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
ELECTRICAL AND ELECTRONICS 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 : Electrical & Electronics Engineering

Programme : B.E. - Electrical & Electronics 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	06	03	-	-	-	-	-	19
Semester – II	04	06	06	02	04	-	-	-	22
Semester – III	04	-	-	02	18	-	-	-	24
Semester – IV	04	-	-	02	17	-	-	-	23
Semester – V	-	03	-	02	16	03	-	-	24
Semester – VI	-	-	-	02	14	03	-	03	22
Semester – VII	-	-	02	03	06	09	03	-	23
Semester – VIII	-	-	-	08	-	-	-	-	08
Total Credits	**22**	**15**	**11**	**21**	**75**	**15**	**03**	**03**	**165**
Percentage (%)	**13.33**	**9.09**	**6.67**	**12.73**	**45.45**	**9.09**	**1.82**	**1.82**	**100**

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: 21.4.26

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Board of Studies of EEE Dept.
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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: Graduates will apply sound knowledge and practical skills in Electrical and Electronics Engineering to design and implement effective solutions in their professional careers.

PEO2: Graduates will engage in research, lifelong learning, and innovative problem-solving to address complex challenges in power systems, energy, and embedded technologies.

PEO3: Graduates will serve as ethical, entrepreneurial, and socially responsible engineers contributing to technological growth and the betterment of society and the nation.

Program Specific Outcomes (PSOs):

PSO1: Analyze, design, and develop electrical circuits and systems for various industrial and societal requirements.

PSO2: Utilize modern tools and techniques for solving complex problems in electrical and electronic systems and provide sustainable solutions.

PSO3: Upskill with rapid advancements in the field of Electrical Engineering and exhibit research aptitude, work effectively as team and uphold ethical practices.

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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.	26CY102L	Chemistry for Electrical Engineers	LIT	2-0-2	4	3	BS
6.	26CSC01L	Problem Solving using C Programming	LIT	2-0-2	4	3	ES (G)
7.	26MEC01L	Engineering Drawing	LIT	2-0-2	4	3	ES (G)
8.	---	Physical Education – I	P	0-0-1	1	NC	MC
9.	---	Induction Program	---	---	---	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 தொழில் நுட்பமும் / Tamils & Technology	T	1-0-0	1	1	HUM
4.	26ES201T	Basic Civil and Mechanical Engineering	T	3-0-0	3	3	ES (G)
5.	26ENC02L	English Essentials – II	LIT	1-0-2	3	2	HUM
6.	26EE201L	Electric Circuits Analysis	LIT	2-1-2	5	4	ES (PC)
7.	26CSC04L	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.		Foreign Language (German /Japanese /Korean)	P	0-0-2	2	1	HUM
10.	---	Foundations of Problem Solving	T	3-0-0	3	NC	MC
11.	---	Physical Education – II	P	0-0-1	1	NC	MC
12.	---	Self-Learning Course – I	---	---	---	NC	SLC
13.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	MC
14.	---	NSS/NCC/NSO	---	---	---	NC	MC
Total Credits					**32**	**22**	

Semester – III							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	26MA301T	Matrix Theory and Numerical Methods	T	3-1-0	4	4	BS
2.	26EE301T	DC Machines and Transformers	T	3-0-0	3	3	ES (PC)
3.	26EE302T	Digital Logic Circuits	T	3-0-0	3	3	ES (PC)
4.	26EE303T	Electromagnetic Fields	T	3-1-0	4	4	ES (PC)
5.	26EE304L	Analog Electronics	LIT	2-0-2	4	3	ES (PC)
6.	26EE305L	Industry Oriented Course – I	LIT	2-0-2	4	3	ES (PC)
7.	26EE306P	DC Machines and Transformers Laboratory	P	0-0-4	4	2	ES (PC)
8.	26EE307P	Career Readiness & Professional Skills – Foundation Level	P	0-0-2	2	1	SD
9.	26EE308P	Project Work – I	P	0-0-2	2	1	SD
10.	---	Indian Constitution	T	3-0-0	3	NC	MC
11.	---	Self-Learning Course – II	---	---	---	NC	SLC
12.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	---
Total Credits					**33**	**24**	

Semester – IV							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	26EE401T	Synchronous and Asynchronous Machines	T	3-0-0	3	3	ES (PC)
2.	26MA401T	Computational Techniques	T	3-1-0	4	4	BS
3.	26EE402T	Measurements and Instrumentation	T	3-0-0	3	3	ES (PC)
4.	26EE403T	Generation, Transmission, and Distribution	T	3-0-0	3	3	ES (PC)
5.	26EE404L	Linear Integrated Circuits	LIT	2-0-2	4	3	ES (PC)
6.	26EE405L	Industry Oriented Course – II	LIT	2-0-2	4	3	ES (PC)
7.	26EE406P	Synchronous and Asynchronous Machines Laboratory	P	0-0-4	4	2	ES (PC)
8.	26EE407P	Career Readiness & Professional Skills – Intermediate	P	0-0-2	2	1	SD
9.	26EE408P	Project Work – II	P	0-0-2	2	1	SD
10.	---	Self-Learning Course – III	---	---	---	NC	SLC

11.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	---
Total Credits					**29**	**23**	

Semester – V							
S. No.	**Course Code**	**Course Name**	**Course Type**	**Periods/Week**		**Credits**	**Category**
				L-T-P	**TCP**		
1.	26EE501T	Power System Analysis	T	3-0-0	3	3	ES (PC)
2.	26EE502T	Control Systems	T	3-0-0	3	3	ES (PC)
3.	26EE0XXX	Programme Elective – I	T	3-0-0	3	3	ES (PE)
4.	26CSC02L	Python Programming	LIT	2-0-2	4	3	ES (G)
5.	26EE503L	Microprocessors and Digital Signal Controllers	LIT	2-0-2	4	3	ES (PC)
6.	26EE504L	Industry Oriented Course – III	LIT	2-0-2	4	3	ES (PC)
7.	26EE505P	Power System Laboratory	P	0-0-4	4	2	ES (PC)
8.	26EE506P	Control & Instrumentation Laboratory	P	0-0-4	4	2	ES (PC)
9.	26EE507P	Career Readiness & Professional Skills – Advance Level	P	0-0-2	2	1	SD
10.	26EE508P	Project Work – III	P	0-0-2	2	1	SD
11.	---	Self-Learning Course – IV	---	---	---	NC	SLC
12.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	---
Total Credits					**33**	**24**	

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.	26EE601T	Protection and Switchgear	T	3-0-0	3	3	ES (PC)

2.	26EE602T	Power Electronics	T	3-0-0	3	3	ES (PC)
3.	26OE9XXT	Open Elective - I	T	3-0-0	3	3	OE
4.	26EE603L	Electrical Machine Design	LIT	2-0-2	4	3	ES (PC)
5.	26EE0XXX	Programme Elective - II	LIT	2-0-2	4	3	ES (PE)
6.	26EE604L	Industry Oriented Course -IV	LIT	2-0-2	4	3	ES (PC)
7.	26EE605P	Power Electronics Laboratory	P	0-0-4	4	2	ES (PC)
8.	26EE606P	Career Readiness & Professional Skills – Placement Level	P	0-0-2	2	1	SD
9.	26EE607P	Project Work – IV	P	0-0-2	2	1	SD
10.	---	Self-Learning Course – V	---	---	---	NC	SLC
11.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	---
Total Credits					**29**	**22**	

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.	26EE701T	High Voltage Engineering	T	3-0-0	3	3	ES (PC)
3.	26EE0XXX	Programme Elective – III	T	3-0-0	3	3	ES (PE)
4.	26EE0XXX	Programme Elective – IV	T	3-0-0	3	3	ES (PE)
5.	26EE0XXX	Programme Elective – V	LIT	2-0-2	4	3	ES (PE)
6.	26EE702L	Industry Oriented Course -V	LIT	2-0-2	4	3	ES (PC)
7.	26EE703L	Industry Oriented Course -VI	LIT	2-0-2	4	3	ES (ET)
8.	26EE704P	Major Project – Phase I	P	0-0-4	4	2	SD
9.	26EE705P	Summer Internship	P	---	---	1	SD
Total Credits					**27**	**23**	

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.	26EE801P	Major Project – Phase II	P	0-0-16	16	8	SD
Total Credits					**16**	**8**	

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PROGRAMME ELECTIVE / HONOURS COURSES

Vertical - I	Vertical - II	Vertical - III	Vertical - IV	Vertical - V
Converters and Drives	**Embedded Systems**	**Power Engineering**	**Electric Vehicle Technology**	**Diversified Courses**
Special Electrical Machines	Digital Signal Processing	Utilization and Conservation of Electrical Energy	Electric Vehicle Architecture	Hybrid Energy Technology
Multilevel Power Converter	Smart System Automation	Substation Engineering and Automation	Design of Motor and Power Converters for Electric Vehicles	Design and Modelling of Renewable Energy Systems
Analysis of Electrical Machines	MEMS and NEMS	Restructured Power Market	Battery Management Systems	Energy Management and Auditing
SMPS and UPS	Embedded C Programming	Smart Grid	EV Charging Infrastructure	VLSI Design
Power Electronics for Renewable Energy Systems	Embedded System Design	HVDC and FACTS	Safety and Testing of Electric Vehicles	Power Plant Engineering
Control of Power Electronic Circuits	Embedded Processors	Power System Operation and Control	Intelligent Control Electric Vehicles	PLC Programming
Electrical Drives	Internet of Things	Underground Cable Engineering	Drone Technologies	Machine Learning
---	Signals and Systems	Grid Integrating Techniques and Challenges	Grid Integration of Electric Vehicles	Energy Storage System

PROGRAMME ELECTIVE / HONOURS COURSES

VERTICAL – 1: CONVERTERS AND DRIVES

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	26EE0XXX	Special Electrical Machines	LIT	2-0-2	3	3	ES (PE)
2.	26EE0XXX	Multilevel Power Converter	LIT	2-0-2	3	3	ES (PE)
3.	26EE0XXX	Analysis of Electrical Machines	LIT	2-0-2	3	3	ES (PE)
4.	26EE0XXX	SMPS and UPS	LIT	2-0-2	3	3	ES (PE)
5.	26EE0XXX	Power Electronics for Renewable Energy Systems	LIT	2-0-2	3	3	ES (PE)
6.	26EE0XXX	Control of Power Electronic Circuits	LIT	2-0-2	3	3	ES (PE)
7.	26EE0XXX	Electrical Drives	LIT	2-0-2	3	3	ES (PE)

VERTICAL 2: EMBEDDED SYSTEMS

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	26EE0XXX	Digital Signal Processing	LIT	2-0-2	3	3	ES (PE)
2.	26EE0XXX	Smart System Automation	LIT	2-0-2	3	3	ES (PE)
3.	26EE0XXX	MEMS and NEMS	LIT	2-0-2	3	3	ES (PE)
4.	26EE0XXX	Embedded C Programming	LIT	2-0-2	3	3	ES (PE)
5.	26EE0XXX	Embedded System Design	LIT	2-0-2	3	3	ES (PE)
6.	26EE0XXX	Embedded Processors	LIT	2-0-2	3	3	ES (PE)
7.	26EE0XXX	Internet of Things	LIT	2-0-2	3	3	ES (PE)
8.	26EE0XXX	Signals and Systems	LIT	2-0-2	3	3	ES (PE)

VERTICAL 3: POWER ENGINEERING

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	26EE0XXX	Utilization and Conservation of Electrical Energy	T	3-0-0	3	3	ES (PE)
2.	26EE0XXX	Substation Engineering and Automation	T	3-0-0	3	3	ES (PE)
3.	26EE0XXX	Restructured Power Market	T	3-0-0	3	3	ES (PE)
4.	26EE0XXX	Smart Grid	T	3-0-0	3	3	ES (PE)
5.	26EE0XXX	HVDC and FACTS	T	3-0-0	3	3	ES (PE)
6.	26EE0XXX	Power System Operation and Control	T	3-0-0	3	3	ES (PE)
7.	26EE0XXX	Underground Cable Engineering	T	3-0-0	3	3	ES (PE)

8.	26EE0XXX	Grid Integrating Techniques and Challenges	T	3-0-0	3	3	ES (PE)

VERTICAL 4: ELECTRIC VEHICLE TECHNOLOGY

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	26EE0XXX	Electric Vehicle Architecture	T	3-0-0	3	3	ES (PE)
2.	26EE0XXX	Design of Motor and Power Converters for Electric Vehicles	T	3-0-0	3	3	ES (PE)
3.	26EE0XXX	Battery Management Systems	T	3-0-0	3	3	ES (PE)
4.	26EE0XXX	EV Charging Infrastructure	T	3-0-0	3	3	ES (PE)
5.	26EE0XXX	Safety and Testing of Electric Vehicles	T	3-0-0	3	3	ES (PE)
6.	26EE0XXX	Intelligent Control Electric Vehicles	T	3-0-0	3	3	ES (PE)
7.	26EE0XXX	Drone Technologies	T	3-0-0	3	3	ES (PE)
8.	26EE0XXX	Grid Integration of Electric Vehicles	T	3-0-0	3	3	ES (PE)

VERTICAL 5: DIVERSIFIED COURSES

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	26EE0XXX	Hybrid Energy Technology	LIT	2-0-2	3	3	ES (PE)
2.	26EE0XXX	Design and Modelling of Renewable Energy Systems	LIT	2-0-2	3	3	ES (PE)
3.	26EE0XXX	Energy Management and Auditing	LIT	2-0-2	3	3	ES (PE)
4.	26EE0XXX	VLSI Design	LIT	2-0-2	3	3	ES (PE)
5.	26EE0XXX	Power Plant Engineering	LIT	2-0-2	3	3	ES (PE)
6.	26EE0XXX	PLC Programming	LIT	2-0-2	3	3	ES (PE)
7.	26EE0XXX	Machine Learning	LIT	2-0-2	3	3	ES (PE)
8.	26EE0XXX	Energy Storage System	LIT	2-0-2	3	3	ES (PE)

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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.		Renewable Energy Technologies	T	3-0-0	3	3	OE
2.		Energy Conservation and Management	T	3-0-0	3	3	OE
3.		Drone Technologies	T	3-0-0	3	3	OE
4.		Energy Technology	T	3-0-0	3	3	OE
5.		Batteries and Management System	T	3-0-0	3	3	OE
6.		Introduction to Industrial Automation Systems	T	3-0-0	3	3	OE
7.		Electric and Hybrid Vehicles	T	3-0-0	3	3	OE
8.		Introduction to PLC Programming	T	3-0-0	3	3	OE
9.		Electrical Safety Practices and Standards	T	3-0-0	3	3	OE
10.		Waste to Energy	T	3-0-0	3	3	OE
11.		Electrical Machines	T	3-0-0	3	3	OE
12.		Renewable Power Generation Systems	T	3-0-0	3	3	OE
13.		Analog and Digital Electronics	T	3-0-0	3	3	OE
14.		Electric Power Utilization	T	3-0-0	3	3	OE
15.		Power Electronics for Renewable Energy Systems	T	3-0-0	3	3	OE

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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 Schrödinger 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

26CY102L	Chemistry for Electrical Engineers	Category	L	T	P	C
		BS	2	0	2	3

Course Prerequisites:

- Basic knowledge of chemistry (electrochemistry, reactions, materials).
- Fundamentals of physics (electricity, energy systems, material behaviour).
- Basic understanding of materials science (metals, polymers, corrosion basics).

Course Objectives:

- To understand electrochemical reactions, electrode potentials, electrochemical cells, sensors, and conductance measurements.
- To study the principles, types, and applications of batteries, hydrogen production, and fuel cell technologies.
- To understand corrosion mechanisms and explore methods for corrosion prevention and protection.
- To learn polymer synthesis, properties, and applications of functional polymers in electronic and energy storage devices.
- To study materials and chemical processes used in electronics manufacturing and electrical systems.

Electrochemistry

Electrochemical reactions – electrode potential, single electrode potential and standard electrode potential – Nernst Equation – galvanic cells and electrolyte concentration cells – EMF of a cell and Electrochemical Series with applications – reference electrodes and potential measurements – ion-selective electrodes and glass electrode.

Practical:

1. Conductometric estimation of a mixture of strong and weak acids
2. Electrochemical cell demonstration

Batteries and Fuel Cells

Batteries – types: primary batteries (zinc–carbon, lithium) and secondary batteries (lead–acid and lithium-ion) – characteristics and working principles-Supercapacitors – working principle-Na and Li ion supercapacitor. Hydrogen production by electrolysis – alkaline and PEM electrolysis.

Practical:

3. Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.
4. Demonstration of battery pack in e-vehicles

Corrosion and Control

Corrosion – definition, causes and mechanisms; dry (chemical) and wet (electrochemical) corrosion; Pilling–Bedworth rule. Types of corrosion – galvanic corrosion, differential aeration corrosion. Rate of corrosion – factors influencing corrosion. Corrosion control methods – cathodic protection- metallic coatings (galvanizing, tinning) - sacrificial anode and impressed current methods.

Practical:

5. Corrosion study by weight loss and salt spray method.

6. Effect of Electrolyte Concentration on Corrosion Rate

Polymers

Polymers - classification, structure and polymerization mechanism - addition and condensation polymerization - degree of polymerisation, polydispersity - amorphousness and crystallinity. Thermal properties (Tg & Tm) - thermoplastics and thermosetting plastics- mechanical and electrical properties - Conducting polymers – Insulating polymers - types and applications.

Practical:

7. Determination of viscosity of lubricating oil using Oswald viscometer
8. Melting Temperature (Tm) of Polymers

Electronic Materials and Industrial Chemical Processes

Ultrapure water – specifications – purification methods: ion exchange, reverse osmosis and electrodialysis. PCB fabrication – electroless plating and electroplating of copper and nickel- Lubricating oils - classification – purification – viscosity, water content, flash and fire point, cloud and pour points, emulsification, aniline point, corrosion stability, electric properties - breakdown voltage, dielectric constant, dissipation factor.

Practical:

9. Analysis of alkalinity
10. Analysis of hardness and dissolved oxygen.

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

Text Books:

1. Shashi Chawla, 'A Textbook of Engineering Chemistry'. Dhanpat Rai and Co., 6th Edition, 2022.
2. P. C. Jain and Monica Jain, Engineering Chemistry, Dhanpat Rai Publishing Company, New Delhi, 2018.
3. S.S. Dara, S.S. Umare, A textbook of Engineering Chemistry, New Delhi: S.Chand & Co., 2018.
4. Shikha Agarwal, Engineering chemistry: Fundamentals and applications, 2nd Edition, 2015.

Reference Books:

1. J.M.G. Cowie and Valeria Arrighi, 'Polymers: Chemistry and Physics of Modern Materials'. CRC Press, 3rd edition, 2016.
2. Florinel-Gabriel Banica, 'Chemical Sensors and Biosensors – Fundamentals and Applications'. John Wiley and Sons Ltd., 2012.
3. Peter Van Zant, 'Microchip Fabrication: A Practical Guide to Semiconductor Processing. McGraw Hill, 2014.
4. Allen J. Bard and Larry R. Faulkner, Electrochemical Methods: Fundamentals and Applications, Wiley, 2001.
5. Mendham, J., Denney, R. C., Barnes, J. D., Thomas, M., & Sivasankar, B. (2009). Vogel's Textbook of Quantitative Chemical Analysis. Pearson Education. 6th Edition.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply electrochemical principles, electrode potentials, Nernst equation, and electrochemical cells to analyze electrochemical systems and potential measurements.
CO2	Explain the working principles, characteristics, and applications of batteries, supercapacitors, and hydrogen production systems for energy storage and conversion.
CO3	Analyze the mechanisms, types, factors, and rate of corrosion and evaluate appropriate methods for corrosion prevention and control.
CO4	Explain the structure, polymerization mechanisms, thermal and mechanical properties of polymers and select suitable polymers for engineering applications.
CO5	Apply chemical principles involved in water purification, PCB fabrication, metal plating, and lubricant characterization for industrial and electronic applications.

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.

26MEC01L	Engineering Drawing (Common to AI&DS, BME, CIVIL, CSE, EEE, IT, Mechanical and R&A)	Category	L	T	P	C
		ES (G)	2	0	2	3

Prerequisites:

- Basic knowledge of geometry, including lines, angles, circles and simple shapes.
- Familiarity with basic mathematical concepts such as measurements, proportions and scaling.
- Basic computer literacy for operating CAD software and handling digital drawing tools.

Course Objectives:

- To impart knowledge on dimensions and drawing standards.
- To explore the orthographic projection of lines and solids.
- To provide the understanding of orthographic, isometric and perspective views.

Fundamentals

Drawing instruments, Drawing standards (BIS), Lettering in engineering, Sheet layout, elements of dimensioning, Systems of dimensioning. Free hand sketching of 2D & 3D objects, Conics – Ellipse, Parabola and Hyperbola.

Activities: Virtual Demonstration of Conics and Cycloids.

Orthographic Projection

First angle projection, Projection of points, straight lines and planes.

Projection of Solids

Projection of Simple Solids when the axis is inclined to one reference plane.

Activities: Development of models of various solids and virtual demonstration of sectioning and development of Surfaces. CAD modelling of 2D objects.

Isometric Projection

Isometric Scale, Projection of Simple solids.

Activities: Conversion of 3D into 2D orthographic views, CAD modelling of 3D objects.

Perspective Projection

Simple solids projection.

Activities: Virtual demonstration of perspective views.

Project: Development of 2D objects and 3D objects using CAD tools.

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

Reference Books:

1. Natarajan, K. V. (2025). A Text Book of Engineering Graphics. Dhanalakshmi Publisher.
2. K. Venugopal and V. Prabhu Raja (2022). Engineering Drawing with AutoCAD. New Age International Publishers. 6th Edition.

E–Resources:

1. CAD Software – https://www.freecadweb.org/
2. Engineering Drawing and Computer Graphics, Prof. Rajaram Lakkaraju (IIT Kharagpur) – https://onlinecourses.nptel.ac.in/noc22_me105/preview

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply standard drawing practices, including BIS conventions, lettering, dimensioning and sheet layout, in engineering drawings.
CO2	Construct and interpret freehand sketches and conic sections (ellipse, parabola, hyperbola) for basic engineering applications.
CO3	Develop orthographic projections of points, lines, planes and simple solids using first–angle projection methods.
CO4	Create isometric and perspective projections of simple solids and convert between 2D and 3D representations.
CO5	Utilize CAD tools to model and visualize 2D and 3D objects.

Approved by
Academic Council Meeting
No.: 01 Dated: 21.4.26

Recommended by
Board of Studies of EEE Dept.
Meeting No.: 01 Dated: 27.3.26

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.

26ES201T	Basic Civil and Mechanical Engineering	Category	L	T	P	C
		ES (G)	3	0	0	3

Prerequisites

- Basic knowledge of Physics concepts.
- Basic understanding of Mathematics used in engineering calculations.
- General awareness of engineering structures, machines, and infrastructure systems.

Course Objectives:

- To provide the students an illustration of the significance of the Civil and Mechanical Engineering Profession in satisfying the societal needs.
- To help students acquire knowledge in the materials used for construction.
- To provide an insight to the essentials of components of a building and the infrastructure facilities.
- To explain the component of power plant units and detailed explanation to IC engines their working principles.
- To explain the Refrigeration & Air-conditioning system.

Overview of Civil Engineering

Civil Engineering contributions to the welfare of Society - Specialized sub disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering – National building code – terminologists: Plinth area, Carpet area, Floor area, Buildup area, Floor space index - Types of buildings: Residential buildings, Industrial buildings.

Overview of Mechanical Engineering

Overview of Mechanical Engineering - Mechanical Engineering Contributions to the welfare of Society –Specialized sub disciplines in Mechanical Engineering – Manufacturing, Automation, Automobile and Energy Engineering - Interdisciplinary concepts in Mechanical Engineering.

Civil Engineering Materials

Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel - Timber - Modern Materials, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Modern uses of Gypsum, Pre-fabricated Building component (brief discussion only)

Building Components and Infrastructure

Building plans – Setting out of a Building - Foundations: Types of foundations - Bearing capacity and settlement – Brick masonry – Stone Masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering. Types of Bridges and Dams – Water Supply Network - Rain Water Harvesting – Solid Waste Management - Introduction to Highways and Railways - Introduction to Green Buildings.

Power Plants

Classification of Power Plants - Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Working principle of steam, Gas, Diesel, Hydro - electric and Nuclear Power plants.

Basic Manufacturing Processes and Refrigeration and Air Conditioning System

Overview of manufacturing processes - Description of parts and operations performed - Lathe, Shaper and Drilling, Welding, Foundry, Metal Forming – Rolling and Extrusion – Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator - Window and Split type room Air conditioner.

Total periods: 45

Text Books

1. Shanmugam, G., & Palanichamy, M. S. (2018). *Basic civil and mechanical engineering*. McGraw Hill Education. First Edition.
2. Joseph, B. (2006). *Environmental science and engineering*. Tata McGraw Hill. Second Edition.

Reference Books

1. Palanikumar, K. (2018). *Basic mechanical engineering*. ARS Publications.
2. Ramamrutham, S. (2013). *Basic civil engineering*. Dhanpat Rai Publishing Co. (P) Ltd.
3. Seetharaman, S. (2005). *Basic civil engineering*. Anuradha Agencies.
4. Shantha Kumar, S. R. J. (2000). *Basic mechanical engineering*. Hi-Tech Publications, Mayiladuthurai.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Explain fundamentals, societal roles, and key sub-disciplines of Civil and Mechanical Engineering.
CO2	Identify and evaluate construction materials and their applications.
CO3	Explain building components, construction processes, and infrastructure systems.
CO4	Compare power plants and explain engine and power generation principles.
CO5	Understand manufacturing processes and refrigeration & air conditioning 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.

26EE201L	Electric Circuits Analysis	Category	L	T	P	C
		ES (PC)	2	1	2	4

Prerequisites:

- Basic knowledge of Electrical quantities such as voltage, current, resistance, power, and energy.
- Understanding of Ohm's law and basic circuit components like resistors, capacitors, and inductors.
- Basic knowledge of mathematics and complex numbers used in electrical circuit analysis.

Course Objectives:

- To understand the fundamentals of electric circuit elements and DC circuit analysis techniques.
- To analyze single-phase AC circuits using phasor representation and power concepts.
- To analyze balanced and unbalanced three-phase circuits and measure three-phase power.
- To determine transient response of circuits and analyze resonance using Laplace transform methods.
- To characterize magnetically coupled circuits and two-port networks.

DC Circuits

Circuit elements, independent and dependent sources, Ohm's law, KCL, KVL. Network reduction: series, parallel, series–parallel circuits, star–delta and delta–star transformations. Mesh analysis, nodal analysis of DC circuits with independent and Dependent Sources.

DC Network Theorems

Network theorems: Superposition, Thevenin, Norton, Reciprocity, Milliman's and Maximum Power Transfer theorem. Applications of Network theorems for DC Circuits.

AC Circuits

Fundamental parameters of AC circuits – Solutions of simple circuits – Series resonance and Parallel resonance – Frequency response – Quality factor and Bandwidth – Introduction to three phase system – Analysis of three phase 3-wire and 4-wire circuits with star and delta connection – Power and power factor measurements using Two wattmeter method.

Electrical Circuit Analysis Using Laplace Transforms

Review of Laplace Transform and inverse Laplace – Analysis of electrical circuits using Laplace Transform for RL, RC and RLC networks with initial conditions.

Two Port Network

One port and Two port networks – Terminal pairs – Impedance parameters – Admittance parameters – Transmission parameters – Hybrid parameters – Interconnections of two port networks – Relationship of two port variables.

Total periods (L: 30, T: 15): 45

List of Experiments:

1. Experimental Verification of Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL).

2. Experimental Verification of Thevenin's Theorem.
3. Experimental Verification of Maximum Power Transfer Theorem.
4. Simulation of R-C, R-L and RLC electric circuit transients.
5. Simulation of frequency response of RLC electric circuit.
6. Simulation of Transient Response of RLC Circuit — Observation of Overdamped, Critically Damped, and Underdamped Conditions.
7. Simulation of Determination and Verification of ABCD (Transmission) Parameters of a passive two-port network.
8. Determination of Power and Power Factor in Three-Phase Circuits using Two-Wattmeter Method.
9. Three-Phase Star and Delta Connection — Verification of Phase and Line Voltage/Current Relations.

Total periods (P): 30

Total Periods (L + T + P): 75

Text Books:

1. Hayt, W. H., Kemmerly, J. E., & Durbin, S. M. (2018). Engineering Circuit Analysis. McGraw-Hill.
2. Alexander, C. K., & Sadiku, M. N. O. (2020). Fundamentals of Electric Circuits. McGraw-Hill.

Reference Books:

1. Van Valkenburg, M. E. (2014). Network Analysis. PHI Learning.
2. Sudhakar, A., & Palli, S. S. (2015). Circuits and Networks: Analysis and Synthesis. McGraw-Hill.
3. Edminister, J. A., & Nahvi, M. (2018). Electric Circuits. McGraw-Hill. Schaum's Outline Series.
4. Schaum's Outline Series, Electric Circuits, McGraw-Hill.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply basic electrical laws and network reduction techniques to analyze DC circuits.
CO2	Apply network theorems such as Superposition, Thevenin, Norton, Reciprocity, Milliman's, and Maximum Power Transfer for circuit analysis.
CO3	Analyze single-phase and three-phase AC circuits using phasor representation and determine power and power factor.
CO4	Analyze the transient response of RL, RC, and RLC circuits using Laplace transform methods.
CO5	Evaluate the parameters and interconnections of two-port networks used in electrical circuit analysis.

26CSC04L	Data Structures using C (Common AI&DS, CSE, EEE and IT)	Category	L	T	P	C
		ES (G)	2	0	2	3

Prerequisites:

- Basic knowledge of C programming concepts such as variables, data types, operators, control flow and functions is required.
- Understanding of pointers, pointer arithmetic and dynamic memory allocation is essential.
- Familiarity with structures, user-defined data types and recursion is needed.
- Basic mathematical concepts such as logarithms, summations and powers of 2 should be known.
- Awareness of asymptotic notations such as Big-O, Big-Omega and Big-Theta is desirable.

Course Objectives:

- Understand the need for data structures and implement linear structures – arrays and linked lists in C.
- Implement stack and queue ADTs using arrays and linked lists and apply them to solve real-world problems.
- Understand and implement tree-based non-linear data structures and perform standard traversals.
- Apply graph algorithms including BFS, DFS, shortest path and minimum spanning tree techniques.
- Apply searching, sorting and hashing algorithms for efficient data organization and retrieval.

Linear Data Structures - Lists

Abstract data types, need, classification of data structures – Arrays: Array representation, operations, sparse matrix representation – Linked Lists: Singly linked list, doubly linked list, circular linked list, insertion, deletion, traversal, searching – Applications: Polynomial addition, sparse matrix using linked lists – Complexity Analysis: Time complexity, space complexity, Big O notation, Big Theta notation, Big Omega notation, best case analysis, worst case analysis, average case analysis

Linear Data Structures - Stacks and Queues

Stack ADT: Array implementation, linked list implementation, applications: balanced parentheses, arithmetic expression evaluation, function call stack – Queue ADT: Array implementation, linked list implementation, circular queue, priority queue, deque, applications of queues

Non-Linear Data Structures - Trees

Tree ADT: Terminologies – Binary Trees: Array representation, linked representation, tree traversals: inorder, preorder, postorder – Binary Search Trees: Insertion, deletion, searching – AVL Trees: Rotations: LL, RR, LR, RL – Heaps: Max heap, min heap, heap operations, priority queue using heap – Applications of Trees: Expression trees, B tree array representation, linked representation

Non-Linear Data Structures - Graphs

Graph ADT: Terminologies, adjacency matrix representation, adjacency list representation – Graph Traversals: BFS, DFS – Topological Sort – Shortest Path: Dijkstras algorithm – Minimum Spanning Tree: Prims algorithm, Kruskals algorithm – Applications: Computer networks routing, social graph analysis OS, CN linkage

Searching, Sorting and Hashing Techniques

Searching: Linear search, binary search – Sorting Algorithms: Insertion sort, merge sort, quick sort, heap sort – Hashing: Hash functions, collision resolution: separate chaining, open addressing: linear probing, quadratic probing, double hashing, rehashing – Applications of Hashing: Database indexing, caching, password storage.

Total periods (L): 30

List of Experiments:

1. Implement Linked Lists (Singly/Doubly/Circular) with insert, delete, search and display operations.
2. Implement Stack and Queue using both array and linked list and apply stack for balanced parentheses checking.
3. Implement Prefix and Postfix expression evaluation and conversion using stack.
4. Implement Circular Queue and Priority Queue using arrays with enqueue, dequeue, display and overflow/underflow handling.
5. Implement Polynomial Addition using Linked Lists and display the resultant polynomial.
6. Implement Binary Search Tree (BST) with insertion, deletion, search and tree traversals (Inorder, Preorder, Postorder).
7. Implement an AVL Tree with insertion, perform rotations (LL, RR, LR, RL) and display height and balance factor.
8. Develop a simple application (such as a map or network) to represent a graph and use BFS and DFS to explore it. Implement any one feature such as finding the shortest path or connecting all points with minimum cost.
9. Implement Merge Sort and Quick Sort, run them on the same dataset and compare their execution steps.
10. Implement a Hash Table using Separate Chaining and Open Addressing (Linear Probing), including collision handling.

Total periods (P): 30

Total periods (L + P): 60

Text Books:

1. Thareja, R. (2023). *Data Structures Using C*. Oxford University Press (3rd ed.).
2. Tenenbaum, A. M., Langsam, Y., & Augenstein, M. J. (2024). *Data Structures Using C*. Pearson (Updated ed.).
3. Aho, A. V., Hopcroft, J. E., & Ullman, J. D. (2024). *Data Structures and Algorithms – Modern Approach*. Springer (Revised ed.).

Reference Books:

1. Horowitz, E., Sahni, S., & Anderson-Freed, S. (2023). *Fundamentals of Data Structures in C*. Universities Press (Updated ed.).
2. Samanta, D. (2023). *Classic Data Structures*. PHI Learning (2nd ed., Updated reprint).
3. Kanetkar, Y. (2023). *Data Structures Through C*. BPB Publications (Latest revised ed.).

E-Resources:

1. NPTEL – Data Structures & Algorithms (IIT Madras)
   - https://nptel.ac.in/courses/106106127
2. VisuAlgo – Algorithm Visualization - https://visualgo.net
3. MIT OpenCourseWare – Introduction to Algorithms (6.006)
   - https://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020
4. CS50 – Harvard Open Online Course (2024 Edition) - https://cs50.harvard.edu/x

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Implement linear data structures (arrays, linked lists, stacks and queues) and demonstrate their operations and applications.
CO2	Implement tree-based data structures (BST, AVL, Heap) and apply standard traversal and balancing techniques.
CO3	Apply graph representations and algorithms (BFS, DFS, Dijkstra's, Prim's, Kruskal's) to solve connectivity and path problems.
CO4	Apply sorting, searching and hashing techniques to organize and retrieve data efficiently.

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.

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: 21.4.26

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Meeting No.: 01 Dated: 27.3.26

CK COLLEGE OF ENGINEERING AND TECHNOLOGY

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