Curriculum & Syllabi

Regulation 2025

2025-2029 Batch

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institution | Approved by AICTE | Affiliated to Anna University | Accredited by NAAC with A++ Grade

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Batch 2025-2029)

VISION OF THE INSTITUTION

- To Produce Globally Competitive Engineers with High Ethical Values and Social Responsibilities.

MISSION OF THE INSTITUTION

- To impart the highest quality state-of-the-art technical education by providing impetus to innovation, research, and development and empowering students with entrepreneurship skills.
- To instill ethical values, imbibe a sense of social responsibility, and strive for societal well-being.
- To identify the needs of society and offer sustainable solutions through outreach programs.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION OF THE DEPARTMENT

- To equip future engineers with high academic knowledge, ethical values, leadership skills and a passion to contribute to the society.

MISSION OF THE DEPARTMENT

- To provide quality and contemporary education in Electronics and Communication Engineering through continuous upgradation of Curriculum and laboratory facilities, industrial collaboration and effective teaching learning process.
- To facilitate research activities and entrepreneurship skills to cope up with the changes in industrial demand and meet the global and societal needs.
- To inculcate professional attitude and ethical values.

I.	PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1	Exhibit technical competence in Electronics and Communication Engineering by providing innovative engineering solutions and excel in professional career.
PEO 2	Indulge in problem identification, analysis and formulation to provide technically superior, economically feasible, environmentally compatible and socially acceptable design solutions.
PEO 3	Contribute towards entrepreneurship and research, and exercise leadership through effective communication, teamwork and knowledge upgradation through lifelong learning.

II.	PROGRAMME OUTCOMES (POs)

PO 1	**Engineering knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4).
PO 3	**Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO 4	**Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO 5	**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO 6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO 7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9).
PO 8	**Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO 9	**Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective

	reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO 10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Knowledge and Attitude Profile (WK)

WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
WK2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
WK7	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
WK8	Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
WK9	Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

III.	PROGRAMME SPECIFIC OUTCOMES (PSOs)

The Graduates of B.E – ELECTRONICS AND COMMUNICATION ENGINEERING programme will be able to:

PSO 1	Technical Proficiency in Core Domains Graduates will analyze, design, and develop innovative solutions in VLSI, embedded systems, and communication networks, addressing complex engineering challenges with technical expertise.
PSO 2	Leadership, Research, and Entrepreneurship Graduates will excel as ethical leaders, engage in cutting-edge research, and pursue lifelong learning and entrepreneurship to contribute to advancements in Electronics and Communication Engineering.
PSO 3	Sustainable and Societal Impact Solutions Graduates will integrate multidisciplinary knowledge to create sustainable and ethical solutions, meeting global industrial demands and societal needs through innovation and professionalism.

IV.	MAPPING OF PEOs WITH POs

PEO	POs										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
1	3	3	3	3	2	2	1	1	1	1	2
2	3	3	3	3	3	3	1	1	1	1	2
3	1	1	1	1	1	2	3	3	3	3	1
	1- low, 2 - medium, 3 - high, '-' - no correlation										

V.	MAPPING OF PEOs WITH PSOs

	PSO 1	PSO 2	PSO 3
PEO 1	3	2	2
PEO 2	2	2	3
PEO 3	2	3	2

AUTONOMOUS CURRICULUM AND SYLLABI

Regulations 2025

S. No.	Course Code	Courses	L/T/P	Total Hours	Credits	SDG Mapping
SEMESTER I						
Theory (Internal 40 Marks & External 60 Marks)						
1	25MA101	Mathematical Foundations for Electrical Sciences	3 / 1 / 0	4	4	4,7,8,9
2	25CS101	Problem Solving and Programming Paradigms	3 / 0 / 0	3	3	4,8
Theory with Practical (Internal 50 Marks & External 50 Marks)						
3	25EE101	Electric Circuits	3 / 0 / 2	5	4	4,7,9
4	25MSC01	Materials Science	2 / 0 / 2	4	3	3, 4, 7, 9, 11, 12, 13, 16
5	25CS103	C Programming	1 / 0 / 4	5	3	4,9
Indian Knowledge System - Blended Learning (Internal 100 Marks)						
6	25TA101	Heritage of Tamils	1 / 0 / 0	1	1	2,7,9,12,15,16
7	25IKC01	Introduction to Indian Knowledge System	2 / 0 / 0	2	2	3,5,7,9,11,13,15,17
Mandatory Course (Internal 100 Marks)						
8	25MC101	Induction Programme	3 weeks			4,12
			TOTAL	**24**	**20**	

S. No.	Course Code	Courses	L/T/P	Total Hours	Credits	SDG Mapping
SEMESTER II						
Theory (Internal 40 Marks & External 60 Marks)						
1	25EE201	Network Analysis and Synthesis	3 / 1 / 0	4	4	4, 9
Theory with Practical (Internal 50 Marks & External 50 Marks)						
2	25EE202	Electronic Devices and Circuits	3 / 0 / 2	5	4	6,12
3	25EC201	Digital Circuits and Logic Design	3 / 0 / 2	5	4	4,9

4	25ENC01	Business Communication and Value Science	2 / 0 / 2	4	3	4,8,9,16
5	25IT201	Object Oriented Programming Using C++	1 / 0 / 4	5	3	4,8,9
Practical (Internal 60 Marks & External 40 Marks)						
6	25CS202	Application Development Practices	0 / 0 / 4	4	2	4.8,9,11
7	25MEC03	Design Thinking and Idea Lab	0 / 0 / 2	2	1	4,9,11,12
Indian Knowledge System - Blended Learning (Internal 100 Marks)						
8	25TA201	Tamils and Technology	1 / 0 / 0	1	1	2,7,9,11,12 ,15,17
			TOTAL	**30**	**22**	

SEMESTER III						
S. No.	**Course Code**	**Courses**	**L/T/P**	**Total Hours**	**Credits**	**SDG Mapping**
Theory - Blended Learning (Internal 100 Marks)						
1	25GE301	Universal Human Values	3 / 0 / 0	3	3	3,4,16
Theory (Internal 40 Marks & External 60 Marks)						
2	25EC301	Signals and Systems	3 / 1 / 0	4	4	4,9
3	25EC302	Analog Communication	3 / 0 / 0	3	3	4.9,11,12
Theory with Practical (Internal 50 Marks & External 50 Marks)						
4	25EC303	Analog Electronics	3 / 0 / 2	5	4	4.9,11,12
5	25CSC01	Data Structures	3 / 0 / 2	5	4	4, 9
6	25IT302	Database Systems	2 / 0 / 2	4	3	4, 9
Indian Knowledge System - Blended Learning (Internal 100 Marks)						
7	25IK301	Mathematical and Computer Logic for Nyaya Sastra Studies	2 / 0 / 0	2	2	4, 12
Spoken Language (Internal 100 marks)						
8	25SLC01	Multilingual Practices	0 / 0 / 2	2	1	4,11,17
			TOTAL	**27**	**24**	
Certification/Online Course						
Certification/Spoken Tutorial/Coursera/NPTEL Courses- Minimum one Course Mandatory						

SEMESTER IV

S. No.	Course Code	Courses	L/T/P	Total Hours	Credits	SDG Mapping
		Theory (Internal 40 Marks & External 60 Marks)				
1	25EC401	Electromagnetic Fields and Wave guides	3 / 1 / 0	4	4	4.9,11,12
		Theory with Practical (Internal 50 Marks & External 50 Marks)				
2	25EE402	Control Systems	3 / 0 / 2	5	4	4.9,11,12
3	25EC402	Microcontroller and Interfacing	3 / 0 / 2	5	4	4.9,11,12
4	25EC403	Digital Signal Processing	3 / 0 / 2	5	4	4,9
5	25EC0XX	Open / Emerging/ Industrial Elective- I	2 / 0 / 2	4	3	
6	25CS302	Programming in Java	1 / 0 / 4	5	3	4, 8
		Indian Knowledge System - Blended Learning (Internal 100 Marks)				
7	25IKEC01	Indian Ethics	2 / 0 / 0	2	2	4, 16
		Mandatory Course (Internal 100 Marks)				
8	25MCC01	Environmental Sciences	1 / 0 / 0	1	0	4, 6, 12, 13
			TOTAL	**31**	**24**	

SEMESTER V

S. No.	Course Code	Courses	L/T/P	Total Hours	Credits	SDG Mapping
		Theory (Internal 40 Marks & External 60 Marks)				
1	25EC501	Antenna and Wave Propagation	3 / 0 / 0	3	3	4.9,11,12
2	25EC502	Wireless Communication	3 / 0 / 0	3	3	4.9,11,12
		Theory with Practical (Internal 50 Marks & External 50 Marks)				
3	25EC503	VLSI Design	3 / 0 / 2	5	4	4.9,11,12
4	25EC504	Digital Communication	3 / 0 / 2	5	4	4.9,11,12

5	25EC505	Computer Networks	2 / 0 / 2	4	3	4,9
6	25AMC01	Machine Learning Techniques	2 / 0 / 2	4	3	4,9
Mini Project (Internal 100 Marks)						
7	25EC506	Capstone Project I - MERN Stack	0 / 0 / 6	6	3	4, 9,12,17
Mandatory Course (Internal 100 Marks)						
8	25MCC03	Indian Constitution	1 / 0 / 0	1	0	1,5,8
			TOTAL	**31**	**23**	

SEMESTER VI						
S. No.	**Course Code**	**Courses**	**L/T/P**	**Total Hours**	**Credits**	**SDG Mapping**
Theory - Blended Learning (Internal 100 Marks)						
1	25GEC01	Entrepreneurship and Startups	3 / 0 / 0	3	3	4, 8, 9
Theory (Internal 40 Marks & External 60 Marks)						
2	25EC601	Green communication and Networks	3 / 0 / 0	3	3	4,7,8,9,11,12 13
3	25EC9XX	Professional Elective - I	3 / 0 / 0	3	3	
4	25EC0XX	Open / Emerging/ Industrial Elective- II	3 / 0 / 0	3	3	
Theory with Practical (Internal 50 Marks & External 50 Marks)						
5	25EC602	Microwave and Optical Communication	3 / 0 / 2	5	4	4.9,11,12
6	25EC603	Embedded systems and connected devices	3 / 0 / 2	5	4	4.9,11,12
Mini Project (Internals 100 Marks)						
7	25EC604	Capstone Project II	0 / 0 / 4	4	2	4.9,11,12
Practical (Internal 60 Marks & External 40 Marks)						
8	25EC605	Prototype Lab	0 / 0 / 2	2	1	4.9,11,12
			TOTAL	**28**	**23**	

S. No.	Course Code	Courses	L/T/P	Total Hours	Credits	SDG Mapping
SEMESTER VII						
Theory (Internal 40 Marks & External 60 Marks)						
1	25EC0XX	Open / Emerging/ Industrial Elective- III	3 / 0 / 0	3	3	
2	25EC9XX	Professional Elective - II	3 / 0 / 0	3	3	
3	25EC9XX	Professional Elective - III	3 / 0 / 0	3	3	
4	25EC9XX	Professional Elective - IV	3 / 0 / 0	3	3	
5	25EC9XX	Professional Elective - V	3 / 0 / 0	3	3	
Project & Internship (Internals 100 Marks)						
6	25EC701	Project - I	0 / 0 / 6	6	3	4,8 ,9,11,12
7	25EES01	Employability Enhancement Skills (Internship)	28 days		2	4.9,11,12
			TOTAL	**21**	**20**	

S. No.	Course Code	Courses	L/T/P	Total Hours	Credits	SDG Mapping
SEMESTER VIII						
Project						
1	25EC801	Project - II	0 / 0 / 24	24	12	4,8 9,11,12
			TOTAL	**24**	**12**	

SI. No.	Stream	Credits/Semester								C	%
		I	II	III	IV	V	VI	VII	VIII		
1	Humanities & Social Sciences Including Management (HSMC)	3	4	5	2		3			17	10.12
2	Basic Sciences (BSC)	7								7	4.16
3	Engineering Sciences (ESC)	10	14	7	3					34	20.24
4	Professional Core (PCC)		4	11	16	20	11			62	36.9
5	Professional Electives (PEC)						3	12		15	8.93
6	Open/Emerging/Industry (OEC)				3		3	3		9	5.36
7	Project Work (PROJ)					3	3	5	12	23	13.69
8.	Mandatory Course (MC) / Spoken language (SLC)	-	-	1	-	-	-	-	-	1	0.6
	Total	20	22	24	24	23	23	20	12	168	100

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

	STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAM		
S. No.	**Course Work - Subject Area**	**AICTE Suggested Credits**	**SKCET Credits (168)**
1.	Humanities and Social Sciences (HS), including Management;	15	17
2.	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology;	23	7
3.	Engineering Sciences (ES), including Materials, Workshop, Drawing, Basics of Electrical/Electronics/Mechanical/Computer Engineering, Instrumentation;	17	34
4.	Professional Subjects-Core (PC), relevant to the chosen specialization/branch; (May be split into Hard (no choice) and Soft (with choice), if required	61	62
5.	Professional Subjects – Electives (PE), relevant to the chosen specialization/ branch;	12	15
6.	Open Subjects- Electives (OE), from other technical and/or emerging subject areas;	12	9
7.	Project Work, Seminar and/or Internship in Industry or elsewhere.	20	23
8.	Mandatory Courses (MC)/ Spoken Language Courses(SLC)	Non-credit	1
	Total	**160**	**168**

Minor Variations is allowed as per need of the respective disciplines

	HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT (17 Credits)					
SL. No.	**Course Code**	**Course Title**	**L/T/P**	**Contact hrs./Wk.**	**C**	**SDG Mapping**
1.	25TA101	Heritage of Tamils	1 / 0 / 0	1	1	2,7,9,12,15,16
2.	25IKC01	Introduction to Indian Knowledge System	2 / 0 / 0	2	2	3,5,7,9,11,13,15,17
3.	25ENC01	Business Communication and Value Science	2 / 0 / 2	4	3	4,8,9,16
4.	25TA201	Tamils and Technology	1 / 0 / 0	1	1	2,7,9,11,12,15,17

5.	25GE301	Universal Human Values	3 / 0 / 0	3	3	3,4,16
6	25IK301	Mathematical and Computer Logic for Nyaya Sastra Studies	2 / 0 / 0	2	2	4,12
7	25IKEC03	Indian Ethics	2 / 0 / 0	2	2	4, 16
8	25GEC01	Entrepreneurship and Startups	3 / 0 / 0	3	3	4, 8,9

BASIC SCIENCE COURSES (7 Credits)						
SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	SDG Mapping
1.	25MA101	Mathematical Foundations for Electrical Sciences	3 / 1 / 0	4	4	4,7,8,9
2.	25MSC01	Materials Science	2 / 0 / 2	4	3	3, 4, 7, 9, 11, 12, 13, 16

ENGINEERING SCIENCE COURSES (34 Credits)						
SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	SDG Mapping
1.	25CS101	Problem Solving and Programming Paradigms	3 / 0 / 0	3	3	4,8
2.	25EE101	Electric Circuits	3 / 0 / 2	5	4	4,7,9
3.	25CS103	C Programming	1 / 0 / 4	5	3	4,9
4.	25EE201	Network Analysis and Synthesis	3 / 1 / 0	4	4	4,9
5.	25EE202	Electronic Devices and Circuits	3 / 0 / 2	5	4	6,12
6.	25IT201	Object Oriented Programming Using C++	1 / 0 / 4	5	3	4,8,9
7.	25CS202	Application Development Practices	0 / 0 / 4	4	2	4,8,9,11
8.	25MEC03	Design Thinking and Idea Lab	0 / 0 / 2	2	1	4, 9, 11,12
9.	25CSC01	Data Structures	3 / 0 / 2	5	4	4,9
10.	25IT302	Database Systems	2 / 0 / 2	4	3	4,9
11.	25CS302	Programming in Java	1 / 0 / 4	5	3	4,8

		PROFESSIONAL CORE COURSES (62 Credits)				
SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	SDG Mapping
1.	25EC201	Digital Circuits and Logic Design	3 / 0 / 2	5	4	4,9
2.	25EC301	Signals and Systems	3 / 1 / 0	4	4	4,9
3.	25EC302	Analog Communication	3 / 0 / 0	3	3	9,12
4.	25EC303	Analog Electronics	3 / 0 / 2	5	4	4,9,11,12
5.	25EC401	Electromagnetic Fields and Wave guides	3 / 1 / 0	4	4	4,9,11,12
6.	25EE402	Control Systems	3 / 0 / 2	5	4	4,9,11,12
7.	25EC402	Digital Communication	3 / 0 / 2	5	4	4,9,11,12
8.	25EC403	Digital Signal Processing	3 / 0 / 2	5	4	4.9
9.	25EC501	Antenna and Wave Propagation	3 / 0 / 0	3	3	4,9,11,12
10.	25AMC01	Machine Learning Techniques	2 / 0 / 2	4	3	4,9
11.	25EC502	Wireless Communication	3 / 0 / 0	3	3	4,9,11,12
12.	25EC503	VLSI Design	3 / 0 / 2	5	4	4,9,11,12
13.	25EC504	Microcontroller and Interfacing	3 / 0 / 2	5	4	4,9,11,12
14.	25EC505	Computer Networks	2 / 0 / 2	4	3	4.9
15.	25EC601	Green communication and Networks	3 / 0 / 0	3	3	4,7,8,9,11,12,13
16.	25EC602	Microwave and Optical Communication	3 / 0 / 2	5	4	4,9,11,12
17.	25EC603	Embedded systems and connected devices	3 / 0 / 2	5	4	4,9,11,12

S.No	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	Ext/Int
PROFESSIONAL ELECTIVE COURSES (15 Credits)						
ELECTIVE STREAM I – EMBEDDED SYSTEMS						
1.	25EC901	Real-Time Operating Systems and Applications	3/0/0	3	3	60/40
2.	25EC902	Automotive Embedded System	3/0/0	3	3	60/40
3.	25EC903	Hardware-Software Co-Design	3/0/0	3	3	60/40
4.	25EC904	Computational Intelligence	3/0/0	3	3	60/40
5.	25EC905	Embedded System Design using IoT	3/0/0	3	3	60/40
6.	25EC906	Embedded Processors and Architecture	3/0/0	3	3	60/40
7.	25EC907	Embedded Programming	3/0/0	3	3	60/40
8.	25EC908	Industrial IoT	3/0/0	3	3	60/40
9.	25EC909	Embedded Robotics	3/0/0	3	3	60/40
ELECTIVE STREAM II – VLSI						
1.	25EC910	Reconfigurable Architecture	3/0/0	3	3	60/40
2.	25EC911	VLSI Architectures for AI Algorithms	3/0/0	3	3	60/40
3.	25EC912	Low Power VLSI Design	3/0/0	3	3	60/40
4.	25EC913	Testing of VLSI Circuits	3/0/0	3	3	60/40
5.	25EC914	Digital CMOS VLSI Design	3/0/0	3	3	60/40
6.	25EC915	Analog VLSI Design	3/0/0	3	3	60/40
7.	25EC916	System on Chip Design	3/0/0	3	3	60/40
8.	25EC917	ASIC Design	3/0/0	3	3	60/40
9.	25EC918	Design of Semiconductor Memories	3/0/0	3	3	60/40
5ELECTIVE STREAM III - NETWORKS, IMAGE AND VIDEO PROCESSING						
1.	25EC919	Network Engineering for IoT and Constrained Devices	3/0/0	3	3	60/40
2.	25EC920	Advanced Computer Network Architectures	3/0/0	3	3	60/40
3.	25EC921	Python Programming for Image and Video Processing	3/0/0	3	3	60/40
4.	25EC922	R Programming for Image and Video Data Analysis	3/0/0	3	3	60/40
5.	25EC923	Digital Image Processing	3/0/0	3	3	60/40
6.	25EC924	Computer Vision Techniques	3/0/0	3	3	60/40
7.	25EC925	Deep Learning for Image and Video Analysis	3/0/0	3	3	60/40
8.	25EC926	Video Analytics and Surveillance Systems	3/0/0	3	3	60/40
9.	25EC927	Network Integration for IoT and Multimedia Applications	3/0/0	3	3	60/40
ELECTIVE STREAM IV – NEXT GENERATION COMMUNICATION SYSTEMS						
1.	25EC928	RF System Design	3/0/0	3	3	60/40
2.	25EC929	Microwave integrated circuits	3/0/0	3	3	60/40
3.	25EC930	CAN and CAN Open Protocols	3/0/0	3	3	60/40
4.	25EC931	Software Defined Networking	3/0/0	3	3	60/40
5.	25EC932	Satellite Communication and GPS	3/0/0	3	3	60/40
6.	25EC933	High Frequency Communication Systems	3/0/0	3	3	60/40

7.	25EC934	Smart Antennas	3/0/0	3	3	60/40
8.	25EC935	Radar Systems	3/0/0	3	3	60/40
9.	25EC936	Wireless Broadband Networks	3/0/0	3	3	60/40
ELECTIVE STREAM V – MICROELECTRONICS, IC DESIGN AND PHOTONICS						
1.	25EC937	Electromagnetic Interference and Compatibility	3/0/0	3	3	60/40
2.	25EC938	Nanophotonics	3/0/0	3	3	60/40
3.	25EC939	SOI Devices Modeling and Simulation	3/0/0	3	3	60/40
4.	25EC940	Modeling of Microelectronic Devices	3/0/0	3	3	60/40
5.	25EC941	IC Design and Technology	3/0/0	3	3	60/40
6.	25EC942	RF Microelectronics	3/0/0	3	3	60/40
7.	25EC943	Photonic Integrated Circuits	3/0/0	3	3	60/40
8.	25EC944	RF and MEMS	3/0/0	3	3	60/40
9.	25EC945	E-Waste Management and Recycling	3/0/0	3	3	60/40
ELECTIVE STREAM VI – SMART SENSOR TECHNOLOGIES AND BIOMEDICAL ENGINEERING						
1.	25EC946	Artificial Intelligence in Healthcare	3/0/0	3	3	60/40
2.	25EC947	Automotive Sensors	3/0/0	3	3	60/40
3.	25EC948	Data Acquisition and Hardware Interfaces	3/0/0	3	3	60/40
4.	25EC949	Flexible and Wearable Sensors	3/0/0	3	3	60/40
5.	25EC950	Medical Sensors and MEMS Technology	3/0/0	3	3	60/40
6.	25EC951	Bio Signal Processing	3/0/0	3	3	60/40
7.	25EC952	Emerging Applications of Biosensors	3/0/0	3	3	60/40
8.	25EC953	Micro Systems & Hybrid Technology	3/0/0	3	3	60/40
9.	25EC954	Medical Robotics	3/0/0	3	3	60/40

INDIAN KNOWLEDGE SYSTEM (9 Credits)						
SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	SDG Mapping
1.	25TA101	Heritage of Tamils	1 / 0 / 0	1	1	2,7,9,12,15,16
2.	25IKC01	Introduction to Indian Knowledge System	2 / 0 / 0	2	2	3,5,7,9,11,13,15,17
3	25IK02	Mathematical and Computer Logic for Nyaya Sastra Studies	2 / 0 / 0	2	2	4, 12
4.	25IK03	Indian Ethics	2 / 0 / 0	2	2	4, 16
5	25TA201	Tamils and Technology	1 / 0 / 0	1	1	2,7,9,11,12,15,17
6	25MCC03	Indian Constitution	1 / 0 / 0	1	0	4,16
7	25SLC01	Multilingual Practices	0 / 0 / 2	2	1	4,11,17

SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	SDG Mapping
		OPEN/ EMERGING/ INDUSTRY (9 Credits)				
1.	25EC001	Principles of Cyber Physical Systems	3 /0 /0	3	3	4,9, 11, 12
2.	25EC002	Introduction to Raspberry Pi and Arduino	3 /0 /0	3	3	4, 9, 8
3.	25EC003	IT Workshop SCILAB/MATLAB	3 /0 /0	3	3	4, 9, 17
4.	25EC004	Brain Computer Interface and its Applications	3 /0 /0	3	3	3, 4,9, 11
5.	25EC005	Wireless Wearable Sensors	3 /0 /0	3	3	3, 4, 9, 11
6.	25EC006	Organizational Behavior	3 /0 /0	3	3	4, 8, 9, 11
7	25EC007	Fundamentals of Digital Signal Processing	3 /0 /0	3	3	3, 4, 9
8	25EC008	Principles of Embedded Systems	3 /0 /0	3	3	4,7,9,12
9.	25EC009	Edge AI and TinyML	3/0/0	3	3	4, 8,9,11
10.	25EC010	6G and Future Wireless Networks	3/0/0	3	3	4,9,11
11.	25EC011	Neuromorphic Computing and Design	3/0/0	3	3	3,4,9,11
12.	25EC012	Quantum Electronics	3/0/0	3	3	4, 9,12,13
13	25EC013	Cyber-Physical Systems and Security	3/0/0	3	3	3,4,9,11
14	25EC014	Quantum Computing and Information	3/0/0	3	3	4, 9,12,13

SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	SDG Mapping
		PROJECT WORK (21 Credits)				
1.	25EC506	Capstone Project I - MERN Stack	0 / 0 / 6	6	3	4,8,9,11,12
2.	25EC604	Capstone Project II	0 / 0 / 4	4	2	4,8,9,11,12
3.	25EC605	Prototype Lab	0 / 0 / 2	2	1	4,8,9,11,12
4.	25EC701	Project - I	0 / 0 / 6	6	3	4,8,9,11,12
5.	25EC801	Project - II	0 / 0 / 24	24	12	4,8,9,11,12

SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	SDG Mapping
		INTERN (2 Credits)				
1.	25EES01	Employability Enhancement Skills (Internship)	28 days		2	4.9,11,12

PROFESSIONAL ELECTIVE COURSES: VERTICALS					
Vertical I **Embedded Systems**	**Vertical II** **VLSI**	**Vertical III** **Networks, Image And Video Processing**	**Vertical IV** **Next Generation Communication Systems**	**Vertical V** **Microelectronics, IC Design And Photonics**	**Vertical VI** **Smart Sensor Technologies And Biomedical Engineering**
Real-Time Operating Systems and Applications	Reconfigurable Architecture	Network Engineering for IoT and Constrained Devices	RF System Design	Electromagnetic Interference and Compatibility	Artificial Intelligence in Healthcare
Automotive Embedded System	VLSI Architectures for AI Algorithms	Advanced Computer Network Architectures	Microwave integrated circuits	Nanophotonics	Automotive Sensors
Hardware-Software Co-Design	Low Power VLSI Design	Python Programming for Image and Video Processing	CAN and CAN Open Protocols	SOI Devices Modeling and Simulation	Data Acquisition and Hardware Interfaces
Computational Intelligence	Testing of VLSI Circuits	R Programming for Image and Video Data Analysis	Software Defined Networking	Modeling of Microelectronic Devices	Flexible and Wearable Sensors
Embedded System Design using IoT	Digital CMOS VLSI Design	Digital Image Processing	Satellite Communication and GPS	IC Design and Technology	Medical Sensors and MEMS Technology
Embedded Processors and Architecture	Analog VLSI Design	Computer Vision Techniques	High Frequency Communication Systems	RF Microelectronics	Bio Signal Processing
Embedded Programming	System on Chip Design	Deep Learning for Image and Video Analysis	Smart Antennas	Photonic Integrated Circuits	Emerging Applications of Biosensors
Industrial IoT	ASIC Design	Video Analytics and Surveillance Systems	Radar Systems	RF and MEMS	Micro Systems & Hybrid Technology
Embedded Robotics	Design of Semiconductor Memories	Network Integration for IoT and Multimedia Applications	Wireless Broadband Networks	E-Waste Management and Recycling	Medical Robotics

VALUE ADDED COURSES (Based on student's interest)							
SL. No	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	SDG Mapping	Sem
1.	25VA401	Python for Data Science	2 /0 /0	2	1	4,9,11	3 & 4
2.	25VA402	Embedded Linux	2 /0 /0	2	1	4,9,11	3 & 4
3.	25VA403	CCNA	2 /0 /0	2	1	4,9,11	3 & 4
4.	25VA404	AWS Cloud Practitioner	2 /0 /0	2	1	4,9,11	3 & 4
5.	25VA405	Microsoft Azure Fundamentals	2 /0 /0	2	1	4,9,11	3 & 4
6.	25VA406	System Administrator	2 /0 /0	2	1	4,9,11	3 & 4

MANDATORY COURSES (Non-Credits)/SPOKEN LANGUAGE COURSE (Courses conducted either by internal faculty or through MOOCs)						
SL. No.	Course Code	Course Title	L/T/P	Contact hrs./Wk.	C	SDG Mapping
1.	25MC101	Induction Programme	3 weeks		-	4
2.	25MCC01	Environmental Sciences	1 / 0 / 0	1	0	4,6,12,13
3.	25MCC03	Indian Constitution	1 / 0 / 0	1	0	4,16
4	25SLC01	Multilingual Practices	0 / 0 / 2	2	1	4,11,17

L: Lecture   **T:** Tutorial   **P:** Practical   **C:** Credit   **O:** Outside Class hours   **Cat.:** Category

HSMC	: Humanities and Social Sciences including Management	**OEC**	: Open and Emerging Elective Courses
BSC	: Basic Science Courses	**PROJ**	: Project Work
ESC	: Engineering Science Courses	**EES**	: Employability Enhancement Skills
PCC	: Professional Core Courses	**MC**	: Mandatory Course
PEC	: Professional Elective Courses		
SLC	: Spoken Language Course		

Definition of Credit:

L – Lecture	1 Hr. Lecture (L) per week	1 credit
T – Tutorial	1 Hr. Tutorial (T) per week	1 credit
P - Practical/Practice (Project and Industry based Courses)	1 Hr. Practical (P) per week	0.5 credit

SEMESTER – I

25MA101 SDG NO. 4,7,8,9	MATHEMATICAL FOUNDATIONS FOR ELECTRICAL SCIENCES (Common to ECE, EEE)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES
1. To understand and gain the knowledge of vector spaces, inner product, Gram-Schmidt orthonormal process and matrix decomposition techniques.
2. To reduce quadratic form to canonical form of a matrix and identify its nature.
3. To investigate the behavior of functions using derivatives, including maxima, minima identification and points of inflection.
4. To evaluate definite integrals using Bernoulli's formula, Beta and Gamma functions.
5. To compute double, triple integral and apply them to find the area and volume.

MATRICES 12

Types of matrices - Characteristic equation - Eigenvalues and Eigenvectors of a real matrices and their properties-Cayley-Hamilton theorem- Orthogonal transformation of a real symmetric matrix to diagonal form - Reduction of quadratic form to canonical form by orthogonal transformation - Nature of quadratic forms. Case study: Eigenvalues and Eigenvectors in principal component analysis and stretching an elastic membrane using MATLAB.

LINEAR ALGEBRA 12

Vector space - Subspace - Linear dependence and linear independence -Fundamentals of bases and dimensions - Inner product space - Orthogonality - Projection - Gram-Schmidt orthogonalization process and QR decomposition.Case study: Applications of vector spaces and subspaces in an electrical circuits.

MULTIVARIABLE CALCULUS 12

Representation of functions - Limit of a function - Continuity - Partial derivative -Total derivative - Differentiation of implicit functions -Jacobian and its properties - Taylor's series for functions of two variables - Maxima and minima of functions of two variables - Method of Lagrangian multipliers. Case study: Application of partial differentiation in semiconductor solar cells.

DEFINITE INTEGRALS 12

Evaluation of definite integrals using Bernoulli's formula-Beta and Gamma integrals- Relation between beta and gamma functions -Evaluation of integrals using beta and gamma functions. Case study: Beta and Gamma integrals using MATLAB, Electromechanical systems.

MULTIPLE INTEGRALS 12

Double integration in Cartesian coordinates - Area as double integral - change the order of integration -Triple integration in Cartesian co-ordinates - Volume as triple integral. Case study: Volume as triple integral using MATLAB.

TOTAL PERIODS: 60

COURSE OUTCOMES

Upon completion of the course, students shall have ability to,

CO1	Find orthonormal vectors to apply Gram-Schmidt's orthogonalization process to and decompose the matrix using QR decomposition.	[U]
CO2	Compute the eigenvalues and eigenvectors to diagonalizablethematrix and reduce quadratic form to canonical form.	[AP]
CO3	Find extreme of functions with constraints to utilize the Lagrange multiplier method.	[U]
CO4	Solve definite integrals using Bernoulli's formula, Beta and Gamma functions.	[AP]
CO5	Determine areas, volumes and other practical problems to apply multiple integral ideas.	[AP]

TEXT BOOKS

1. Gilbert Strang, "Introduction to linear algebra", 6th edition, Wellesley-Cambridge Press, 2023.
2. Kreyszig. E, "Advanced Engineering Mathematics", 10th edition, John Wiley and Sons (Asia) Limited, Singapore, 2020.
3. Grewal. B.S, "Higher Engineering Mathematics", 42nd edition, Khanna Publications, Delhi, 2021.

REFERENCE BOOKS

1. Veerarajan. T, "Engineering Mathematics", McGraw-Hill, New Delhi, 2011.
2. Ramana. B.V, "Higher Engineering Mathematics", McGraw Hill, New Delhi, 2017.
3. Wartikar. P.N, and Wartikar. J.N, Applied Mathematics (Volumes I and II), Vidyathi Griha Prakshan, 2010.

WEB RESOURCES

1. https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/
2. https://nptel.ac.in/courses/111/107/111107105/
3. https://ocw.mit.edu/courses/mathematics/18-01-single-variable-calculus-fall-2006/
4. https://nptel.ac.in/courses/117/101/117101055/
5. https://www.coursera.org/learn/integration-calculus

25CS101 SDG NO. 4, 8	PROBLEM SOLVING AND PROGRAMMING PARADIGMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

1. To familiarize the fundamental concepts of problem-solving techniques and differences between Computational Thinking and Logical Thinking
2. To introduce the different programming paradigms and their concepts
3. To understand how to create a hybrid programming paradigm
4. To study the suitability of programming paradigms for solving complex computational tasks
5. To develop algorithmic thinking and efficiency analysis skills for solving real-world computational problems.

PROBLEM SOLVING TECHNIQUES   9
Problem solving aspect - Top-down design - Implementation of algorithms- Program Verification - Efficiency - Analysis of Algorithms – Fundamental Algorithms - Swapping - counting - Factorial - Reversing the digits - Base conversion Algorithms. Computational Thinking - Logical Thinking - Flowcharts- Algorithmic thinking - Characteristics of algorithms - Pseudo code - Example problems.

IMPERATIVE PROGRAMMING PARADIGM   9
Basics of Programming Paradigms, Expression Semantics, Data Semantics, Imperative Design principles – Structured, Turing Complete, Modularity, Procedural abstraction, Structured Theorem - Sequencing, Selection, Iteration and Recursion.

SEQUENTIAL PROGRAMMING PARADIGM   9
Procedural Programming Paradigm: Procedures, Parameter passing, Procedural abstraction, Case Study - C Programming. Object Oriented Programming Paradigm: OOP design principles - Groupings of Data and Operations, Encapsulation, Data Abstraction, Inheritance and Polymorphism, Exceptions, Case Study - Object Oriented Programming Paradigm using Java Programming.

CONCURRENT & SCRIPTING PROGRAMMING PARADIGM   9
Concurrent Programming Paradigm: Concurrency design with interleaving of process, Safe Access to Shared Data – Semaphore, Liveness property of concurrent programs - Case Study-Concurrency in ADA. Scripting Paradigm: – Basics of Web design language and Scripting Language, Case Study: JavaScript – Syntax of writing JavaScript, Variables and Functions.

FUNCTIONAL & LOGIC PROGRAMMING PARADIGM   9
Functional Programming Paradigm: Declarative programming design – Functional and logic paradigm, Basics of Functional programming paradigm, Expressions – Syntax, Parsing, Types and Values, Assigning names to expressions, Lambda Calculus fundamentals, Function Abstraction and Recursive Functions - Case Study Haskell. The Logic Programming Paradigm: Clauses and Predicates, Operations and Arithmetic, List and Operations, Unification and Backtracking.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1	Explain fundamental problem-solving strategies and algorithmic principles such as top-down design, program verification, and computational thinking	[U]
CO2	Apply simple algorithms to solve structured problems	[AP]
CO3	Develop modular programs using imperative, sequential and Object Oriented programming paradigms	[AP]
CO4	Implement simple concurrent and scripting programs by applying concurrency design concepts and scripting language syntax	[AP]
CO5	Understand the principles of functional and logic programming paradigms in solving problems using recursive functions, lambda expressions, unification, and backtracking	[U]

TEXT BOOKS

1. Rebert W Sebesta, "Concepts of Programming Languages", 12th Edition, Pearson Edition, 2019.
2. Ravi Sethi, "Programming Languages: Concepts and Constructs", 2nd Edition, Pearson India, 2006.
3. Seyed Mohamed Buhari, "Principles of Programming Languages: A Paradigm approach", McGraw-Hill, 2011.
4. Michael L. Scott, "Programming Language Pragmatics", 4th Edition, Morgan Kaufmann, 2016.

REFERENCE BOOKS

1. Seyed H. Roosta, "Foundations of Programming Languages: Design and Implementation", 1st Edition, Cengage Learning, 2003.
2. David A. Watt, "Programming Language Design Concepts", 1st Edition, John Wiley & Sons Ltd, 2004.
3. Minh Quang Tran, "The Art of Functional Programming Paradigm", 1st Edition, Pragmatic Bookshelf, 2022.
4. Alejandro Serrano Mena, "Practical Haskell: A Real-World Guide to Functional Programming", 3rd Edition Apress Media, 2022.

WEB RESOURCES

1. https://www.freecodecamp.org/news/an-introduction-to-programming-paradigms/
2. https://www.geeksforgeeks.org/introduction-of-programming-paradigms/ language/
3. https://archive.nptel.ac.in/courses/106/102/106102067/
4. https://www.decipherzone.com/blog-detail/programming-paradigms
5. https://hackr.io/blog/programming-paradigms
6. https://www.docsity.com/en/lecture-notes/computer-science/programming-paradigms/

25EE101	ELECTRIC CIRCUITS	L	T	P	C
SDG NO. 4,7,9		3	0	2	4

COURSE OBJECTIVES

1. To understand the fundamental concepts and circuit terminology in DC circuits.
2. To illustrate the performance of RL, RC, and RLC circuits, including power measurement in AC circuits.
3. To apply network theorems to analyse the behaviour of electric circuits.
4. To introduce the concept of Laplace Transform in solving electrical network problems.
5. To interpret the transient response in electric circuits.

DC CIRCUITS   9
R, L, C, M elements in an electric circuit - Independent and Dependent sources - source transformation - series and parallel circuits - current and voltage division rule - star-delta transformation - Mesh and Nodal analysis.

AC CIRCUITS   9
Single-phase circuits: Peak and RMS values: Phasor representation, Power and Impedance triangle, Power factor - Analysis of single-phase AC circuits consisting of R, L, C, RL, RC and RLC combinations. Three-phase circuits: Three-phase balanced systems - Star and Delta connections.

NETWORK THEOREMS   9
Superposition theorem - Source Transformations - Thevenin's theorem - Norton's theorem - Maximum power transfer theorem - Reciprocity theorem - Analysis of circuits with independent current and voltage sources.

LAPLACE TRANSFORM   9
Laplace Transforms - Inverse Laplace Transforms - Basic Theorems for the Laplace Transform - Solution to differential equations - First and second order equations.

TRANSIENT ANALYSIS   9
Transient concepts - Transient response of simple RL, RC, and RLC Series circuits for DC excitation - Overdamped - Underdamped and Critically damped response. Overview of BIS: IS 1293

TOTAL (THEORY) : 45 PERIODS

LIST OF EXPERIMENTS
1. Analyze and determine the current flow in a residential power distribution network using Mesh Analysis.

2. Determine the voltage at different nodes in residential power systems using Nodal Analysis.

3.   Design a domestic circuit of series and parallel combinations of lamps controlled proper wiring components such as MCBs, switches, bulbs, holders, and wiring boards.

4.   Analyse the resistance of various dimensions with different resistivity, Inductance of various dimensions, winding configurations and capacitance of various shapes and materials using a Virtual Lab.

5.   Measure the Power in three-phase circuits by two wattmeter method.

6.   Apply the Superposition theorem for a street lighting system and examine the impact of multiple voltage sources.

7.   Apply source transformation techniques to simplify a complex power distribution circuit into an equivalent circuit and to verify experimentally that the load voltage and current remain unchanged.

8.   Analyze the lighting system using Norton's theorem and examine the impact of current source in parallel with resistive load.

9.   Transfer the Maximum power by matching the impedance of Solar panel to the battery.

10.   Using a virtual lab, verify the current flow in an electric circuit by applying the Reciprocity theorem, and observe the effect of swapping the positions of the load and the source.

11.   Determine the steady state response of RL, RC and RLC circuits and simulate the response.

12.   Determine the transient response of RL, RC and RLC circuits and simulate the response.

TOTAL (LAB) : 30 PERIODS

TOTAL : 75 PERIODS

COURSE OUTCOMES

Upon completion of the course, students shall have ability to,

CO1	Illustrate the fundamental concepts and circuit terminology in DC circuits	[U]
CO2	Interpret the single-phase and three-phase AC circuits	[AN]
CO3	Employ the network theorems to determine the circuit parameters	[AP]
CO4	Apply Laplace transform techniques for analyzing simple time-domain functions and solving first and second-order differential equations	[AP]
CO5	Infer the transient response in electric circuits	[U]

TEXT BOOKS

1. Jr William H. Hayt, Jack E. Kemmerly and Jamie D. Phillips, "Engineering Circuits Analysis", McGraw-Hill, 10th Edition, 2024.
2. Charles K. Alexander and Mathew N.O Sadiku, "Fundamentals of Electric Circuits", 7th edition, McGraw-Hill, 2022.
3. Sudhakar A and Shyam Mohan S Palli, "Circuits and Network Analysis and Synthesis", McGraw Hill, 4th edition, 2017.

REFERENCE BOOKS

1. Ravish R Singh, "Network Analysis and Synthesis", 2nd edition, McGraw Hill, New Delhi, 2019.
2. David E. Johnson, Johnny R. Johnson, S.K.Aggarwal, "Electric Circuit Analysis," 3rd Edition, Wiley, 2015.
3. Joseph A. Edminister, Mahmood Nahvi, "Electric Circuits", Schaum series, McGraw Hill, 5th edition, New Delhi, 2017.

WEB RESOURCES

1. https://nptel.ac.in/courses/108102185

2. https://archive.nptel.ac.in/courses/108/105/108105112/

3. https://onlinecourses.nptel.ac.in/noc22_ee113/preview

4. https://www.coursera.org/learn/linear-circuits-dcanalysis

25MSC01 SDG NO. 3, 4, 7, 9, 11, 12, 13, 16	MATERIALS SCIENCE	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

1. To explore the basic concepts of physics for computing engineering.
2. To impart the physics concepts in solving real time engineering problems.
3. To explore and visualize theoretical concepts of physics by computational methods.
4. To enhance the ability to record, analyse and interpret experimental data.
5. To familiarize the basic concepts, synthesis and application of nano materials.

WAVE OPTICS   6

An introduction to Wave Optics, Interference - Principle of superposition - Michelson interferometer. Diffraction definition - Fresnel's diffraction and Fraunhofer's diffraction - Difference between interference and diffraction - Fraunhofer diffraction at Single slit-plane diffraction grating (Multi slit diffraction). Polarization definition – Brewsters law, Double refraction – Polarimeter – construction and working.

QUANTUM MECHANICS   6

Quantum Mechanics Introduction – Planck's quantum theory - Matter waves, de-Broglie wavelength, Heisenberg's uncertainty principle, Time independent and Time – dependent Schodinger's wave equation, Physical significance of wave function, Particle in one dimensional potential box.

LASER AND FIBER OPTICS   6

Characteristics of laser – Principle of spontaneous emission and stimulated emission – Einstein's theory of matter radiation interaction and A and B coefficients (derivation) – Population inversion – Pumping – CO_2 laser, Fiber optics: principle and propagation of light in optical fibers – Numerical aperture and acceptance angle – Application of optical fiber in communication system.

ELECTRONICS AND OPTOELECTRONIC DEVICES   6

Introduction to semiconductors –Basic concept of Band theory - Basic of Intrinsic and extrinsic semiconductors – PN Junction diode and its IV characteristics - Transistor – Bi-polar Junction Transistor (BJT). Optoelectronic devices: light detectors and solar cells – light emitting diode.

NANO MATERIALS   6

Nanomaterials – Definition - Types - Comparison of nanomaterials with bulk materials. Nanoparticles, nanoclusters and nanorods - Preparation by sol-gel and solvo-thermal methods - Properties and applications. Carbon nanotubes – preparation by chemical vapor deposition -Properties and applications in electronics. Nanowires - Preparation by electrochemical deposition and electro-spinning - Properties and sensing applications.

TOTAL (THEORY): 30 PERIODS

LAB EXPERIMENTS

1. Calculate the Wavelength of mercury spectrum using Spectrometer and grating.

2. Calculate the thickness of a thin wire using Air wedge interference method.

3. Determination of Brewsters angle through V - Lab

4. Exploring light and energy: A practical Planck's constant experiment.

5. Estimate the value of Stefan's constant using an incandescent Bulb.

6. Analyze the dust particle size using the given LASER source.

7. Calculate the Numerical aperture and acceptance angle of the given optic fibre for data communication

8. Estimate the Band gap of the given semiconductor.

9. Calculate the efficiency of the given Solar panel.

10. Analyze the Characteristics of the Light dependent resistor.

11. Determination of stopping potential of different materials through V - lab.

12. Evaluate the cathode efficiency of nickel using electro-deposition process.

LIFE SKILL EXPERIMENTS

1. Estimate the value of the given resistor, capacitor and voltage/Current fluctuations using Multimeter.

2. Identify the earth, neutral and phase line in an AC circuit.

TOTAL (LAB): 30 PERIODS
TOTAL: 60 PERIODS

COURSE OUTCOMES
Upon completion of the course, students shall have ability to:

CO1	To apply the principles of simple harmonic motion and wave optics in practical and theoretical contexts.	[AP]
CO2	Apply quantum principles to explain atomic and subatomic system behaviour.	[AP]
CO3	Understand the principles of Lasers, Einstein's coefficients and the fundamentals of fiber optics along with their practical applications.	[U]
CO4	Apply the principles of semiconducting materials to analyze and design electronic circuits and systems.	[U]
CO5	Utilize the fundamental principles of nanomaterials to explore and implement their applications in Engineering.	[AP]

TEXT BOOKS

1. Bhattacharya,D.K. & Poonam,T. "Engineering Physics", Oxford University Press, 2015.
2. Malik,H.K. & Singh,A.K. "Engineering Physics", Tata McGraw-Hill Education, 2017.
3. Gary N. Felder & Kenny M. Felder, "Modern Physics", Cambridge University Press, 2022.
4. Sulabha K. Kulkarnl, Nanotechnology: principles and practices, Springer publications, 3rd Edition, 2018.

REFERENCE BOOKS

1. Halliday, D., Resnick, R. & Walker, J., "Principles of Physics: Extended, International Adaptation", 12th Edition, Wiley, 2023.
2. Serway, R.A. & Jewett, J.W., "Physics for Scientists and Engineers", Cengage Learning, 2019.
3. Jenkins & White, "Fundamentals of Optics", 4th Edition, McGraw Hill Education, 2017.
4. B. Rogers, J Adams and S. Pennathur, Nanotechnology the whole story, CRC Press, 2013.

WEB RESOURCES

1. https://www.khanacademy.org/science/physics
2. http://www.feynmanlectures.caltech.edu/info/
3. https://physics.info/
4. http://hyperphysics.phy-astr.gsu.edu/hbase/index.html

25CS103	C PROGRAMMING	L	T	P	C
SDG NO. 4, 9		1	0	4	3

COURSE OBJECTIVES:

1. To understand the basics of C language, including syntax, data types, variables, constants, operators, and control structures.
2. To familiarize the fundamental logic to write, debug, and optimize code using conditional statements, loops, and functions to solve real-life problems.
3. To acquire the skills to manipulate and store data using arrays, strings, pointers, and dynamic memory allocation.
4. To learn how to implement structures, unions, and file handling to create modular and scalable programs.
5. To familiarize the development of small projects to apply their learning in practical, real-world scenarios by adhering to best programming practices.

BASICS OF C PROGRAMMING AND CONTROL STRUCTURES   3
Introduction to C Programming - Structure of a C Program, Keywords, Identifiers, Constants, Variables, Basic Data Types, Type Conversion, Input & Output Functions (printf(), scanf(), getchar(), putchar()). Operators in C - Arithmetic, Relational, Logical, Assignment, Bitwise Operators, Operator Precedence, Associativity, and Typecasting.

CONTROL FLOW AND LOOPING   3
Control Structures - Decision-Making: if, if-else, nested if-else, switch-case, Looping: for, while, do-while, Loop Control Statements: break, continue, goto.

ARRAYS, STRINGS, AND POINTERS   3
Arrays - Defining, Declaring, Initializing, Accessing Arrays, Multi-Dimensional Arrays (2D Arrays and Matrix Operations). Strings - Character Arrays, String Handling Functions (strlen(), strcpy(), strcmp(), strcat()), String Manipulation.

POINTERS, FUNCTIONS AND RECURSION   3
Pointers and Dynamic Memory Allocation - Basics of Pointers, Pointer Arithmetic, Pointer to Functions, Dynamic Memory Allocation: malloc(), calloc(), free(), realloc(), Dangling Pointers, NULL Pointers. Functions - User-defined and Library Functions, Parameter Passing: Call by Value, Call by Reference, Recursion.

STRUCTURES AND FILE HANDLING   3
Structures and Unions - Declaring and Accessing Structures, Array of Structures, Nested Structures, Structures vs Unions. File Handling and Command-Line Arguments - File I/O Functions: fopen(), fclose(), fread(), fwrite(), fprintf(), fscanf(), Text Files and Binary Files, Command-line Arguments. Bitwise Operators and Preprocessor Directives, Bit Manipulation, Bitwise AND, OR, XOR, Left Shift, Right Shift. Preprocessor Directives: #define, #include, Macros, Conditional Compilation.

TOTAL (THEORY): 15 PERIODS

LAB EXPERIMENTS

1. Programs illustrating Input/output operations, arithmetic operators

Sample - Billing System for a Retail Store

Scenario: A retail store wants to automate its billing system. Write a C program that takes item names, quantities, and prices as input and calculates the total bill, including tax.

Concepts Used: Input/output operations, arithmetic operators, and control structures.

2. Programs illustrating Control Structures - Decision Making

Sample - Movie Ticket Booking System

Scenario: A multiplex offers discounts on movie tickets based on age. Write a program to accept the age of the user and display the ticket price using the following conditions:
- Children (below 12) - ₹100
- Seniors (above 60) - ₹150
- Others - ₹250

Concepts: if-else, Logical Operators

3. Programs illustrating Control Structures - Iteration

Sample - ATM PIN Validation

Scenario: A banking system allows users a maximum of three attempts to enter the correct PIN. Implement a program that asks the user for a 4-digit PIN. If the entered PIN is incorrect, the program should allow up to three attempts before locking the user out.

Concepts: while loop, Conditional statements

4. Programs illustrating Arrays

Sample - Smart Attendance Tracker

Scenario: A school wants to track student attendance. Develop a C program that allows input of student roll numbers and marks attendance. The program should display present and absent students.

Concepts Used: Arrays, loops, and conditional statements.

5. Programs illustrating String Manipulation

Sample - User Authentication System

Scenario: A company wants a basic user login system. Write a program that accepts a username and password from the user and checks if they match a pre-stored username and password. If they match, print "Login Successful"; otherwise, print "Invalid Credentials".

Concepts: strcmp(), gets(), puts(), Input Validation

6. Programs illustrating Functions

Sample - Banking Transaction System

Scenario: A bank needs an application to handle transactions. Write a program that allows users to deposit, withdraw, and check their account balance. Ensure that withdrawal doesn't exceed the account balance.

Concepts Used: Functions, conditional statements, and loops.

7. Programs illustrating Pointers and Dynamic Memory Allocation

Sample - Dynamic Array Allocation

Scenario: A data-processing application needs to store n numbers dynamically. Task: Write a program that takes n as input, dynamically allocates memory for an array, accepts n numbers, and prints them.

Concepts: malloc(), free(), Pointer arithmetic

8. Programs illustrating Structures and Unions

Sample - Online Shopping Cart

Scenario: An e-commerce website wants a shopping cart system. Write a program that allows users to add products to the cart, calculate the total price, and apply discounts for orders above a certain amount.

Concepts Used: Arrays, structures, and conditional statements.

9. Programs illustrating File Handling

Sample - File Encryption & Decryption

Scenario: A company wants to protect sensitive data by encrypting text files. Write a program that reads a text file, encrypts the content using a simple character shift algorithm, and saves it to a new file.

Concepts Used: File handling, character manipulation, and loops.

TOTAL (LAB): 60 PERIODS

TOTAL: 75 PERIODS

COURSE OUTCOMES

Upon completion of the course, students shall have ability to:

CO1	Describe the C programming fundamental concepts and to select suitable keywords and data types for simple programs	[U]

CO2	Choose appropriate control structures and looping techniques to design structured and efficient programs	[AN]
CO3	Apply arrays, strings, and pointers concepts to manipulate and process data for problem-solving in C programming	[AP]
CO4	Examine the effectiveness of functions and dynamic memory allocation in enhancing program modularity and efficiency	[AN]
CO5	Develop applications using structures, file handling and preprocessor directives to manage data and system interactions	[AP]

TEXT BOOKS

1. Jens Gustedt, "Modern C", 3rd Edition, Manning Publications, 2023.
2. Robert C. Seacord, "Effective C: An Introduction to Professional C Programming", 2nd Edition, No Starch Press, 2023.
3. Dan Gookin, "C Programming for Dummies", 2nd Edition, For Dummies Publication, 2020.

REFERENCE BOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Prentice Hall, 2015.
2. Stephen G. Kochan, "Programming in C", 4th Edition, Developer's Library, 2014.
3. King. K. N., "C Programming: A Modern Approach", 2nd Edition, W. W. Norton & Company, 2008.

WEB RESOURCES

1. https://cs50.harvard.edu/x/
2. https://www.learn-c.org/
3. https://www.geeksforgeeks.org/c-programming-language
4. https://www.programiz.com/python-programming
5. https://www.w3schools.com/c/
6. https://www.codechef.com/cpp-online-compiler

		L	**T**	**P**	**C**
25TA101 **SDG NO.** **2,7,9,12,15,16**	**HERITAGE OF TAMILS**	**1**	**0**	**0**	**1**

COURSE OBJECTIVES

1. To know various concepts of Tamil Language families.
2. To know about the essentialities of Heritage.
3. To understand the Aram concepts of Tamils and the cultural influence.

Language and Literature   3

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

Heritage - Rock Art Paintings to Modern Art – Sculpture   3

Hero stone to modern sculpture - bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

Folk and Martial Arts   3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

Thinai Concept of Tamils   3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

Contribution of Tamils to Indian National Movement and Indian Culture   3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL PERIODS: 15

Course Outcomes:

Upon completion of the course, students shall have ability to,

C101.1	Know about the language families in India, impact of religions and the contribution of Bharathiyar and Bharathidhasan	[U]
C101.2	Observe the growth of sculpture, making of musical instruments and the role of temples in socio and economic lives	[U]
C101.3	Understand the significance of folklore and martial arts	[U]
C101.4	Learn the sangam literature, sangam age and overseas conquest of Cholas	[U]
C101.5	Understand the contribution of Tamils to Indian Freedom Struggle, role of Siddha medicine and print history of Tamil Books	[U]

TEXT-CUM-REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கக. கக. பிள்ளை (வவளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முளைவர் இல. சுந்தரம் . (விகடன் பிரசுரம்).
3. கீழடி – எவளக நதிக்களரயில் சங்ககால நகர நாகரிகம் (வதால்லியல் துளை வவளியீடு)
4. வபாருளந – ஆற்றைங்களர நாகரிகம். (வதால்லியல் துளை வவளியீடு).

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

25IKC01 SDG No: 3,4,5,11,16	Introduction to Indian Knowledge System	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

1. Identify key aspects of Indian knowledge systems, including philosophy, science, mathematics, medicine (Ayurveda), astronomy, and architecture.
2. Highlight the contributions of Indian philosophy and spirituality to global thought and ethics.
3. Illustrate the cultural diversity of India through its languages, festivals, arts, and traditions
4. Implement practices from Indian knowledge systems such as yoga, meditation, and sustainable living in daily routines.
5. Compare ancient Indian scientific theories with contemporary scientific principles.

Introduction to Indian Knowledge Systems (IKS) 6
About Indian Knowledge System; Definition of Indigenous/ Traditional Knowledge; Scope, and Importance of Traditional Knowledge Ancient India - Bharat Varsha: People of Ancient Bharat Varsha; Our great natural heritage: The great Himalayas and the rivers; The civilizations of the Sindhu -Ganga valley, Ancient Indian Traditional Knowledge and Wisdom about nature and climate.

Indian Heritage of Knowledge 6
Ancient Indian Knowledge: The Vedas and its components - the Vedangas Ancient Indian books and treaties: The Sastras.; The Great Indian Epics: The Ramayana and The Mahabharata Epics.

Languages and language studies in India: What is linguistics? Script and Language; Alphabet of the Indian; languages Varnamala: Origin, Evolution, and phonetic features; Languages of India; Important texts of Indian languages: Skills Siksha, Expression/Prounciation-Nirukta.

Introduction to Fine Arts and Performing Arts of India 6
Ancient Indian classical music and dance forms: The Science of Dramas- Natyasastra and the Science of Music-Gandharva-Veda; Aesthetics in Indian Art and Culture; Folk music and traditional dance forms of the Northeast.

Indian Science & Technology: Ancient India's contribution to Mathematics - Number System. Algebra and Arithmetic, Geometry and Trigonometry; Origin of Decimal system in India; nomenclature of numbers in the Vedas. Zero and Infinity Sulba-sutras.

Indian Astronomy 6
Planetary System: Motion of the Planets; Velocity of Light; Eclipse. Astronomy. Navagrahas. Important works in Indian Astronomy. Aryabhata and Nilakantha: Contribution to Astronomical Studies. Indian Metal Works: Mining Techniques. Types of Metals. Tools & Techniques for Metal Smelting with examples.

Contribution of Ancient India to Health Sciences   **6**
Traditional Indigenous systems of medicines in India:- Ayurveda and Yoga; Elements of Ayurveda: Gunas and Doshas, Pancha Mahabhuta and Sapta-dhatu; Concept of disease in Ayurveda; Ayurvedic lifestyle practices: Dinacharya and Ritucharya; Important Ayurvedic Texts; Hospitals in Ancient India; Ayurveda: Gift of India to the modern world.

The experiential learning sessions may include:
- Field Visits: Organizing visits to historical sites, museums, traditional craft centers, and other places relevant to Indian knowledge systems.
- Interactive Sessions: Engaging students in discussions with experts and practitioners in various fields of Indian knowledge systems to gain insights and practical knowledge.
- Online Lecture Series: Providing the students with online lectures by distinguished experts in the field of the Indian Knowledge System.
- Hands-on Activities: Providing opportunities for students to participate in activities related to traditional arts, crafts, music, dance, agriculture, etc., to understand the practical aspects of Indian knowledge systems.
- Practical Demonstrations: Conducting workshops or sessions to demonstrate traditional practices, such as yoga, Ayurveda, Vastu Shastra, etc., for the students.

TOTAL PERIODS: 30

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1	Recall the rich heritage of Indian knowledge systems	[U]
CO2	Describe the contribution of Indian knowledge systems to the world	[R]
CO3	Demonstrate knowledge of sociocultural and ethnolinguistic diversity that constitutes the soul of Bharatvarsha.	[R]
CO4	Apply traditional knowledge and techniques in day-to-day life	[AP]
CO5	Distinguish knowledge traditions that originated in the Indian subcontinent	[AP]

TEXT BOOKS
1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavan RN. *Introduction to Indian Knowledge System: Concepts and Applications.* PHI Learning Private Ltd.2022.
2. Mukul Chandra Bora*, Foundations of Bharatiya Knowledge System.* Khanna Book Publishing, 2023.

REFERENCE BOOKS:

1. Dharampal, *The Beautiful Tree: Indian Indigenous Education in the Eighteenth Century*, Dharampal Classics Series, Rashtrotthana Sahitya, Bengaluru, 2021

2. Baladev Upadhyaya, *Samskrta Śāstrom ka Itihās*, Chowkhambha, Varanasi, 2010.

3. Bose,D.M.,Sen, S.N. and Subbarayappa,B.V., Eds., *A Concise History of Science in India*, 2nd Ed., Universities Press, Hyderabad, 2010.

4. Astāngahrdaya, Vol. I, *Sūtrasthāna and Śarīrasthāna*, Translated by K. R. Srikantha Murthy, Vol. I, Krishnadas Academy, Varanasi, 1991.

5. Bajaj,J.K. and Srinivas,M.D., *Indian Economy, and Polity in Eighteenth-century Chengalpattu*, in J. K. Bajaj ed., Indian Economy and Polity, Centre for Policy Studies, Chennai, 1995.

SEMESTER – II

25EE201	NETWORK ANALYSIS AND SYNTHESIS	L	T	P	C
SDG NO. 4, 9		3	1	0	4

COURSE OBJECTIVES
1. To explore the principles of resonance and graph theory applied to electrical networks.
2. To interpret the behaviour of AC circuits using two-port network parameters.
3. To understand the different types of filters.
4. To relate various attenuators for signal transmission.
5. To synthesize electrical networks using Foster and Cauer methods based on positive real functions.

RESONANCE AND GRAPH THEORY 12

Series and Parallel resonance in RLC circuits -Resonant frequency, bandwidth, Q factor, Voltage magnification - Graph Theory - Oriented Graphs, Tree, links and Twigs - Network matrices, Incidence matrix, Loop and cut set matrices - Relation between different network matrices.

TWO PORT NETWORK FOR AC CIRCUITS 12

Types of two port networks - Open circuit impedance parameters - short circuit admittance parameters - transmission parameters and hybrid parameters. Network functions, driving point and transfer parameters - Relationship between parameter sets, Conditions for reciprocity and symmetry in two-port networks.

COUPLED CIRCUITS AND FILTERS 12

Dot convention, Coefficient of coupling, mutual inductance in loop and nodal equations. - Classification of filters - Analysis of a prototype Low Pass Filter, High Pass Filter, Band Pass Filter, Band Stop Filter, Design of m-derived and constant-k filters.

ATTENUATORS 12

Attenuation, Types of attenuators, Symmetrical T-type attenuator, Symmetrical π-type attenuator, Symmetrical bridged T-type attenuator, Symmetrical lattice type attenuator, Asymmetrical L-type attenuator, Asymmetrical T-type attenuator, Asymmetrical π-type attenuator, Applications of attenuators in signal conditioning and communication systems.

NETWORK SYNTHESIS 12

Elements of circuit synthesis - Positive Real Functions - properties - Hurwitz Polynomial - Synthesis of RC, RL and LC Networks using Foster and Cauer forms.

TOTAL : 60 PERIODS

COURSE OUTCOMES

Upon completion of the course, students shall have ability to,

CO1	Interpret the various resonance conditions and apply graph theory techniques in electrical networks	[AP]
CO2	Relate the different two-port network parameters and their interdependencies	[U]
CO3	Classify the various types of filters based on their functions	[U]
CO4	Infer the types of symmetrical and asymmetrical attenuators for various applications	[U]
CO5	Employ the various passive networks using positive real functions	[AP]

TEXT BOOKS

1. Jr William H. Hayt, Jack E. Kemmerly and Jamie D. Phillips, "Engineering Circuits Analysis", McGraw-Hill, 10th Edition, 2024.
2. Wadhwa. C.L, "Network Analysis and Synthesis", New Age International Publishers, 5th edition, 2023.
3. Van Valkenburg. M.E, "Network Analysis", Pearson Kindle Edition, 2023.

REFERENCE BOOKS

1. Sudhakar A and Shyam Mohan S Palli, "Circuits and Network Analysis and Synthesis", McGraw Hill, 4th edition, 2017.
2. Katharina A. Zweig, "Network Analysis Literacy: A Practical Approach to the Analysis of Network", Springer Verlag, 2018.
3. Franklin F. Kuo, ''Network Analysis and Synthesis'', Wiley Student Edition, 2006.
4. Joseph A. Edminister, Mahmood Nahvi, "Electric Circuits", Schaum series,McGraw Hill, 5th edition, New Delhi, 2017.

WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc20_ee46/preview
2. https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/pages/syllabus
3. https://www.analog.com/en/product-category/attenuators.html
4. https://ekeeda.com/degree-courses/electronics-engineering/electrical-network-analysis-and-synthesis

25EE202 SDG NO. 6, 12	ELECTRONIC DEVICES AND CIRCUITS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES

1. To understand the operation, characteristics, and applications of diodes and display devices in electronic systems.
2. To interpret the operation and characteristics of BJT configurations.
3. To explore the operation and characteristics of JFET and n-channel MOSFET configurations.
4. To analyse the frequency response of an amplifier using BJT devices.
5. To familiarize with the characteristics and efficiency of power amplifiers.

DIODE APPLICATIONS   9

Diode Applications - Rectifiers with and without filters, Regulated power supplies, Clippers and Clampers. Light Emitting Diodes (LEDs) - Light dependent resistor (LDR) - Photodiode - Optocoupler. Overview of Bureau of Indian Standards (BIS):12970 (Part5/Section 1): 191 for semiconductor devices.

BIPOLAR JUNCTION TRANSISTOR   9

Transistors operation - PNP and NPN - Input and Output Characteristics of CB, CE and CC Transistor configurations - Transistor as a switch - Load Line - Stability factor - Fixed bias and Voltage divider bias.

FIELD EFFECT TRANSISTOR   9

Junction Field Effect Transistors operation - types - drain and transfer characteristics - FET as variable resistor - Metal Oxide Semiconductor Field Effect Transistor - operation and V-I Characteristics of n-channel MOSFET - Self Biasing, FINFET.

FREQUENCY RESPONSE OF AN AMPLIFIER   9

Small signal model - Determination of h Parameters - hybrid π model: Analysis of CE amplifiers, High frequency response of CS amplifier - Multistage Cascade Amplifier - Darlington pair amplifiers.

POWER AMPLIFIERS   9

Power amplifiers: Class A, B, AB, C, D - Class A - transformer coupled, Class B - complementary-symmetry power amplifiers - Calculation of Power Output, Efficiency and power dissipation, heat sinks.

TOTAL THEORY : 45 PERIODS

LIST OF EXPERIMENTS

1. Control a relay using semiconductor device to switch ON/OFF a light bulb based on temperature sensor reading.

2. Design and implementation of half-wave and full-wave rectifier circuits using PN junction diodes to measure the output voltage waveform, ripple voltage, and efficiency using simulation software.

3. Design clipper and clamper circuits to achieve a desired bias voltage using a virtual lab.

4. Evaluate the characteristics of Light Emitting Diode (LED) for traffic lighting systems using a virtual lab.

5. Measurement of transconductance, voltage gain and output impedance from the input and output characteristics of a BJT in Common Emitter (CE) configuration.

6. Design an amplifier circuit that detects a clap sound to switch ON/OFF the light load.

7. Analyse the correlation between I_C and I_{CO} for self-bias and fixed bias circuits and determine the stability factor for each case using simulation software.

8. Design a JFET circuit to plot its drain and transfer characteristics under different gate-source voltages and drain currents, and to measure knee and pinch off points.

9. Design the MOSFET to act as a switch for controlling the ON/OFF operation.

10. Design a lamp dimmer circuit using a Darlington pair of transistors for use in cars.

11. Frequency response analysis of a common emitter BJT amplifier for a public address system using a virtual lab.

12. Interpret the operation of a complementary-symmetry Class B power amplifier for driving loudspeakers.

TOTAL LAB : 30 PERIODS

TOTAL : 75 PERIODS

COURSE OUTCOMES

Upon completion of the course, students shall have ability to,

CO1	Understand the performance of various semiconductor-based circuits	[U]
CO2	Illustrate the operation and characteristics of BJT configurations	[U]
CO3	Infer the operation and characteristics of JFET and n-channel MOSFET configurations	[U]
CO4	Analyze the various amplifier circuits using transistors	[AN]
CO5	Interpret the performance of power amplifiers	[AP]

TEXT BOOKS

1. Vasudevan. K, "Basic electronic circuits: problems and solutions", Springer, 2023.
2. Salivahanan.S, Suresh Kumar.N, "Electronic Devices and Circuits", Tata McGraw Hill, 5th edition, 2022.
3. Sudhakar A and Shyam Mohan S Palli, "Circuits and Network Analysis and Synthesis", McGraw Hill, 4th edition, 2017.
4. Thomas.L. Floyd, "Electronic Devices", Prentice Hall,9th Edition, 2012.

REFERENCE BOOKS

1. Mehta V.K, Rohit Mehta, "Principles of Electronics", S. Chand Publishing, 12th Edition, 2020
2. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, reprint, 2015.
3. Jacob Millman, Christo C Halkias, Stayabatra Jit, "Electronic Devices & Circuits", 3rd Edition, McGraw Hill Education India,2010.

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WEB RESOURCES

1. https://onlinecourses.nptel.ac.in/noc25_ee39/preview
2. https://onlinecourses.nptel.ac.in/noc25_ee75/preview
3. https://www.coursera.org/learn/diode-pn-junction-metal-semiconductor-contact?specialization=semiconductor-devices
4. https://www.coursera.org/learn/transistor-field-effect-transistor-bipolar-junction-transistor

		L	T	P	C
25EC201 **SDG No. 4,9**	**DIGITAL CIRCUITS AND LOGIC DESIGN**	3	0	2	4

COURSE OBJECTIVES

1. To understand the principles of canonical forms for minimizing logic expressions.
2. To infer the various combinational and sequential logic circuits.
3. To analyze synchronous sequential circuits.
4. To implement memory devices for combinational logic systems.
5. To develop and simulate Verilog code for combinational and sequential logic circuits.

LOGIC FUNCTIONS AND MINIMIZATION   9

Canonical Forms - Minterms, Maxterms, Complements, Subtraction using Complements (10's complement and 2's complement), Universal logic gates, Implementation of Boolean functions using universal logic gates, Minimizing functions using Karnaugh map and Quine McClusky method. Generation of Clock using NAND and NOR Gates. Application of basic logic gates in Fire Alarms.

COMBINATIONAL LOGIC CIRCUITS   9

Full Adder, Full Subtractor, Multiplexer, Demultiplexer, Implementation of combinational logic functions using Multiplexer and Demultiplexer, Encoders, Decoders, Priority Encoder, Two-bit magnitude comparator, Binary Multiplier, 4-bit Parallel Adder, Carry look-ahead adder, BCD Adder, Code converters - Binary to Gray, BCD to Excess-3. Design of Digital Lock System using Combinational logic circuit.

SEQUENTIAL LOGIC CIRCUITS   9

Latches and flip flops, Realization of one flip flop using other flip flops, Asynchronous up counter and timing waveform, Synchronous counter design using SR, D, T, JK flip flop, Shift registers - Types of shift register - SISO, SIPO, PISO, PIPO - Application of shift registers - Scoreboard System Using Sequential Logic.

SYNCHRONOUS SEQUENTIAL LOGIC CIRCUITS   9

Clocked sequential circuits - Mealy model, Moore model, Analysis of clocked sequential circuits using D, JK and T - Flip flops - State equations, state table, state diagram, state reduction and state assignment. Vending Machine as a Simple FSM.

PROGRAMMABLE LOGIC DEVICES AND VERILOG   9

ROM, PROM, Programmable Logic Devices - PLA, PAL, Implementation of combinational logic functions using PLA, PAL. Modeling of basic combinational and sequential circuits using Verilog - Gate level modeling, Data flow modeling, Behavioral modeling. Automatic Lighting System Using PLD.

TOTAL THEORY : 45 PERIODS

LIST OF EXPERIMENTS

1. Design a basic alarm circuit using logic gates to detect intrusions.
2. Design and simulate a controller for Washing machine using Virtual Lab.
3. Construct a voting machine circuit using universal gates to determine the majority count.

4. Implement and verify the truth table of adder and subtractor using Logisim and Verilog.
5. Simulate Arithmetic Logic Unit using Virtual Lab.
6. Synthesize and implement Encoder, Decoder, Multiplexer and Demultiplexer using Logisim and Verilog.
7. Realize the implementation of a 2 - bit magnitude comparator to verify password matching in access control systems using Verilog.
8. Construct an Error-Resilient Data Transmission based on Code Conversion using Verilog.
9. Synthesize and implement Flip-flops using Logisim.
10. Simulate a digital clock module through a 4-bit synchronous up/down counter using Virtual Lab.
11. Design a shift register-based UART transmitter for serial communication applications using Virtual Lab
13.12. Design a traffic light controller using Finite State Machine approach

TOTAL LAB : 30 PERIODS

TOTAL : 75 PERIODS

COURSE OUTCOMES

Upon completion of the course, students shall have ability to,

CO1	Illustrate the Canonical forms and minimize Boolean functions using Karnaugh Map and Tabulation method.	[U]
CO2	Interpret the various combinational logic circuits.	[AP]
CO3	Illustrate the various sequential logic circuits.	[AN]
CO4	Employ synchronous sequential circuits for state reduction and state assignment.	[AP]
CO5	Infer the modelling of combinational and sequential circuits using Verilog.	[AP]

TEXTBOOKS

1. Roger L. Tokheim, Patrick E. Hoppe, "Digital Electronics: Principles and Applications", McGraw Hill, 9th Edition, 2021.
2. Morris Mano.M, Michael D.Ciletti, "Digital Design", 6th Edition Reprint, Pearson Education, 2020.
3. Donald P Leach, Albert Paul Malvino, Saha, "Digital Principles and Applications" (SIE), 8th Edition, McGraw Hill Education, 2020.

REFERENCE BOOKS

1. Floyd T.L., "Digital Fundamentals", Pearson Education; 11th Edition, Reprint, 2021.
2. Ming-Bo Lin, "Digital Systems Design and Practice: Using Verilog HDL and FPGAs", 2nd Edition, Create Space Independent Publishing Platform, 2019.
3. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2021.

WEB RESOURCES

1. https://www.tutorialspoint.com/digital_circuits/digital_circuits_useful_resources.htm
2. http://www.technologystudent.com/elec1/dig1.htm
3. https://www.electronicsforu.com/technology-trends/learn-electronics/digital-electronics-basics.
4. https://onlinecourses.nptel.ac.in/noc20_ee32/preview

25ENC01	**BUSINESS COMMUNICATION AND VALUE SCIENCE**	**L**	**T**	**P**	**C**
SDG NO. 4,8,9,16		**2**	**0**	**2**	**3**

COURSE OBJECTIVES:

1. Recognize the significance of life skills and their role in leading a happy and well-balanced life.
2. Motivate students to look within and create a better version of self.
3. Introduce the key concepts of values, life skills and business communication.
4. Apply clarity, conciseness, and coherence in workplace communication to ensure effective message delivery.
5. Identify best practices for communication in teamwork and leadership scenarios.

INTRODUCTION TO VALUES AND COMMUNICATION   6

Introduction to values-Its importance and necessity–Overview of business communication (Importance of oral & written communication) - Listening skills (Hearing Vs Listening) – Body language- SATORI (sharing personal experience)

WORKPLACE COMMUNICATION ESSENTIALS   6

Tenses – Subject-verb agreement – Voice -Summary writing – Story writing –Email writing - Its advantages & disadvantages- Business etiquette and protocol across cultures- Cross cultural leadership and conflict resolution-Virtual communication (Dos and Don'ts)-AI application in business communication-Meeting summaries and Content creation.

EFFECTIVE COMMUNICATION SKILLS   6

Effective communication-Types of communication (Verbal, Written & Non-verbal communication) – Barriers to effective communication – Tips to develop communication skills-Branding and its types- Introduction to basic presentation skills- Storytelling in Writing and Presentations.

LISTENING AND READING SKILLS   6

Principles of listening –The Process of listening–Types of listening-- – Pronunciation and enunciation- Speed Reading - Introduction to skimming and scanning – Reading Reviews (Book blurb) - Reading and understanding technical articles.

LIFE SKILLS   6

Analyzing personality traits- Dr.MeredithBelbin and his research on teamwork - Belbin's 9 Team Roles and Lindgren's Big 5 personality traits - Belbin's 9 team player styles- Diversity & Inclusion- Different forms of Diversity in our society- Life skills –Importance and necessity – Thinking skills – Social skills – Emotional skills – Howard Gardner's Multiple Intelligence–Embracing adversity.

TOTAL (THEORY): 30 PERIODS

Lab Components

1. Listening skills- British Council B2&C1

2. Listeningto technical lectures (Audio/Video)

3. Immersion activity

4. Create resume

5. Group assignment

6. Trek followed by project

7. Group activities

8. Record a conversation

9. Group case study

10. News room buzz

TOTAL (LAB): 30 PERIODS

TOTAL: 60 PERIODS

COURSE OUTCOMES
Upon completion of the course, students shall have ability to:
CO1   Comprehend the importance of life skills and values.   [U]

CO2   Recognize own strengths and opportunities of Business Communication.   [R]

CO3   Analyze the life skills in different fields.   [A]

CO4   Apply the basic tenets of communication in workplace.   [AP]

CO5   Analyze the basic communication practices in different types of situations.   [A]

TEXTBOOKS
1. King, Patrick. *How to Speak Effectively: A Guide to Engaging Conversations, Presentations, and Making an Impact on People. Penguin India, 2024.*
2. BharadwajApoorva, "Leadership Communication Skills for Intercultural Management: Strategies for Effective Intercultural Management (Contemporary Themes in Business and Management)", Routledge India; 1st edition, 2024.
3. Bovee, Courtland L., John V. Thill, and Barbara E. Schatzman.*Business Communication Today. 15th ed., Pearson, 2021.*

REFERENCE BOOKS
1. Helen Spencer-Oatey and DomnaLazidou**, "**Making Working Relationships Work: The TRIPS Toolkit for Handling Relationship Challenges and Promoting Rapport",Castledown Publishers,2023.
2. Dr.Praveen Sam and K N Shoba - A Course in Technical English by Cambridge University press, 2020.
3. C. Gangalakshmi, B. Rathika, L. Saranraj, "Professional English for Engineers", Cengage India, 2023 (2nd Edition).

WEB RESOURCES
1. Train your mind to perform under pressure- Simon Sinek https://curiosity.com/videos/simon-sinek-on-training-your-mind-to-perform-under-pressure-capture-your-flag/

2. Brilliant way one CEO rallied his team in the middle of layoffs
https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-before-numbers.html
3. Will Smith's Top Ten rules for success
https://www.youtube.com/watch?v=bBsT9omTeh0
4. https://www.coursera.org/specializations/business-english
5. https://www.coursera.org/specializations/effective-business-communication

25IT201	OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C
SDG NO. 4,8,9		1	0	4	3

COURSE OBJECTIVES

1. To outline the basic structure, syntax, and semantics of C++ programming
2. To illustrate the use of control structures, functions, and recursion in solving computational problems
3. To illustrate the control structures, functions, and recursion to solve real-world problems
4. To explore object-oriented programming concepts such as classes, objects, inheritance, and polymorphism
5. To inculcate the insights on pointers, memory allocation, and file handling for advanced programming solutions
6. To use the Standard Template Library (STL) and modern programming concepts like lambda functions and exception handling

INTRODUCTION TO C++ AND PROGRAMMING BASICS   3

Introduction to C++: History, Features, Structure of C++ Program, Basic Syntax: Variables, Data Types, Constants, Header Files, Operators in C++: Arithmetic, Relational, Logical, Assignment, Bitwise, and Precedence, Scope Resolution Operator, Conditional Statements: if, if-else, switch-case, Looping Statements: for, while, do-while, break, continue, goto, Arrays: 1D and 2D Arrays, Array Manipulations, Strings and String Functions: String Handling in C++.

FUNCTIONS, POINTERS, AND MEMORY MANAGEMENT   3

Functions: Function Basics, Call by Value, Call by Reference, Return by Reference. Inline Functions, Function Overloading. Recursion: Recursive Functions in C++. Pointers: Pointers and Dynamic Memory Allocation (malloc, free, new, delete).

CLASSES, CONSTRUCTORS, AND OPERATOR OVERLOADING   3

Object Oriented Concepts – Features of OOP - Classes and Objects: Defining Classes, Access Specifiers (public, private, protected), Static Data members and Static Member Function. Constructors and Destructors: Default, Parameterized, Copy Constructors, Shallow Copying, Deep Copying. Friend Functions and Friend Classes, Overloading 'this' Pointer. Operator Overloading: Implementing Operator Overloading.

INHERITANCE, POLYMORPHISM, AND EXCEPTION HANDLING   3

Inheritance: Single, Multilevel, and Multiple Inheritance, Function Overriding, Overloading vs. Overriding, Polymorphism: Compile-time and Run-time Polymorphism, Virtual Functions, Pure Virtual Functions, Abstract Classes. Exception Handling: Built-in and Custom Exceptions, try-catch Blocks.

FILE HANDLING, STL, AND LAMBDA   3

File Handling in C++: File I/O, File Streams (ifstream, ofstream, fstream), Templates: Function Templates, User Defined Templates, Class Templates. Standard Template Library (STL): Introduction to STL, Generic Programming. Lambda Functions: Syntax, Applications and Use Cases.

TOTAL (THEORY): 15 PERIODS

LIST OF EXPERIMENTS

1. You are building a grade calculator where students are given scores in three subjects. You need to calculate the total score and then determine the grade based on the total score.
   Question: Write a C++ program where you:

   a. Accept three subject scores (out of 100).
   b. Calculate the total score using the arithmetic + operator.
   c. Use a relational operator to determine if the total score is above a passing grade (e.g., 50).
   d. Print a message based on the result (either "Pass" or "Fail").

2. Simple C++ Programs to Implement Various Control Structures.
   a. If statement
   b. Switch case statement and
   c. For loop
   d. While loop
   e. do while loop

3. Implement a C++ Program to the following
   a. Perform sorting and find maximum, and minimum elements in the given 1D array
   b. Perform Matrix addition, Matrix Multiplication, and Matrix transposition using 2D array

4. You are building a simple utility that checks whether a given string is a palindrome. A palindrome is a word, phrase, number, or other sequence of characters that reads the same forward and backward, ignoring spaces, punctuation, and letter case.
   Question: Write a C++ program that:

   a. Accepts a string as input from the user.
   b. Removes spaces and converts the string to lowercase.
   c. Checks if the string is a palindrome.
   d. Prints the result: either "The string is a palindrome" or "The string is not a palindrome".

5. Implement a C++ program to Factorial and Fibonacci concepts using Recursion
6. Implement C++ program using dynamic memory allocation.
7. Implement a C++ program using class and object to solve real world problem
8. Implement a C++ program using constructor and destructor.
9. Implement a C++ program using the Friend Function to perform vector addition, subtraction, and multiplication.
10. Implement a C++ program to perform operator overloading using unary and binary operators.
11. Implement a C++ program using Inheritance with real-world examples.
12. Implement a C++ program Using Polymorphism.
13. Implement a C++ program using virtual and pure virtual Function.
14. Implement a C++ program using exception handling.
15. Implement a C++ program to perform Student Grades Management using file concept.
16. Implement a C++ program Using Template.
17. Develop an application in C++ using the oops Concept.

TOTAL (LAB): 60 PERIODS

TOTAL: 75 PERIODS

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1	Apply the basic syntax and operators in C++ to develop functional programs	[AP]
CO2	Construct programs using control structures, arrays, and functions to solve various computational problems	[AP]
CO3	Utilize key +concepts such as encapsulation, inheritance, and polymorphism to design and implement software solutions	[AP]
CO4	Design and develop robust programs using dynamic memory allocation, exception handling, and file operations	[AP]
CO5	Utilize STL, lambda expressions, and abstract classes to improve code efficiency and reusability	[AP]

TEXT BOOKS

1. Robert Lafore, "Object-Oriented Programming in C++", Sams Publishing, 4th Edition, 2023.
2. Yashavant Kanetkar, "Let Us C++", BPB Publications,17th Edition, 2022.
3. Ashok N. Kamthane, "Object-Oriented Programming with ANSI & Turbo C++", Pearson Education, 7th Edition, 2016.
4. Bjarne Stroustrup, "The C++ Programming Language", Addison-Wesley, 4th Edition, 2013.

REFERENCE BOOKS

1. Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo, "C++ Primer", Addison-Wesley, 5th Edition, 2010.
2. Herbert Schildt, "C++: The Complete Reference", McGraw Hill Education, 4th Edition, 2021.
3. Paul Deitel and Harvey Deitel, "C++ How to Program", Pearson Education,10th Edition 2017.

WEB RESOURCES

1. https://www.programiz.com/cpp-programming/operators
2. https://www.tpointtech.com/cpp-inheritance
3. https://cplusplus.com/doc/tutorial/files/
4. https://onlinecourses.nptel.ac.in/noc21_cs38/preview
5. https://www.coursera.org/specializations/hands-on-cpp

25CS202	**APPLICATION DEVELOPMENT PRACTICES**	**L**	**T**	**P**	**C**
SDG NO. 4,8,9,11		0	0	4	2

COURSE OBJECTIVES

1. To impart the knowledge of fundamental concepts in HTML, CSS, and Bootstrap.
2. To implement JavaScript and TypeScript features to create dynamic, data-driven applications.
3. To gain proficiency in Linux shell scripting and basic Linux commands.
4. To utilize branching, merging, and remote repository operations in Git and GitHub.
5. To effectively use Git and GitHub for version control, collaboration, and managing software development projects.

LIST OF EXPERIMENTS

1. Create a responsive web page with a registration form using HTML5, CSS3, and Bootstrap grid system.
2. Enhance web elements with CSS: Shadows, Rounded Borders, and Multiple Backgrounds
3. Implement a CSS grid-based layout to create a responsive web page.
4. Implement a JavaScript-based form validation for user input fields (email, password, etc.).
5. Develop a dynamic webpage using JavaScript and DOM manipulation.
6. Work with APIs and fetch data asynchronously using JavaScript.
7. Create a TypeScript application demonstrating object-oriented programming concepts.
8. Write a Linux shell script to automate file management tasks.
9. Schedule background jobs using Linux cron and batch scripting.
10. Perform Git version control operations: cloning, committing, branching, and merging.
11. Collaborate on a project using GitHub: Forking, pull requests, and resolving merge conflicts.
12. Deploy a static website using GitHub Pages.

TOTAL: 60 PERIODS

COURSE OUTCOMES
Upon completion of the course, students shall have ability to

CO1	Develop structured and responsive web pages using HTML, CSS, and Bootstrap	[AP]
CO2	Construct JavaScript and TypeScript programs	[AP]
CO3	Build and execute Linux shell scripts to automate tasks, manage files, and schedule jobs	[AP]
CO4	Utilize Git and GitHub for version control, including repository management, branching, merging, and collaborative development	[AP]
CO5	Apply Agile principles for project management, using GitHub tools to track progress, manage tasks, and enhance team collaboration	[AP]

TEXT BOOKS

1. Duckett, J., "HTML and CSS: Design and Build Websites", 1st Edition, Wiley, 2011.
2. Flanagan, D., "JavaScript: The Definitive Guide", 7th Edition, O'Reilly Media, 2020.
3. Cherny, B., "Learning TypeScript: Enhance Your Web Development Skills", O'Reilly Media, 2022.
4. Tushar, S., & Lakshman, S, "Linux Shell Scripting Cookbook", 2nd Edition. Packt Publishing, 2013.
5. Chacon, S., & Straub, B., "Pro Git", 2nd Edition, Apress, 2014.

REFERENCE BOOKS

1. Harris, A., "HTML5 and CSS3 All-in-One For Dummies". Wiley, 2014.
2. Haverbeke, M, "Eloquent JavaScript", 3rd Edition, No Starch Press, 2018.
3. Simpson, K, "You Don't Know JS: Scope & Closures", O'Reilly Media, 2014.
4. Loeliger, J., & McCullough, M. "Version Control with Git", 2nd Edition, O'Reilly Media, 2012.
5. Sass, H., "Mastering Bootstrap 5", Packt Publishing, 2021.

WEB RESOURCES
1. https://developer.mozilla.org/en-US/docs/Web/HTML
2. https://developer.mozilla.org/en-US/docs/Web/CSS
3. https://developer.mozilla.org/en-US/docs/Web/JavaScript
4. https://www.coursera.org/learn/html-css-javascript-for-web-developers
5. https://online-learning.harvard.edu/subject/javascript

25MEC03	DESIGN THINKING AND IDEA LAB	L	T	P	C
SDG NO. 4, 9, 11, 12	(Common to All Branches)	0	0	2	1

COURSE OBJECTIVES

1. To accelerate development of indigenous products in line with the "Make in India" campaign.
2. To encourage aspiring engineers to actualize their ideas under one roof.
3. To impart multidisciplinary education to all students to promote innovation and product development.
4. To initiate new ways of creative thinking and enable the students to learn the cycle of Design Thinking process for developing innovative products.
5. To promote experiential learning and entrepreneurial skills among the students.

DESIGN THINKING

Design Thinking: Definition, Need and Objective, Concepts and Brainstorming, Stages – Empathize, Define, Ideate, Prototype, Test. Practical Examples of Customer Challenges, Alignment of Customer Expectations with Product Design - Feedback, Re-Design and Re-Create, Design Thinking Approaches by IDEO and School of Design Thinking's Design Definition - 3 Laws of Design Thinking - DCAFE – 5 Frictional.

INTRODUCTION TO TOOLS AND EQUIPMENT

Introduction to Hand Tools and Power Tools - 3-axis CNC routing, basic turning, milling, drilling and grinding operations, Laser cutting, Laser engraving etc.

Basic 2D and 3D designing using CAD tools such as FreeCAD, Sketchup, Prusa Slicer, FlatCAM, Inkspace and OpenBSP - 2D and 3D structures for prototype building using CNC machine - Basic welding and other joining techniques for assembly - Basics of 3D scanning, Point cloud data generation for reverse engineering.

Exposure to PCB prototype fabrication - Familiarity and use of soldering and de-soldering equipment - Usage of Arduino, Raspberry Pi and Beagle Bone.

EXPERIMENTAL LEARNING

1. 2D profile cutting of press fit box / casing in acrylic (3- or 6-mm thickness) / polymer / cardboard / MDF (2 mm thickness) board using laser cutter and engraver.
2. Machine 3D geometry on soft material such as soft wood using CNC router.
3. Fabricate products like trusses using cutting and welding tools.
4. 3D printing of scanned geometry using FDM or SLA printer.
5. Designing a suitable PCB layout, fabrication and testing of the circuit.
6. Assemble and disassemble electronic components on a PCB using soldering and de-soldering equipment.
7. Embedded programming using Arduino, Raspberry Pi and Beagle Bone.

DESIGN THINKING PROJECT
1. Design and implementation of a capstone project.

TOTAL PERIODS: 30

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1	Summarize the concepts of Design Thinking	[U]
CO2	Use the equipment, tools and inventories associated with Design Thinking Laboratory	[Ap]
CO3	Perform fundamental fabrication operation using hand tools, power tools, welding equipment, laser cutter and engraver	[AP]
CO4	Perform fundamental electrical and electronic circuit design using PCB machine	[Ap]
CO5	Develop innovative products by implementing the design thinking approach	[C]

TEXT BOOKS

1. Veeranna D.K, "Workshop / Manufacturing Practices (with Lab Manual)", AICTE's Prescribed Textbook, Khanna Book Publishing, 1st edition, 2022.
2. E. Balaguruswamy, "Design Thinking: A Beginner's Perspective", McGraw-Hill Education, 1st edition, 2024.
3. Anuja Agarwal, "Design Thinking: A Framework for Applying Design Thinking in Problem Solving", Cengage India, 1st edition, 2024.

REFERENCE BOOKS

1. Lal, D. M., "Design Thinking- Beyond the Sticky Notes", Sage Publications India Pvt. Ltd., 1st edition, 2021.
2. Kaushik Kumar and Muralidhar Kurni, "Design Thinking: A Forefront Insight", CRC Press, 1st edition, 2023.
3. Shalini Rahul Tiwari, "Design Thinking: A Comprehensive Textbook", Wiley India, 1st edition, 2024.

WEB RESOURCES

1. https://fab-coep.vlabs.ac.in/List%20of%20experiments.html
2. https://www.innovationtraining.org/how-to-use-design-thinking-to-design-an-innovation-lab/
3. https://www.erdster.co.in/design-thinking-lab.html
4. https://www.coursera.org/learn/uva-darden-design-thinking-innovation

25TA201 SDG NO: 4,11,16	TAMILS AND TECHNOLOGY / தமிழரும் தநொழில்நுட்பமும்	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES

1. To know about weaving, ceramic, design and construction technologies in sangam age.
2. To know the significance of technologies such as manufacturing, agriculture and irrigation.
3. To be aware of the development of Scientific Tamils and Tamil Computing.

Weaving And Ceramic Technology   3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

Design and Construction Technology   3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple) - Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

Manufacturing Technology   3

Art of ship building- Metallurgical studies,iron industry- Iron smelting, steel - Copper and gold - Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads - Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

Agriculture and Irrigation Technology   3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

Scientific Tamil & Tamil Computing   3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL PERIODS: 15

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1 Describe about the weaving industry in sangam age and ceramic technology [U]

CO2 Observe the design of houses, sculptures and construction of temples [U]

CO3 Relate the various manufacturing materials and stone types in Silappathikaram [U]

CO4 Understand the significance of agriculture and irrigation technology in ancient period [U]

CO5 Explain the growth of scientific Tamil, Tamil computing and digitization of Tamil books [U]

TEXTBOOKS

1. "தமிழக வரலாறு – மக்களும் பண்பாடும்" – கக. கக. பிள்ளை (வவளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முளைவர் இல. சுந்தரம் . (விகடன் பிரசுரம்).
3. கீழடி – எவளக நதிக்களரயில் சங்ககால நகர நாகரிகம் (வதால்லியல் துளை வவளியீடு)

REFERENCE BOOKS

1. "Social Life of Tamils" (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2. "Social Life of the Tamils - The Classical Period" (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

WEB RESOURCES

1. https://archive.org/details/keeladibookenglish18092019/page/n13/mode/2up
2. https://www.tamildigitallibrary.in/admin/assets/book/TVA_BOK_0005812_Language_and_Literature.pdf
3. https://archive.org/details/ILXZ_historical-heritage-of-the-tamils-edited-by-s-v-subrahmanian-and-k-d-thirunavukk