas, Map knowledge
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	PROGRAMMIG IN C LAB **(Skill enhancement course 1)**	**- Practical (SEC – 1)**	**-**	**-**	**2**	**-**	**2**	**2**	**50**	**50**	**100**

Course Objectives	
CO1	Gain knowledge of Basic conditional statements
CO2	Examine the characteristics of various looping statements
CO3	Identify the various types of functions
CO4	Extract important information about arrays
CO5	Interpret the importance of Pointers

UNIT	Details	No .of Hours	Course Objectives
I	Temperature Conversion Fahrenheit to Degree Celsius and Solve and find all the possible roots of a Quadratic equation.	4	CO1
II	Sort a list of numbers in descending order and Matrix Multiplication	4	CO2
III	Check if a string is palindrome and Prepare a Mark sheet & also print the grade of the result	4	CO3
IV	Sort a list of names in alphabetic order and Find nCr using recursion	4	CO4
V	Calculate Std Deviation for a set of numbers and Evaluate the power series.	4	CO5
	Total	20	

Course Outcomes		
Course Outcomes	On completion of this course ,students will;	
CO1	Practice with various data types and if statements.	PO4, PO7, PO8, PO9, PO11
CO2	Learn the various looping statements characteristics.	PO4, PO7, PO8, PO9
CO3	Understand the basic working principles and methodology of user defined functions.	PO4,PO7,PO8, PO9, PO11
CO4	Design, construct the 1-D and 2-D arrays and observe the Characteristics.	PO4, PO7, PO8, PO9
CO5	Study the various aspects of Pointers.	PO4,PO7,PO8, PO9

Text Books	
1	E.Balagurusamy ,"Programming in ANSI C" ,TMH
2	Yashwant Kanetkar," Let Us C ", S.Chand &Co

References Books	
1	Computer Fundamentals and Introduction of C,Reema Theraja Programming with ANSI and Turbo C – Asok N.Kamthane, Pearson Education

Web Resources	
1	https://www.electronics-tutorials.ws/diode/diode_1.html
2	https://www.electronicshub.org/types-of-semiconductor-devices/
3	https://www.britannica.com/technology/semiconductor-device

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	50Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	50Marks
	Total	100 Marks

Methods of Assessment	
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend(K 2)	MCQ, True /False, Short essays, Concept explanations, short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate Between various ideas ,Map knowledge
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pro sand cons
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				M			L	M	L		M
CO2				S			L	L	L		
CO3				S			M	M	L		M
CO4				S			M	L	L		
CO5				S			M	L	L		

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	FOUNDATION OF ELECTRONICS & COMPUTERS (Skill enhancement Foundation Course)	**SEC FC 1**	**2**	**-**	**-**	**-**	**2**	**2**	**25**	**75**	**100**

Course Objectives	
CO1	Describe the concepts of basic semiconductors
CO2	Understand the concepts of diode circuits
CO3	Know about transistors and amplifiers
CO4	Gain knowledge of computer software's and languages
CO5	Learn how to solve problems and their concepts

UNIT	Details	No.of Hours	Course Objectives
I	**SEMICONDUCTOR BASICS:** Introduction to semiconductor materials, intrinsic & extrinsic semiconductors. p-type semiconductors, n-type semiconductors, p-n junction diode	6	CO1
II	**DIODE CIRCUITS:** Clipper, Clamping circuits, half wave and full wave rectifiers, center tapped and bridge rectifiers, Block diagram of DC power supply, Zener diode as voltage regulator	6	CO2
III	**TRANSISTORS AND FEEDBACK AMPLIFIERS:** BJT,FET, And MOSFET transistors action, Transistor configurations, Concept of feedback, negative and positive feedback, oscillators, Study of Hartley, Colpitts oscillators and crystal oscillator, IC, VLSI and ULSI	6	CO3
IV	**COMPUTER SOFTWARE & LANGUAGES:** i) Type of Software's – System Architecture ii) Machine Language – Assembly Language-High Level Language - Object Oriented Languages **PROGRAMMINGSTRUCTURE:** Modules and their function- Local and Global variables-Parameters-Return values-Sequential Logic Structure.	6	CO4
V	**PROBLEM SOLVING CONCEPTS FORTHECOMPUTER:** Constant Variables - Data Types - Functions -Operators - Expressions and Equations - **Organizing the Solution:** Analysing the problem - Algorithm - Flowchart - Pseudo code	6	CO5
	Total	30	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Identify the basics of computer and electronic applications	PO1,PO5, PO6
CO2	Understand and differentiate the concepts of basic Semiconductors	PO1,PO2,PO3,PO5, PO6, PO9
CO3	Learn amplifiers and circuit theory	PO1,PO5, PO6
CO4	Acquire the knowledge of problem-solving concepts	PO4,PO5, PO6
CO5	Recommend the usage of software' sin electronic devices	PO1,PO5, PO6
CO1	Identify the basics of computer and electronic applications	PO1,PO5, PO6

Text Books	
1.	Basic and Applied Electronics-T.K Bandyopadhyay, Books and Allied Pvt Ltd (2002)
2.	B.L.Theraja,"Basic Solid-state Electronics", S.Chand &Co
3.	V.K.Mehta, "Principles of Electronics",S.Chand & Co
4.	R.L.Boylestad,L.Nashelsky, Electronic Devices and Circuit Theory,Pearson Education(2006).
5.	Pradeep K.Sinha and PritiSinha,(2004)—Computer Fundamentals, Sixth Edition, BPB Publications
6.	Maureen Sprankle and Jim Hubbard,(2009)—Problem Solving and Programming Concept, Ninth Edition, Prentice Hall.
References Books	
1	N Bhargava,DC Kulshreshtha and S C Gupta, Basic Electronics and linear circuits, Tata Mc Graw-Hill (2007).
2	J.Millmanand C.Halkias, Integrated Electronics, Tata Mc Graw Hill (2001).
3	C.S.V.Murthy,(2009)—FundamentalsofComputers‖,ThirdEdition,Himalaya Publishing House
Web Resources	
1	http://www.tutorialspoint.com/computer_fundamentals/
2	http://www.top-windows-tutorials.com/computer-basics/
3	http://www.homeandlearn.co.uk/
4	https://archive.nptel.ac.in/courses

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S				S	S					
CO2	S	S		M	S	S			M		
CO3				M	S	S					
CO4	S			S	S	M					
CO5	S				S	S					

SEMESTER II

Subject Code	Subject Name	Category		L	T	P	S	Credits	Inst. Hours	Marks		
										CIA	External	Total
	DIGITAL ELECTRONICS	**Core Course 3 (CC-3)**		**5**	**-**	**-**	**-**	**5**	**5**	**25**	**75**	**100**

		Course Objectives
CO1		Study the basic principles of number systems and codes
CO2		Understand the basic concepts of digital logic families
CO3		Analyse arithmetic circuits.
CO4		Observe various Latches
CO5		Study registers and memories.

Unit	Details	No.of Hours	Course Objectives
I	**NUMBERSYSTEMANDCODES:** 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-alphanumeric codes.	15	CO1
II	**DIGITAL LOGIC FAMILIES:** Fan-in, Fan out, Noise Margin, Power Dissipation, Figure of merit, Speed power product, comparison of TTL and CMOS families. 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	15	CO2

Unit	Details	No.of Hours	Course Objectives
III	**ARITHMETIC CIRCUITS:** Binary addition. Half and Full Adder. Half and Full subtractor, Binary Adder/Subtractor. Multiplexers, De-multiplexers, Decoders, Encoders. Parity checker–parity generators – code converters	15	CO3
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–Programmable counters– Modulo–n counter	15	CO4
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 –Static RAM Cell	15	CO5
	Total	75	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Describe the outcomes of number systems.	PO6, PO9
CO2	Know the concept of Logical families.	PO6, PO7, PO9
CO3	Explain the methods of arithmetic circuits.	PO6, PO9
CO4	Describe latches, registers and memories.	PO6, PO9
CO5	Elaborate on the digital logic families	PO6,PO9

Text Books	
1	Digital Principles & Applications–Albert Paul Malvino & Leach
2	Digital Fundamentals– Thomas L.Floyd– Prentice Hall
3	Digital Electronics-an introduction to Theory and Practice-William H.Gothmann Prentice Hall

References Books	
1	Digital Practice using Integrated Circuits–R.P.Jain and Anand
2	Fundamentals of Digital Circuits,AnandKumar, 2nd Edn,2009,PHIL Earning Pvt.Ltd.
3	Digital Circuits and systems,Venugopal,2011,Tata Mc Graw Hill.
4	Digital Systems: Principles & Applications, R.J.Tocci,N.S.Widmer,2001,PHILearning
5	Digital Principles,R.L.Tokheim, Schaum"s Outline Series,Tata Mc Graw-Hill(1994)
WebResources	
1	https://onlinelibrary.wiley.com/doi/book/10.1002/9780470510520
2	https://www.freebookcentre.net/electronics_communication_books/Digital-Electronics-Books-Download.html

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or over view
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						M			M		
CO2						M	L		M		
CO3						M			M		
CO4						M			M		
CO5						M			M		

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	DIGITAL ELECTRONICS LAB	**CORE Practical – 4 (CC-4)**	**-**	**-**	**4**	**-**	**3**	**4**	**50**	**50**	**100**

Course Objectives

CO1	Understand the principles of motility test.
CO2	Understand the basic concepts of logic gate functions.
CO3	Learn the Demorgan's theorem using logic gates.
CO4	Study the Multiplexer and De-multiplexer demonstration using logic gates and identification.
CO5	Study and identification of Up/Down counters .

No. of Experiments	Details	No. of Hours	Course Objectives
1	Study and verify truth tables of AND, OR, NOT, NAND, NOR And XOR gates and Design all logic gates using NAND gate	8	CO1
2	Design all logic gates using NOR gate and Verify Demorgan"s theorem	8	CO2
3	Construction of gates using discrete components and Code conversion and Multiplexer using IC 74153 and De-Multiplexer using IC 74155	8	CO3

4	Truth table verification of Half adder and Full adder and Encoder using IC 74147 and Decoder using IC 7442 and Up counter using IC 7490 or IC 7493	8	CO4
5	Truth table verification of Half subtractor and Full subtractor and Study of M-S and J-K Flip flopsusing7476IC	5	CO5
6	Parallel-in and Parallel-out Shift register using IC 7495 Clock generation using NAND or NOR gate	3	CO5
	Total	40	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Describe and verify logic gates truth tables.	PO6, PO7, PO8, PO9, PO11
CO2	Demonstrate logic gates using NAND and NOR gates.	PO6, PO7, PO8, PO9, PO11
CO3	Construct and verify theorems.	PO6, PO7, PO8, PO9, PO11
CO4	Demonstrate Adder, Subtractor, Multiplexor, Encoder, Decoder	PO6, PO7, PO8, PO9, PO11
CO5	Describe Flip-flops, Shift registers, Clock generation using ICs.	PO6, PO7, PO8, PO9, PO11

Text Books	
1	M.Morris Mano Digital System Design, Pearson Education Asia (Fourth Edition)
2	Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia(1994)
	References Books
1	W.H. Gothmann, Digital Electronics: An Introduction to Theory and Practice, Prentice Hall of India (2000)
2	R.L.Tokheim,Digital Principles, Schaum,, Outline Series, Tata Mc Graw-Hill(1994)
Web Resources	
1	https://www.technicalbookspdf.com/electronic-engineering/digital-electronics/
2	https://easyengineering.net/digital-electronics-by-godse/

Methods of Evaluation		
	Continuous Internal Assessment Test	

Internal Evaluation	Assignments	50 Marks
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	50 Marks
	Total	100 Marks

Methods of Assessment	
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend(K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or over view
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze(K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						M	L	M	L		M
CO2						M	M	L	M		L
CO3						L	M	M	L		M
CO4						L	M	M	M		M
CO5						M	M	M	M		M

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	INTRODUCTION OF PYTHON LANGUAGE	**Elective – 2 (ELE-2)**	**0**	**5**	**-**	**-**	**5**	**5**	**25**	**75**	**100**

Course objectives	
CO1	Understand the basic python programming language
CO2	Learn data structures and concepts
CO3	Know the files, exceptions of python program
CO4	Understand tuples, dictionaries and dictionaries
CO5	Use and adopt GUI in python program

UNIT	Details	No. of Hours	Course Objectives
I	**BASICS OF PYTHON PROGRAMMING:** Features of Python, variables and identifiers, operators and expressions. Decision control Statements: Selection/Conditional branching statements, basic loop structures/iterative Statements, nested loops, break, continue, and pass Statements. Functions and Modules: function definition, function call, more on defining functions, recursive functions, modules.	15	CO1
II	**DATA STRUCTURES: Strings:** Introduction, built-in string methods and functions, slice operation, String Module. Regular Expressions. **Lists:** Introduction, nested list, cloning lists, basic list operations, list methods. **Functional programming:** filter(), map(),reduce()function.	15	CO2
III	**FILES AND EXCEPTIONS:** Read and writing files, pickling, handling exceptions. Built-in and user-defined exceptions. OOPS Concepts: Introduction, classes and object, class method and self-argument, the init () method, class variables and object variables, public and private data members, Inheritance, Operator Overloading.	15	CO3

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, built-indictionary functions.	15	CO4
V	**GRAPHICAL USER INTERFACES**: 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, Display text with Label Widgets, Organizing, Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons.	15	CO5
	Total	75	

Course Outcomes		
Course Outcomes	On completion of this course, student scan able to:	
CO1`	Study the concept of basic python programming language.	PO5, PO6, PO10
CO2	Gain the knowledge of data types.	PO10
CO3	Understand the various types of files and exceptions	PO11
CO4	Define, Explain and Need of python Program	PO4, PO11
CO5	Understand the tuples and GUI interfaces of python	PO4, PO11

Text Books	
1	Kenneth A.Lambert, The Fundamentals of Python: First Programs,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	AllenDowney,"ThinkPython:HowtoThinkLikeaComputerScientist",O"Reilly publications,2nd Edition
3	Albert Lukaszewski, "My SQL for python", PACKT publishers
4	MarkLutz,"Learning Python", O"Reilly Publications

Web Resources		
1	http://nptel.ac.in/courses/117106113/34	
2	www.scipy-lectures.org/intro/language/python_language.html	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge	
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations	

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	PROGRAMMING IN PYTHON LAB **(Skill Enhancement course) - 2**	**Practical (SEC – 2)**	-	-	2	-	2	2	50	50	100

Course Objectives	
CO1	Gain knowledge of Basic control statements
CO2	Examine the characteristics of Lists and Strings, Tuples and Dictionaries
CO3	Identify the various types of functions
CO4	Extract important information about files and Exceptions
CO5	Interpret the importance of GUI Programs

UNIT	Details	No .of Hours	Course Objectives
I	Basic Programs using Control statements and Loops, Solve and find the power bill for domestic households.	4	CO1
II	Sort a list of numbers in ascending order, Program to calculate and print the number of minutes in a year	4	CO2
III	Check if a string is palindrome, Program using various String methods	4	CO3
IV	Sort a list of names in alphabetic order, Program using List Methods	4	CO4
V	Program for traversing a dictionary, Program using Graphical User Interface	4	CO5
	Total	20	

Text Books	
1	Kenneth Lambert ,“Fundamentals of Python” ,TMH
References Books	
1	Allen Downey, ‘Think Python: How to Think Like a Computer Scientist”, O‟Reilly publications, 2nd Edition

Web Resources	
1	https://www.Python-tutorials.ws/Python_1.html
2	https://www.geeksforgeeks.org/Python_lists/

Course Outcomes		
Course Outcomes	On completion of this course ,students will	
CO1	Practice with various data types and if statements.	PO4, PO7, PO8, PO9, PO11
CO2	Learn the various looping statements characteristics.	PO4, PO7, PO8, PO9
CO3	Understand the basic working principles and methodology of lists and strings.	PO4,PO7,PO8, PO9, PO11
CO4	Design, construct the map(), filter() and reduce() functions.	PO4, PO7, PO8, PO9
CO5	Study the various aspects of GUI systems.	PO4,PO7,PO8, PO9

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	50 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	50 Marks
	Total	100 Marks

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				M			L	M	L		M
CO2				S			L	L	L		
CO3				S			M	M	L		M
CO4				S			M	L	L		
CO5				S			M	L	L		

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	COMPUTER HARDWARE **(Skill Enhancement Course) -3**	**SEC-3**	**2**	**-**	**-**	**-**	**2**	**2**	**25**	**75**	**100**

Course Objectives

CO1	Acquire knowledge on the concepts of computer hardware.
CO2	Describe the concept of memories, CPU and peripherals.
CO3	Discuss about power management in PC hardware system
CO4	Demonstrate PC drives and understand with latest device configurations.
CO5	Understand the latest hardware usage and architecture.

Unit	Details	No.of Hours	Course Objectives
I	**CPU:** CPU essentials–processor modes–modern CPU concepts–Architectural performance features–the Intel's CPU	4	CO1
II	**MEMORY CONCEPT:** Essential memory concepts – memory organizations–memory packages–modules–logical memory organizations – memory considerations – memory types – memory techniques – selecting and installing memory	4	CO2
III	**MOTHERBOARD:** Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots –form factor–upgrading a motherboard–chipsets–north bridge – south bridge	4	CO3
IV	**POWERSUPPLY:** 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– floppy drive–hard drive–data organization and hard drive– sector layout	4	CO4
V	**DRIVES:** IDE drive standard and features–Hard drive electronics – CDROM drive construction – CDROM electronics	4	CO5

	– DVD-ROM – DVD media – DVD drive and decoder.		
	Total	20	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Discuss the over all aspects of PC Hardware system	PO1,PO5, PO7
CO2	Familiarize with the recent technologies of computer drives.	PO1, PO2
CO3	Explain the hardware system and understand with the latest Device practices.	PO1, PO5
CO4	Understand very well about the computer motherboard architectures and peripherals.	PO7, PO8, PO10
CO5	Understand the essentials of computer hardware's	PO5, PO7, PO8

Text Books	
1	Stephen J. Bigelow,— Trouble Shooting, maintaining and Repairing PCs, Tata McGraw-Hill, New Delhi, 2001.
2	Craig Zacker & John Rourke, — The complete reference: PC hardware, Tata Mc Graw-Hill, New Delhi,2001.
References Books	
1	Mike Meyers, Introduction to PC Hardware and Troubleshooting, Tata McGraw-Hill, New Delhi,2003
2	B.Govindarajulu,IBMPCandCloneshardwaretroubleshootingandMaintenance,Tata McGraw-Hill,NewDelhi,2002
Web Resources	
1	https://egyankosh.ac.in/bitstream/123456789/33613/1/Unit-13.pdf
2	https://cdn.ttgtmedia.com/search Systems Channel/downloads/Windows7Bible.pdf

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	

	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or over view
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze(K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate Between various ideas, Map knowledge
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pro and cons
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S				S		S				
CO2	M				S						
CO3	S				S						
CO4							S	S		S	
CO5					S		S	S			

SEMESTER III

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	ELECTRONIC CIRCUITS	**Core Course - 5 (CC-5)**	**4**	**0**	**-**	**-**	**4**	**4**	**25**	**75**	**100**

Course Objectives	
CO1	Learn the fundamentals of Power supply.
CO2	Provide the in-depth knowledge of Various amplifiers.
CO3	Understand the basic concepts of Power amplifiers.
CO4	Examines the principles and characteristics of Negative feedback.
CO5	Know the basics of Oscillators.

UNIT	Details	No .of Hours	Course Objectives
I	Rectifier–Half wave rectifier, Full wave rectifier, Bridge rectifier, Inductor- Capacitor-L type filters- Ripple factor – Voltage regulator (Series type)- Current limit Over load production- Introduction to IC fixed and variable IC 723, 78XX, 79XX- Voltage regulators-Formula value substitution problems.	12	CO1
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-transformer coupled amplifiers- Frequency response- Formula value substitution problems.	12	CO2
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-distortion-formula value substitution problems.	12	CO3

IV	Feed back-basic concepts-characteristics-effect of negative feedback-on gain-stability-distortion-band width- analysis of voltage and current feedback amplifier circuits-formula value substitution problems.	12	CO4
V	Classification of oscillators-use of positive feedback-Barkhausen criterion for oscillators - Colpitts oscillator- Hartley oscillator -Wein bridge oscillators- Phase shift oscillator- Crystal oscillator-frequency stability of oscillators- Multivibrators (Mono, Astable, Bistable)-formula value substitution problems.	12	CO5
	Total	60	

Course Outcomes		
Course Outcomes	On completion of this course, students can able to	
CO1	Study the functional blocks of Power Supply.	PO5, PO6, PO10
CO2	Gain the knowledge of detailed Multi stage Amplifiers.	PO10
CO3	Understand the Power amplifiers and various types of Power amplifiers and its characteristics	PO11
CO4	Explain the principles and working feedback amplifiers Types of feedback and the scope of application.	PO4, PO11
CO5	Understand the basics of Oscillator and help the Students to understand the concept of Oscillator	PO4, PO11
Text Books		
1	R. S. Sedha, "Electronics Circuit" ,S.Chand &Co.,	
2	"Electronics devices and circuits" S.Salivahanan N Suresh Kumar 2nd Edition MG Hill	
References Books		
1 2	Electronics devices and circuits-An Introduction Allen Mottershed Electronics devices and applications and intergrated circuits-mathur.	
Web Resources		
1	https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_useful_resources.html	
2	https://www.buildinggadgets.com	
3	https://www.circuitlab.com	

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps ,Concept definitions	
Understand/ Comprehend (K2)	MCQ ,True/False, Short essays, Concept explanations ,short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain	
Analyse (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge	
Evaluate (K5)	Longer essay / Evaluation essay ,Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations	

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	ELECTRONIC AND ELECTRICAL CIRCUITS LAB (Core Course – 6)	**Practical 3 (CC-6)**	-	-	4	-	4	4	50	50	100

Course Objectives	
CO1	Gain knowledge of electronic circuits
CO2	Examine the gain of amplifiers and Electronic devices
CO3	Identify the various measurements and graphical representation of amplifiers
CO4	Extract important information from the Coupling concept for amplifiers
CO5	Interpret the experimental data to understand the behavior of the device

UNIT	Details	No .of Hours	Course Objectives
1	(a) Half-wave rectifier (b) To familiarize with basic electronics components (R , C, L, diodes, transistors) (a) Full wave rectifier (b) Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.	6	CO1
2	(a) Construction of power supply using C filter and zener diode as regulator (b) verification of ohm's law (a) Construction of variable power supply using IC723 (b)Measurement of amplitude, frequency &phase difference using oscilloscope. (a) Construction of variable power supply using LM317 (b) Verification of kirchoff 's law. (a) Astable multivibrator using BJT. (b) Monostable multivibrator using BJT	10	CO2

3	(a) Characteristics of class A power amplifier (b) Verification of Thevenin 's theorem . (a) Colpitt's oscillators (b) Parallel Resonance (a) Hartley oscillator (b) Series Resonance	8	CO3
4	(a) Characteristics of class B power amplifier (b) Verification of Norton 's Theorem. (a) Design a single stage CE amplifier. (b) Verification of Superposition Theorem. (a) Clamping circuits (b) Transient Response	8	CO4
5	(a) Design of two stage RC coupled amplifier (b) Verification of Reciprocity Theorem. (a) Darlington pair amplifier (b) Verification of Millimans Theorem. (a) Clipping circuits (b) Verification of Maximum power transfer Theorem.	8	CO5
	Total	40	

Course Outcomes		
Course Outcomes	On completion of this course ,students will;	
CO1	Practice with active and passive components of Electronic circuit devices	PO4, PO7, PO8, PO9, PO11
CO2	Learn the evaluation methods of connection for Electronic circuit.	PO4, PO7, PO8, PO9
CO3	Understand the basic semiconductor components working principles and methodology used inside the laboratory Environment	PO4,PO7,PO8, PO9, PO11
CO4	Design, construct the electronic circuits and observe the Basics of Electronic component.	PO4, PO7, PO8, PO9
CO5	Study and compare Electronic circuit with components.	PO4,PO7,PO8, PO9

Text Books	
1	R. S. Sedha, "Electronics Circuit" ,S.Chand &Co.,
2	Allen mottershead "Electronics devices and circuits"

References Books	
1	Electric Circuit Theory Dr.M Arumugam N. Premakumaran Kanna Publications
2	Circuits and Networks Analysis and Syntesis 2nd Edition A. Sudhakar Shyammohan Palli Tata Mc GREW HILL
Web Resources	
1	https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_useful_resources.html
2	https://www.buildinggadgets.com
3	https://www.circuitlab.com

Method of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	50 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	50 Marks
	Total	100 Marks

Methods of Assessment	
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True /False, Short essays, Concept explanations, short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate Between various ideas, Map knowledge
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	MATHEMATICS FOR ELECTRONICS– I	**Elective–3 (ELE-3)**	**4**	**0**	**-**	**-**	**4**	**4**	**25**	**75**	**100**

Course objectives	
CO1	Provide the depth knowledge of Matrices and Determinant.
CO2	Understand the basic concepts of Complex Analysis.
CO3	Apply the concept of probability and distribution in the electronics.
CO4	Solve the various curves through differential and integral calculus.
CO5	Know the basics of Beta and Gamma Integrals.

UNIT	Details	No .of Hours	Course Objectives
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 – Skew Symmetric Matrix-Matrix Addition, Subtraction and Multiplication by a scalar – Multiplication by a Matrix – Transpose of Matrix-Inverse of Matrix.	12	CO1
II	**Complex Analysis:** Complex numbers – Geometrical Interpretation-De Moivre's Theorem-Roots-Complex functions – Hyperbolic functions – Inverse Hyperbolic functions – Logarithmic function of a Complex variable.	12	CO2
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 – Normal Distribution - Statistical Methods for Data Fitting: Linear, multi-linear regression.	12	CO3

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, Radius of curvature for cartesian curve.	12	CO4
V	**Integral Calculus:** Beta and Gamma functions, Differentiation under the integral sign, double integrals, Triple integrals, Jacobian	12	CO5
	Total	60	

Course Outcomes		
Course Outcomes	On completion of this course, students can able to	
CO1	Analyze problem through the basic knowledge of mathematics.	PO5, PO6, PO10
CO2	Explain the concept of complex number in electronics.	PO10
CO3	Apply the various techniques of probability in the real world problem.	PO11
CO4	Remember the basic formula in differential calculus.	PO4, PO11
CO5	Understand and solve the various calculations through integral calculation.	PO4, PO11

1	Prof . S. Duraipandian and Dr. S. Udayabaskaran "Allied Mathematics 1 and 2" ,S.Chand &Co.,
2	Higher Engineering Mathematics, B.S.Agarwal, Khanna publishers.
3	Allied Mathematics Paper I & II, K.Thilagavathi, S.Chand Publications.
References Books	
1	Advanced Engineering Mathematics, Erwin Kreyszig,John-Wiely
Web Resources	
1	https://nptel.ac.in
2	https://Matheworld.wolfram.com
3	https://www.math.mit.edu

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps ,Concept definitions
Understand/ Comprehend (K2)	MCQ ,True/False, Short essays, Concept explanations ,short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyse (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay / Evaluation essay ,Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	ELECTRONICS FOR COMPETITIVE EXAMS	**Elective – 3 (ELE-3)**	**4**	**0**	**-**	**-**	**4**	**4**	**25**	**75**	**100**

Course Objectives

CO1	Provide a platform to the students for building the fundamentals of basic mathematics for competitive examinations preparation strategy.
CO2	To help them acquire skills in solving quantitative aptitude by simple methods..
CO3	Establish a framework to help students acquire knowledge and expertise necessary to secure employment opportunities in the Electronics field of Government sector.
CO4	The main focus of the students will be on quantitative aptitude and Electronics formulas in short span of time.
CO5	Compete in various competitive exams like TNPSC , UPSC, TANCET and Railways.

UNIT	Details	No .of Hours	Course Objectives
I	Number Systems - LCM and HCF - Decimal Fractions - Simplification - Square Roots and Cube Roots - Electrical units – Voltage, Current, Power, Energy.	12	CO1
II	Problems on Ages - Surds & Indices - Percentages - Problems on Numbers - Logarithm - Permutation and Combinations – Probability- Electrical Laws: Ohm's law – Krichoff's Laws.	12	CO2
III	Profit and Loss -Simple and Compound Interest -. Time, Speed and Distance - Time & Work Ratio and Proportion Area - Mixtures and Allegation. Digital Electronics: Binary, Octal, Decimal, Hexa Decimal number systems and its conversions.	12	CO3
IV	Data Interpretation - Data Interpretation - Tables - Column Graphs - Bar Graphs - Line Charts - Pie Chart - Venn Diagrams. Basic Boolean algebra used in digital Electronics.	12	CO4
V	Number and Letter Series - Coding – Decoding - Calendars -Clocks - Venn Diagrams - Seating Arrangement - Syllogism. Communication systems formula: Shananon' channel capacity formula - S/N ratio Nyquist bit rate – AM and FM basic formulas.	12	CO5
	Total	60	

Course Outcomes		
Course Outcomes	On completion of this course, students can able to	
CO1	The basic concepts of quantitative ability	PO5, PO6, PO10
CO2	Gain the knowledge of solving the problem in permutation and combination, logarithm	PO10
CO3	Acquire the knowledge in simple and compound interest and ratio problems	PO11
CO4	Interpret the data through various graphing.	PO4, PO11
CO5	Understand the basics of Blood relation, calendar and clock problems and Venn Diagrams.	PO4, PO11
Text Books		
1	A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal	
2	Analytical and Logical reasoning By Sijwali B S	
3.	Principles of Electronics V.K Mehta, S.Chand & Co	
4.	Electronics Devices, PHI Publications 1st Edition Mottershed.	
References Books		
1	Quantitative aptitude for Competitive examination By R S Agarwal	
2	Analytical and Logical reasoning for CAT and other management entrance test By Sijwali B S	
3	Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4th edition	
4	Basic Solid state Electronics, B.L Theraja, S.Chand & Co	
Web Resources		
1	https://prepinsta.com/	
2	https://www.indiabix.com/	
3	https://www.javatpoint.com/	
4	https://www.pw.live /exam/school/communication-formula/	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	

	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps ,Concept definitions
Understand/ Comprehend (K2)	MCQ ,True/False, Short essays, Concept explanations ,short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyse (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay / Evaluation essay ,Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	APPLIED ELECTRICAL CIRCIUTS **Skill Enhancement Course - 4**	**(SEC-4)**	**2**	**0**	**-**	**-**	**2**	**2**	**25**	**75**	**100**

Course objectives	
CO1	Learn the fundamental components of electronic circuits
CO2	Provide the in-depth knowledge of basic circuit laws.
CO3	Understand the basic concepts of resonance circuits
CO4	Examines the principles and operations of circuit Theorems
CO5	Know the basics of AC circuits

UNIT	Details	No .of Hours	Course Objectives
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	CO1
II	**Circuit Laws:** Ohm's law- Kirchoff's voltage law – Kirchoff's current law – Current division – Voltage division – Star connection – Delta connection – Series circuits – Parallel circuits- Series & Parallel circuits – Open circuits – Short circuits.	6	CO2
III	**Theorems:** Super position theorem – Thevanin's theorem – Norton's theorem – Millman's theorem – Maximum power transfer theorem – Reciprocity theorem.	6	CO3
IV	**AC Circuit Basics:** Sinusoidal and Non sinusoidal ave forms – Peak value – Peak to Peak value – Average value – RMS value – Period and frequency measurement – Power factor – Real power – Reactive power.	6	CO4

V	**Resonance:** Capacitive reactance – Inductive reactance – Impedance –RL and RC series and parallel – RLC series and parallel – Series resonance – Parallel resonance.	6	CO5
	Total	30	

Course Outcomes		
Course Outcomes	On completion of this course, students can able to	
CO1	Study the basics of function of components and color coding of a resistance.	PO5, PO6, PO10
CO2	Explain the concepts of circuit laws and theorem.	PO10
CO3	Understand and solve the formula and principles of electrical circuit theorems.	PO11
CO4	Remember the basics in AC Circuits.	PO4, PO11
CO5	Analyze the basics concepts of Resonance circuits.	PO4, PO11
Text Books		
1	Electric Circuit Theory Dr.M Arumugam N. Premakumaran Kanna Publications	
2	Circuits and Networks Analysis and Syntesis 2nd Edition A. Sudhakar Shyammohan Palli Tata McGREW HILL	
References Books		
1	Electronics devices and circuits- milliman & Halkias.	
2	Electronics devices and applications and integrated circuits-mathur.	
Web Resources		
1	https://www.atechtraining.com/applied-electrical-trainer	
2	https://resources.pcb.cadence.com/blog/2023-the-bacic-laws-and-theorems-in-electrical-circuit-network-analysis	
3	https://www.scribd.com/document/629886536/applied-Electricity	

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps ,Concept definitions
Understand/ Comprehend (K2)	MCQ ,True/False, Short essays, Concept explanations ,short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyse (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay / Evaluation essay ,Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

SEMESTER IV

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	LINEAR INTEGRATED CIRCUITS	**Core Course 7 (CC-7)**	**4**	**0**	**-**	**-**	**4**	**4**	**25**	**75**	**100**

Course objectives	
CO1	Learn the fundamental components of differential amplifiers.
CO2	Provide the in-depth knowledge of input, output offset current and voltage resistance.
CO3	Understand the basic concepts of slew rate and various filters.
CO4	Examines the principles and operations of Adder – subtractor and oscillator principles
CO5	Know the basics of trigger, operations and their applications and understand IC555 functions.

UNIT	Details	No .of Hours	Course Objectives
I	Differential amplifiers-dual input-balance output differential amplifier-current mirror-level translator-block diagram representation of typical OP amp-interpreting typical set off data sheets-the ideal opamp-equivalent circuit of an opamp-ideal voltage transfer curve.	12	CO1
II	Input of set voltage-input bias current-input off set current- Total output offset voltage- input and output resistance-thermal drift-CMRR-voltage shunt and voltage series feed back amplifier	12	CO2
III	Frequency response of initially compensated op amp-circuit stability-slew rate. Filters: low pass filters-high pass filters-band pass filters-band reject filters-all pass filters.	12	CO3
IV	Adder-subtractor-Integrator-differentiator-Vto1 and 1 to V converter. Oscillator: principles-types-frequency stability phase shift oscillator- Weinbridge oscillator- square wave generator-triangular wave generator.	12	CO4

V	Comparator-Schmitt trigger-clipper and clamper-peak detector-zero crossing detector-IC-555 function block diagram-mono stable operation- Astable operation-applications.	12	CO5
	Total	60	

Course Outcomes		
Course Outcomes	On completion of this course, students can able to	
CO1	Study the basic of differential amplifiers and their Characterization.	PO5, PO6, PO10
CO2	Gain the knowledge of input, output offset current and voltage resistance.	PO10
CO3	Understand the various types of frequency response of filters	PO11
CO4	Explain the principles and operation of adder –subtractor and Types of oscillators and the wave of generators.	PO4, PO11
CO5	Understand the concept of trigger, operation, applications and help the students to understand linear integrated circuits.	PO4, PO11
Text Books		
1	Ramkant A.Gayakward, "Operational Amplifiers and Linear Integrated Circuits" 3rd Edition PHI.	
2	D.Roychoudry and Shail Jain "Linear Integrated Circuits" New Age Publications 1999	
References Books		
1	F.Couglin & Drison, "Operational Amplifiers and Linear Integrated Circuits" 4rd Edition PHI(1992).	
2	Denton J Daily ,"Linear Integrated Circuits" Mc Grew Hill 1989	
Web Resources		
1	https://www.wileyindia.com/linear-integrated-circuits-analysis-design-applications.html	
2	https://www.udemy.com/course/linear-integrated-circuits-and-applications-for-all-levels/	
3	https://www.electroniclinic.com/linear-integrated-circuits-analogue-and-digital-integrated-circuits/	

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	

	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps ,Concept definitions
Understand/ Comprehend (K2)	MCQ ,True/False, Short essays, Concept explanations ,short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyse (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay / Evaluation essay ,Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	LINEAR INTEGRATED CIRCUITS LAB **Core Course – 8**	**Practical 4** **(CC-8)**	**-**	**-**	**4**	**-**	**4**	**4**	**50**	**50**	**100**

Course Objectives

CO1	Gain knowledge of linear integrated circuits.
CO2	Examine the amplifiers and characteristics of linear circuits.
CO3	Identify the various oscillators and multivibrators from OP-AMP
CO4	Extract important information from the integrated circuits.
CO5	Interpret the experimental circuit to understand the behavior of the device

UNIT	Details	No .of Hours	Course Objectives
1	Inverting and non Inverting amplifier. Integrator and differentiator Instrumentation amplifier	6	CO1
2	High pass, Low pass filters. Band pass filter.	6	CO2
3	Astable multivibrator using OP-AMP. Monostable multivibrator using OP-AMP Astable multivibrator using IC 555. Monostable multivibrator using IC555	6	CO3
4	Phase shift oscillator using OP-AMP Wien bridge oscillator using OP-AMP Schmitt trigger and comparator using OP-AMP.	6	CO4
5	Digital to analog converter. Analog to digital converter. Design of light switch using LDR and Relay.	6	CO5
	Total	30	

Course Outcomes		
Course Outcomes	On completion of this course ,students will;	
CO1	Practice with oscillators and amplifiers	PO4, PO7, PO8, PO9, PO11
CO2	Learn the linear circuit and characteristics.	PO4, PO7, PO8, PO9
CO3	Understand the basic oscillator and multivibrator working principles and methodology used inside the laboratory Environment	PO4,PO7,PO8, PO9, PO11
CO4	Design, construct the linear integrated circuit and observe the Characteristics.	PO4, PO7, PO8, PO9
CO5	Study and compare Frequency response of various filter	PO4,PO7,PO8, PO9
Text Books		
1	Ramkant A.Gayakward, "Operational Amplifiers and Linear Integrated Circuits" 3rd Edition PHI.	
2	D.Roychoudry and Shail Jain "Linear Integrated Circuits" New Age Publications 1999	
References Books		
1	F.Couglin & Drison, "Operational Amplifiers and Linear Integrated Circuits" 4rd Edition PHI (1992).	
2	Denton J Daily ," Operational Amplifiers and Linear Integrated Circuits" Mc Grew Hill 1989	
Web Resources		
1	https://www.wileyindia.**com**/linear-integrated-circuits-analysis-design-applications.html	
2	https://www.udemy.com/course/linear-integrated-circuits-and-applications-for-all-levels/	
3	https://www.electroniclinic.com/linear-integrated-circuits-analogue-and-digital-integrated-circuits/	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External	End Semester Examination	75 Marks

Evaluation		
	Total	100 Marks
Methods of Assessment		
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True /False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain	
Analyze(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate Between various ideas ,Map knowledge	
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create(K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations	

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Subject Code	Subject Name	Category	L	T	P	S	Cre dits	Inst. Hours	Marks		
									CIA	External	Total
	MATHEMATICS FOR ELECTRONICS - II	**Elective-4 (ELE-4)**	**5**	**-**	**-**	**-**	**4**	**5**	**25**	**75**	**100**

Course objectives	
CO1	To develop efficient algorithm approach for solving algebraic and transcendental equation.
CO2	To understand the concept of numerical matrix methods.
CO3	Basic idea of solving numerical integration and differentiation
CO4	To find solution for equal and unequal data through interpolation method.
CO5	To know the methods of numerical solution of ordinary first and second order differential equation.

UNIT	Details	No .of Hours	Course Objectives
I	**Numerical solution of algebraic and transcendental equations**: Bolzano‟s bisection method - Successive approximation method – Regula Falsi method – Newton-Raphson method	12	CO1
II	**Numerical solution of simultaneous linear algebraic equations:** Gauss elimination method - Gauss Jordan elimination method – Gauss Seidel iteration method – Gauss Jacobi iteration method	12	CO2
III	**Finite Difference Method:** Finite difference operator: Forward difference operator, backward difference operator, central difference operator, shift operator, average operator, difference operator. Relation betweenΔ and E. Relation between $E and \nabla$. Interpolation – Newton-Gregory forward and backward interpolation	12	CO3
IV	**Interpolation:** Newton's divided difference formula – Lagrange's interpolation formula for uneven intervals – Gauss interpolation formula. Numerical differentiation – Numerical Integration – Trapezoidal rule – Simpson‟s1/3rd rule	12	CO4
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	CO5
	Total	60	

Course Outcomes		
Course Outcomes	On completion of this course, students can able to	
CO1	understand the numerical methods, equations and analysis for engineering applications	PO5, PO6, PO10
CO2	Solve the various types matrix through iteration methods.	PO10
CO3	Remember the concept various difference operator	PO11
CO4	Create algorithm for solving problem in interpolation, numerical differentiation and numerical integration.	PO4, PO11
CO5	Find the solution for first order and second order differential equation by Euler, Runge-Kutta method.	PO4, PO11
Text Books		
1	Numerical Method in Science and Engineering, M.K. Venkataraman, National Publication Co, Chennai(2001)	
2	Computer oriented Numerical Methods by V. Rajaram – PHI(P)Ltd.	
3	Numerical Methods by Ram Pearson Education India, 2010.	
References Books		
1	Introductory Methods of Numerical Analysis by S. S. Sastry, PHI learning 2012	
Web Resources		
1	https://nptel.ac.in	
2	http://ndl.iitkgp.ac.in	
3	http://ocw.mit.edu	

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps ,Concept definitions
Understand/ Comprehend (K2)	MCQ ,True/False, Short essays, Concept explanations ,short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyse (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay / Evaluation essay ,Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or off beat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	CONSUMER ELECTRONIC APPLIANCES	**Elective– 4 (ELE-4)**	**2**	**-**	**-**	**-**	**2**	**2**	**25**	**75**	**100**

Course Objectives	
CO1	Describe the concepts of microwave ovens
CO2	Understand the concepts of washing machines
CO3	Know about air conditioners and refrigerators
CO4	Gain knowledge about home or office digital devices
CO5	Learn about digital access services such as LAN, MODEM,ATM

UNIT	Details	No.of Hours	Course Objectives
I	**MICROWAVE OVENS:** Microwaves - Properties and generation Magnetrons, Waveguides microwave oven block diagram - LCD timer with alarm – Single chip controllers – Types of micro wave ovens- micro wave Cooking-Features and parts of microwave oven-Wiring and safety instructions – Microwave cookware-Operating problem and solutions-Care and cleaning	6	CO1
II	**WASHING MACHINES:** Electronic controller for washing machines - Washing machine hardware – Washing cycle- Hardware and software development - Types of washing machines-Fuzzy logic washing machines-Features of Washing machines.	6	CO2
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	6	CO3

IV	**HOME/OFFICEDIGITALDEVICES:** Facsimile machine –Basic fax machine operations-Group 3 fax machines- Xerographic copier, Process-Extension to dynamic copier - Digital clocks - Block diagram of a digital clock-LSI digital clock.	6	CO4
V	**DIGITALACCESSSERVICES:** 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	6	CO5
	Total	30	

Course Outcomes

Course Outcomes	On completion of this course, students will	
CO1	Identify the consumer electronic application	PO1,PO5, PO6
CO2	Associate various digitally made instruments	PO1,PO2,PO3,PO5, PO6, PO9
CO3	Choose the appropriate digital services	PO1,PO5, PO6
CO4	Acquire the knowledge of digital devices enhancement	PO4,PO5, PO6
CO5	Recommend the usage of alternate digital resources	PO1,PO5, PO6

Text Books

1.	Consumer Electronics- S.P.Bali, Pearson Education, NewDelhi,2005.
2.	Consumer electronics by Deepak Arora, Eagle Prakashan, Jalandhar.

References Books

1	Consumer electronics by Yagnik and Jain-Ishan Publication
2	Service manuals, BPB Publication, New Delhi

Web Resources

1	https://archive.nptel.ac.in/courses
2	https://esdm-skill.deity.gov.in

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall(K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand / Comprehend (K2)	MCQ,True/False, Short essays, Concept explanations, short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze(K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons
Create(K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	S				S	S					
CO2	S	S		M	S	S			M		
CO3				M	S	S					
CO4	S			S	S	M					
CO5	S				S	S					

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	ELECTRONIC MEASUREMENTS AND INSTRUMENATION	**Skill Enhancement Course–5 (SEC-5)**	**2**	**0**	**-**	**-**	**2**	**2**	**25**	**75**	**100**

Course objectives	
CO1	Learn the measurement and errors, system of units and measurement.
CO2	Provide the in-depth knowledge for stands of measurements.
CO3	Understand the basic concepts of electromechanical indicating instrument and its characteristics
CO4	Explain the basic of oscilloscope and its block diagram.
CO5	Know the basics of signal generation/analysis and function generator.

UNIT	Details	No .of Hours	Course Objectives
I	**Measurement and error:** Definitions - Accuracy and precision-Significant figures-Types of errors-statistical analysis-Probability errors-Limiting errors. **System of Units and Measurement:** Fundamental and derived units – Systems of units – Electric and Magnetic units – International system of units – other system of units.	12	CO1
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 - IEEE Standards	12	CO2
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	12	CO3

	resistor)- DC Voltmeters:(multiplier resistor, multi range voltmeter) -Multimeter.		
IV	**Oscilloscopes:** Oscilloscopes block diagram – Cathode Ray Tube – CRT Circuits – Vertical Deflection system – Delay line – Multiple Trace – Horizontal Deflection system –Oscilloscope technique. **Special Oscilloscopes:** Storage Oscilloscopes – Sampling Oscilloscopes	12	CO4
V	**Signal Generation:** Frequency synthesized signal generator – **Function generator:** Basic elements of Function generator – **Signal Analysis:** Wave Analyzers -Harmonic distortion Analyzers – Spectrum Analyzers - Digital Storage Oscilloscopes.	12	CO5
	Total	60	

Course Outcomes		
Course Outcomes	On completion of this course, students can able to	
CO1	Study the basic measurement and error , system of units .	PO5, PO6, PO10
CO2	Gain the knowledge of Electrical standards(IEEE).	PO10
CO3	Understand the various types of electromechanical inducing instruments and their mechanism.	PO11
CO4	Explain the block diagram of oscilloscope and its functions	PO4, PO11
CO5	Understand the concept of signal generation and help the Students to understand the electronics instrumentation and measurement.	PO4, PO11
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” , Dhanpat rai &co.,	
References Books		
1	“Electrical and Electronics Measurements and Instrumentation engineering” Dr.N.K.Datta. ,Books and allied (P)ltd, since 1960.	
2	“Measurement systems Application and design” Earnest O. Doebelin., Fourth Edition., Tata McGraw-hill publishing company ltd.	

Web Resources	
1	https://www.tutorialspoint.com/electronic_measuring_instruments/measuring_instuments.htm
2	https://www.udemy.com/course/electronic-measurements-and-instrumentation
3	https://www.meducation.co.in/electronics-instrumentation-and-measurements-9789353162511-india

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps ,Concept definitions
Understand/ Comprehend (K2)	MCQ ,True/False, Short essays, Concept explanations ,short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyse (K4)	Problem-solving questions, finish aprocedure in many steps, Differentiate between Various ideas, Map knowledge
Evaluate (K5)	Longer essay / Evaluation essay ,Critique or justify with pro sand cons
Create (K6)	Check knowledge in specific or off beat situations, Discussion, Debatingor Presentations

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S

SUBSTITUTE COURSE FOR NAAN MUDHALVAN COURSES.

If a student is unable to appear for Naan Mudhalvan course in a particular semester or who failed the same should clear the respective self-study courses specified here.

External 100 marks. (No Internal Test)

FOUNDATION IN ELECTRONICS

(Substitute for 2nd semester Naan Mudhalvan course)

UNIT I

Types of resistors – color code –Construction of various types of resistors (carbon Composition, carbonfilm, wire-wound etc.) Capacitors (ceramic, mica polystyrene electrolytic etc.)

UNIT II

Semiconductor Basics: Introduction to semiconductor materials, intrinsic & extrinsic semiconductors. P type semiconductor, N type semiconductor p-n junction diode

UNIT III

Half wave rectifier, Center tapped and bridge full wave rectifiers, DC power supply: Block diagram of a power supply, Zener diode as voltage regulator.

UNIT IV

Decimal, Binary, Octal and Hexadecimal number systems, base conversions.Digital Logic families, Truth Tables of OR, AND, NOT, NOR, NAND, EXOR, Universal Gates

UNIT V

Memory Devices Classification of memories – ROM PROM – EPROM – EEPROM – EAPROM, RAM – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell Programmable Logic Devices

Text Books

1.Basic and Applied Electronics-T.K Bandyopadhyay, Books and Allied Pvt Ltd (2002)
2. V.K.Mehta, "Principles of Electronics", S.Chand & Co
3. B.L.Theraja, "Basic solid state Electronics", S.Chand &Co
4. Digital Principles & Applications – Albert Paul Malvino& Leach
5. Digital Fundamentals – Thomas L. Floyd – PrenticeHall
6. Digital Electronics-an introduction to Theory and Practice - William H.Gothmann Prentice Hall

CONSUMER ELECTRONIC APPLIANCES

(Substitute for 3rd semester Naan Mudhalvan course)

UNIT I

Audio Systems: Stereophony - Stereophonic recording and reproduction - Hi-Fi Stereo reproducing system - Block diagram of Public Addressing system - Requirement of Public Addressing system - Typical PA installation planning for a public meeting - PA system for an auditorium

UNIT II

Digital Tv: Digital TV system - Cable TV concepts set top box - Dish TV and connections - Closed circuit television - Introduction to FLAT LCD and LED television systems

UNIT III

Washing Machines:Electronic controller for washing machines - Washing machine hardware – Washing cycle- Hardware and software development - Types of washing machines - Fuzzy logic washing machines - Features of washing machines.)

UNIT IV

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 and safety instructions – Microwave cookware - Operating problem and solutions- Care and cleaning.

UNIT V

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 .

Text books:

1.Consumer Electronics - S.P. Bali, Pearson Education, New Delhi, 2005

2. Audio and Video systems Principles, Maintenance and Troubleshooting. - R.G. Gupta Tata Mc Graw Hill PublishingCo.Ltd.

OFFICE AUTOMATION

(Substitute for 4th semester Naan Mudhalvan course)

UNIT – I

Microsoft word: Word processor Basics – Opening, Closing andQuitting Saving the Document – Closing – Changing the size of a document.Editing the Document: Opening an existing word document –Undoing any operation – Saving changes made to the Document–Checking Spelling in the Document – Automatic correction of errors – Printing the file – Savingand Closing the Document.

UNIT – II

Designing your Document: Creating a well formatted Document – Setting the Left , Right , Topand Bottom Margins – Setting page Numbers on your Document – Specifying text at the top andthe Bottom of each page.Creating Tables: Inserting Rows – Inserting Columns – Deletinga Row – Deleting a Column – Formatting the Text – Mail Merge.

UNIT – III

Microsoft Excel: Introduction to Spreadsheets – Use of Spreadsheet – Spreadsheet Basics – Formatting a Spreadsheet – Graphs – Functions of Microsoft Excel – Starting Microsoft Excel - Changing size of a Work book and Excel Window – Cell and CellAddress – Standard Toolbar – Formatting toolbar – the Formula bar – Status bar – Componentsof an Excel workbook.Working in Excel: Entering data in cell address – MathematicalCalculations – Formulas using numbers – Formula using Cell address – Defining functionssimple Graphs.

UNIT – IV

Microsoft Access: Introduction to Databases – Defining a Database – Understanding DBMS–objects of a Relational Database – Macros – Functions of a DBMS – Starting Microsoft Access –Creating Tables – Understanding Database – Creating database - Creating a Table – Working onTables – Saving the Table – Defining primary Key – Closing the Table – Closing the Databasewindow and Quitting Access.

UNIT – V

Microsoft PowerPoint: Starting PowerPoint – Creating a presentation – Saving a Presentation– working with views – Adding Graphics, Charts and Tables – Masters – Using Slide Transition-Printing – Closing the Slides – Quitting Microsoft PowerPoint.

Text Book:

1. Vikas Gupta, Comdex Computer Course Kit (XP Edition), Dreametech press, New Delhi.

References:

1. Stephen L. Nelson, The Complete Reference Office 2000, Tata McGraw – Hill Publishing Company limited, New Delhi.
2. N. Krishnan, Window and MS Office 2000 with Database Concepts, Scitech publications (India) Pvt Ltd., Chennai

QUANTITATIVE APTITUDE

(Substitute for 5th semester Nann Mudhalvan course)

Unit I:

Numbers-HCF and LCM of numbers-DecimalFractions-Simplification-Squareroot and cuberoots - Average-problems on Numbers.

Unit II:

Problems on Ages - Surds and Indices - percentage -profits and loss - ratio and proportion-partnership-Chainrule.

Unit III:

Time and work - pipes and cisterns - Time andDistance - problems on trains -Boats and streams - simple interest - compound interest - Logarithms -Area-Volume and surfacearea -races and Games ofskill.

Unit IV:

Permutation and combination-probability-TrueDiscount-Bankers Discount – Height and Distances-Oddment& Series.

Unit V:

Calendar - Clocks - stocks and shares – Datarepresentation - Tabulation – BarGraphs-Piecharts-Linegraphs.

Text Book

"QuantitativeAptitude",R.S.AGGARWAL.S.Chand&CompanyLtd.,

SOFT SKILLS FOR EMPLOYABILITY

(For 6th semester Naan Mudhalvan course)

Unit I

Soft Skills- Need & Importance. Intra & Inter Personal Skills - Campus to Corporate- Employability Skills- Need of the hour - SWOT Analysis. - Attitude- Developing Professional & Positive AttitudePerception – Importance of analytical thinking.

Unit II

Communication Skills – Need and Methods - Body-Language -I; How to interpret and understand other's bodylanguage - Body Language-II; How to improve one's own Body LanguagePresentation Skills (Seminar Talk & Power Point Presentation)

Unit III

Goal Setting- Need & Importance - Magic of Team Work. - Leadership Qualities - Six Thinking Hats.

Unit IV

Accountability towards Work- Paragraph Writing – Descriptive and Analytical with illustrations - Email Writing - Work Etiquette

Unit V

Group Discussion (Open & Monitored) - Resume Preparation - Interview Skills -Mock Interviews

Text Book

1. The ACE of Soft Skills by Gopalaswamy Ramesh & Mahadevan Ramesh –Pearson
2. Working with Emotional Intelligence - David Goleman.
3. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillanIndia Ltd.,Delhi.

Reference

Soft Skills: Meenakshi Raman.

Note: All Substitute for 2nd to 6th semester Naan Mudhalvan course has External evaluation only as per given format for methods of evalution.

Methods of Evaluation-Theory		
External Evaluation	**End Semester Examination**	
	Part - A Each Unit Two Questions (1 to 10) **Answer ALL Questions** 10*2 =	20 Marks
	Part - B Each Unit Two Questions (11 to 15) **Either (a) or (b)** 5 * 6 =	30 Marks
	Part - B Each Unit Two Questions (16 to 20) **Either (a) or (b)** 5 * 10 =	50 Marks

	Total	100 Marks