

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
CIVIL 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

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UNDERGRADUATE CURRICULUM

Department : Civil Engineering.

Programme : B.E. – Civil 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)	OE	Total
Semester – I	10	03	03	–	03	–	–	19
Semester – II	07	07	06	02	–	–	–	22
Semester – III	04	–	–	02	19	–	–	25
Semester – IV	04	–	–	02	17	–	–	23
Semester – V	–	–	–	02	13	09	–	24
Semester – VI	–	–	–	02	13	06	03	24
Semester – VII	–	–	02	03	12	03	–	20
Semester – VIII	–	–	–	08	–	–	–	08
Total Credits	25	10	11	21	77	18	03	165
Percentage (%)	15.15	6.06	6.67	12.73	46.67	10.91	1.82	100.00

CATEGORY OF COURSES

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

Approved by

Academic Council Meeting

No.: 01 Dated: 21.4.26

Recommended by

Board of Studies of **CIVIL** Dept.

Meeting No.: 01 Dated: 28.3.26

Knowledge and Attitude Profile (WK)

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

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Program Outcomes (POs):

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

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

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8)

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)

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

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

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Educational Objectives (PEOs):

PEO1: Gain knowledge and skills in Civil engineering which will enable them to have a career and professional accomplishment in the public or private sector organizations.

PEO2: Become consultants on complex real life Civil Engineering problems related to Infrastructure development especially housing, construction, water supply, sewerage, transport, spatial planning.

PEO3: Become entrepreneurs and develop processes and technologies to meet desired infrastructure needs of society and formulate solutions that are technically sound, economically feasible, and socially acceptable.

PEO4: Perform investigation for solving Civil Engineering problems by conducting research using modern equipment and software tools.

PEO5: Function in multi-disciplinary teams and advocate policies, systems, processes and equipment to support civil engineering.

Program Specific Outcomes (PSOs):

PSO1: Demonstrate in-depth knowledge of Civil Engineering discipline, with ability to evaluate, analyze and synthesize existing and new knowledge.

PSO2: Critically analyze complex Civil Engineering problems, apply independent judgment and make innovative advances in a theoretical, practical and policy contexts.

PSO3: Conceptualize and solve Civil Engineering problems, evaluate potential solutions and arrive at technically feasible, economically viable and environmentally sound solutions considering health, safety, and socio-cultural factors.

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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.	26CE101T	Introduction to Civil Engineering	T	3-0-0	3	3	ES (PC)
5.	26PH101L	Physics for Civil Engineering – I	LIT	2-0-2	4	3	BS
6.	26CY103L	Chemistry for Civil Engineers	LIT	2-0-2	4	3	BS
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 Programme	---	---	---	NC	---
Total Credits					23	19	

Semester – II							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L–T–P	TCP		
1.	26MAC03T	Complex Functions and Transforms	T	3-1-0	4	4	BS
2.	26CYC01T	Climate Change and Sustainability	T	2-0-0	2	2	HUM
3.	26TLC02T	தமிழர்களும் தொழில்நுட்பமும் / Tamils & Technology	T	1-0-0	1	1	HUM
4.	26MEC03T	Engineering Mechanics	T	3-1-0	4	4	ES (G)
5.	26ENC02L	English Essentials – II	LIT	1-0-2	3	2	HUM
6.	26PH202L	Physics for Civil Engineering – II	LIT	2-0-2	4	3	BS
7.	26EE103L	Basic Mechanical and Electrical Engineering	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	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.	26MA302T	Matrix Theory and Numerical Methods for Civil Engineering	T	3-1-0	4	4	BS
2.	26CE301T	Surveying	T	3-0-0	3	3	ES (PC)
3.	26CE302T	Fluid Mechanics	T	3-0-0	3	3	ES (PC)
4.	26CE303L	Construction Materials & Practices	LIT	2-0-2	4	3	ES (PC)
5.	26CE304L	Industry Oriented Course – I	LIT	2-0-2	4	3	ES (PC)
6.	26CE305L	Strength of Materials	LIT	2-0-2	4	3	ES (PC)
7.	26CE306P	Fluid Mechanics Laboratory	P	0-0-4	4	2	ES (PC)
8.	26CE307P	Surveying Laboratory	P	0-0-4	4	2	ES (PC)
9.	26CE308P	Career Readiness & Professional Skills – Foundation Level	P	0-0-2	2	1	SD
10.	26CE309P	Project Work – I	P	0-0-2	2	1	SD
11.	---	Self-Learning Course – II	---	---	---	NC	SLC
12.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	---
Total Credits					34	25	

Semester – IV							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	26MAC07T	Probability & Statistics	T	3-1-0	4	4	BS
2.	26CE401T	Hydrology and Water Resources Engineering	T	3-0-0	3	3	ES (PC)
3.	26CE402T	Mechanics of Solids	T	3-0-0	3	3	ES (PC)
4.	26CE403L	Soil Mechanics	LIT	2-0-2	4	3	ES (PC)
5.	26CE404L	Water and Wastewater Engineering	LIT	2-0-2	4	3	ES (PC)

6.	26CE405L	Industry Oriented Course – II	LIT	2-0-2	4	3	ES (PC)
7.	26CE406P	Material Testing Laboratory	P	0-0-4	4	2	ES (PC)
8.	26CE407P	Career Readiness & Professional Skills – Intermediate Level	P	0-0-2	2	1	SD
9.	26CE408P	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					30	23	

Semester – V							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L–T–P	TCP		
1.	26CE501T	Structural Analysis	T	3-0-0	3	3	ES (PC)
2.	26CE0XXX	Programme Elective – I	T	3-0-0	3	3	ES (PE)
3.	26CE0XXX	Programme Elective – II	T	3-0-0	3	3	ES (PE)
4.	26CE0XXX	Programme Elective – III	T	3-0-0	3	3	ES (PE)
5.	26CE502L	Highway Engineering	LIT	2-0-2	4	3	ES (PC)
6.	26CE503L	Industry Oriented Course – III	LIT	2-0-2	4	3	ES (PC)
7.	26CE504L	Industry Oriented Course – IV	LIT	2-0-2	4	3	ES (PC)
8.	26CE505P	Career Readiness & Professional Skills – Advance Level	P	0-0-2	2	1	SD
9.	26CE506P	Survey Camp	P	0-0-2	2	1	ES (PC)
10.	26CE507P	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					30	24	

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

For Minor Degree							
1.		Minor Elective – I	T	3-0-0	3	3	HE
2.		Minor Elective – II	T	3-0-0	3	3	HE

Semester – VI							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	26CE601T	Advanced Structural Analysis	T	3-1-0	4	4	ES (PC)
2.	26CE602T	Railways, Airport and Harbour Engineering	T	3-0-0	3	3	ES (PC)
3.	26CE9XXX	Open Elective – I	T	3-0-0	3	3	OE
4.	26CE0XXX	Programme Elective – IV	T	3-0-0	3	3	ES (PE)
5.	26CE0XXX	Programme Elective – V	T	3-0-0	3	3	ES (PE)
6.	26CE603L	Construction Management	LIT	2-0-2	4	3	ES (PC)
7.	26CE604L	Industry Oriented Course – V	LIT	2-0-2	4	3	ES (PC)
8.	26CE605P	Career Readiness & Professional Skills – Placement Level	P	0-0-2	2	1	SD
9.	26CE606P	Project Work – IV	P	0-0-2	2	1	SD
10.	---	Indian Constitution	T	3-0-0	3	NC	MC
11.	---	Self-Learning Course – V	---	---	---	NC	SLC
12.	---	Student Transformation & Enrichment Programme (STEP)	---	---	---	NC	---
Total Credits					30	24	

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	HE
2.		Honours Elective – IV	T	3-0-0	3	3	HE
For Minor Degree							
1.		Minor Elective – III	T	3-0-0	3	3	HE
2.		Minor Elective – IV	T	3-0-0	3	3	HE

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.	26CE0XXX	Programme Elective – VI	T	3-0-0	3	3	ES (PE)
3.	26CE701L	Estimation Costing and Valuation	LIT	2-0-4	6	4	ES (PC)
4.	26CE702L	Industry Oriented Course – VI	LIT	2-0-2	4	3	ES (PC)
5.	26CE703L	Structural Design and Drawing	LIT	2-0-2	4	3	ES (PC)
6.	26CE704P	Computer–Aided Structural Engineering	P	0-0-4	4	2	ES (PC)
7.	26CE705P	Major Project – Phase I	P	0-0-4	4	2	SD
8.	26CE706P	Internship	P	0-0-2	2	1	SD
Total Credits					29	20	

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

Semester – VIII							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L–T–P	TCP		
1.	26CE801P	Major Project – Phase II	P	0-0-16	16	8	SD
Total Credits					16	8	

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PROGRAMME ELECTIVE & HONORS COURSES: STREAMS

Vertical – I	Vertical – II	Vertical – III	Vertical – IV	Vertical – V	Vertical – VI
Structural Engineering	Geotechnical & GIS	Transportation & Infrastructure Engineering	Water Resources & Hydraulic Engineering	Environmental & Sustainable Engineering	Construction Technology & Management
Prefabricated Structures	Ground Improvement Techniques	Pavement Engineering	Irrigation Engineering & Drawing	Solid & Hazardous Waste Management	Advanced Construction Techniques
Special Concrete	Engineering Geology	Bridge Engineering	Watershed Management	Industrial Wastewater Management	Safety in Construction
Earthquake Resistant Structures	Remote Sensing & GIS	Smart Cities	Flood Control Engineering	Energy Efficient Buildings	Green Building & Sustainable Materials
Prestressed Concrete Structures	Offshore Structures	Traffic Safety Engineering	Coastal Engineering	Air & Noise Pollution Control Engineering	Construction Equipment & Planning
Rehabilitation / Heritage Restoration	Soil Dynamics	Intelligent Transport Systems	Integrated Water Resources Management	Climate Change Adaptation Engineering	Digitalized Construction Lab
Introduction to Finite Element Method	Rock Mechanics	Traffic Engineering & Management	Reservoir Planning & Operation	Environmental Impact Assessment	3D Printing in Construction
Theory of Elasticity & Plasticity	Tunnel Engineering	Road Safety Audit & Accident Analysis	Stormwater Management	Waste-to-Energy Technologies	Sustainable Construction and Lean Construction
Tall Structures	Hydrographic Surveying	Urban Transportation Planning	Urban Water Infrastructure	Life Cycle Assessment of Infrastructure	Formwork Engineering

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LIST OF PROGRAMME ELECTIVE COURSES: VERTICALS**VERTICAL 1: STRUCTURAL ENGINEERING**

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26CE0XXX	Prefabricated Structures	T	3-0-0	3	3	ES (PE)
2	26CE0XXX	Special Concrete	T	3-0-0	3	3	ES (PE)
3	26CE0XXX	Earthquake Resistant Structures	T	3-0-0	3	3	ES (PE)
4	26CE0XXX	Prestressed Concrete Structures	T	3-0-0	3	3	ES (PE)
5	26CE0XXX	Rehabilitation/ Heritage Restoration	T	3-0-0	3	3	ES (PE)
6	26CE0XXX	Introduction to Finite Element Method	T	3-0-0	3	3	ES (PE)
7	26CE0XXX	Theory of Elasticity & Plasticity	T	3-0-0	3	3	ES (PE)
8	26CE0XXX	Tall Structures	T	3-0-0	3	3	ES (PE)

VERTICAL 2: GEOTECHNICAL & GIS

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26CE0XXX	Ground Improvement Techniques	T	3-0-0	3	3	ES (PE)
2	26CE0XXX	Engineering Geology	T	3-0-0	3	3	ES (PE)
3	26CE0XXX	Remote Sensing & GIS	T	3-0-0	3	3	ES (PE)
4	26CE0XXX	Offshore Structures	T	3-0-0	3	3	ES (PE)
5	26CE0XXX	Soil Dynamics	T	3-0-0	3	3	ES (PE)
6	26CE0XXX	Rock Mechanics	T	3-0-0	3	3	ES (PE)
7	26CE0XXX	Tunnel Engineering	T	3-0-0	3	3	ES (PE)
8	26CE0XXX	Hydrographic Surveying	T	3-0-0	3	3	ES (PE)

VERTICAL 3: TRANSPORTATION & INFRASTRUCTURE ENGINEERING

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26CE0XXX	Pavement Engineering	T	3-0-0	3	3	ES (PE)
2	26CE0XXX	Bridge Engineering	T	3-0-0	3	3	ES (PE)
3	26CE0XXX	Smart Cities	T	3-0-0	3	3	ES (PE)
4	26CE0XXX	Traffic Safety Engineering	T	3-0-0	3	3	ES (PE)
5	26CE0XXX	Intelligent Transport Systems	T	3-0-0	3	3	ES (PE)

6	26CE0XXX	Traffic Engineering & Management	T	3-0-0	3	3	ES (PE)
7	26CE0XXX	Road Safety Audit & Accident Analysis	T	3-0-0	3	3	ES (PE)
8	26CE0XXX	Urban Transportation Planning	T	3-0-0	3	3	ES (PE)

VERTICAL 4: WATER RESOURCES & HYDRAULIC ENGINEERING

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26CE0XXX	Irrigation Engineering & Drawing	T	3-0-0	3	3	ES (PE)
2	26CE0XXX	Watershed Management	T	3-0-0	3	3	ES (PE)
3	26CE0XXX	Flood Control Engineering	T	3-0-0	3	3	ES (PE)
4	26CE0XXX	Coastal Engineering	T	3-0-0	3	3	ES (PE)
5	26CE0XXX	Integrated Water Resources Management	T	3-0-0	3	3	ES (PE)
6	26CE0XXX	Reservoir Planning & Operation	T	3-0-0	3	3	ES (PE)
7	26CE0XXX	Stormwater Management	T	3-0-0	3	3	ES (PE)
8	26CE0XXX	Urban Water Infrastructure	T	3-0-0	3	3	ES (PE)

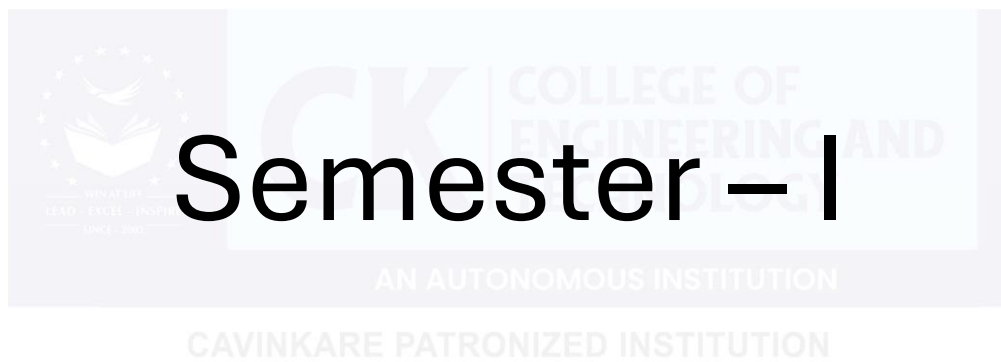
VERTICAL 5: Environmental & Sustainable Engineering

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26CE0XXX	Solid & Hazardous Waste Management	T	3-0-0	3	3	ES (PE)
2	26CE0XXX	Industrial Wastewater Management	T	3-0-0	3	3	ES (PE)
3	26CE0XXX	Energy Efficient Buildings	T	3-0-0	3	3	ES (PE)
4	26CE0XXX	Air & Noise Pollution Control Engineering	T	3-0-0	3	3	ES (PE)
5	26CE0XXX	Climate Change Adaptation Engineering	T	3-0-0	3	3	ES (PE)
6	26CE0XXX	Environmental Impact Assessment	T	3-0-0	3	3	ES (PE)
7	26CE0XXX	Waste-to-Energy Technologies	T	3-0-0	3	3	ES (PE)
8	26CE0XXX	Life Cycle Assessment of Infrastructure	T	3-0-0	3	3	ES (PE)

VERTICAL 6: Construction Technology & Management

S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1	26CE0XXX	Advanced Construction Techniques	T	3-0-0	3	3	ES (PE)
2	26CE0XXX	Safety in Construction	T	3-0-0	3	3	ES (PE)
3	26CE0XXX	Green Building & Sustainable Materials	T	3-0-0	3	3	ES (PE)
4	26CE0XXX	Construction Equipment & Planning	T	3-0-0	3	3	ES (PE)
5	26CE0XXX	Digitalized Construction Lab	T	3-0-0	3	3	ES (PE)
6	26CE0XXX	3D Printing in Construction	T	3-0-0	3	3	ES (PE)
7	26CE0XXX	Sustainable Construction and Lean Construction	T	3-0-0	3	3	ES (PE)
8	26CE0XXX	Formwork Engineering	T	3-0-0	3	3	ES (PE)

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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 அச்ச 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.



26CE101T	Introduction to Civil Engineering	Category	L	T	P	C
		ES (PC)	3	0	0	3
Prerequisites: • General awareness of infrastructure and the built environment. • Interest in engineering concepts and construction practices.						
Course Objectives: • To understand the role and ethics of civil engineers in society. • To gain basic knowledge of major civil engineering disciplines. • To learn the properties and uses of construction materials. • To understand building components and basic construction practices. • To develop awareness of infrastructure systems and sustainable development.						
Overview of Civil Engineering Role of civil engineers in society – Ethics in Civil Engineering Practice – Outstanding accomplishments of the profession and future trends – Types of civil engineering projects and stages of project development – Basic concepts of specifications and scope of work. Civil engineering case studies of major infrastructure projects.						
Fields of Civil Engineering Overview and scope of major civil engineering disciplines: Structural Engineering – Construction Engineering and Management – Geotechnical Engineering – Environmental Engineering – Transportation Engineering – Water Resources Engineering – Engineering Geology and seismology – Industry applications and real-world civil engineering practices.						
Civil Engineering Materials Basic properties, manufacturing process, Uses and Applications of Construction Materials: Bricks – Stones – Sand – Cement – Concrete – Steel – Glass and Timber – Introduction to modern construction materials and their applications – Basic concepts of thermal insulation and waterproofing materials – Introduction to sustainable construction materials.						
Building Concepts Building plans – Setting out of a Building – Foundations: Types of foundations – Concept of bearing capacity and settlement – Brick masonry & Stone Masonry – Structural components: Beams, Columns, Lintels, Roofing, Flooring and Plastering – Basic construction site exposure – Introduction to National Building Code (NBC).						
Infrastructure Types of Bridges and Dams (basic concepts) – Water Supply Network & Rain Water Harvesting – Solid Waste Management system – Introduction to Highways and Railways – Smart Infrastructure & green buildings concepts.						
						Total periods: 45
Text Books: 1. M. L. Gambhir (2017). <i>Basic Civil Engineering</i>. Tata McGraw Hill Education. 4th Edition. 2. S. Palaniappan, K. Natarajan and K. S. Mani (2019). <i>Basic Civil Engineering</i>. McGraw Hill Education (India). 2nd Edition.						

3. S. Ramamrutham (2018). *Basic Civil Engineering*. Dhanpat Rai Publishing Co. (P) Ltd. Revised Edition.

Reference Books:

1. Mackenzie Davis and Susan Masten (2018). *Principles of Environmental Engineering and Science*. McGraw Hill Education. 3rd Edition.
2. R. Chudley and R. Greeno (2020). *Construction Technology*. Pearson Education. 11th Edition.
3. B. Kumar (2019). *Basic Civil Engineering*. Satya Prakashan.
4. Bureau of Indian Standards (2016). National Building Code of India (NBC 2016).
5. H. S. Peavy and D. R. Row (2017). *Environmental Engineering*. McGraw Hill Education.
6. S. C. Rangwala (2020). *Building Materials*. Charotar Publishing House Pvt. Ltd. 33rd Edition.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Explain the role, responsibilities, ethics and professional practices of civil engineers in society.
CO2	Describe the various fields of civil engineering and their real-world engineering applications.
CO3	Identify common construction materials and explain their basic properties and applications in civil engineering.
CO4	Explain the basic components of buildings and understand fundamental construction practices and codes.
CO5	Describe infrastructure systems and recognize concepts related to sustainable development, smart infrastructure and green buildings.

CAVINKARE PATRONIZED INSTITUTION

26PH101L	Physics for Civil Engineering – I	Category	L	T	P	C
		BS	2	0	2	3
Prerequisites: • Basic knowledge of mathematics including algebra, trigonometry and introductory calculus. • Understanding of fundamental physics concepts such as mechanics, waves and heat. • Basic electricity, magnetism and material properties.						
Course Objectives: • To understand the principles of oscillations and wave motion and their relevance in engineering systems. • To study the mechanical behavior of solids and fluids for structural and hydraulic applications. • To learn the fundamentals of laser and fiber optic technologies and their use in modern civil engineering. • To analyze thermal properties of materials and heat transfer mechanisms in engineering contexts. • To explore magnetic and dielectric properties of materials for electrical and smart infrastructure applications.						
Oscillations and Waves Oscillations: Oscillation and types – Differential Equation of SHM – Damped Harmonic Oscillator – Forced Vibrations. Waves: Wave characteristics – types of waves – travelling and standing waves – reflection and transmission at boundaries – stationary waves and harmonics. Practical: 1. Measurements – Vernier callipers, Screw gauge, Travelling microscope and other measurements. 2. Determination of moment of inertia of a rigid body – Torsional pendulum – Digital Set Up. 3. Melde’s string experiment – Frequency of an electrically vibrating metal tip.						
Mechanics of solids and fluids Mechanics of solids: Mechanics of Solids: Elastic and plastic nature – stress–strain graph – elastic moduli – factors affecting elastic moduli. Mechanics of Fluids: Dimensions and units – Fluid properties – Viscosity – Types of fluids – compressibility and bulk modulus – relation between modulus and pressure – surface tension of liquid droplet, bubble, liquid jet – Bernoulli’s theorem.						
Laser and Fiber optics Laser: Laser characteristics – Spontaneous and stimulated processes – population inversion – Metastable states – components of laser – semiconductor diode laser – Classification of lasers based on safety – applications: Surface Treatments, Drilling, Cutting. Fiber Optics: Optical fiber structure – acceptance angle and numerical aperture (Qualitative) – types of optical fibers – fiber optic communication system. Practical: 4. Determination of wavelength and divergence angle of laser using diffraction grating. 5. Determination of acceptance angle in an optical fiber.						

Thermal Properties Temperature scales – Specific heat capacity, thermal capacity – heat transfer processes – heat conduction through a bar – heat through compound media – thermodynamic laws – isothermal and adiabatic processes – reversible and irreversible processes. Practical: 6. Specific heat of solids/liquids. 7. Measurement of temperature using thermocouple.	
Magnetic and dielectric properties of materials. Magnetic materials: Basic parameters – Dia, para, ferro, anti-ferro and ferromagnetic materials – Domain theory of ferromagnetism – Soft and hard magnetic materials. Dielectric materials: Properties of dielectric materials – dielectric constant – induced and permanent dipoles – polar and non-polar dielectrics — applications of dielectric materials. Practical: 8. Hysteresis curve – Determination of energy loss of a coil.	
Total periods (L: 30; P:30): 60	
Text Books: 1. M.N. Avadhanulu, (2018). Engineering Physics, P. G. Kshirsagar, S. Chand Publishing Revised Edition 2. Hitendra K. Malik, Ajay Kumar Singh, (2019). Engineering Physics, McGraw Hill Education (India) Publishing, 2 nd Edition 3. H. C. Verma, (2017). Concept of physics, Bharati Bhawan Publishing, Latest Revised Edition.	
Reference Books: 1. Ajoy Ghatak, (2017). Optics, Mc Graw Hill Education Publishing, 6 th Edition. 2. Keigolizuka, (2008). Engineering Optics, Springer 3 rd Edition 3. S. P. Timoshenko, J. M. Gere, (2012). Mechanics of Materials, CBS Publishers/Cengage Learning, 3 rd Edition 4. Frank M. White, (2016). Fluid Mechanics, Mc Graw Hill Education 8 th Edition.	

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Explain the concepts of oscillations, wave motion and resonance in engineering applications
CO2	Analyze stress, strain and deformation in solids and evaluate fluid properties and behavior
CO3	Apply laser and fiber optic principle in surveying, sensing and communication systems
CO4	Understand thermal properties, heat transfer processes and thermodynamic principles
CO5	Evaluate magnetic and dielectric properties of materials and their applications in civil Engineering systems

26CY103L	Chemistry For Civil Engineers	Category	L	T	P	C
		BS	2	0	2	3
Prerequisites: • Basic knowledge of chemistry: water chemistry, reactions, materials. • Fundamentals of environmental science: water quality, treatment basics. • Basic understanding of construction materials: cement, steel, polymers.						
Course objectives: • To impart knowledge of water quality parameters and treatment methods used in drinking water and wastewater management. • To develop understanding of the chemical properties and behavior of construction materials such as cement, concrete, steel and polymers. • To understand polymer materials, their types, processing methods and basic applications in civil engineering. • To introduce the causes, effects and prevention methods of corrosion in construction materials. • To provide understanding of chemical aspects involved in modern construction materials and sustainable building technologies.						
Water and its Treatment Sources, Impurities – water quality standards for construction – significance: Colour, Odour, Turbidity, pH, Hardness, Alkalinity, TDS, COD, BOD, Fluoride, Arsenic – Municipal water treatment: primary treatment, disinfection: UV, ozonation, break-point chlorination – water softening: External treatment, Internal treatment – desalination: Reverse osmosis. Practical 1. Determination of Hardness by EDTA Method. 2. Determination of Alkalinity.						
Chemistry for construction materials Cement: Chemical composition, manufacturing: Dry process, wet process, hydration, types, applications – gypsum: Applications – admixtures: Types, applications – glass: Composition, manufacture, types, applications – steel: Manufacturing, types, applications. Practical 3. Estimation of ferric oxide, alumina in portland cement. 4. Determination of chloride in hardened concrete by argentometric titration.						
Polymeric materials Classification, degree of polymerization – molecular weights: Weight average, number average – polymerization reactions: Step mechanism, chain mechanism – compounding of plastics – polymer processing: Injection moulding, extrusion, compression moulding, blow moulding – polymers in civil engineering: fibre reinforced polymers, glass fibre, carbon fibre, steel fibre, laminates, coating, concrete – thermal insulating foams. Practical 5. Determination of viscosity of lubricating oil using oswald viscometer. 6. Melting temperature (Tm) of polymers.						

Corrosion and control

Introduction to corrosion – chemical and electrochemical corrosions, galvanic series – corrosion rate expression – E–pH diagram of iron – electrode polarization, passivation, pilling bed worth rule – types of corrosion: Galvanic, differential aeration, atmospheric, pitting, waterline, soil corrosion – factors influencing corrosion – corrosion of rebars in concrete – corrosion control: Cathodic protection, Anodic protection.

Practical

7. Corrosion study by weight loss and salt spray method.
8. Effect of Electrolyte concentration on corrosion rate

Coating technology

Paints: Constituents, formulation, functions, requisites of good paint – types of paints: Emulsion paints, special paints: heat resistant paints, fire retardant paints, water paint, aluminium paint, cement paint, graphite paint, silicate paint – defects in painting – varnishes: Characteristics, ingredients, types: oil varnish, turpentine varnish, spirit varnish – coatings: Electroplating: copper, nickel, chromium, principle, applications.

Practical

9. Anodizing of aluminium & determination of coating thickness.
10. Determination of drying time and defects in paint.

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

Text Books:

1. P.C. Jain and M. Jain, 'Engineering Chemistry', Dhanpat Rai Publishing Company, New Delhi., 17th Edition, 2019.
2. U.K. Shrivastava, 'Building Materials Technology', Galgotia Publications Pvt. Ltd., New Delhi., 1st Ed, 2012.

Reference Books:

1. N. Jackson and R.K. Dhir 'Civil Engineering Materials', Brijbasi Art press Ltd., Noida, 2007.
2. S Shan, 'Civil Engineering Materials', Pearson Education. Inc – Prentice Hall., New Delhi, 2012.
3. S.K. Duggal, 'Building Materials', New Age International Publishers., New Delhi, 5th Edition, 2019.
4. Vogel's Textbook of Quantitative Chemical Analysis, 8th Edition, 2014.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Understand water quality parameters and apply suitable water treatment methods for construction and municipal applications.
CO2	Explain the chemistry of cement, hydration process and the role of chemical admixtures in concrete technology.
CO3	Describe polymeric materials and their applications in modern civil engineering construction and insulation systems.

CO4	Analyze corrosion mechanisms in metals and reinforced concrete structures and recommend suitable corrosion prevention methods.
CO5	Identify different paints, varnishes and coating technologies used for protection and durability of civil engineering structures.



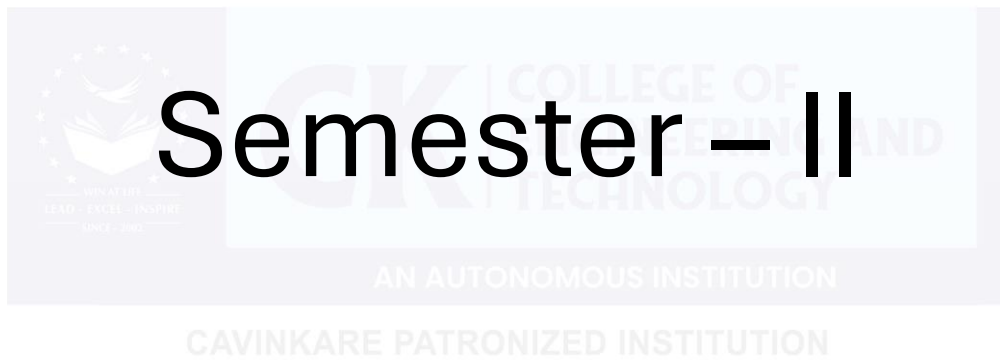
26MEC01L	Engineering Drawing (Common to all Branches)	Category	L	T	P	C
		ES (G)	2	0	2	3
Prerequisites: - Basic knowledge of geometry, including lines, angles, circles and simple shapes. - Familiarity with basic mathematical concepts such as measurements, proportions and scaling. - Basic computer literacy 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: - Natarajan, K. V. (2025). A Text Book of Engineering Graphics. Dhanalakshmi Publisher. K. Venugopal and V. Prabhu Raja (2022). Engineering Drawing with AutoCAD. New Age International Publishers. 6th Edition.						
E–Resources: - CAD Software – https://www.freecadweb.org/ - 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 CIVIL Dept.Meeting No.: 01..... Dated: 28.3.26

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 (Möbius) 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. Karthik, 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 குமிழித்தாம்பின் 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. பொருதை - 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.



26MEC03T	Engineering Mechanics (Common to Civil, Mech & RAE)	Category	L	T	P	C
		ES (G)	3	1	0	4
Prerequisites: • Basic knowledge of Physics (forces, motion, energy and vectors). • Understanding of Mathematics (algebra, trigonometry and vector calculus basics). • Familiarity with engineering drawing concepts. • Fundamental problem-solving and analytical skills.						
Course Objectives: • Understand the fundamental concepts of force systems acting on particles and rigid bodies in two and three dimensions. • Apply equilibrium principles using Free Body Diagrams to analyse engineering structures and mechanical systems. • Compute centroids, moments of inertia and related geometric properties essential for structural and mechanical design. • Analyse frictional forces in practical systems such as wedges, ladders and belt drives encountered in everyday engineering. • Apply Newton’s laws of motion, work–energy and impulse–momentum principles to solve particle dynamics problems.						
Statics of Particles: Resultant of forces in a plane, Equilibrium of a particle in a plane, Addition of concurrent forces in space, Equilibrium of a particle in space.						
Activities: Assignments and Quiz on resultant forces, Solving of GATE questions.						
Statics of Rigid Bodies: Concept of Free Body Diagram, Equivalent systems of forces, Transmissibility, Moment of a force about a point and an axis, Couples and force–couple systems, Equilibrium of rigid bodies in two and three dimensions, Principle of virtual work.						
Activities: Virtual demonstration of rigid bodies, Solving of GATE questions.						
Moments of Inertia: First moments of areas and lines, Centroids of composite areas and lines, Theorems of Pappus – Guldinus, Second moment of area, Parallel axis theorem, Rectangular and Polar Moments of inertia of composite areas, Radius of Gyration, Product of Inertia, Principal Axes and Principal Moments of Inertia, Mass moments of inertia of thin plates.						
Activities: Virtual Simulation of Moment of Inertia, Principal Axes Determination, Solving of GATE questions.						
Friction: Laws of friction, Coefficients of Friction, Angles of Friction, Types of Friction Problems, Wedges and Ladder friction, Belt friction.						
Activities: Virtual Demonstration of Friction in belts and pulleys, Solving of GATE questions.						
Dynamics of Particles Introduction to Dynamics; Newton’s laws of motion — applications to rectilinear and curvilinear motion; D’Alembert’s principle; Work and kinetic energy — work–energy theorem; Impulse and momentum – Impact of bodies						
Total Periods (L: 45; T:15): 60						

Text Books:

1. R. C. Hibbeler (2023). *Engineering Mechanics: Statics and Dynamics*. Pearson Education. 15th Edition.
2. R. K. Bansal (n.d.). *Engineering Mechanics*. Laxmi Publications. Latest Edition.
3. F. P. Beer, E. R. Johnston Jr. and D. F. Mazurek (2021). *Vector Mechanics for Engineers*. McGraw Hill. 12th Edition.
4. S. P. Timoshenko and D. H. Young (n.d.). *Engineering Mechanics*. McGraw Hill. Latest Edition.

References:

1. F. P. Beer, E. R. Johnston Jr., J. T. DeWolf and D. F. Mazurek (2015). *Mechanics of Materials*. McGraw–Hill Education.
2. J. L. Meriam and L. G. Kraige (2018). *Engineering Mechanics: Statics and Dynamics*. Wiley.
3. A. Pytel and J. Kiusalaas (2014). *Engineering Mechanics*. Cengage Learning India.

E–resources:

1. Moment of Inertia Calculator – <https://skyciv.com/free-moment-of-inertia-calculator/>
2. OpenStax – University Physics Volume 1 – <https://openstax.org/books/university-physics-volume-1/pages/10-4-moment-of-inertia-and-rotational-kinetic-energy>.
3. Engineering Mechanics, Dr. Dwarakish. G. S. – https://onlinecourses.swayam2.ac.in/ntr24_ed75/preview.

COURSEOUTCOMES:

At the end of the course, students will be able to:	
CO1	Apply vector mechanics and equilibrium principles to solve engineering problems.
CO2	Construct and analyse free body diagrams for various mechanical systems.
CO3	Determine centroids, moments of inertia and related properties of engineering components.
CO4	Evaluate frictional forces in practical applications such as wedges, ladders and belts.
CO5	Solve problems in particle dynamics using Newton's laws, energy and momentum methods.

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: - Raman, M., & Sharma, S. (2008). Technical Communication: English Skills for Engineers. Oxford University Press. - Subhashini, B., et al. (2025). English for Technical Communication. RK Publications. - 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.



26PH202L	Physics for Civil Engineering – II	Category	L	T	P	C
		BS	2	0	2	3
Prerequisites: - Understanding of waves, oscillations and basic optics concepts. - Basic knowledge of acoustics, materials and electrical principles.						
Course Objectives: - To understand the principles of wave optics and their applications in measurement and sensing. - To study acoustics for designing noise-controlled and comfortable buildings. - To learn non-destructive testing techniques and structural health monitoring methods. - To understand the working and applications of sensors in civil engineering systems. - To explore engineering materials, including advanced, smart and sustainable materials.						
Wave optics Introduction – Wave nature of light – Interference of light: constructive and destructive interference – air wedge: theory and experiment – Diffraction of Light: Fresnel and Fraunhofer diffraction – Single slit diffraction – Young’s double slit experiment. Practical: - Determination of Thickness of a thin wire – Air wedge method. - Newton rings using different laser sources.						
Fundamentals of Acoustics Sound waves and propagation – intensity and decibel scale – reflection, refraction and diffraction of sound – absorption and transmission of sound – echo and reverberation – reverberation time and Sabine’s formula (qualitative) – factors affecting acoustics in enclosed spaces – design of auditoriums and theatres – sound absorption materials – noise control principles in buildings. Practical: - Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer. - Acoustic Grating – Determination of velocity of sound.						
Non-Destructive Testing Visual Inspection – Microscope – Liquid penetrating test – Magnetic particle testing – Eddy current testing – Radiographic imaging testing – Ultrasonic flaw testing – Acoustic emission testing – Thermographic testing – codes and standards.						
Sensors and applications Definition and classification of sensors – standard capacitive pressure sensors – pressure sensor by piezoelectric effect – position sensitive photodetectors – Turbidity sensors – mechanical flow meter – Magnetic flow meter – Level sensor: Linear variable differential transformer. Practical: - Determination of bandgap of semiconductor (thermistor) using meter bridge. - Determination of electrical resistivity of a given material using four probe setup.						

Materials for Civil Engineering

Classification of materials – ceramics: types, properties and manufacturing process– slip casting method – polymers: types, properties and manufacturing process

Composite materials – types, properties FRP, fiber-reinforced concrete – Smart materials: shape memory alloys, piezoelectric materials – Nanomaterials in construction.

Practical:

7. Determination of Young's modulus of the material – Uniform Bending – Using digital scales.

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

Text Books:

1. Brijlal and Subramanyam. (2021). *A Textbook of Optics*. S. Chand & Co.
2. M. N. Avadhanulu and P. G. Kshirsagar. (2018). *A Textbook of Engineering Physics* (9th Revised Edition). S. Chand and Company, New Delhi.
3. Baldev Raj, T. Jayakumar and M. Thavasimuthu. (2002). *Practical Non-Destructive Testing*. Woodhead Publishing.
4. Pavel Ripka and Alois Tipek. (2007). *Modern Sensors Handbook*. ISTE Publications.
5. William D. Callister Jr. and David G. Rethwisch. (2018). *Materials Science and Engineering: An Introduction* (10th Edition). Wiley.
6. Charles Kittel. (2005). *Introduction to Solid State Physics* (8th Edition). Wiley.

Reference Books:

1. Ghatak, A. (2017). *Optics* (6th Edition). New Delhi. McGraw Hill Education.
2. Kinsler, L. E., Frey, A. R., Coppens, A. B., & Sanders, J. V. (2000). *Fundamentals of Acoustics* (4th Edition). New York. Wiley.
3. Prasad, J., & Nair, C. G. K. (2011). *Non-Destructive Test and Evaluation of Materials*. New Delhi. McGraw Hill Education.
4. Fraden, J. (2016). *Handbook of Modern Sensors: Physics, Designs and Applications* (5th Edition). Springer.
5. Varghese, P. C. (2015). *Building Materials*. Prentice Hall India.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Explain wave optics concepts such as interference, diffraction and polarization
CO2	Apply acoustical principles in building design and noise control
CO3	Use NDT techniques for evaluating structural integrity and detecting defects
CO4	Select and apply appropriate sensors for monitoring civil infrastructure
CO5	Evaluate properties and applications of conventional, advanced and smart materials

26EE103L	Basic Mechanical and Electrical Engineering	Category	L	T	P	C
		ES (G)	2	0	2	3
Prerequisites: • Basic knowledge of Physics, particularly electricity, magnetism and simple circuits. • Familiarity with fundamental mathematics, including algebra, basic trigonometry and complex numbers.						
Course Objectives: • Understand the basic scope of Mechanical Engineering and different types of power plants. • Learn fundamental manufacturing processes and refrigeration and air conditioning systems. • To understand basic electrical circuit concepts and AC/DC fundamentals. • To study the operating principles of electrical machines and transformers used in power conversion systems. • To understand house wiring components, protection devices, appliances, UPS systems, batteries and earthing methods.						
Basic Mechanical Engineering and Power Plants Scope of Mechanical Engineering – Overview of Mechanical Engineering – Mechanical Engineering contributions to the welfare of Society. 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.						
Electrical Circuit Fundamentals Charge, Current, Voltage, Power, Energy – Ohm's law – Kirchhoff's voltage, Current laws – DC circuit analysis – Sinusoidal voltage, Current – RMS, Average values – Power factor – Phasor representation – Simple AC circuits: RL, RC, RLC series circuits.						
Magnetic Circuits & Machines Electromagnetic induction – Induced currents, Faraday's law, Induction, Energy, Motional emf, Lenz's law – Magnetic field – Magnetic circuit – Inductance, Mutual inductance. Electrical machines – Construction, Principle of operation: DC generators, DC motors, Transformers, Three-phase Induction motor: Qualitative.						
House Wiring and Safety House wiring – Standards for selection of cables, Electrical devices: Indicator, SPST/SPDT Switch, MCB, ICDP Switch, Fuse – Working principle of air conditioning systems, Induction based appliances – On-Line UPS, OFF-Line UPS – Batteries – Earthing systems: Domestic, Industrial, Sub stations.						
Total periods (L): 30						

List of Experiments (Mechanical Engineering):	
1. Valve Timing and Port Timing diagrams. 2. Fabricating simple structural shapes using Gas Metal Arc Welding machine. 3. Preparing green sand moulds with cast patterns. 4. Taper Turning and Eccentric Turning on circular parts using lathe machine. 5. Drilling and Reaming using vertical drilling machine.	
Total periods (P): 15	
List of Experiments (Electrical Engineering):	
1. Verification of ohms Law. 2. Verification of Kirchhoff's Laws. 3. Load test on DC shunt Motor. 4. Load test on DC series Motor. 5. Basic household wiring & Staircase wiring	
Total periods (P): 15	
Total periods (L+P): 60	
Text Books:	
1. Theraja B L and Theraja A K, "A Textbook of Electrical Technology – Volume I & II", S. Chand & Company, 2014. 2. Hayt W H and Kemmerly J E, "Engineering Circuit Analysis", McGraw–Hill, 8th Edition, 2012. 3. Nagrath I J and Kothari D P, "Basic Electrical Engineering", Tata McGraw–Hill, 3rd Edition, 2010.	
Reference Books:	
1. Sudhakar A and Shyam Mohan S P, "Circuits and Networks Analysis and Synthesis", McGraw Hill, 2015. 2. Basic Electrical and Electronics Engineering – 2nd Edition – R Muthusubramanian, S Salivahanan, McGraw Hill 25th October 2024. 3. Theraja, B. L. & Theraja, A. K. – "A Textbook of Electrical Technology (Vol. I & II)", S. Chand. 4. IS 732:2019 – Code of Practice for Electrical Wiring Installations (Bureau of Indian Standards).	

Course Outcomes:

CO1	Understand the basics of Mechanical Engineering and different power plants.
CO2	Understand basic manufacturing processes and refrigeration systems.
CO3	Understand the fundamental concepts of DC and AC circuits.
CO4	Explain the working principle and applications of electrical machines
CO5	Select suitable wiring devices and explain the working of domestic electrical systems, UPS, batteries and earthing arrangements.

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/ .
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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! - To greet, learn numbers till 20, practice telephone numbers & e mail address, learn alphabet, speak about countries & languages. - Vocabulary: related to the topic. - Grammar: W – Questions, Verbs & Personal pronouns I.						
FREUNDE, KOLLEGEN UND ICH - To speak about hobbies, jobs, learn numbers from 20; build dialogues and frame simple questions & answers. - Vocabulary: related to the topic. - Grammar: Articles, Verbs & Personal pronouns II, sein & haben verbs, ja/nein Frage, singular/plural.						
IN DER STADT - To know places, buildings, question, know transport systems, understand international words; build dialogues and write short sentences. - Vocabulary: related to the topic. - Grammar: Definite & indefinite articles, Negotiation, Imperative with Sie verbs.						
GUTEN APPETIT! - To speak about food, shop, converse; Vocabulary: related to the topic; build dialogues and write short sentences. - Grammar: Sentence position, Accusative, Accusative with verbs, personal pronouns & prepositions, Past tense of haben & sein verbs.						
TAG FÜR TAG/ZEIT MIT FREUNDEN - To learn time related expressions, speak about family, about birthdays, understand & write invitations, converse in the restaurant; ask excuse, fix appointments on phone. - Vocabulary: related to the topic. - Grammar: Time related prepositions, Possessive articles, Modalverbs.						
						Total periods: 30
Text Books: - Dengler, S. (2013). Netzwerk A1.1. Klett–Langenscheidt GmbH. - 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: - Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times. - 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.

26FLC04P	Foreign Language (Arabic) (Common to all Branches)	Category	L	T	P	C
		HUM	0	0	2	1
Course Objectives: - To enable students to communicate in simple everyday situations using basic Arabic vocabulary, greetings, numbers and common expressions. - To develop foundational Arabic language skills in reading, writing, pronunciation and basic grammar. - To build practical communicative competence through dialogues, role–plays and simple writing activities related to daily life, travel, shopping and social interactions.						
العَرَبِيَّةُ الْأَسَاسِيَّةُ (Basic Arabic) Introduction to the Arabic alphabet (letters and pronunciation), greetings and farewells, introducing oneself, numbers (1–20), countries and nationalities. Vocabulary: Greetings, classroom expressions, family members, countries and languages. Grammar: Personal pronouns, nominal sentences, demonstrative pronouns (this/that), simple question words (Who? What? Where?). Activity: Alphabet writing practice, pronunciation drills, greeting dialogues, self–introduction, number games.						
أَنَا وَحَيَاتِي (Myself and Daily Life) Talking about family, occupations, hobbies, daily routine, days of the week and time expressions. Vocabulary: Family, professions, hobbies, daily activities. Grammar: Definite article (ال), gender (masculine & feminine), singular/plural nouns, present tense of common verbs. Activity: Role–play introducing family members, describing occupations, daily routine conversations, simple reading exercises.						
فِي الْمَدِينَةِ (In the City) Places in a city, transportation, asking and giving directions, weather expressions. Vocabulary: Buildings, transportation, public places, directions. Grammar: Prepositions of place, simple prepositional phrases, imperative expressions, yes/no questions. Activity: City map exercises, asking and giving directions, transportation dialogues, listening practice.						
الطَّعَامُ وَالشَّوْقُ (Food and Shopping) Food and beverages, shopping, ordering in restaurants, buying items, expressing preferences. Vocabulary: Fruits, vegetables, meals, shopping terms, currency. Grammar: Adjectives and agreement, simple present tense sentences, expressing likes and dislikes, numbers (21–100). Activity: Restaurant role–play, shopping conversations, menu reading, vocabulary games.						

التَّوَاصُلُ اليَّوميُّ (Everyday Communication)

Making appointments, telephone conversations, invitations, festivals and cultural expressions, travel-related communication.

Vocabulary: Time, travel, celebrations, communication expressions.

Grammar: Future expressions using simple constructions, possessive pronouns, revision of essential grammar.

Activity: Telephone conversations, invitation writing, travel dialogues, group presentations and listening exercises.

Total periods: 30

Text Books:

1. Mastering Arabic 1 (4th Edition), Jane Wightwick & Mahmoud Gaafar, Hippocrene Books, 2018.
2. Alif Baa: Introduction to Arabic Letters and Sounds (3rd Edition), Kristen Brustad, Mahmoud Al-Batal & Abbas Al-Tonsi, Georgetown University Press, 2022.

Reference Books:

1. Karin C. Ryding, A Reference Grammar of Modern Standard Arabic, Cambridge University Press, 2005.
2. Eckehard Schulz, Modern Standard Arabic: An Elementary–Intermediate Course, Cambridge University Press, 2004.
3. Mahmoud Gaafar & Jane Wightwick, Arabic Vocabulary, Hippocrene Books, Latest Edition.

COURSE OUTCOMES:

At the end of the course, students will be able to:	
CO1	Recognize and write the Arabic alphabet, use basic greetings, introduce themselves and communicate using simple numbers and common expressions.
CO2	Describe themselves, their family, occupations, hobbies and daily activities using basic Arabic vocabulary and simple sentence structures.
CO3	Ask for and give directions, identify places and transportation and communicate using common expressions in everyday situations.
CO4	Communicate in restaurants and shopping situations, express preferences and use basic grammatical structures for daily conversations.
CO5	Handle simple social interactions such as making appointments, writing short invitations and engaging in basic travel-related communication using elementary Arabic.

	Foundations of Problem Solving (Common to all Branches)	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 $\geq 85\%$.						
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 $\geq 85\%$ 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**Recommended by**Board of Studies of CIVIL Dept.Meeting No.: 01 Dated: 28.3.26



CAVINKARE PATRONIZED INSTITUTION

C.K. COLLEGE OF ENGINEERING & TECHNOLOGY (An Autonomous Institution)

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