CK COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
CAVINKARE PATRONIZED INSTITUTION

C.K. COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution)

Approved by AICTE, Affiliated to Anna University & Recognized under UGC section 2(f) & 12(B)
Accredited by NAAC with 'A' grade and ISO 9001:2015 Certified Institution

Jayaram Nagar, Chellangkuppam, Cuddalore-607 003, Tamil Nadu, India.

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM AND SYLLABI

I & II SEMESTER

(UNDER CKCET AUTONOMOUS REGULATION)

REGULATION 2026

Academic Year 2026-27 onwards

C. K. COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution)

UNDERGRADUATE CURRICULUM

Department : Electronics & Communication Engineering

Programme : B.E. - Electronics & Communication Engineering

Regulations : 2026, with effect from the AY 2026 - 27 to all the students of Under Graduate Programme

OVERVIEW OF CREDITS

Semester / Category	BS	ES (G)	HUM	SD	ES (PC)	ES (PE)	ES (ET)	OE	Total
Semester - I	10	03	03	-	03	-	-	-	19
Semester - II	04	03	06	02	09	-	-	-	24
Semester - III	04	03	-	02	18	-	-	-	27
Semester - IV	04	-	-	02	18	-	-	-	24
Semester - V	-	-	-	02	18	03	-	-	23
Semester - VI	-	-	-	02	09	06	-	03	20
Semester - VII	-	-	02	03	06	06	03	-	20
Semester - VIII	-	-	-	08	-	-	-	-	08
Total Credits	**22**	**09**	**11**	**21**	**81**	**15**	**03**	**03**	**165**
Percentage (%)	**13.33**	**5.45**	**6.67**	**12.73**	**49.09**	**9.09**	**1.82**	**1.82**	**100.00**

CATEGORY OF COURSES

HUM	Humanities (Languages, Management, Heritage and others)	BS	Basic Science (Mathematics, Physics, Chemistry)
P	Laboratory Course	T	Theory Course
SD	Skill Development	MC	Mandatory Course
OE	Open Elective	SLC	Self-Learning Course
ES (G)	Engineering Science (General)	LIT	Laboratory Integrated Theory
ES (PC)	Engineering Science (Programme Core)	ES (PE)	Engineering Science (Programme Elective)
ES (ET)	Engineering Science (Emerging Technology)		

Approved by
Academic Council Meeting
No.: 01 Dated: 27.4.26

Recommended by
Board of Studies of ECE Dept.
Meeting No.: 01 Dated: 28.3.26

Knowledge and Attitude Profile (WK)

The Knowledge and Attitude Profile (WK) is intended to define the essential knowledge base and professional attitudes expected of program graduates. It ensures alignment with OBE principles and equips graduates with the capability to effectively analyze and address complex engineering problem.

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, reuse 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.

Program Outcomes (POs):

PO1: 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.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: 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)

PO4: 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)

PO5: 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)

PO6: 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)

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams

PO9: 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.

PO10: 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, and to manage projects and in multidisciplinary environments.

PO11: 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)

Program Educational Objectives (PEOs):

PEO1: To provide the students with a strong foundation in the required sciences in order to pursue studies in Electronics and Communication Engineering.

PEO2: To gain adequate knowledge to become good professional in electronic and communication engineering associated industries, higher education and research.

PEO3: To develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves.

PEO4: To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research-oriented methodologies to solve the problems identified.

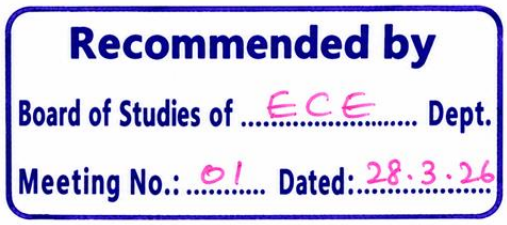
PEO5: To inculcate in the students a professional and ethical attitude and an ability to visualize the engineering issues in a broader social context.

Program Specific Outcomes (PSOs):

PSO1: Apply core ECE principles to design and implement systems spanning analog / digital circuits, VLSI, embedded systems, signal processing and communication.

PSO2: Analyze and solve complex ECE problems using domain-specific tools - EDA, simulation platforms, AI/ML frameworks and industry-aligned design practices.

PSO3: Demonstrate readiness for ECE industry and research through knowledge of emerging technologies - 5G/6G, chip design, IoT, space and biomedical applications.



Semester – I							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T- P	TCP		
1.	26MAC01T	Applied Calculus	T	3-1-0	4	4	BS
2.	26ENC01T	English Essentials – I	T	2-0-0	2	2	HUM
3.	26TLC01T	தமிழர் மரபு / Heritage of Tamils	T	1-0-0	1	1	HUM
4.	26PHC02L	Physics of Electronic Materials and Devices	LIT	2-0-2	4	3	BS
5.	26CY101L	Applied Chemistry	LIT	2-0-2	4	3	BS
6.	26CSC01L	Problem Solving using C Programming	LIT	2-0-2	4	3	ES (G)
7.	26ECC01L	Basic Electrical and Instrumentation Engineering	LIT	2-0-2	4	3	ES (PC)
8.	---	Physical Education – I	P	0-0-1	1	NC	MC
9.	---	Induction Programme	---	---	---	NC	---
Total Credits					**24**	**19**	

Semester – II							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T- P	TCP		
1.	26MAC03T	Complex Functions and Transforms	T	3-1-0	4	4	BS
2.	26CYC01T	Climate Change and Sustainability	T	2-0-0	2	2	HUM
3.	26TLC02T	தமிழர்களும் தொழில்நுட்பமும் / Tamils & Technology	T	1-0-0	1	1	HUM
4.	26ECC01T	Circuits and Network Analysis	T	3-1-0	4	4	ES (PC)
5.	26EC201T	Electron Devices	T	3-0-0	3	3	ES (PC)
6.	26ENC02L	English Essentials - II	LIT	1-0-2	3	2	HUM
7.	26CS201L	Data Structures using C++	LIT	2-0-2	4	3	ES (G)
8.	26MEC01P	Engineering Practices and Re-Engineering Laboratory	P	0-0-4	4	2	SD
9.	26EC202P	Electron Devices Laboratory	P	0-0-4	4	2	ES (PC)
10.		Foreign Language (German/Japanese/Korean)	P	0-0-2	2	1	HUM
11.	---	Foundations of Problem Solving	T	3-0-0	3	NC	MC
12.	---	Physical Education – II	P	0-0-1	1	NC	MC
13.	---	Self – Learning Course – I	---	---	---	NC	SLC

14.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	MC
15.	---	NSS/NCC/NSO	---	---	---	NC	MC
Total Credits					**35**	**24**	

Semester – III							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods/Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26MAC05T	Advanced Engineering Mathematics	T	3-1-0	4	4	BS
2.	26EC301T	Electromagnetic Fields	T	3-0-0	3	3	ES (PC)
3.	26EC302T	Electronic Circuits	T	3-0-0	3	3	ES (PC)
4.	26ECC03L	Signals and Systems	LIT	2-1-2	5	4	ES (PC)
5.	26CSC02L	Python Programming	LIT	2-0-2	4	3	ES (G)
6.	26EC303L	Digital System Design	LIT	2-0-2	4	3	ES (PC)
7.	26EC304L	Industry Oriented Course - I	LIT	2-0-2	4	3	ES (PC)
8.	26EC305P	Electronic Circuits Laboratory	P	0-0-4	4	2	ES (PC)
9.	26EC306P	Career Readiness & Professional Skills – Foundation Level	P	0-0-2	2	1	SD
10.	26EC307P	Project Work – I	P	0-0-2	2	1	SD
11.	26EC308T	Indian Constitution	T	3-0-0	3	NC	MC
12.	---	Self – Learning Course – II	---	---	---	NC	SLC
13.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	MC
Total Credits					**39**	**27**	

Semester - IV							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods/Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26MAC08T	Probability and Statistics	T	3-1-0	4	4	BS
2.	26EC401T	Control Systems	T	3-1-0	4	4	ES (PC)
3.	26EC402L	Analog Communication	LIT	2-0-2	4	3	ES (PC)
4.	26EC403L	Artificial Intelligence and Machine Learning	LIT	2-0-2	4	3	ES (PC)
5.	26EC404L	Linear Integrated Circuits	LIT	2-0-2	4	3	ES (PC)
6.	26EC405L	Industry Oriented Course – II	LIT	2-0-2	4	3	ES (PC)

7.	26EC406P	Analog Communication Laboratory	P	0-0-4	4	2	ES (PC)
8.	26EC407P	Career Readiness & Professional Skills – Intermediate Level	P	0-0-2	2	1	SD
9.	26EC408P	Project Work – II	P	0-0-2	2	1	SD
10.	---	Self-Learning Course – III	---	---	---	NC	SLC
11.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	MC
Total Credits					**32**	**24**	

Semester - V							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods/Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26EC501T	Transmission Lines and Radio Frequency	T	3-1-0	4	4	ES (PC)
2.	26EC0XXX	Programme Elective – I	LIT	2-0-2	4	3	ES (PE)
3.	26EC502T	Data Communication and Networks	T	3-0-0	3	3	ES (PC)
4.	26EC503L	Digital Signal Processing	LIT	3-0-2	5	4	ES (PC)
5.	26EC504L	Digital Communication	LIT	3-0-2	5	4	ES (PC)
6.	26EC505L	Industry Oriented Course – III	LIT	2-0-2	4	3	ES (PC)
7.	26EC506P	Career Readiness & Professional Skills – Advance Level	P	0-0-2	2	1	SD
8.	26EC507P	Project Work – III	P	0-0-2	2	1	SD
9.	---	Self – Learning Course – IV	---	---	---	NC	SLC
10.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	MC
Total Credits					**29**	**23**	

For Honours Degree							
1.		Capstone Design Project - I	CDP	0-0-12	12	6	SD
Or							
1.		Honours Elective - I	T	3-0-0	3	3	
2.		Honours Elective - II	T	3-0-0	3	3	
For Minor Degree							
1.		Minor Elective - I	T	3-0-0	3	3	

2.		Minor Elective - II	T	3-0-0	3	3	

Semester - VI							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods/Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26EC9XXX	Open Elective – I	T	3-0-0	3	3	OE
2.	26EC0XXX	Programme Elective – II	T	3-0-0	3	3	ES (PE)
3.	26EC0XXX	Programme Elective – III	T	3-0-0	3	3	ES (PE)
4.	26EC601L	Wireless Communication	LIT	2-0-2	4	3	ES (PC)
5.	26EC602L	Antenna and Microwave Engineering	LIT	2-0-2	4	3	ES (PC)
6.	26EC603L	Industry Oriented Course – IV	LIT	2-0-2	4	3	ES (PC)
7.	26EC604P	Career Readiness & Professional Skills – Placement Level	P	0-0-2	2	1	SD
8.	26EC605P	Project Work – IV	P	0-0-2	2	1	SD
9.	---	Self – Learning Course – V	---	---	---	NC	SLC
10.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	MC
Total Credits					**25**	**20**	

For Honours Degree							
1.		Capstone Design Project - II	CDP	0-0-12	12	6	SD
Or							
1.		Honours Elective - III	T	3-0-0	3	3	
2.		Honours Elective - IV	T	3-0-0	3	3	
For Minor Degree							
1.		Minor Elective - III	T	3-0-0	3	3	
2.		Minor Elective – IV	T	3-0-0	3	3	

Semester - VII							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods/Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26MGC01T	Engineering Entrepreneurship Development	T	2-0-0	2	2	HUM
2.	26EC0XXX	Programme Elective - IV	T	3-0-0	3	3	ES (PE)

3.	26EC0XXX	Programme Elective - V	T	3-0-0	3	3	ES (PE)
4.	26EC701L	Millimeter and Optical Communication	LIT	2-0-2	4	3	ES (PC)
5.	26EC702L	Industry Oriented Course - V	LIT	2-0-2	4	3	ES (ET)
6.	26EC703L	Industry Oriented Course - VI	LIT	2-0-2	4	3	ES (PC)
7.	26EC704P	Major Project - Phase I	P	0-0-4	4	2	SD
8.	26EC705P	Internship	P	---	---	1	SD
Total Credits					**24**	**20**	

For Honours Degree							
1.		Capstone Design Project - III	CDP	0-0-12	12	6	SD
Or							
1.		Honours Elective - V	T	3-0-0	3	3	
2.		Honours Elective - VI	T	3-0-0	3	3	
For Minor Degree							
1.		Minor Elective - V	T	3-0-0	3	3	
2.		Minor Elective - VI	T	3-0-0	3	3	

Semester - VIII							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods/Week**		**Credits**	**Category**
				L-T- P	**TCP**		
1.	26EC801P	Major Project - Phase II	P	0-0-16	16	8	SD
Total Credits					**16**	**8**	

Approved by
Academic Council Meeting
No.: 01 Dated: 27.4.26

Recommended by
Board of Studies of ECE Dept.
Meeting No.: 01 Dated: 28.3.26

PROGRAMME ELECTIVE COURSES – STREAMS

Vertical - I	Vertical - II	Vertical - III	Vertical - IV	Vertical - V	Vertical - VI	Vertical - VII	Vertical - VIII
Cyber Security	**Signal Processing**	**Biomedical Technologies**	**6G Communications**	**Underwater Technologies**	**Sensor Technologies and IoT**	**Space Technologies**	**High Speed Communication**
Cryptography and Network Security	Advanced Digital Signal Processing	Wearable Devices	Advanced Wireless Communication	Underwater Instrumentation System	Cloud Computing	Radar Technologies	Optical Communication & Networks
Ethical Hacking and Penetration Testing	Image Processing	Human Assist Devices	Massive MIMO and Beamforming Techniques	Underwater Imaging Systems and Image Processing	Industrial IoT and Industry 4.0	Avionics Systems	Wireless Broad Band Networks
Cyber Security and Digital Forensics	Speech Processing	Therapeutic Equipment	Millimeter Wave and Terahertz Communication	Underwater Communication	IoT Processors	Positioning and Navigation Systems	4G/5G Communication Networks
Embedded System Security (IoT Security)	Cognitive Radio Systems	Medical Imaging Systems	Software Defined Radio	Ocean Observation Systems	IoT System Design	Satellite Communication	Software Defined Networks
Cloud and Web Security	DSP Architecture and Programming	Brain Computer Interface and Applications	AI/ML for Wireless Communication Systems	Underwater Navigation Systems	MEMS Design	Remote Sensing	Massive MIMO Networks
Hardware Security and Trust	Computer Vision	Body Area Networks	Next-Generation Multiple Access Techniques	Ocean Acoustics	Electric Vehicles and Smart Mobility Systems	Rocketry and Space Mechanics	Advanced Wireless Communication Techniques

LIST OF PROGRAMME ELECTIVE COURSES: VERTICALS

VERTICAL 1: CYBER SECURITY

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26EC001L	Cryptography and Network Security	LIT	2-0-2	4	3	ES (PE)
2	26EC009L	Ethical Hacking and Penetration Testing	LIT	2-0-2	4	3	ES (PE)
3	26EC017L	Cyber Security and Digital Forensics	LIT	2-0-2	4	3	ES (PE)
4	26EC025L	Embedded System Security (IoT Security)	LIT	2-0-2	4	3	ES (PE)
5	26EC033L	Cloud and Web Security	LIT	2-0-2	4	3	ES (PE)
6	26EC041L	Hardware Security and Trust	LIT	2-0-2	4	3	ES (PE)

VERTICAL 2: SIGNAL PROCESSING

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26EC002L	Advanced Digital Signal Processing	LIT	2-0-2	4	3	ES (PE)
2	26EC010L	Image Processing	LIT	2-0-2	4	3	ES (PE)
3	26EC018L	Speech Processing	LIT	2-0-2	4	3	ES (PE)
4	26EC026L	Cognitive Radio Systems	LIT	2-0-2	4	3	ES (PE)
5	26EC034L	DSP Architecture and Programming	LIT	2-0-2	4	3	ES (PE)
6	26EC042L	Computer Vision	LIT	2-0-2	4	3	ES (PE)

VERTICAL 3: BIOMEDICAL TECHNOLOGIES

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26EC003T	Wearable Devices	T	3-0-0	3	3	ES (PE)
2	26EC011T	Human Assist Devices	T	3-0-0	3	3	ES (PE)
3	26EC019T	Therapeutic Equipment	T	3-0-0	3	3	ES (PE)
4	26EC027L	Medical Imaging Systems	LIT	2-0-2	4	3	ES (PE)
5	26EC035L	Brain Computer Interface and Applications	LIT	2-0-2	4	3	ES (PE)
6	26EC043T	Body Area Networks	T	3-0-0	3	3	ES (PE)

VERTICAL 4: 6G COMMUNICATIONS

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26EC004L	Advanced Wireless Communication	LIT	2-0-2	4	3	ES (PE)
2	26EC012L	Massive MIMO and Beamforming Techniques	LIT	2-0-2	4	3	ES (PE)
3	26EC020L	Millimeter Wave and Terahertz Communication	LIT	2-0-2	4	3	ES (PE)
4	26EC028L	Software Defined Radio	LIT	2-0-2	4	3	ES (PE)
5	26EC036L	AI/ML for Wireless Communication Systems	LIT	2-0-2	4	3	ES (PE)
6	26EC044L	Next-Generation Multiple Access Techniques	LIT	2-0-2	4	3	ES (PE)

VERTICAL 5: UNDER WATER TECHNOLOGIES

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26EC005T	Underwater Instrumentation System	T	3-0-0	3	3	ES (PE)
2	26EC013L	Underwater Imaging Systems and Image Processing	LIT	2-0-2	4	3	ES (PE)
3	26EC021L	Underwater Communication	LIT	2-0-2	4	3	ES (PE)
4	26EC029L	Ocean Observation Systems	LIT	2-0-2	4	3	ES (PE)
5	26EC037L	Underwater Navigation Systems	LIT	2-0-2	4	3	ES (PE)
6	26EC045T	Ocean Acoustics	T	3-0-0	3	3	ES (PE)

VERTICAL 6: SENSOR TECHNOLOGIES & IOT

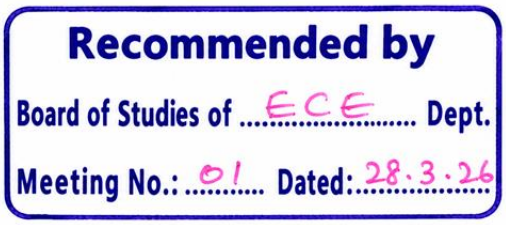
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26EC006L	Cloud Computing	LIT	2-0-2	4	3	ES (PE)
2	26EC014L	Industrial IoT and Industry 4.0	LIT	2-0-2	4	3	ES (PE)
3	26EC022L	IoT Processors	LIT	2-0-2	4	3	ES (PE)
4	26EC030L	IoT System Design	LIT	2-0-2	4	3	ES (PE)
5	26EC038L	MEMS Design	LIT	2-0-2	4	3	ES (PE)
6	26EC046T	Electric Vehicles and Smart Mobility Systems	T	3-0-0	3	3	ES (PE)

VERTICAL 7: SPACE TECHNOLOGIES

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26EC007T	Radar Technologies	T	3-0-0	3	3	ES (PE)
2	26EC015T	Avionics Systems	T	3-0-0	3	3	ES (PE)
3	26EC023L	Positioning and Navigation Systems	LIT	2-0-2	4	3	ES (PE)
4	26EC031T	Satellite Communication	T	3-0-0	3	3	ES (PE)
5	26EC039L	Remote Sensing	LIT	2-0-2	4	3	ES (PE)
6	26EC047T	Rocketry and Space Mechanics	T	3-0-0	3	3	ES (PE)

VERTICAL 8: HIGH SPEED COMMUNICATIONS

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26EC008L	Optical Communication & Networks	LIT	2-0-2	4	3	ES (PE)
2	26EC016L	High Speed Networks	LIT	2-0-2	4	3	ES (PE)
3	26EC024L	Wireless Broadband Networks	LIT	2-0-2	4	3	ES (PE)
4	26EC032L	4G/5G Communication Networks	LIT	2-0-2	4	3	ES (PE)
5	26EC040L	Software Defined Networks	LIT	2-0-2	4	3	ES (PE)
6	26EC048L	Massive MIMO Networks	LIT	2-0-2	4	3	ES (PE)



LIST OF OPEN ELECTIVE COURSES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories)

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T- P	TCP		
1.	26EC901L	Sensors and Actuators	LIT	2-0-2	4	3	OE
2.	26EC902L	PCB Design and Fabrication	LIT	2-0-2	4	3	OE
3.	26EC903L	Fiber Optic Communication	LIT	2-0-2	4	3	OE
4.	26EC904L	IoT Fundamentals and Applications	LIT	2-0-2	4	3	OE
5.	26EC905L	Introduction to VLSI Design	LIT	2-0-2	4	3	OE
6.	26EC906L	Fundamentals of Nanoelectronics	LIT	2-0-2	4	3	OE
7.	26EC907L	Fundamentals of Cybersecurity	LIT	2-0-2	4	3	OE
8.	26EC908T	RF System Design	T	3-0-0	3	3	OE
9.	26EC909T	Electronic Product Design and Prototyping	T	3-0-0	3	3	OE
10.	26EC910L	AI in Embedded Systems	LIT	2-0-2	4	3	OE
11.	26EC911L	Network Simulation and Modeling	LIT	2-0-2	4	3	OE
12.	26EC912L	Quantum Electronics	LIT	2-0-2	4	3	OE
13.	26EC913L	Drone Technologies	LIT	2-0-2	4	3	OE
14.	26EC914L	Introduction to Digital Forensics	LIT	2-0-2	4	3	OE
15.	26EC915T	Smart Cities and Intelligent Infrastructure	T	3-0-0	3	3	OE
16.	26EC916T	Assistive Technologies	T	3-0-0	3	3	OE
17.	26EC917L	MATLAB for Engineers	LIT	2-0-2	4	3	OE
18.	26EC918L	Real Time Operating Systems (RTOs)	LIT	2-0-2	4	3	OE
19.	26EC919T	Medical Electronics	T	3-0-0	3	3	OE
20.	26EC920T	Bio-MEMS and Lab-on-Chip Systems	T	3-0-0	3	3	OE
21.	26EC921T	Democracy and Good Governance	T	3-0-0	3	3	OE

Approved by
Academic Council Meeting
No.: 01 Dated: 27.4.26

Recommended by
Board of Studies of ECE Dept.
Meeting No.: 01 Dated: 28.3.26

Semester - I

26MAC01T	Applied Calculus (Common to all Branches)	Category	L	T	P	C
		BS	3	1	0	4

Prerequisites:

- Fundamental knowledge of Algebra, Functions, Trigonometry, Differentiation and basic Integration.

Course Objectives:

- To provide a strong foundation in differential and integral calculus for Engineering applications.
- To develop analytical skills in solving functions of several variables and optimization problems.
- To enable students to apply integral calculus concepts in computing arc length, area and surface area.
- To introduce multiple integrals and their evaluation in Cartesian, polar, cylindrical and spherical coordinate systems.

Differential Calculus

Functions and graphs - New functions from old functions - Limit of a function - Continuity - Limits at infinity - Derivative as a function - Differentiation rules - Maxima and minima of functions of a single variable - Mean value theorem - Effect of derivatives on the shape of a graph- Applications.

Activities: Open-source Software: Visualization of the functions, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

Functions of several variables

Partial derivatives - Higher-order partial derivatives - Total derivative - Chain rule - Taylor's formula for functions of two variables - Maxima and minima of functions of two variables - Method of Lagrange multipliers - Engineering applications.

Activities: Open-source Software: Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).

Integral Calculus

Fundamental theorem of calculus - Indefinite integrals and the net change theorem - Techniques of integration - Improper integrals - Arc length - Area of a plane region - Area of a surface of revolution - Applications.

Activities: Open-source Software: Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).

Multiple Integrals

Double integrals - Iterated integrals and Fubini's theorem - Change of order of integration - Change of variables: Cartesian to polar coordinates - Triple integrals - Change of variables: Cartesian to cylindrical and spherical coordinates - Engineering applications.

Activities: Open-source Software: Double integrals and triple integrals using open-source software, Solving of Competitive Examination questions (Ex. GATE).

Total periods (L: 45; T: 15): 60

Text Books:

1. Grewal, B. S. (2017). Higher Engineering Mathematics. Khanna Publishers. 44th Edition.
2. Kreyszig, E. (2016). Advanced Engineering Mathematics. John Wiley & Sons. 10th Edition.

Reference Books:

1. K Kandasamy, K Thilagavathy and K Gunavathy K (2026). Engineering Mathematics. S. Chand Publishing.
2. Anton, H., Bivens, I. C., & Davis, S. (2012). Calculus: Early Transcendentals. John Wiley & Sons. 10th Edition.
3. Larson, R., & Falvo, D. C. (2013). Calculus: An Applied Approach. Cengage Learning. 9th Edition.
4. Stewart, J., Clegg, D., & Watson, S. (2021). Calculus: Early Transcendentals. Cengage Learning. 9th Edition.
5. Thomas, G. B., Weir, M. D., Hass, J., & Heil, C. (2018). Thomas' Calculus: Early Transcendentals. Pearson Education. 14th Edition.
6. Singh, K. (2019). Engineering Mathematics through Applications. Bloomsbury Publishing. 2nd Edition.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply the concepts of limits, continuity and differentiation to analyze the behaviour of single-variable functions and solve optimization problems.
CO2	Apply partial differentiation, Taylor's expansion and the method of Lagrange multipliers to solve optimization problems involving functions of several variables.
CO3	Evaluate definite and improper integrals and apply them to compute arc length, plane area and surface area of revolution.
CO4	Evaluate double and triple integrals using appropriate coordinate systems and apply them to Engineering problems.

26ENC01T	English Essentials – I (Common to all Branches)	Category	L	T	P	C
		HUM	2	0	0	2

Prerequisites:

- Basic knowledge on English communication skills (writing, speaking, reading and listening).

Course Objectives:

- To improve Listening and Pronunciation Skills.
- To develop effective verbal and non-verbal skills.
- To enhance Reading and Comprehension abilities.
- To develop Professional Writing Skills.

Listening & Pronunciation Skills

Listening to academic and workplace conversations - Recorded interview - Pronunciation drills: Stress, Intonation, Phonetics basics - Accent neutralization - Listening comprehension tasks.

Grammar: Introduction to Parts of Speech, Word Syllable, Synonyms & Antonyms.

Activities: Audio Exercises, Minimal Pair Practice, Listening Tests.

Basic Grammar and Communication

Self-introduction: Formal, Informal - Making requests and giving instructions - Expressing opinions and ideas - Conversation.

Grammar: Articles, Tenses, Subject Verb & Agreement, Phrasal Verbs, Collocations, Word Formation, One Word Substitution.

Activities: Self-Introduction, Listen Short Podcasts, Just A Minute (JAM) Video Recording, Situational Role Plays, Spell Bee, Group Discussion.

Reading and Language Skills

Reading strategies: Skimming, Scanning, Predicting - Intensive reading: Short passages, Long passages on suggested theme - Reading comprehension passages.

Grammar: Sentence Patterns, Prefixes and Suffixes, Idioms and Phrases, Prepositions - Gerunds - Conjunctions.

Activities: Reading - Newspaper and Digital Articles, Cloze, Reading Comprehension, Note Making and Summarising.

Written Communication

Discourse markers - Completing sentences - Jumbled sentences - Paragraph writing - Essay writing - Report writing.

Grammar: Active and Passive Voice - Direct and Indirect Questions - Wh-Questions - Yes/No Questions.

Activities: Describe a Product, Apply/Request for Internship Program, Listening and Repeating, Gap Filling Exercises, Note-Taking.

Total periods: 30

Reference Books:

1. Tiwari, A. (2022). Communication Skills in English.
2. Murphy, R. (2019). English Grammar in Use. Cambridge University Press. 5th Edition.
3. English Edge (2025). Speaking. Orient BlackSwan.
4. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists. PHI Learning. 2nd Edition.

E - Resources:

1. Cambridge English - https://www.cambridgeenglish.org/learningenglish/grammar-and-vocabulary/
2. Perfect English Grammar - https://www.perfect-english-grammar.com/
3. British Council - Learn English - https://learnenglish.britishcouncil.org/grammar
4. SpSDhling - https://spSDhling.com/
5. mePro by Pearson - https://mepro.pearson.com/
6. TED Talks - https://www.ted.com/

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Demonstrate improved listening skills in academic and real-life contexts.
CO2	Use basic grammatical structures accurately in spoken communication.
CO3	Apply reading strategies to understand and interpret technical and professional texts.
CO4	Develop clear, coherent and professional writing skills.

26TLC01T	தமிழர் மரபு (Common to all Branches)	Category	L	T	P	C
		HUM	1	0	0	1

மொழி மற்றும் இலக்கியம்

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செம்மொழி இலக்கியங்கள் - சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மை கருத்துக்கள் - தமிழ்க் காப்பியங்கள் - தமிழர்களின் சமண, பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம்: ஆழ்வார்கள், நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார், பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக்கலை

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள் - பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத்தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள்: மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்

தெருக்கூத்து - கரகாட்டம் - வில்லுப்பாட்டு - கணியான் கூத்து - ஒயிலாட்டம் - தோற்பாவைக் கூத்து - தமிழர்களின் வீர விளையாட்டுகள்: சிலம்பாட்டம், வளரி, புலியாட்டம், ஜல்லிக்கட்டு, கபடி, வழுக்குமரம்.

தமிழர்களின் திணைக் கோட்பாடுகள்

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம், புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும், துறைமுகங்களும் - சங்ககாலத்தில் ஏற்றுமதி, இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்கு தமிழர்களின் பங்களிப்பு

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள் – கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

Total periods: 15

References:

1. தமிழக வரலாறு, மக்களும் பண்பாடும், கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல்மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை, ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு).
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.

26TLC01T	Heritage of Tamils (Common to all Branches)	Category	L	T	P	C
		HUM	1	0	0	1

Language and Literature

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 Thirukkural - Tamil epics - Impact of Buddhism, Jainism in Tamil land - Bhakti literature: Azhwars, Nayanmars - Forms of minor poetry - Development of modern literature in Tamil - Contribution of Bharathiyar, Bharathidhasan.

Heritage - Rock Art Paintings to Modern Art - Sculpture

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 - Musical instruments: Mridangam, Parai, Veena, Yazh, Nadaswaram - Role of temples in social and economic life of Tamils.

Folk and Martial Arts

Therukoothu - Karagattam - Villu pattu - Kaniyan koothu - Oyilattam - Leather puppetry - Sports and games of Tamils: Silambattam, Valari, Tiger dance.

Thinai Concept of Tamils

Flora and fauna of Tamils - Aham, Puram concepts from Tholkappiyam and Sangam literature - Aram concept of Tamils - Education and literacy during Sangam age - Ancient cities, ports of Sangam age - Export, import during Sangam age - Overseas conquest of Cholas.

Contribution of Tamils to Indian National Movement and Indian Culture

Contribution of Tamils to Indian freedom struggle - Cultural influence of Tamils over 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

References:

1. தமிழர் வரலாறு - மக்கள் பண்பாடு - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணியன் பூங்குன்றன் - முதன்மை நூல் - இல. சுந்தரம் (விடியல் பதிப்பகம்).
3. தமிழ் - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
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.

26PHC02L	Physics of Electronic Materials and Devices (Common to BME, ECE and EEE)	Category	L	T	P	C
		BS	2	0	2	3

Prerequisites:

- Basic knowledge of Physics fundamentals, including wave optics and electricity.
- Fundamental knowledge of algebra and logarithms.

Course Objectives:

- To study optics, laser physics and fiber optic technologies and their applications in communication and sensing.
- To introduce the fundamental principles of quantum mechanics as the foundation for understanding material properties.
- To understand the electrical properties of materials through classical and quantum free electron theories.
- To study the electrical properties of semiconductors and their applications in electronic devices.
- To understand the dielectric, magnetic and superconducting properties of materials and their engineering applications

Optics and Laser Physics

Interference: Air wedge - Michelson Interferometer. Lasers: Einstein coefficients - population inversion - Laser Types: Nd: YAG laser, CO_2 laser and dye laser: construction, working principle and applications-Classification of lasers based on safety- Fiber optics: structure of an optical fiber - acceptance angle and numerical aperture (qualitative) - types of optical fibers - fiber optic communication system - fiber sensors: displacement sensor, temperature sensor - applications: Endoscopy.

Practical:

1. Air wedge - Determination of thickness of a thin sheet/wire.
2. Michelson Interferometer - Determination of Wavelength of the light source.
3. Determination of wavelength and divergence angle of laser using diffraction grating.

Quantum Mechanics

Inadequacy of classical mechanics - Blackbody radiation - photoelectric effect - wave- particle duality - de Broglie hypothesis- Wave function - physical significance and normalization - Schrödinger wave equation: time-independent form - particle in a one- dimensional box. quantum tunneling - Scanning Tunnelling Microscope: STM - Resonant Tunnelling Diode.

Practical:

4. Photo-electric effect – Determination of Planck's constant.

Electrical Properties of Materials

Ohm's law - electrical resistivity and conductivity - electron theory of metals - Classical free electron theory: electrical conductivity derivation - limitations of classical theory. Quantum free electron theory - Fermi-Dirac statistics - Fermi energy - effect of temperature on Fermi function - Band theory of solids- classification of solids - density of energy states.

Practical:

5. Determination of electrical resistivity of a given material using four probe setup.

Physics of Semiconductors

Types of semiconductors - energy band diagram - direct and indirect band gap semiconductors - carrier concentration in intrinsic semiconductors. Extrinsic semiconductors - carrier concentration in n-type and p-type semiconductors - variation of carrier concentration with temperature. Carrier transport in semiconductors: drift, mobility and diffusion current. Hall effect- determination of carrier concentration and mobility. Photo detectors and solar cells.

Practical:

6. Measurement of hall coefficient of a semiconductor using Hall Effect setup.
7. Determination of bandgap of semiconductor (thermistor) using meter bridge.
8. Study of I-V characteristics of LED and Solar cell.

Dielectric and Magnetic Properties of Materials

Dielectric materials: Properties of dielectric materials - dielectric constant - polar and non-polar dielectrics - types of polarisation - local field derivation - Clausius - Mossotti equation - ferro-electricity and piezo-electricity (qualitative) - frequency dependence of dielectric constant - applications of dielectric materials.

Magnetic materials: Classification of magnetic materials - domain theory - hard and soft magnetic materials and applications. Superconductors: Introduction - type I, type II superconductors-applications: SQUID, Cryotron.

Practical:

9. Hysteresis curve - Determination of energy loss of a coil.

Total periods (L: 30; P: 30): 60

Text Books:

1. Avadhanulu, M. N., & Kshirsagar, P. G. (2012). Engineering Physics. S. Chand Publishing.
2. Aruldhas, G. (2015). Engineering Physics. PHI Learning Pvt. Ltd. 2nd Edition.
3. Pillai, S. O. (2010). Solid State Physics. New Age International Publishers.
4. Streetman, B. G., & Banerjee, S. K. (2015). Solid State Electronic Devices. Pearson. 7th Edition.

Reference Books:

1. Halliday, D., Resnick, R., & Walker, J. (2021). Fundamentals of Physics. John Wiley & Sons. 12th Edition.
2. Kasap, S. O. (2018). Principles of Electronic Materials and Devices. McGraw-Hill Education. 4th Edition.
3. Callister, W. D., & Rethwisch, D. G. (2018). Materials Science and Engineering: An Introduction. Wiley. 10th Edition.
4. Kittel, C. (2005). Introduction to Solid State Physics. Wiley. 8th Edition.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Analyze the principles of interference, laser physics and fiber optic systems for applications in communication, sensing and medical.
CO2	Understand the fundamental principles of quantum mechanics including wave-particle duality, uncertainty principle and Schrodinger wave equation.
CO3	Analyze the electrical properties of materials using classical and quantum free electron theories, Fermi-Dirac statistics and band theory.
CO4	Apply the concepts of carrier concentration, transport mechanisms and Halll effect to analyze the behavior of intrinsic and extrinsic semiconductors.
CO5	Apply the dielectric, magnetic and superconducting properties of materials and evaluate their suitability for engineering applications

26CY101L	Applied Chemistry	Category	L	T	P	C
		BS	2	0	2	3

Prerequisites:

- Fundamental knowledge of chemistry, including atomic structure, chemical bonding and electrochemical principles.
- Basic understanding of chemical reactions, solutions and laboratory practices.

Course Objectives:

- To understand the basics, synthesis methods, properties and applications of nanomaterials.
- To understand the basic properties and applications of electronic materials
- To understand the fundamentals of electrochemical energy storage devices.
- To learn the key fabrication processes used in electronics manufacturing
- To study the principles and applications of chemical sensors for monitoring and analysis.

Nanomaterials and Nanotechnology

Basics of nanomaterials - Classification - Size-dependent properties - Optical, Electrical, Mechanical, Magnetic properties - Synthesis of nanomaterials: Top-down methods: Laser ablation, Physical vapour deposition - Bottom-up methods: Sol-gel synthesis, Solvothermal, Electrospinning, Electrodeposition - Applications of nanomaterials: Electronics, Sensors, Semiconductors, Medical devices.

Practical:

1. Preparation of nanomaterial (ZnO, CuO) by solvothermal synthesis.

Electronic Materials

Inorganic semiconductors - Energy band theory of elemental Si, Ge - Doping mechanisms - Compound semiconductors - Band gap engineering - Organic semiconductors - Conjugated polymers - Mechanism of charge transport, Doping, Material properties: Thermal, Mechanical, Electrical, Chemical, Electrochemical - OLED and OPV - Working principle, Applications.

Practical:

2. Estimation of iron content of the water sample using spectrophotometer.
3. Determination of strength of acids in a mixture of acids using conductivity meter.

Batteries, Fuel Cells and Supercapacitors

Electrochemical cell - Electrode potential - EMF of a cell - Dependence of EMF on electrolyte concentration - Nernst equation - Batteries: Primary battery: Leclanche cell, Lithium battery - Secondary battery: Lead-acid battery, Lithium-ion battery - Supercapacitors: Sodium-ion, Lithium-ion supercapacitors.

Practical:

4. Estimation of Fe^{2+} by redox titration.

Advanced Processes in Electronics Manufacturing

Microchip fabrication - Wafer processing - Photoresists: Chemistry, Types - Fabrication facilities - Clean rooms, Maintenance - Ultrapure water - Specifications - Purification methods: Ion

exchange - PCB fabrication: Electroless plating, Electroplating of copper, Nickel - Principle, Bath chemistries, Process parameters, Formation of copper track on plastic board.

Practical:

5. Analysis of hardness, alkalinity and DO in water sample

Advanced Chemical Sensors

Chemical sensors - Basic components - Electrochemical sensor: Principle, Ion-selective electrode (pH) - Configurations, Functions, Applications - Potentiometric titrations - Conductivity sensor: Principle, Application in conductometric titrations - Colorimetric sensors: Beer-Lambert's law, Components, Applications.

Practical:

6. Estimation of copper ion by colorimetry.
7. Determination of strength of given hydrochloric acid using pH meter.
8. Determination of ferric ion in water sample using potentiometry

Total periods (L: 30; P: 30): 60

Text Books:

1. Shashi Chawla (2022). A Textbook of Engineering Chemistry. Dhanpat Rai and Co. 6th Edition.
2. J.M.G. Cowie and Valeria Arrighi (2016). Polymers: Chemistry and Physics of Modern Materials. CRC Press. 3rd Edition.
3. William D. Callister Jr. (2017). Materials Science and Engineering. Wiley India. 10th Edition.

Reference Books:

1. Bansi D. Malhotra (2002). Handbook of Polymers in Electronics. Rapra Technology Ltd. UK. 1st edition.
2. Peter Van Zant (2014). Microchip Fabrication: A Practical Guide to Semiconductor Processing. McGraw Hill. 6th edition.
3. Derek Pletcher and Frank C. Walsh (1993). Industrial Electrochemistry. 2nd edition. Chapman and Hall.
4. Florinel-Gabriel Banica (2012). Chemical Sensors and Biosensors – Fundamentals and Applications. 1st edition. John Wiley and Sons Ltd.
5. Vogel's Textbook of Quantitative Chemical Analysis. 8th edition. 2014.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Explain the fundamentals, synthesis methods, properties and applications of nanomaterials.
CO2	Apply the concepts of electronic materials, including semiconductors and polymers, in electronic devices.
CO3	Apply the principles of electrochemical energy storage systems such as batteries, fuel cells and supercapacitors.
CO4	Analyze the key fabrication processes and chemical techniques used in electronics manufacturing.
CO5	Analyze the working principles and applications of chemical sensors for monitoring and analysis.

26CSC01L	Problem Solving using C Programming (Common to AI&DS, BME, CSE, ECE, EEE and IT)	Category	L	T	P	C
		ES (G)	2	0	2	3

Prerequisite:

- Basic knowledge of mathematics and logical reasoning.
- Familiarity with fundamental computer concepts such as input, output and memory.
- Ability to understand simple problem statements and step-by-step procedures.

Course Objectives:

- To develop problem-solving skills by understanding problem definition, analysis and designing algorithms using flowcharts and pseudocode.
- To introduce the fundamentals of C programming, including syntax, data types, operators, control structures and error handling for writing efficient programs.
- To enable modular programming skills through functions, recursion, parameter passing and structured program design techniques.
- To provide knowledge of advanced C concepts such as arrays, strings, pointers, user-defined data types and file handling for building real-world applications.

Problem Solving and Algorithmic Thinking

Problem Solving: Problem definition, problem analysis, problem solving techniques, problem analysis chart – Algorithms: Characteristics, design, representation – Flowcharts: Symbols, construction, examples – Pseudocode: Writing structured pseudocode – Program Design Techniques: Top-down approach, modular approach.

C Fundamentals and Programming Constructs

Introduction to Programming Languages: History of C, structure of C program, compilation, execution process – Preprocessor Directives, Comments, Documentation, Indentation, Coding Standards – Types of Errors: Syntax, runtime, logical – Tokens, Delimiters: Keywords, identifiers, constants, variables, data types, reserved words – Operators: Arithmetic, relational, logical, bitwise, assignment, conditional, special operators, precedence, associativity – Input, Output Functions – Control Structures: if, if else, nested if, switch case, while, do while, for, nested loops, jump statements.

Functions and Modular Programming

Functions: Declaration, definition, calling, function parameters, return types, parameter passing: call by value, call by reference using pointers, recursive functions – Variables: Scope, lifetime, storage classes – Header Files – Modular Programming Concepts.

Arrays, Strings and Pointers

Arrays: One-dimensional arrays, multi-dimensional arrays, array processing, array as function argument – Strings: String declaration, input, output, string handling functions – Pointers: Pointer declaration, initialization, pointer arithmetic, pointers and arrays, pointers and functions.

User Defined Data Types and File Processing

Structures, Unions: Defining structures, using structures, array of structures, pointers to structures, unions, applications – Enumerations, Typedef – File Processing: File operations: open, read, write, close, text files, binary files, file pointers, error handling, sequential access, random access – Dynamic Memory Allocation – Command Line Arguments

Total periods (L): 30

List of Experiments:

1. Basic: Algorithm, Flowchart, Pseudocode.
2. Decision Making statements: Simple If, If – else, Nested-If, Switch- case.
3. Looping Statements: For, While, do – while, Jump, Go-to, break and continue statement.
4. Pass by value and pass by reference, Recursion using functions.
5. One-dimensional arrays and multi-dimensional arrays.
6. Operations on Strings.
7. String handling operations using pointers.
8. Structures and unions.
9. File operations and command line arguments.
10. Dynamic Memory Allocation.
11. Write a C program for Authentication and string comparison.
12. Write a C program for ATM Withdrawal System.

Total periods (P): 30

Total periods (L + P): 60

Text Books:

1. Thareja, R. (2016). Programming in C. Oxford University Press. 2nd Edition.
2. Forouzan, B. A., & Afyouni, H. (2023). Computer Science: A Structured Programming Approach in C. Cengage Learning. 4th Edition.
3. Pont, M. J. (2007). Embedded C. Pearson Education. 2nd Edition.

Reference Books:

1. Balagurusamy, E. (2024). Programming in ANSI C. McGraw Hill Education. 9th Edition.
2. Gustedt, J. (2020). Modern C. Manning Publications. 2nd Edition.
3. Kanetkar, Y. (2020). Let Us C. BPB Publications.
4. Kalicharan, N. (2022). Learn to Program with C: An Introduction to Programming using the C Language. Apress.

E - Resources:

1. NPTEL. (n.d.). Programming in C (IIT Kharagpur). Available at: https://nptel.ac.in
2. GNU Project. (n.d.). GDB Manual. Available at: https://sourceware.org/gdb
3. Valgrind Developers. (n.d.). Valgrind Quick Start Guide. Available at: https://valgrind.org/docs
4. GeeksforGeeks. (n.d.). C Programming Tutorial. Available at: https://www.geeksforgeeks.org/

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply problem-solving techniques to design algorithms, flowcharts and pseudocode for computational problems.
CO2	Develop C programs using fundamental concepts such as data types, operators, control structures and input/output functions.

CO3	Implement modular programming using functions, recursion and parameter passing techniques.
CO4	Develop programs using arrays, strings, pointers, user-defined data types and file handling for real-world applications.
CO5	Apply problem-solving techniques to design algorithms, flowcharts and pseudocode for computational problems.

Approved by
Academic Council Meeting
No.: 01 Dated: 27.4.26

Recommended by
Board of Studies of ECE Dept.
Meeting No.: 01 Dated: 28.3.26

26ECC01L	Basic Electrical and Instrumentation Engineering (Common to BME and ECE)	Category	L	T	P	C
		ES (PC)	2	0	2	3

Prerequisites:

- Basic knowledge of Physics, particularly electricity, magnetism and simple circuits.
- Familiarity with fundamental mathematics, including algebra and basic trigonometry.
- Understanding of basic scientific units and measurements.

Course Objectives:

- To develop fundamental understanding of DC and AC circuit principles and analyse electrical quantities in single-phase and three-phase systems.
- To study the principles, construction and operation of electrical machines used in engineering applications.
- To impart knowledge on the types, construction and working of AC rotating machines.
- To introduce the functional elements and working principles of measuring instruments.
- To introduce the basics of power system structure and electrical protection schemes.

DC and AC Fundamentals

DC Circuits: Ohm's law – Kirchhoff's laws – Series and parallel circuits – Voltage and current sources: Ideal, Practical – Mesh analysis – Nodal analysis – Source transformation – Star-delta transformation.

AC Circuits: Definition of AC quantities – Form factor – Peak factor – Analysis of steady-state AC circuits: R, L, C, R-L, R-C, R-L-C elements – Complex notation – Phasor diagrams – Power, Power factor.

DC Machines

DC Machines: Introduction – Constructional features – Motor, Generator modes – EMF equation – Torque equation – Applications.

Special DC Machines: Universal motor – Stepper motors – Brushless DC motors: Constructional features, Applications.

AC Machines

Single-phase Induction Motors: Construction, types and working principle.

Three-phase Induction Motors: Types, construction and principle of operation.

Synchronous Motors: Construction, principle of operation and applications.

Transformers: Introduction – Transformer: Ideal, Practical – EMF equation – Phasor diagram - Equivalent circuit - Applications.

Application-Based Learning: Problem-solving exercises - Case studies - Mini assignments: Machine selection, Performance analysis, Fault diagnosis in practical engineering scenarios.

Measurements and Instrumentation

Instruments: Functional elements of an instrument - Standards and calibration - Operating principles, Types of measuring instruments: Moving coil, Moving iron meters, Energy meter, Instrument transformers (CT, PT).

Digital Instruments: Digital storage oscilloscope (DSO): Block diagram, Data acquisition.

Basics of Power Systems

Power system structure: Generation, Transmission, Distribution.

Earthing: Methods of earthing - Circuit breakers: Miniature circuit breaker (MCB), Moulded case circuit breaker (MCCB), Earth leakage circuit breaker (ELCB).

Safety: Safety precautions in electrical systems, First aid for electrical accidents.

Total periods (L): 30

List of Experiments:

1. Verification of Ohm's Law and V–I Characteristics.
2. Verification of Kirchhoff's Laws (KVL & KCL).
3. Analysis of DC Circuits using Mesh and Nodal Methods.
4. Study of AC Circuits – R, L, C and RLC Combinations.
5. Measurement of Power and Power Factor in AC Circuits.
6. Open Circuit and Load Test on Single-Phase Transformer.
7. Speed Control of DC Motor.
8. Measurement of Electrical Quantities using Analog and Digital Instruments (Ammeter, Voltmeter, Energy Meter and Digital Storage Oscilloscope)

Total periods (P): 30

Total periods (L+P): 60

Text Books:

1. Kothari, D. P., & Nagrath, I. J. (2010). Basic Electrical Engineering. Tata McGraw-Hill Education. 3rd Edition.
2. Sawhney, A. K. (2015). A Course in Electrical and Electronic Measurements and Instrumentation. Dhanpat Rai & Co.
3. Bakshi, U. A., & Bakshi, V. U. (2009). Electrical Machines. Technical Publications.

Reference Books:

1. Sahdev, S. K. (2015). Basic Electrical Engineering. Pearson Education India.
2. Theraja, B. L., & Theraja, A. K. (2014). A Textbook of Electrical Technology – Volume I & II. S. Chand & Company.
3. Kalsi, H. S. (2010). Electronic Instrumentation. Tata McGraw-Hill. 3rd Edition.
4. Naidu, M. S., & Kamaraju, V. (2009). High Voltage Engineering. Tata McGraw-Hill. 4th Edition.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Understand the fundamental concepts of DC and AC circuits.
CO2	Analyze electrical quantities in single-phase and three-phase circuits.
CO3	Illustrate the construction and working principle of DC machines, AC machines and transformers for various engineering applications.
CO4	Apply appropriate measuring instruments for electrical measurements.
CO5	Evaluate the power system structure, protection schemes and electrical safety practices.

Semester - II

26MAC03T	Complex Functions and Transforms (Common to BME, Civil, ECE and EEE)	Category	L	T	P	C
		BS	3	1	0	4

Prerequisites:

- Basic knowledge of calculus, differential equations, complex numbers and elementary integration techniques.

Course Objectives:

- To understand analytic functions, apply the Cauchy-Riemann equations and use conformal and bilinear transformations in engineering contexts.
- To apply complex integration techniques - Cauchy's integral theorem, Cauchy's integral formula, Taylor's and Laurent's series and the residue theorem for evaluation of real integrals.
- To learn and apply Laplace and Z-transforms to solve continuous differential equations and discrete difference equations.
- To analyze periodic and non-periodic functions using Fourier series and Fourier transforms, including Parseval's identity and the convolution theorem.

Complex Differentiation

Analytic functions - Necessary and Sufficient conditions for analyticity in Cartesian, Polar coordinates - Cauchy-Riemann equations - Properties of analytic functions - Harmonic functions, Laplace's equation - Construction of analytic function: Milne-Thomson method - Conformal mapping - Mapping by functions: $w = z + c$, cz, $1/z$, z^2, $z + 1/z$ - Bilinear (Mobius) transformation.

Activities: Open-source software: Verify Cauchy-Riemann equations, check harmonic function: Laplace equation, Visualize conformal mapping.

Complex Integration

Line integral - Cauchy's integral theorem - Cauchy's integral formula (Statement only) - Derivatives of analytic functions: Using Cauchy's formula - Taylor's series - Laurent's series - Singularities, Zeros - Residues - Cauchy's residue theorem - Application of residue theorem: Evaluation of real integrals using circular contour, semicircular contour.

Activities: Open-source software: Line integral: Numerical approximation, Taylor series expansion, Laurent series, Evaluate real integral using residues.

Laplace and Z - Transforms

Laplace transform of standard functions - Linearity property - First shifting theorem - Second shifting theorem: t-shifting - Laplace transform of derivatives - Unit step function (Heaviside function) - Inverse Laplace transform: Partial fraction method and Convolution theorem - Z-transform: Definition - Linearity, Shifting properties - Inverse Z-transform: Partial fraction method - Difference equations - Solution of linear difference equations with constant coefficients using Z-transform.

Activities: Open-source software: Laplace transform, Inverse Laplace transform, Solve linear difference equations with constant coefficients using Z-transform method.

Fourier Series and Fourier Transforms

Fourier series - Dirichlet's conditions - Euler's formulae - Fourier series for functions with arbitrary period: Change of interval formula - Even, Odd functions - Half-range cosine, Sine series - Parseval's identity - Fourier transforms - Properties of Fourier transforms - Fourier cosine, Sine transforms - Convolution theorem for Fourier transforms.

Activities: Open-source software: Fourier series, Plot Fourier approximation, Fourier transform, Verify Parseval's identity.

Total periods (L: 45; T: 15): 60

Text Books:

1. Grewal, B. S. (2017). Higher Engineering Mathematics. Khanna Publishers. 44th Edition.
2. Kreyszig, E. (2016). Advanced Engineering Mathematics. John Wiley & Sons. 10th Edition.

Reference Books:

1. Churchill, R. V., & Brown, J. W. (2013). Complex Variables and Applications. McGraw-Hill. 9th Edition.
2. H. S. Govinda Rao (2008). Higher Engineering Mathematics. Viva books, New Delhi, India.
3. Veerarajan, T. (2014). Engineering Mathematics (Semester II). Tata McGraw-Hill. 4th Edition.
4. Narayanan, S., Manicavachagom Pillay, T. K., & Ramanaiah, G. (2009). Advanced Mathematics for Engineering Students (Vol. 2). S. Viswanathan Publishers. 2nd Edition.
5. Spiegel, M. R. (2018). Laplace Transforms. McGraw-Hill.
6. Simmons, G. F. (2016). Differential Equations with Applications and Historical Notes. CRC Press. 3rd Edition.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply Cauchy-Riemann equations, construct analytic functions using Milne-Thomson method and use conformal and bilinear transformations.
CO2	Evaluate complex integrals using Cauchy's theorem and formula, expand functions in Taylor's and Laurent's series and apply the residue theorem to real integrals.
CO3	Compute Laplace and Z-transforms, find their inverses using partial fractions and convolution theorem and solve differential and difference equations.
CO4	Represent functions using Fourier series, construct half-range series and apply Fourier transforms with Parseval's identity and convolution theorem.

26CYC01T	Climate Change and Sustainability (Common to all Branches)	Category	L	T	P	C
		HUM	2	0	0	2

Prerequisites:

- Fundamental knowledge of science subjects studied at higher secondary level.
- Awareness of current environmental issues and sustainability practices.

Course Objectives:

- To understand the basics of climate and weather, atmospheric structure and the factors affecting climatic conditions.
- To learn about climate change, global warming, greenhouse effect, air pollution and their impacts on environment and human life.
- To gain knowledge on urbanization, sustainable development, waste management, green energy and sustainable urban planning.
- To study adaptation and mitigation measures for climate change using green engineering, green technologies and climate resilient infrastructure.
- To understand sustainable technologies and international efforts such as Kyoto Protocol, carbon credit and Paris Agreement for reducing greenhouse gas emissions.

Climate

Climate and weather – Composition and structure of atmosphere. Factors influencing weather – Insolation, Temperature, Humidity, Pressure, Wind, Precipitation, Topography. Climate change and variability – Atmospheric stability - Inversions.

Activity: Assignment on regional climate change.

Climate Change

Climate change – Global warming – Greenhouse effect- Air pollution, Carbon footprint, carbon cycle, carbon sequestration. Impact of climate change on water cycle, agriculture, forest, urban areas, biodiversity human health.

Activity: Case Study on Air Pollution.

Urbanization and sustainable development

Urbanisation and Industrialization – problems – Urban sprawl. Urban planning – Zoning of land use – Sustainable development, Green energy, Waste management, 3R concepts, sustainable transport, sustainable urbanization.

Activity: Field visit to waste management plant.

Adaptation and mitigation strategies

Green Engineering, Green technologies, circular economy. Climate change and infrastructure planning, Climate resilient cities, climate resilient infrastructure – nature based solutions in disaster management. Adaptations and strategies for combating climate change.

Activity: Poster presentation about Green Building.

Sustainable technologies

Sustainability Engineering, United Nations Framework Convention on climate change – Climate change action plans – Kyoto mechanisms to reduce GHG emission – Clean development mechanism – Joint implementation – Case studies – Carbon credit, Paris Agreement.

Total periods: 30

Text Books:

1. J. Tompkins and T. Taylor, Sustainability: A comprehensive Foundation, 1st Edition, 12th Media Services, 2018.
2. K. Karthilk, Green Building Guidance: The Ultimate Guide for IGBC Accredited Professional Examination Book, 1st Edition. NVICO Notion Press, 2019.
3. D.S. Lal, Climatology, Latest Edition. Sharda Pustak Bhavan, ISBN 8186204121.
4. J.T. Houghton and J. Pasternak, Climate Change: Causes, Effects and Solutions, 1st Edition, Wiley Publications, 2003.

E - Resources:

1. D. T. Allen and D. R. Shonnard, Sustainability Engineering: Concepts, Design and Case Studies, 1st Edition, Prentice Hall, 2001.
2. J. W. Twidell and A. D. Weir, Renewable Energy Resources, 2nd Edition, Taylor & Francis, 2006.
3. A. S. Bradley, A. O. Adebayo and P. Maria, Engineering Applications in Sustainable Design and Development, 1st Edition, Cengage Learning, 2015.
4. N. B. Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, 1st Edition, McGraw-Hill Professional, 2011.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Explain the basic concepts of climate, weather, atmospheric structure and factors influencing climatic conditions.
CO2	Discuss climate change, global warming, greenhouse effect, air pollution and their environmental and social impacts.
CO3	Analyze the issues related to urbanization and apply principles of sustainable development, waste management and green energy.
CO4	Apply adaptation and mitigation strategies using green technologies, circular economy and climate resilient infrastructure concepts.
CO5	Describe sustainable technologies and international climate agreements and evaluate measures for reducing greenhouse gas emissions.

26TLC02T	தமிழர்களும் தொழில்நுட்பமும் (Common to all Branches)	Category	L	T	P	C
		HUM	1	0	0	1

நெசவு மற்றும் பானைத் தொழில்நுட்பம்

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு, சிவப்பு பானைகள் மற்றும் கீறல் குறியீடுகள்.

வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்

சங்க காலத்தில் வடிவமைப்பு, கட்டுமானங்கள் - சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகற்களும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்கள், கோவில்கள் - சோழர் காலத்து பெருங்கோயில்கள், பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல் - மதுரை மீனாட்சி அம்மன் ஆலயம், திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னை இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

உற்பத்தித் தொழில் நுட்பம்

கப்பல் கட்டும் கலை - உலோகியல் - இரும்புத் தொழிற்சாலை - இரும்பு உருக்குதல் - எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு, தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - மணிகள்: கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்

அணை - ஏரி - குளங்கள் - மதகு - சோழர் காலக் குமிழித்தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்

அறிவியல் தமிழின் வளர்ச்சி - கணினித் தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம்: தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

Total periods: 15

References:

1. தமிழர் வரலாறு - மக்கள் பண்பாடு - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

2. கணினித் தமிழ் - முனைவர் இள. சுந்தரம் (விகடன் பதிப்பகம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
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.

26TLC02T	Tamils and Technology (Common to all Branches)	Category	L	T	P	C
		HUM	1	0	0	1

Weaving and Ceramic Technology

Weaving industry during Sangam age - Ceramic technology - Black, Red ware potteries (BRW) - Graffiti on potteries.

Design and Construction Technology

Designing, Structural construction of houses during Sangam age - Design in household materials during Sangam age - Building materials, Hero stones of Sangam age - Details of stage constructions in Silappathikaram - Sculptures, Temples of Mamallapuram - Great temples of Cholas, Other worship places - Temples of Nayaka period - Type study: Madurai Meenakshi temple - Thirumalai Nayakar mahal - Chettinad houses - Indo-Saracenic architecture at Madras during British period.

Manufacturing Technology

Art of ship building - Metallurgical studies - Iron industry - Iron smelting - Steel - Copper, Gold coins as sources of history - Minting of coins - Bead making industries: Stone beads, Glass beads, Terracotta beads, Shell beads, Bone beads - Archaeological evidences - Gemstone types described in Silappathikaram.

Agriculture and Irrigation Technology

Dam - Tank - Ponds - Sluice - Significance of Kumizhi thoompu of Chola period - Animal husbandry - Wells designed for cattle use - Agriculture, Agro processing - Knowledge of sea - Fisheries - Pearl, Conch diving - Ancient knowledge of ocean - Knowledge-based society.

Scientific Tamil & Tamil Computing

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

References:

1. தமிழர் வரலாறு - மக்கள் பண்பாடு - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இள. சுந்தரம் (விகடன் பதிப்பகம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
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.

26ECC01T	Circuits and Network Analysis (Common to ECE and BME)	Category	L	T	P	C
		ES (PC)	3	1	0	4

Prerequisites:

- Basic knowledge of electrical circuits, including voltage, current, resistance and Ohm's law.
- Understanding of basic physics concepts related to electricity and magnetism.

Course Objectives:

- To understand the fundamental concepts of electrical circuits, network elements and basic circuit laws for analyzing DC and AC networks.
- To apply network theorems and systematic analysis techniques such as mesh and nodal methods to solve electrical circuits.
- To analyze steady-state and transient behavior of RL, RC and RLC circuits using time-domain and frequency-domain approaches.
- To study resonance characteristics, coupled circuits and transformer principles for practical circuit applications.
- To evaluate two-port network parameters and design passive filters and attenuator circuits for signal processing applications.

Circuit Analysis and Network Theorems

Analysis of DC, AC electrical circuits: Dependent, Independent sources - Supermesh, Supernode analysis: Independent sources - Star-delta transformation - Network theorems: Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem, Reciprocity theorem.

Steady - State and Transient Analysis of AC and DC Circuits

Component behavior in AC, DC: R, L, C - Characteristics of sinusoids - Phasor relationship: R, L, C - Phasor diagram - Natural, Forced response - Steady-state, Transient analysis of RL, RC, RLC circuits: Using Laplace transform.

Resonance and Coupled Circuits

Natural frequency, Damping ratio - Series resonance - Parallel resonance - Quality factor (Q) - Bandwidth - Selectivity - Effect of Q on bandwidth, Selectivity - Self-inductance, Mutual inductance - Dot convention - Ideal transformer.

Two - Port Network Analysis

Introduction to two-port networks - Characterization in terms of parameters: Impedance, Admittance, Hybrid, Transmission - Parameter conversions - Interconnection of two-port networks - Symmetry, Reciprocity.

Filters and Attenuators

Passive filters: Low pass, High pass, Band pass, Band stop filters - Constant K, m-derived filter - Attenuators: T-type, Π-type, Lattice attenuator.

Total periods (L: 45; T: 15): 60

Text Books:

1. Singh, R. R. (2019). Circuit Theory and Networks: Analysis and Synthesis. McGraw Hill Education (India) Private Limited. 2nd Edition.

2. Sudhakar, A., & Palli, S. S. (2024). Circuits and Networks: Analysis and Synthesis. McGraw Hill Education (India) Private Limited. 6th Edition.
3. Sukhija, M. S., & Nagsarkar, T. K. (2014). Circuits and Networks: Analysis, Design and Synthesis. Oxford University Press. 2nd Edition.

Reference Books:

1. Choudhury, D. R. (2013). Networks and Systems. New Age International Publishers. 2nd Edition.
2. Chakrabarti, A. (2019). Circuit Theory: Analysis and Synthesis. Dhanpat Rai & Sons. 7th Edition.
3. Nahvi, M., & Edminister, J. A. (2016). Theory and Problems of Electric Circuits. Tata McGraw-Hill. 5th Edition.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply circuit laws and network theorems to analyze DC and AC electrical circuits.
CO2	Analyze steady-state and transient responses of RL, RC and RLC circuits.
CO3	Evaluate resonance characteristics and behavior of coupled circuits.
CO4	Determine parameters and performance of two-port networks.
CO5	Design and analyze passive filters and attenuator circuits.

26EC201T	Electron Devices	Category	L	T	P	C
		ES (PC)	3	0	0	3

Prerequisites:

- Basic knowledge of Physics, particularly electricity, magnetism and atomic structure.
- Understanding of basic semiconductor concepts such as energy bands (intro level).
- Familiarity with basic electrical circuits (voltage, current, Ohm's law).
- Knowledge of basic mathematics, including algebra and simple equations.

Course Objectives:

- To understand semiconductor physics and carrier transport mechanisms.
- To study the operation of PN junction diode and special diodes.
- To analyze the characteristics of BJT.
- To understand the working of JFET and MOSFET devices.
- To explore special semiconductor and optoelectronic devices

Semiconductor Physics

Energy bands in intrinsic, extrinsic semiconductors - Equilibrium carrier concentration - Mass action law - Direct, Indirect bandgap semiconductors - Carrier transport mechanisms: Drift current, Diffusion current - Current density equation - Generation, Recombination of carriers - Continuity equation.

Semiconductor Diode

PN junction diodes: Formation of PN junction - Forward, Reverse bias characteristics - Diode current equation - Diode resistance - Transition, Diffusion capacitance - Rectifiers - Clippers - Clampers.

Special diodes: Zener diode - Breakdown mechanisms: Zener, Avalanche - Voltage regulation using Zener diode - Tunnel diode, Varactor diode, Photodiode - Construction, Operation, Applications.

Bipolar Junction Transistors

Construction, Operation of NPN, PNP transistors - Transistor configurations: CB, CE, CC - Regions of operation - Current gain - Input, Output characteristics - Early effect - Other devices: Multi-emitter transistor - Construction, Applications.

Field Effect Transistors

JFET: Construction, Working, Characteristics, Parameters - MOSFET - MOS capacitor - Depletion, Enhancement modes - nMOS, pMOS - Threshold voltage - Transfer, Output characteristics - CMOS: Introduction, Basic operation.

Special Semiconductor Devices

Thyristor family: SCR, TRIAC, DIAC - Operation, Applications - Thyristor protection techniques.

Unijunction transistor (UJT): Construction, Characteristics, Application as relaxation oscillator.

Optoelectronic devices: LED, LCD, Phototransistor, Opto-coupler - Principle, Characteristics, Applications.

Power MOSFETs: Construction, Switching characteristics, Applications in power circuits.

Total Periods: 45

Text Books:

1. Millman, J., Halkias, C. C., & Satyabrata, J. (2019). Electronic Devices and Circuits. McGraw Hill Education (India) Private Limited.
2. Floyd, T. L. (2021). Electronic Devices and Circuits. Pearson.

Reference Books:

1. Neamen, D. A. (2012). Semiconductor Physics and Devices. Tata McGraw-Hill.
2. Boylestad, R. L., & Nashelsky, L. (2021). Electronic Devices and Circuit Theory. Pearson.
3. Bell, D. A. (2021). Electronic Devices and Circuits. Oxford University Press.
4. Salivahanan, S., Suresh Kumar, N., & Vallavaraj, A. (2008). Electronic Devices and Circuits. Tata McGraw-Hill.
5. Yang, C. Y. (1978). Fundamentals of Semiconductor Devices. McGraw-Hill International.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Understand the fundamental behavior of semiconductor physics and its role in electronic devices.
CO2	Apply the principles of PN junction and special diodes in analyzing basic electronic circuits.
CO3	Compare and analyze the configurations and characteristics of Bipolar Junction Transistors (BJT) in different regions of operation.
CO4	Analyze the working principles and characteristics of Field Effect Transistors (JFET and MOSFET) and their applications in electronic circuits.
CO5	Apply the working principles and applications of special semiconductor and optoelectronic devices in electronic systems.

26ENC02L	English Essentials - II (Common to all Branches)	Category	L	T	P	C
		HUM	1	0	2	2

Prerequisites:

- Fundamental communication skills required for academic and professional contexts.

Course Objectives:

- To enhance practical communication skills through lab-based activities.
- To train students in professional and workplace communication.
- To improve listening, presentation and teamwork skills.
- To equip students with essential skills for interviews and career readiness.

Communication Concepts

Types of communication: Verbal, Non-verbal, Written - Process of communication - Interpersonal, Intrapersonal communication - Barriers to communication - Ways to overcome barriers - Listening skills - Active listening.

Lab Activities: Listening practice using audio clips: Note-taking - Role-play: Formal, Informal communication - Group activity: Identify communication barriers in real-life cases - Short self-introduction: Record, Review - Think-pair-share discussions.

Business Correspondence

Email writing - Cover letter, Resume writing - LinkedIn, Profile building basics - SOP writing.

Lab Activities: Write professional emails: Leave request, Complaint, Enquiry - Resume preparation: ATS-friendly format - Cover letter drafting: Internships, Jobs - Peer review of resumes - Email etiquette - Email writing: Request for education loan, Internship, Placement - Spot-the-error in business email.

Presentation Skills

Public speaking techniques - Structuring a presentation - Body language, Voice modulation - Use of visual aids: PPT - Poster making - Use of AI tools.

Lab Activities: 2-3-minute speech on technical, General topics - PPT presentation - Mirror practice for confidence building - Record, Analyse student presentations - Body language activity: Gesture control, Posture.

Workplace Readiness

Interviews - Types of interviews - Preparing for interviews - Mock interviews - Group discussion - Types of GDs - Preparing for GD - Parameters used for evaluating GD - Telephone, Video call etiquette.

Lab Activities: Simulated job interview: Peer panel - 5-minute group discussion on a given topic - Picture-based non-verbal communication exercise.

Total periods (L: 15; P: 30): 45

Text Books:

1. Raman, M., & Sharma, S. (2008). Technical Communication: English Skills for Engineers. Oxford University Press.
2. Subhashini, B., et al. (2025). English for Technical Communication. RK Publications.
3. Ibbotson, M. (2008). Cambridge English for Engineering. Cambridge University Press.

E - Resources:

1. Cambridge English - https://www.cambridgeenglish.org/learningenglish/grammar-and-vocabulary/
2. Communication for Business Success-https://open.umn.edu/opentextbooks/textbooks/8
3. TED Talks - https://www.ted.com/
4. Speechling - https://speechling.com/
5. mePro by Pearson - https://mepro.pearson.com/

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Demonstrate improved listening and pronunciation skills.
CO2	Draft effective business emails, resumes and cover letters.
CO3	Deliver structured and impactful presentations.
CO4	Apply workplace communication skills including group discussion and interviews.

26CS201L	Data Structures using C++	Category	L	T	P	C
		ES (G)	2	0	2	3

Prerequisites:

- Basic knowledge of programming fundamentals, including variables, data types, control structures (loops and conditional statements).
- Understanding of procedural programming concepts, preferably using C or any high-level programming language.
- Familiarity with mathematical logic and problem-solving techniques, including basic algorithmic thinking.
- Exposure to basic computer organization concepts such as memory, pointers and program execution flow.

Course Objectives:

- To understand object-oriented programming concepts using C++.
- To learn linear and non-linear data structures and their applications.
- To develop problem-solving skills using appropriate data structures.

Fundamentals of Object-Oriented Programming and Overloading

Overview of C++ - Structures, Classes - Class scope - Access specifiers - Constructors, Destructors - Member functions - Friend functions - Dynamic memory allocation - Static members - Function overloading, Operator overloading.

Object Oriented Inheritance and Polymorphism

Base, Derived classes - Types of inheritance - Access control: Public, Private, Protected - Function overriding - Virtual functions - Abstract classes - Dynamic binding - This pointer - Virtual destructors - Composition, Inheritance.

Concepts and Implementation of Linear Data Structures

Asymptotic notations: Big-O, Omega, Theta - Arrays, Representation - Stacks, Queues: Array, Linked list implementation - Linked lists: Singly, Doubly - Expression evaluation - Polynomial addition using linked lists.

Concepts and Implementation of Non-Linear Data Structures

Trees, Binary trees - AVL tree, Binary search tree, B tree, B+ tree - Tree traversals - Threaded binary trees: Basics - Graphs: Representation: Adjacency matrix, List - Graph traversals: BFS, DFS - Connected components - Minimum spanning trees: Prim's algorithm, Kruskal's algorithm - shortest path algorithm: Dijkstra's algorithm - Introduction to STL: Standard template library.

Searching and Sorting Algorithms with Complexity Analysis

Linear search - Binary search - Sorting techniques: Insertion sort, Merge sort, Quick sort, Heap sort - Time complexity analysis: Best, Worst, Average cases.

Total periods (L): 30

List of Experiments:

1. Implement Constructors and Destructors in C++.
2. Programs using Member Functions and Friend Functions.
3. Dynamic Memory Allocation and Operator Overloading.

4. Implementation of Various Types of Inheritance.
5. Virtual Functions and Dynamic Binding.
6. Method Overriding and Polymorphism.
7. Operations on Arrays and Linked Lists.
8. Stack and Queue Implementation (Array & Linked List).
9. Expression Evaluation (Infix to Prefix/Postfix).
10. Binary Tree Traversals (Inorder, Preorder, Postorder).
11. Graph Traversal Algorithms (BFS & DFS).
12. Shortest Path Algorithms (Single Source & All Pairs).
13. Minimum Spanning Tree (Prim's / Kruskal's).
14. Searching Algorithms (Linear & Binary Search).
15. Sorting Algorithms (Insertion, Merge, Quick, Heap).

Total periods (P): 30

Total periods (L + P): 60

Text Books:

1. Mahdi, M. (2025). Data Structures in Depth Using C++. Apress.
2. Srivastava, S. K., & Srivastava, D. (2025). Comprehensive Data Structures and Algorithms in C++. BPB Publications.
3. Akepogu, A. R., & Palagiri, R. R. (2024). Data Structures and Algorithms Using C++. Pearson India.

Reference Books:

1. Deitel, P. J., & Deitel, H. M. (2005). C++ How to Program. Pearson Education.
2. Weiss, M. A. (2013). Data Structures and Algorithm Analysis in C++ (4th Edition). Pearson.
3. Horowitz, E., Sahni, S., & Mehta, D. (2007). Fundamentals of Data Structures in C++. Universities Press.
4. Goodrich, M. T., Tamassia, R., & Mount, D. M. (2014). Data Structures and Algorithms in C++. Wiley.
5. Sedgewick, R., & Wayne, K. (2011). Algorithms in C++. Addison-Wesley.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply object-oriented programming concepts in C++ to develop structured programs.
CO2	Implement linear data structures to solve computational and expression-based problems.
CO3	Design and use non-linear data structures like trees and graphs with standard traversal and representation techniques.
CO4	Analyze and compare searching and sorting algorithms using time complexity measures to select efficient solutions.

26MEC01P	Engineering Practices and Re-Engineering Laboratory (Common to all Branches)	Category	L	T	P	C
		SD	0	0	4	2

Prerequisites:

- Basic understanding of science concepts (Physics fundamentals like force, electricity and energy).
- Familiarity with basic tools, measurements and safety practices (school-level exposure is sufficient).
- Basic awareness of computers and simple programming concepts (intro level).
- Willingness to engage in hands-on activities and teamwork.

Course Objectives:

- To develop practical skills in fabrication, assembly and disassembly of everyday products using appropriate tools and safety practices.
- To provide hands-on training in electrical wiring, electronic components, sensors and microcontroller-based automation.
- To expose students to modern fabrication technologies including 3D printing and laser cutting.
- To cultivate product thinking through reverse engineering - sketching, measuring, modelling and proposing design improvements.
- To build confidence and problem-solving ability in students, particularly those with limited prior exposure to engineering tools and concepts.

List of Experiments

Tools, Safety and Hands - on - Fabrication

1. Identification and safe handling of common workshop and electrical tools - spanners, screw drivers, pliers, multimeter, soldering iron, drill machine.
2. Dis-assembly and assembly of common household appliances: Mixer-Grinder, Ceiling Fan / Table Fan, Washing Machine - understanding of mechanisms, bearings, switches and motor connections.
3. Dis-assembly and assembly of Refrigerator / Air-Conditioner - introduction to refrigeration cycle components (compressor, condenser, expansion valve, evaporator).
4. Dis-assembly and assembly of a Bicycle - chain drive, gearing, brake mechanism and frame joints.
5. Welding Practices: Safety measures, types of joints, hands-on session on SMAW and GMAW on mild steel / stainless steel plates.

Electrical Wiring and Electronics

1. Electrical installation tools and safety measures; handling of Fuses, Miniature Circuit Breakers (MCB) and Distribution Boards.
2. Hands-on wiring for domestic loads: Lights (series and parallel), Fans, Calling Bells.
3. Hands-on wiring for motors and UPS - single-phase motor starter circuit.
4. Electronic components identification: resistors, capacitors, diodes, transistors, LEDs, relays - safe use and testing using multimeter.

5. Soldering practices on Printed Circuit Board (PCB) - soldering, desoldering and inspection.
6. Hands-on construction and testing of a Bridge Rectifier circuit and an Op-Amp based amplifier.

Microcontroller Programming and Automation

1. Introduction to open-source microcontroller platforms (Arduino / ESP32) - architecture, IDE setup, pin configuration, digital and analog I/O.
2. Interfacing digital and analog sensors: temperature sensor (LM35 / DHT11), light sensor (LDR), soil moisture sensor, ultrasonic distance sensor.
3. Interfacing actuators: LED, buzzer, relay, DC motor with L298N driver, servo motor.
4. Mini Project 1 - Home Automation: Automatic light control using LDR sensor and relay.
5. Mini Project 2 - Agricultural Application: Soil moisture-based water pump automation.
6. Mini Project 3 - Healthcare Application: Temperature monitoring with alert system.

Digital Fabrication and Reverse Engineering Project

1. Introduction to Solid Modelling - demonstration and practice on CAD software (Fusion 360 / SolidWorks / Creo) for simple components.
2. 3D Printing - introduction to FDM technology, slicing software (Cura), printing parameters; fabrication of a simple mechanical component.
3. Laser Cutting - demonstration of cutting wood and acrylic sheets into complex profiles for mechanical parts / enclosures.
4. Reverse Engineering Activity (Group of 3-4 students): Select a familiar product (e.g., hand pump, door latch, bicycle brake, water tap, pressure cooker safety valve). Perform: complete disassembly; dimensional measurement using vernier calipers / screw gauge; freehand engineering sketching of each part; CAD modelling of at least two key parts; virtual assembly; identification of one design improvement; fabrication of improved part using 3D printing or workshop tools; presentation of the reverse-engineered model.

Total periods: 60

Text Books:

1. Christena, S. (2014). Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics. Crestline Books.
2. Lipson, H., & Kurman, M. (2013). Fabricated: The New World of 3D Printing. Wiley.
3. Wang, W. (2010). Reverse Engineering: Mechanisms, Structures, Systems & Materials. CRC Press.
4. Margolis, M. (2020). Arduino Cookbook: Recipes to Begin, Expand and Enhance Your Projects. O'Reilly Media. 3rd Edition.
5. Bureau of Indian Standards (2019). Code of Practice for Electrical Wiring Installations (IS 732:2019).

E - Resources:

1. GrabCAD (Free CAD models library) - https://grabcad.com/.
2. GitHub (Open-source microcontroller code repositories) - https://github.com/.
3. Tinkercad (Free browser-based CAD and Arduino simulation) - https://www.tinkercad.com/.

4. NPTEL - Workshop Technology / Manufacturing Processes - https://nptel.ac.in/.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply appropriate tools and safety measures to disassemble, inspect and reassemble common household appliances and mechanical systems.
CO2	Execute basic electrical wiring and electronic circuit connections for domestic and industrial applications.
CO3	Interface sensors and actuators with a microcontroller to realise simple automation systems relevant to home, agriculture and healthcare contexts.
CO4	Fabricate simple components using 3D printing and demonstrate cutting operations using laser cutting machines.
CO5	Reverse-engineer a given product by disassembling it, taking measurements, preparing sketches, creating a CAD model and identifying scope for design improvement.
CO6	Design and build a working prototype of an improved or alternative product using workshop tools, 3D printing and embedded system programming.

26EC202P	Electron Devices Laboratory	Category	L	T	P	C
		ES (PC)	0	0	4	2

Prerequisites:

- Basic knowledge of electronic devices, including diodes and transistors (intro level).
- Familiarity with basic electrical circuits (voltage, current, Ohm's law).
- Understanding of basic electronics laboratory instruments such as multimeter and power supply.
- Knowledge of basic safety practices in electrical and electronics labs.

Course Objectives:

- To study and verify the characteristics of semiconductor devices through experiments.
- To analyze the behaviour of PN junction diodes and special diodes in circuits.
- To experimentally evaluate the performance of BJT in different configurations.
- To understand the characteristics and operation of JFET and MOSFET devices.
- To gain hands-on experience with optoelectronic and special semiconductor devices.

List of Experiments

1. V-I Characteristics of PN Junction Diode.
2. Zener Diode Characteristics and Voltage Regulation.
3. Rectifier Circuits.
4. Clippers and Clampers.
5. Input and Output Characteristics of BJT (CE Configuration).
6. BJT in CB/CC Configuration (Study/Characteristics).
7. BJT as a Switch.
8. JFET Characteristics.
9. MOSFET Characteristics (Enhancement Mode).
10. CMOS Inverter (Basic Study/Simulation).
11. SCR Characteristics.
12. UJT Characteristics and Relaxation Oscillator.
13. LED and Photodiode Characteristics.

Total periods: 60

References:

1. Millman, J., Halkias, C. C., & Satyabrata, J. (2019). Electronic Devices and Circuits. McGraw Hill Education (India) Private Limited.
2. Floyd, T. L. (2021). Electronic Devices and Circuits. Pearson.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Demonstrate the characteristics of semiconductor diodes and analyze their behaviour in electronic circuits.
CO2	Evaluate Zener diode operation and apply it in voltage regulation circuits.
CO3	Analyze BJT characteristics in different configurations and determine key parameters.
CO4	Examine the characteristics of JFET and MOSFET and interpret their operation in circuits.

CO5	Investigate the working of special semiconductor and optoelectronic devices and apply them in practical applications.

26FLC01P	Foreign Language (German) (Common to all Branches)	Category	L	T	P	C
		HUM	0	0	2	1

Course Objectives:

- To enable students to communicate in everyday situations using basic German vocabulary, greetings, numbers and simple sentence structures.
- To develop foundational German grammar skills including verb conjugation, articles, pronouns, question formation and basic tenses.
- To build practical communicative competence through dialogue, role-play and short writing tasks in real-life contexts such as food, travel, city navigation and social interactions.

GUTEN TAG!

1. To greet, learn numbers till 20, practice telephone numbers & e mail address, learn alphabet, speak about countries & languages.
2. Vocabulary: related to the topic.
3. Grammar: W - Questions, Verbs & Personal pronouns I.

FREUNDE, KOLLEGEN UND ICH

1. To speak about hobbies, jobs, learn numbers from 20; build dialogues and frame simple questions & answers.
2. Vocabulary: related to the topic.
3. Grammar: Articles, Verbs & Personal pronouns II, sein & haben verbs, ja/nein Frage, singular/plural.

IN DER STADT

1. To know places, buildings, question, know transport systems, understand international words; build dialogues and write short sentences.
2. Vocabulary: related to the topic.
3. Grammar: Definite & indefinite articles, Negotiation, Imperative with Sie verbs.

GUTEN APPETIT!

1. To speak about food, shop, converse; Vocabulary: related to the topic; build dialogues and write short sentences.
2. Grammar: Sentence position, Accusative, Accusative with verbs, personal pronouns & prepositions, Past tense of haben & sein verbs.

TAG FÜR TAG/ZEIT MIT FREUNDEN

1. To learn time related expressions, speak about family, about birthdays, understand & write invitations, converse in the restaurant; ask excuse, fix appointments on phone.
2. Vocabulary: related to the topic.
3. Grammar: Time related prepositions, Possessive articles, Modalverbs.

Total periods: 30

Text Books:

1. Dengler, S. (2013). Netzwerk A1.1. Klett-Langenscheidt GmbH.
2. Evans, S., & Pude, A. (2012). Menschen A1. Hueber Verlag.

Reference Books:

1. Funk, H., & Kuhn, C. (2009). Studio d A1. Goyal Publishers & Distributors Pvt. Ltd.
2. Dallapiazza, R.-M. (2004). Tangram Aktuell 1 (Deutsch als Fremdsprache). Max Hueber Verlag.
3. Lemcke, C., & Rohrmann, L. (2012). Grammatik Intensivtrainer A1. Goyal Publishers & Distributors Pvt. Ltd.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Use basic greetings, alphabet, numbers (1-20), telephone numbers and email conventions and identify countries and languages in German.
CO2	Describe hobbies and professions, form W-questions and yes/no questions and construct simple dialogues using correct verb forms and articles.
CO3	Identify places and buildings in a city, ask for and give directions, interpret transport-related information and use imperative and negation correctly.
CO4	Converse about food and shopping, apply accusative case with verbs, pronouns and prepositions and use past tense of haben and sein in context.
CO5	Express time and appointments, describe family and birthday events, write simple invitations and use modal verbs and possessive articles appropriately.

26FLC02P	Foreign Language (Japanese) (Common to all Branches)	Category	L	T	P	C
		HUM	0	0	2	1

Course Objectives:

- To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation and speaking.

Writing Systems & Basic Communication

Introduction to Hiragana: vowels, basic characters, reading & writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject-Object- Verb, Numbers 1-100, days of the week, classroom expressions.

Activities: Flashcard games and writing drills, Self-introduction, Numbers & date matching, greeting expressions, Listening to audio.

Grammar & Everyday Vocabulary

Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません, Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、いつ, Vocabulary for family, food, colors and basic actions.

Activities: Verb conjugation drills, Guessing game, Picture description, “Shopping” with food vocab and counters.

Conversation & Cultural Etiquette

Talking about routines and schedules (daily verbs, time expressions), Asking and giving simple directions (〜はどこですか？), Ordering food and making polite requests (〜をください、〜をおねがいします), Expressing likes and dislikes (すき・きらい), Listening to short conversations and identifying key phrases, Introduction to formal/informal spSDh and Japanese etiquette.

Activities: Skits and role-plays, daily schedule, beginner-level dialogue, Group discussion on etiquette.

Activities: Practice worksheets and flashcards for hiragana, Writing drills and reading simple katakana words, Dialogue practice for greetings and self-introduction, Sentence construction exercises with basic SOV structure, Particle usage exercises and short dialogues, Role-play scheduling, shopping and telling time, Verb conjugation drills for common verbs, Descriptive sentence exercises using adjectives, Practice Q&A dialogues forming questions and negations, Kanji writing practice and quizzes for basic characters, Vocabulary tests and conversational practice on daily topics, Oral presentations and listening comprehension quizzes.

Total periods: 30

References:

1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times.
2. The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Understand simple spoken Japanese in everyday contexts.
CO2	Communicate with widely used Japanese words effectively.
CO3	Develop the skills necessary for self-directed learning and continuous improvement in Japanese language.

26FLC03P	Foreign Language (Korean) (Common to all Branches)	Category	L	T	P	C
		HUM	0	0	2	1

Course Objectives:

- To impart fundamentals of the Korean language, including reading, writing systems, pronunciation and speaking.

Fundamentals of Korean

Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (Subject-Object-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요).

Activity: Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.

Essential Grammar and Vocabulary

Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, expressing possession and location, Asking simple questions (어디, 뭐, 누구).

Activity: Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.

Everyday Korean Communication

Polite spSDh levels and honorifics introduction, talking about time, dates and schedules, ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, listening practice with short dialogues, Cultural notes on etiquette and communication.

Activity: Role-play ordering at a restaurant or buying items, listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.

Total periods: 30

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Understand simple spoken Korean in everyday contexts.
CO2	Communicate with widely used Korean words effectively.
CO3	Develop the skills necessary for self-directed learning and continuous improvement in Korean language.

	Foundations of Problem Solving	Category	L	T	P	C
		MC	3	0	0	NC

Course Objectives:

- To impart high-speed mental arithmetic techniques (Vedic Mathematics and derivative systems) covering addition, subtraction, multiplication, squaring, division and approximation.
- To develop numerical intuition and estimation abilities that support quantitative aptitude, data interpretation and engineering calculations.
- To build visual and spatial problem-solving skills for non-verbal reasoning, figure analysis and diagrammatic interpretation.
- To cultivate lateral and lexical reasoning through word-puzzles, cryptarithms and language-logic games.

Speed Mathematics – I (Saw, OZ, Mirror Method)

Introduction to Vedic mathematics: Sixteen sutras, Thirteen sub-sutras, Mental-math mindset, Relevance in aptitude tests: TCS NQT, Infosys, Accenture, CAT, GATE aptitude.

SAW method (Split-and-weave): High-speed addition, Subtraction of multi-digit numbers, Carry-less addition, Column-compression techniques.

OZ method (One-zero technique): Multiplication near powers of 10, Base-method multiplication, Use of deficiencies, Surplus.

Mirror method: Left-to-right multiplication of 2-digit × 2-digit, 3-digit × 2-digit numbers, Applications in currency conversion, Instant percentage computation – Classroom drills: 50-problem speed rounds, Target < 60 seconds per set.

Speed Mathematics – II (High5, Minion, Butterfly Methods)

High5 method: Rapid squaring of numbers ending in 5, Squaring close to 50, 100, Instant computation: 55^2, 95^2, 105^2, 995^2.

Minion method: Multiplication of two 2-digit numbers: Same tens digits, Units digits sum to 10, General criss-cross (Urdhva-Tiryagbhyam) for 2×2, 3×2 multiplication.

Butterfly method: Fast addition, Subtraction of fractions without LCM, Instant comparison of fractions, Application in ratio-proportion, Data interpretation problems – Division shortcuts: Nikhilam, Paravartya division, Approximate division for percentage DI questions – Timed drill: 30 questions in 8 minutes, Target accuracy ≥ 85%.

Speed Mathematics – III (Inception, Golden Eye Method)

Inception method: Recursive approximation for square-roots, Cube-roots, Powers – Digit-sum-based verification of computations.

Golden-eye method: Estimation, Approximation heuristics for large-number arithmetic, Rounding-and-adjust technique for advanced data interpretation (CAT-level caselets).

Percentage, Ratio, Average shortcuts: Conversion of fractions to percentages, Allegation, Weighted-average tricks – Application bridge to placement tests: Mapping shortcuts to TCS NQT, AMCAT, eLitmus, CAT question types.

Thinking with numbers and Number-Sense reasoning

Number-sense development: Divisibility rules: 2, 3, 4, 5, 6, 7, 8, 9, 11, 13, Composite divisors, Unit-digit patterns, Last-two-digit patterns, Cyclicity of powers – Number series, Pattern recognition: Arithmetic, Geometric, Squares, Cubes, Mixed, Wrong-term identification – Logical arithmetic puzzles: Cryptarithms (SEND + MORE = MONEY), Alpha-numeric puzzles, Kakuro-style number placements – Magic squares, Number-grid puzzles, Sudoku.

Mini-project: Each student maintains a personal "trick-log" notebook of at least 25 speed-math shortcuts with worked examples.

Visual Problem Solving and Word Puzzles

Problem solving with visual information: Figure series, Analogy, Odd-one-out, Embedded figures, Water images, Mirror images, Paper folding, Cutting problems – Spatial reasoning: Cube, Dice problems, Rotation of 3-D figures, Counting of figures, Pattern completion – Word puzzles: Anagrams, Word ladders, Palindromes, Logical deductions from verbal statements, Syllogism warm-ups – Cross-word, Coded-word puzzles, Lateral-thinking riddles, Introduction to Fermi-style estimation questions.

Group workshop: Teams of 3-4 students solve a 10-puzzle sprint in 30 minutes and present solution strategies to the class.

Total Periods: 45

Text Books:

1. R. S. Aggarwal, "Quantitative Aptitude for Competitive Examinations", S. Chand Publishing, Revised Edition, 2017. (Units I–IV)

Reference Books:

1. Dhaval Bathia, "Vedic Mathematics Made Easy", Jaico Publishing House, Revised Edition, 2019.
2. Kenneth Williams, "The Cosmic Calculator: A Vedic Mathematics Course for Schools", Motilal Banarsidass Publishers, 2nd Edition, 2015.
3. Jagadguru Sri Bharati Krishna Tirthaji, "Vedic Mathematics", Motilal Banarsidass Publishers, Revised Edition, 2015.
4. Arun Sharma, "How to Prepare for Quantitative Aptitude for the CAT", McGraw Hill Education, 10th Edition, 2023.
5. Shakuntala Devi, "Puzzles to Puzzle You & More Puzzles", Orient Paperbacks, Revised Edition, 2020.

Online Resources / MOOCs:

1. Vedic Maths Forum India — free video lectures and printable drill sheets (https://www.vedicmathsindia.org)
2. PrepInsta Aptitude Daily — TCS NQT pattern quantitative drills (https://prepinsta.com)
3. IndiaBIX Aptitude section — topic-wise unlimited practice (https://www.indiabix.com)
4. NPTEL / SWAYAM — "Speed Mathematics" and "Developing Soft Skills & Personality" MOOCs (https://nptel.ac.in)

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Execute Vedic-math and derivative speed techniques (SAW, OZ, Mirror, High5, Minion, Butterfly, Inception, Golden-Eye) to perform multi-digit arithmetic mentally within target time limits.
CO2	Apply number-sense, divisibility rules and pattern-recognition heuristics to solve quantitative-aptitude and number-series problems with ≥ 85 % accuracy.
CO3	Interpret and solve visual, spatial and non-verbal reasoning problems encountered in placement aptitude tests and competitive examinations.
CO4	Crack word puzzles, cryptarithms and lateral-thinking problems, demonstrating improved cognitive agility and logical fluency.

Approved by
Academic Council Meeting
No.: 01 Dated: 27.4.26

Recommended by
Board of Studies of ECE Dept.
Meeting No.: 01 Dated: 28.3.26

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