



MRK INSTITUTE OF TECHNOLOGY, CUDDALORE

AN AUTONOMOUS INSTITUTION

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
KATTUMANNARKOIL-608 301, CUDDALORE DISTRICT, TAMILNADU, INDIA

CHOICE BASED CREDIT SYSTEM

Programme: B.E., Civil Engineering

Regulations: 2025

Abbreviations:

HUM	–	Humanities (Languages, Management, Heritage, and others)	L	–	Laboratory Course
BS	–	Basic Science (Mathematics, Physics, Chemistry)	T	–	Theory
ES	–	Engineering Science (General (G), Programme Core (PC), Programme Elective (PE) & Emerging Technology (ET))	LIT	–	Laboratory Integrated Theory
SD	–	Skill Development	PW	–	Project Work
SL	–	Self Learning	IPW	–	IPW - Internship cum Project Work
CDP	–	Capstone Design Project	DIC	–	Department Introductory Course
OE	–	Open Elective	TCP	–	Total Contact Period(s)

Program Outcomes

1. **Engineering Knowledge:** Apply math, science, and engineering fundamentals to complex problems.
2. **Problem Analysis:** Identify and analyze complex problems using research and sustainability principles.
3. **Design Solutions:** Design systems and processes considering health, safety, cost, culture, and environment.
4. **Investigations:** Use experiments, modelling, and data analysis to reach valid conclusions.
5. **Engineering Tools:** Apply modern tools for modelling and problem-solving, recognizing their limits.
6. **Society & Environment:** Assess societal, legal, and environmental impacts of



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engineering solutions.

7. **Ethics:** Commit to ethics, human values, diversity, and legal compliance.
8. **Teamwork:** Work effectively as an individual and in multidisciplinary teams.
9. **Communication:** Communicate clearly in reports, presentations, and documentation across diverse groups.
10. **Management & Finance:** Apply management and economic principles in projects and teamwork.
11. **Lifelong Learning:** Engage in continuous learning, adapt to new technologies, and think critically.

Program Specific Outcomes (PSOs)

B.E. Civil Engineering

1. To analyze, design, and execute civil engineering projects for real-time applications.
2. Utilize modern tools, software, and equipment for the development of safe, sustainable, and cost-effective civil engineering structures and systems.
3. To keep pace with rapid advancements in the field of Civil Engineering and demonstrate research aptitude, collaborate effectively in teams and uphold ethical practices.

Semester – I							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.	MA25C01	Applied Calculus	T	3-1-0	4	4	BS
2.	CE25C01	Introduction to Civil Engineering	T	3-0-0	3	3	ES (PC) – DIC
3.	PH25C01	Applied Physics - I	LIT	2-0-2	4	3	BS
4.	CY25C01	Applied Chemistry - I	LIT	2-0-2	4	3	BS
5.	ME25C01	Engineering Drawing	LIT	2-0-4	6	4	ES (G)
6.	UC25H01	தமிழர் மரபு / Heritage of Tamils	T	1-0-0	1	1	HUM
7.	EN25C01	English Essentials - I	T	2-0-0	2	2	HUM
8.	CS25C02	Computer Programming: Python	LIT	2-0-2	4	3	ES (PC)
9.	ME25C04	Makerspace	L	0-0-4	4	2	SD

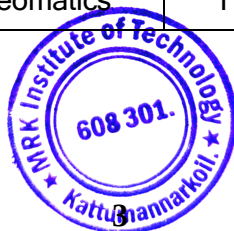


10.	UC25A01	Life Skills for Engineers - I	---	1-0-2	3	1	HUM
11.	UC25A02	Physical Education - I	---	0-0-4	4	1	HUM
12.		NCC / NSS / NSO / YRC	---	---	---	---	---
Total Credits					39	27	

Semester – II							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T-P	TCP		
1.	MA25C02	Linear Algebra	T	3-1-0	4	4	BS
2.	ME25C02	Engineering Mechanics	T	3-1-0	4	4	ES (G)
3.	PH25C02	Applied Physics (CE) - II	T	2-1-0	3	3	BS
4.	EE25C01	Basic Electrical and Electronics Engineering	T	3-0-0	3	3	ES (G)
5.	CY25C02	Applied Chemistry (CE) - II	T	2-0-0	2	2	BS
6.	UC25H02	தமிழர்களும் ததொழில்நுட்பமும் / Tamils and Technology	T	1-0-0	1	1	HUM
7.	CE25201	Construction Materials and Technology	T	3-0-0	3	3	ES (PC)
8.	EN25C02	English Essentials - II	LIT	1-0-2	3	2	HUM
9.	ME25C05	Re-Engineering for innovation	L	0-0-4	4	2	SD
10.	UC25A03	Life Skills for Engineers - II	---	1-0-2	3	1	HUM
11.	UC25A04	Physical Education - II	---	0-0-4	4	1	HUM
12.		Foreign Language^	LIT	1-0-2	3	1	HUM
Total Credits					37	27	

^ Deutsch / Japanese / Korean

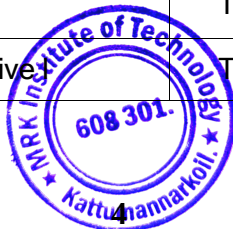
Semester – III							
S. No.	Course Code	Course Name	Course Type	Periods/ Week		Credits	Category
				L-T-P	TCP		
1.	MA25C03	Computational Differential Equations	T	3-1-0	4	4	BS
2.	CE25C02	Fluid Mechanics and Machinery	T	3-1-0	4	4	ES(PC)
3.	AG25C01	Engineering Geology	T	3-0-0	3	3	ES(PC)
4.	CE25301	Strength of Materials I	LIT	3-0-2	5	4	ES(PC)
5.	CE25C03	Surveying and Geomatics	T	3-0-0	3	3	ES(PC)



6.		Skill Development Course I	LIT	1-0-2	3	2	SD
7.	CE25302	Computer-aided Building Drawing	L	0-0-4	4	2	ES(PC)
8.	CE25C04	Surveying and Geomatics Laboratory	L	0-0-4	4	2	ES(PC)
9.	EN25C03	English Communication Skills Laboratory - I	L	0-0-2	2	1	HUM
Total Credits					32	25	

Semester - IV							
S. No.	Course Code	Course Name	Course Type	Periods /Week		Credits	Category
				L-T-P	TCP		
1.	CE25401	Strength of Materials II	T	3-0-0	3	3	ES(PC)
2.	CE25402	Soil Mechanics	T	3-0-0	3	3	ES(PC)
3.	CE25C05	Water Supply Engineering	T	3-0-0	3	3	ES(PC)
4.	CE25403	Introduction to Standards in Civil Engineering	T	1-0-0	1	1	ES(PC)
5.	CE25C06	Concrete Technology	LIT	3-0-2	5	4	ES(PC)
6.	CE25404	Design of Reinforced Cement Concrete Elements	T	3-0-0	3	3	ES(PC)
7.	CE25405	Highway Engineering	LIT	3-0-2	5	4	ES(PC)
8.	CE25C07	Fluid Mechanics and Machinery Laboratory	L	0-0-4	4	2	ES(PC)
9.		Skill Development Course II	LIT	1-0-2	3	2	SD
10.	EN25C04	English Communication Skills Laboratory - II	L	0-0-2	2	1	HUM
Total Credits					32	26	

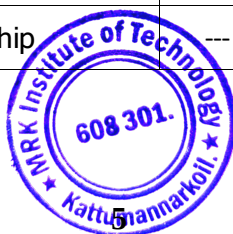
Semester – V							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T-P	TCP		
1.		Structural Analysis - I	T	3-0-0	3	3	ES (PC)
2.		Foundation Engineering	T	3-0-0	3	3	ES (PC)
3.		Wastewater Engineering	T	3-0-0	3	3	ES (PC)
4.		Design of Concrete Structures	T	3-0-0	3	3	ES (PC)
5.		Programme Elective	T	3-0-0	3	3	ES (PE)



6.		Programme Elective II	T	3-0-0	3	3	ES (PE)
7.		Water and Wastewater Engineering Laboratory	L	0-0-4	4	2	ES (PC)
8.		Soil Mechanics Laboratory	L	0-0-4	4	2	ES (PC)
9.		Skill Development Course - III	LIT	1-0-2	3	2	SD
10.		Industry Oriented Course - I	L	1-0-2	3	1	SD
Total Credits					32	25	

Semester – V							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T- P	TCP		
For Honours Degree							
1.		Capstone Design Project - Level I	CDP	0-0-12	12	6	SD
OR							
1.		Honours Elective - I	T	3-0-0	3	3	
2.		Honours Elective - II	T	3-0-0	3	3	
For Minor Degree							
1.		Minor Elective - I	T	3-0-0	3	3	
2.		Minor Elective - II	T	3-0-0	3	3	

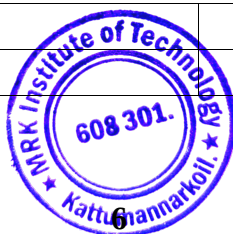
Semester – VI							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T-P	TCP		
1.		Structural Analysis - II	T	3-0-0	3	3	ES (PC)
2.		Design of Steel Structures	T	3-0-0	3	3	ES (PC)
3.		Railways, Airports and Harbour Engineering	T	3-0-0	3	3	ES (PC)
4.		Programme Elective - III	T	3-0-0	3	3	ES (PE)
5.		Open Elective	T	3-0-0	3	3	--
6.		Project Management	T	2-0-0	2	2	HUM
7.		Industry Oriented Course -II	LIT	1-0-2	3	1	SD
8.		Summer Internship	---	---	---	1	SD



9.		Building and Structural Drawing Laboratory	L	0-0-4	4	2	ES (PC)
10.		Self-Learning Course	--	--	0	1	--
Total Credits					24	22	
For Honours Degree							
1.		Capstone Design Project - Level II	CDP	0-0-12	12	6	SD
OR							

Semester – VI							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T-P	TCP		
1.		Honours Elective - III	T	3-0-0	3	3	
2.		Honours Elective - IV	T	3-0-0	3	3	
For Minor Degree							
1.		Minor Elective - III	T	3-0-0	3	3	
2.		Minor Elective - IV	T	3-0-0	3	3	

Semester – VII							
S. No.	Course Code	Course Name	Course Type	Periods / Week		Credits	Category
				L-T-P	TCP		
1.		Engineering Entrepreneurship Development	LIT	2-0-2	4	3	HUM
2.		Climate Change and Sustainability	T	2-0-0	2	2	HUM
3.		Estimation, Costing and Valuation Engineering	T	2-1-0	3	3	ES (PC)
4.		Prestressed Concrete Structures	T	3-0-0	3	3	ES (PC)
5.		Programme Elective -IV	T	3-0-0	3	3	ES (PE)
6.		Programme Elective -V	T	3-0-0	3	3	ES (PE)
7.		Irrigation Engineering and Drawings	T	2-1-0	3	3	ES (PC)
8.		Mini Project	L	0-0-4	4	2	SD
Total Credits					25	22	
For Honours Degree							
1.		Capstone Design Project -Level III	CDP	0-0-12	12	6	SD
OR							
1.		Honours Elective - V	T	3-0-0	3	3	
2.		Honours Elective - VI	T	3-0-0	3	3	



For Minor Degree							
1.		Minor Elective - V	T	3-0-0	3	3	
2.		Minor Elective - VI	T	3-0-0	3	3	

Semester - VIII							
S. No.	Course Code	Course Name	Course Type	Periods/Week		Credits	Category
				L-T-P	TCP		
1.		Project Work / Internship cum Project Work	PW/ IPW	0-0-16	16	8	SD
Total Credits				16	8		

PROGRAMME ELECTIVE COURSES: STREAMS

Structures and Construction Management	Geotechnical Engineering	Transportation	Environment	Water Resources & GIS	Infrastructure
Prefabricated Structures	Ground Improvement Techniques	Traffic Engineering and Management	Solid and hazardous waste management	Hydrology and Water Resources Engineering	Artificial Intelligence in Civil Engineering
Dynamics and Earthquake Resistant Structures	Soil Dynamics	Urban Planning and Development	Industrial wastewater management	Groundwater Engineering	Design of Bridges
Maintenance, Repair and Rehabilitation	Earth Retaining Structures	Intelligent Transportation Systems	Air and noise pollution	Integrated Water Resources Management	Dam Engineering
Energy Efficient Buildings	Rock Mechanics	Pavement Engineering	Environmental Impact Assessment	Remote Sensing and GIS	Underground structures
Construction Management and Safety	Geo-Environmental Engineering	Geomatics for Transportation	Environmental Health and Safety	Geomatics for Hydrology and Water Resources	Formwork Engineering
-	-	-	-	-	Offshore structures





Semester I





MA25C01	Applied Calculus	L	T	P	C
		3	1	0	4
Course Objectives: - To provide technical competence of modelling engineering problems using calculus. - To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.					
Unit I Functions, Limits and Continuity 12					
Functions, graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity function.					
Activities: Visualization of functions and their transformations using open-source software, Solving application-oriented problems involving functions, limits and continuity.					
Unit II Differential Calculus and Applications 12					
Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.					
Activities: Graphical interpretation of derivatives as slopes of tangent lines using open-source software, Solving of Competitive Examination questions (Ex. GATE).					
Unit III Functions of Several Variables 12					
Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange’s Multipliers, Application problems in engineering.					
Activities: Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving of Competitive Examination questions (Ex. GATE).					
Unit IV Integral Calculus 12					
Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.					
Activities: Definite and Indefinite Integrals, Determination of Area, Solving of Competitive Examination questions (Ex. GATE).					
Unit V Multiple Integrals 12					
Iterated integrals and Fubini’s theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, evaluation of triple integrals-change of variables between Cartesian and cylindrical and spherical co-ordinates.					
Activities: Double integrals and triple integrals using open-source software, Solving					



of Competitive Examination questions (Ex. GATE).

Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.

Assessment Methodology: Assignments (20%), Solution to application-oriented problems using software (20%), Solving of GATE questions (20%), Internal Examinations (40%).

TOTAL: 60 PERIODS

References:

1. Anton, H., Bivens, I. C., & Davis, S. (2021). *Calculus: Early transcendentals*. John Wiley & Sons.
2. Ron Larson and David C. Falvo, (2013), *Calculus: an Applied Approach*. Cengage Learning.
3. Stewart, J., Clegg, D., & Watson, S. (2019). *Calculus: Early transcendentals*.
4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). *Thomas' calculus: Early transcendentals*. Pearson.
5. Singh, K. (2019). *Engineering mathematics through applications*. Bloomsbury Publishing.
6. Grewal, B. S. (2012). *Higher engineering mathematics*. Khanna Publishers.

E-resources:

1. [https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus_Early_Transcendentals_\(Stewart\)/](https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus_Early_Transcendentals_(Stewart)/)
2. <https://openstax.org/books/calculus-volume-1/>
3. <https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx>
4. SCILAB, <https://www.scilab.org/>

CO	Description of CO	PO	PSO
CO1	Analyze functions, limits, continuity, and their graphical representations to solve engineering-related problems.	---	---
CO2	Apply differential calculus, mean value theorem, and optimization techniques to analyze and solve engineering problems.	PO1(3)	PSO1(2) PSO2(2)
CO3	Apply partial derivatives, chain rule, total derivatives, and Lagrange multipliers to analyze functions of several variables and solve engineering applications.	PO2(3)	PSO2(3) PSO3(2)
CO4	Apply integral calculus techniques to evaluate integrals, arc lengths, areas, and volumes relevant to engineering applications.	PO5(2) PO11(1)	PSO1(2) PSO2(3) PSO3(2)
CO5	Evaluate double and triple integrals using appropriate coordinate transformations and apply multiple integration techniques to engineering problems.	PO5(2) PO11(1)	PSO1(2) PSO2(3) PSO3(2)



CE25C01	Introduction to Civil Engineering	L 3	T 0	P 0	C 3
Course Objective: To impart the significance of the Civil Engineering and provide insight to the essentials of components of infrastructure.					
UNIT I Overview of Civil Engineering 9 Role of civil engineers in society, Ethics in Civil Engineering Practice, outstanding accomplishments of the profession, future trends-Types of projects, stages of projects, specification and scope.					
UNIT II Fields of Civil Engineering 9 Overview of Structural, Construction, Geotechnical, Environmental, Transportation, Water Resources and Environmental Engineering – Introduction to Engineering Geology and seismology.					
UNIT III Civil Engineering Materials 9 Civil Engineering Materials: Bricks - Stones - Sand - Cement - Concrete - Steel - Timber, Glass - Modern Materials, Thermal and Acoustic Insulating Materials, Decorative Panels, Water Proofing Materials. Modern uses of Gypsum, Pre-fabricated Building components.					
UNIT IV Building Components 9 Building plans - Setting out of a Building - Foundations: Types of foundations - Bearing capacity and settlement – Brick masonry – Stone Masonry – Beams – Columns - Lintels - Roofing - Flooring - Plastering- NBC.					
UNIT V Infrastructure 9 Types of Bridges and Dams – Water Supply Network - Rain Water Harvesting – Solid Waste Management system- Introduction to Highways and Railways - Introduction to Green Buildings. Activities: An Industrial visit to a nearby Civil Engineering Projects. Seminar / assignment on Emerging Civil Engineering fields.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz (10%), Assignments (40%) and Internal Examinations (50%)					



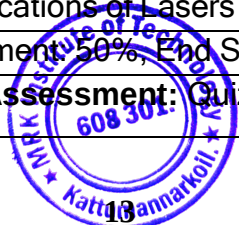
References:

1. Ramamrutham, S. (2013). Basic civil engineering. Dhanpat Rai Publishing Co. (P) Ltd.
2. Seetharaman, S. (2005). Basic civil engineering. Anuradha Agencies.
3. Kumar, S. (2001). Building construction. Standard Publishers.
4. Rangwala, S. C. (2009). Building materials (27th ed.). Charotar Publishing House Pvt. Ltd.
5. Palanichamy, M. S. (2000). Basic civil engineering. Tata McGraw Hill.

CO	Description of CO	PO	PSO
CO1	Explain core Civil engineering concepts.	PO1(3)	-----
CO2	Apply basic engineering calculations in Civil Engineering systems.	PO1(3)	-----
CO3	Identify practices followed in infrastructure construction.	PO1(3), PO3(3)	PSO1(3) PSO2(3)
CO4	Explain the components of buildings, foundation systems, masonry, and other structural elements in accordance with the National Building Code.	PO1(3), PO1(3), PO3(3)	PSO1(3)
CO5	Illustrate the basic concepts of infrastructure systems including bridges, dams, water supply, transportation, waste management, rainwater harvesting, and green buildings.	PO1(3), PO3(3)	PSO1(3) PSO2(3) PSO2(3)



PH25C01	Applied Physics – I	L 2	T 0	P 2	C 3
Course Objective(s): To impart knowledge and expose the essentials of physics in various engineering applications.					
Unit I Properties of Matter 12 Elasticity, Cantilever –Young’s modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method – Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints Practical: Non-Uniform bending, Young’s modulus of the material, Torsional pendulum, Rigidity modulus of the wire and moment of inertia of the disc. Activities: Virtual demonstration of thermal stress.					
Unit II Oscillations and Waves 12 Simple Harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced Oscillation Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo-electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space, wave equation, Cell phone reception Practical: Melde’s string experiment, Frequency of an electrically vibrating metal tip. Activities: Virtual demonstration of propagation of EM waves					
Unit III Quantum Mechanics 12 Black body radiation, Photoelectric effect, de Broglie hypothesis-Schrodinger Wave equation, Particle in a box (infinite potential well, three-dimensional box), Barrier penetration and quantum tunnelling. Practical: Photo-electric effect - Determination of Planck’s constant. Activities: Virtual demonstration of Scanning Transmission Electron Microscope					
Unit IV Applied Optics 12 Interference: Air wedge, Michelson’s Interferometer, Fiber optics: Structure of a fiber – Fiber Optic Communication System – Fiber Sensors (Virtual demo) – Displacement, pressure sensor and Temperature sensor. Practical: Thickness of a thin sheet/wire using Air wedge Method. Activities: Demonstration of sensors.					
Unit V Laser and its Application 12 Einstein Co-efficient - Nd: YAG laser, CO ₂ laser (construction, functioning and applications), dye laser Practical: Ruling width of Compact disc using Laser. Activities: Demonstration of applications of Lasers					
Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%					
Methodology for Continuous Assessment: Quiz (5%), Assignments (20%),					



Flipped Class (5%), Practical (30%), Internal Examinations (40%)

TOTAL: 60 PERIODS

References:

1. Young, H. D., & Freedman, R. A. (2020). University physics with modern physics. Pearson.
2. Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publications.
3. Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4. Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge University Press.
5. Silfvast, W. T. (2008). Laser fundamentals. Cambridge University Press.

E-resources:

1. Barrier penetration problem and Quantum tunnelling:
<https://archive.nptel.ac.in/courses/115/104/115104096/>
2. EM waves and wireless channelling:
https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3. CO2 Laser : https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4. Bimetallic Strips _ <https://www.youtube.com/watch?v=WZQ8lvxdzDk>
5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA
6. Dipole Antenna_ <https://www.youtube.com/watch?v=4xF1Fq2wB1I>
7. Optical Sensors_
<https://auece.digimat.in/nptel/courses/video/108106173/L02.html>
8. Scanning Tunnelling Electron Microscope_
<https://www.youtube.com/watch?v=XNYZYbXNWQA>

CO	Description of CO	PO	PSO
CO1	Explain and understand the properties of matter.	---	---
CO2	Explain oscillations, waves, and electromagnetic wave propagation.	PO1(3)	PSO2(3) PSO3(2)
CO3	Apply quantum mechanical principles to understand microscopic phenomena and quantum devices.	PO1(3) PO2(3)	PSO1(2) PSO2(3)
CO4	Explain interference and fiber-optic sensors.	PO1(3) PO2(3)	PSO1(3) PSO2(3)
CO5	Apply the principle of laser physics in practical systems.	PO1(3) PO4(3) PO5(3)	PSO1(3) PSO2(3) PSO3(3)



CY25C01	Applied Chemistry – I	L	T	P	C
		2	0	2	3
Course Objectives: • To provide students with a solid understanding of the chemical principles for engineering applications. • To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems. • To impart practical applications of chemistry in commonly used engineering devices					
Unit I Water Technology					12
Water quality parameters and standards. Industrial feed water - Remediation. Municipal water treatment. Desalination.					
Practical: Analysis of alkalinity, hardness and dissolved oxygen.					
Activity: Coagulation of water sample using Alum					
Unit II Nano-chemistry					12
Classification, Size-dependent properties. Preparation of nanomaterials - Top-down and Bottom-Up approaches, Applications (Flipped classroom).					
Practical: Preparation of nanoparticles by Sol-Gel method.					
UNIT - III Electrochemistry					12
Electrochemical cell, Electrode potential., Redox reaction. Conductivity of electrolytes, Factors.					
Practical: Conductometric titrations					
Activity: Electrochemical cell demonstration					
UNIT – IV Corrosion & Control					12
Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating.					
Practical: • Corrosion study by weight loss and salt spray method. • Potentiometry/UV-visible spectrophotometer.					
Activities: Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal					
UNIT - V					12
Batteries: Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries, Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects.					
Practical: Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.					
Activities: Demonstration of battery pack in e-vehicles					



Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%
Assessment Methodology: Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (40%)
References: 1. Jain, P. C., & Jain, M. (2015). Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company (P) Ltd. 2. Dara, S. S. (2004). A Textbook of Engineering Chemistry. Chand Publications. 3. Sachdeva, M. V. (2011). Basics of Nano Chemistry. Anmol Publications Pvt Ltd. 4. Friedrich, E. (2014). Engineering Chemistry. Medtech.
1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) - https://nptel.ac.in/courses/105106202. 2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) - https://nptel.ac.in/courses/113106028. 3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) - https://nptel.ac.in/courses/112104088 4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) - https://nptel.ac.in/courses/115106130 5. Resource on all battery types, testing, and safety - https://batteryuniversity.com/articles

CO	Description of CO	PO	PSO
CO1	Understand the underlying mechanisms behind the applications of chemistry.	---	
CO2	Use chemistry concepts in widely used devices.	PO1(3)	PSO1(2) PSO2(2)
CO3	Evaluate how various chemical parameters affect the performance of engineering systems.	PO2(2)	PSO1(2) PSO2(1)
CO4	Conduct experiments in groups and interpret the results.	PO4(3) PO8(1)	PSO2(2) PSO3(2)
CO5	Report findings through case studies and written reports.	PO9(1)	PSO2(2) PSO3(3)



ME25C01	Engineering Drawing	L 2	T 0	P 4	C 4
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.					
Unit-I Fundamentals 6+12 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.					
Unit-II Orthographic Projection 6+12 First angle projection, Projection of points, straight lines and planes.					
Unit-III Projection of Solids 6+12 Simple Solids, Section of Solids, Development of Surfaces Activities: Development of models of various solids and virtual demonstration of sectioning, CAD modelling of 2D objects.					
Unit-IV Isometric Projection 6+12 Isometric Scale, Projection of Simple solids. Activities: Conversion of 3D into 2D orthographic views, CAD modelling of 3D objects.					
Unit-V Perspective Projection 6+12 Simple solids projection Activities: Virtual demonstration of perspective views.					
Project: Development of 2D objects and 3D objects using CAD tools.					
Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%					
Methodology for Continuous Assessment: Project - 10%, Models - 5%, Assignments - 35% and Internal Examinations - 50%					
References: - Natarajan, K. V. (2025). A Text Book of Engineering Graphics. Dhanalakshmi Publisher. - Venugopal, K., & Prabhu Raja, V. (2022). Engineering Drawing + AutoCAD. New Age International Publishers.					
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 - MIT Design Handbook: Engineering Drawing and Sketching - https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/					



CO	CO Description	PO	PSO
CO1	Explain the advantages of engineering drawing in engineering applications	---	
CO2	Apply the concepts of projections in formulating various solid parts in engineering systems.	PO1(3)	PSO1(2)
CO3	Analyse the various view and interpret the engineering drawings.	PO2(3)	PSO1(2)
CO4	Use CAD tools for creation of various models.	PO3(1)	PSO2(2)
CO5	Critically think and develop innovative models.	PO11(1)	PSO3(1)



UC25H01	தமிழர் மரபு	L	T	P	C
		1	0	0	1
அலகு I மமொழி மற்றும் இலக்கியம் 3 இந்திய தமொழிக் குடும்பங்கள் - திரொவிட தமொழிகள் - தமிழ் ஒரு தெம்தமொழி - தமிழ் தெவ்விலக்கியங்கள் - ெங்க இலக்கியத்தின் ெமயெ ெொர்பற்ற தன்மம் - ெங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மமலொண்மமக் கருத்Fக்கள் - தமிழ்க் கொப்பியங்கள் - தமிழகத்தில் ெமண, தபௌத்த ெமயங்களின் தொக்கம் - பக்தி இலக்கியம் - ஆழ்வார்கள் மற்றும் நொயன்மொர்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ெ்சி - தமிழ் இலக்கிய வளர்ெ்சியில் பொரதியொர் மற்றும் பொரதிதொென் ஆகியொரின் பங்களிப்பு.					
அலகு II மரபு பொற்ற ஓவியங்கள் முதல் நவீன ஓவியங்கள் வறர - சிற்பக்கறல 3 பொமற ஓவியங்கள் முதல் நவீன ஓவியங்கள் வமர - நடுகல் முதல் நவீன சிற்பங்கள் வமர - ஐம்தபொன் சிமலகள் - பழங்குடியினர் மற்றும் அவர்கள் தயொாரிக்கும் மகவிமனப் தபொருட்கள், தபொம்மமகள் - கதர் தெய்யும் கமல - சுடுமண் சிற்பங்கள் - நொட்டுப்புறத் ததய்வங்கள் - குமரிமுமனயில் திருவள்ளுவர் சிமல - இமெக்கருவிகள் - மிருதங்கம், பமற, வீமண, யொழ், நொதஸ்வரம் - தமிழர்களின் ெமுக, தபொருளொதொர வொழ்வில் மகொவில்களின் பங்கு.					
அலகு III நொட்டுப்புறக் கறலகள் மற்றும் வீர விறளயொட்டுகள் 3 ததருக்கூத்F, கரகொட்டம், வில்லுப்பொட்டு, கணியொன் கூத்F, ஓயிலொட்டம், மதொல்பொமவக் கூத்F, சிலம்பொட்டம், வளரி, புலியொட்டம், தமிழர்களின் விமளயொட்டுகள்.					
அலகு IV தமிழர்களின் திறைக் ககொட்பொடுகள் 3 தமிழகத்தின் தொவரங்களும், விலங்குகளும் - ததொல்கொப்பியம் மற்றும் ெங்க இலக்கியத்தில் அகம் மற்றும் புறக் மகொட்பொடுகள் - தமிழர்கள் மபொற்றிய அறக்மகொட்பொடு - ெங்ககொலத்தில் தமிழகத்தில் எழுத்தறிவும் கல்வியும் - ெங்ககொல நகரங்களும் Fமறமுகங்களும் - ெங்ககொலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நொடுகளில் மொழர்களின் தவற்றி.					
அலகு V இந்திய கதசிய இயக்கம் மற்றும் இந்தியப் பைப்பொட்டிற்குத் தமிழர்களின் பங்களிப்பு 3 இந்திய விடுதமலப் மபொரில் தமிழர்களின் பங்கு - இந்தியொவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பொட்டின் தொக்கம் - சுயமரியொமத இயக்கம் - இந்திய மருத்Fவத்தில் சித்த மருத்Fவத்தின் பங்கு - கல்தவட்டுகள், மகதயழுத்Fப் படிகள் - தமிழ்ப் புத்தகங்களின் ெசு வரலொறு.					



References:

1. தமிழக வரதலொறு, மக்களும் பண்தபொடும், மக.மக. பிள்மள (தவளியீடு: தமிழ்தனொடு தபொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ், முமனவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி, மவமக நதிக்கமரயில் தங்கதகொல நகர தனொகரிகம் (தததொல்லியல் Fமற தவளியீடு)
4. ததபொருமந, ஆற்றங்கமர தனொகரிகம். (தததொல்லியல் Fமற தவளியீடு)
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)
Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.



CO	Description of CO	PO	PSO
CO1	தமிழ் தமொழி மற்றும் இலக்கியத்தின் வளர்ச்சி மற்றும் சிறப்புகள விளக்குதல்.	PO1(2) PO2(2)	PSO3(2)
CO2	தமிழர்களின் பொரம்பரியக் கமலகள், சிற்பக்கமல, மகவிமனப் தபொருட்கள் மற்றும் இமெக்கருவிகமள அறிந் பொரொட்டுதல்.	PO1(2) PO7(3)	PSO1(1) PSO3(2)
CO3	தமிழர்களின் நொட்டுப்புறக் கமலகள், பொரம்பரிய விமளயொட்டுகள் மற்றும் வீரக் கமலகமள விளக்குதல்.	PO7(3) PO8(3)	PSO3(2)
CO4	தமிழர்களின் திமணக் மகொட்பொடுகள், ஂங்ககொல கல்வி, நகர வளர்ச்சி மற்றும் கடல்கடந்த நொடுகளில் மொழர்களின் தவற்றிகமள அறிதல்.	PO2(3) PO6(3) PO7(3)	PSO2(2) PSO3(2)
CO5	இந்திய விடுதமல இயக்கம், மருத்வம், பண்பொடு, கல்தவட்டுகள் மற்றும் ஂசு வரலொற்றில் தமிழர்களின் பங்களிப்பம அறிதல்.	PO2(3) PO6(3) PO7(3) PO11(1)	PSO2(2) PSO3(3)



UC25H01	Heritage of Tamils	L	T	P	C
		1	0	0	1
Unit I Language and Literature		3			
Language Families in India, Dravidian Languages, Tamil as a Classical Language, Classical Literature in Tamil, Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars, Forms of minor Poetry, Development of Modern literature in Tamil, Contribution of Bharathiyar and Bharathidhasan.					
Unit II Heritage - Rock Art Paintings to Modern Art – Sculpture		3			
Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts, Art of temple car making,Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of Temples in Social and Economic Life of Tamils.					
Unit III Folk and Martial Arts		3			
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance, Sports and Games of Tamils.					
Unit IV Thinai Concept of Tamils		3			
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature, Aram Concept of Tamils, Education and Literacy during Sangam Age, Ancient Cities and Ports of Sangam Age, Export and Import during Sangam Age, Overseas Conquest of Cholas.					
Unit V Contribution of Tamils to Indian National Movement and Indian Culture		3			
Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books.					
TOTAL: 15 PERIODS					



References:

1. தமிழக வரலாறு - மக்களும் பண்பொடும் - டொக்டர் க.க. பிள்ளை (தவளியீடு: தமிழ்நாடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முமனவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி - மவமக நதிக்கமரயில் ஂங்ககொல நகர நொகரிகம் (ததொல்லியல் Fமற தவளியீடு).
4. தபொருமந - ஆற்றங்கமர நொகரிகம் (ததொல்லியல் Fமற தவளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
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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.

CO	Description of CO	PO	PSO
CO1	Explain the development and significance of Tamil language and literature.	PO1(2) PO2(2)	PSO3(2)
CO2	Understand and appreciate traditional Tamil art, sculpture, crafts, and musical instruments.	PO1(2) PO7(3)	PSO1(1) PSO3(2)
CO3	Describe Tamil folk arts, traditional games, and martial practices.	PO7(3) PO8(3)	PSO3(2)
CO4	Explain Tamil ecological concepts, social values, education, trade, and maritime achievements.	PO2(3) PO6(3) PO7(3)	PSO2(2) PSO3(2)
CO5	Understand the contribution of Tamils to the Indian freedom movement, medicine, culture, inscriptions, and printing history.	PO2(3) PO6(3) PO7(3) PO11(1)	PSO2(2) PSO3(3)



EN25C01	English Essentials – I	L	T	P	C
		2	0	0	2
Course Objectives: - Enhance learners’ listening and speaking skills to understand and deliver speeches effectively - Equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes. - Strengthen the ability to comprehend, interpret, and analyse written English across diverse contexts.					
Unit I Listening Skills					9
Listening to Simple Conversations, Understanding tone and intent, Short Speeches / Stories, Extracting information, Pronunciation, Listening to Various Accents.					
Suggested Activities: Listening and Repeating, Note-taking					
Unit II Speaking Skills					9
Self-Introduction, Expressing opinions, Participating in Conversations, Speech Acts - agreeing & disagreeing.					
Suggested Activities: Just a Minute (JAM) Video recording, Situational role plays, Usage of Apps.					
Unit III Reading Skills					9
Reading Strategies – Skimming, Scanning, Predicting, Intensive reading - short passages and long passages on suggested themes.					
Suggested Activities: Reading - newspaper and digital articles, Reading comprehension, note making and summarizing.					
Unit IV Writing Skills					9
Hints Development, Guided Writing, Writing Different Types of Paragraphs, Sentence Structure, Sentence Formation, Letter Writing, Emails (Formal & Informal).					
Suggested Activities: Picture and poster description, Brainstorming and Mind Mapping.					
Unit V Grammar and Vocabulary					9
Tenses, Adjectives, Subject-Verb Agreement, Sentence Patterns, Synonyms and Antonyms, Word Substitution, Prefixes and suffixes, Idioms and Phrases.					
Suggested Activities: Gap fills exercises, Cloze Test, Error Detection and Spell Bee.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz (10%), Assignments (20%), Speaking Task (10%), Reading Task (10%), Writing Task (10%), Internal Examinations (40%).					
References: 1. Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.					



2. Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press.
3. Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists (2nd ed.). PHI Learning.

E-resources:

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

CO	Description of CO	PO	PSO
CO1	Listen and comprehend spoken English, take and draft notes.	---	---
CO2	Apply vocabulary and grammar appropriately to communicate in written and spoken forms.	PO1(3)	PSO1(2) PSO3(3)
CO3	Analyze texts in different contexts using appropriate reading strategies.	PO2(2)	PSO2(1)
CO4	Communicate thoughts and ideas in real life situations.	PO9(2)	PSO3(2)
CO5	Develop communication skills relevant to engineering and technology.	PO11(1)	PSO3(3)



CS25C02	Computer Programming: Python	L	T	P	C
		2	0	2	3
Course Objectives: - To equip engineering students with the foundational knowledge and practical skills in Python programming to analyse and solve computational problems effectively. - To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains.					
Unit I Introduction to Python		12			
Problem Solving, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudocode, Interactive and Script Mode, Indentation, Comments, Error messages, Variables, Reserved Words, Data Types, Arithmetic operators and expressions, Built-in Functions, Importing from Packages.					
Practical: Problem Analysis Chart, Flowchart and Pseudocode Practices. (Minimum three)					
Unit II Control Structures		12			
if, if-else, nested if, multi-way if-elif statements, while loop, for loop, nested loops, pass statements.					
Practical: Usage of conditional logics in programs. (Minimum three)					
Unit III Functions		12			
Hiding redundancy, complexity; Parameters, arguments and return values; formal vs actual arguments, named arguments, Recursive & Lambda Functions.					
Practical: Usage of functions in programs. (Minimum three)					
Unit IV Strings & Collections		12			
String Comparison, Formatting, Slicing, Splitting, Stripping, Lists, tuples, and dictionaries, basic list operators, searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values.					
Practical: String manipulations and operations on lists, tuples, sets, and dictionaries. (Minimum three)					
Unit V File Operations and Packages		12			
Create, Open, Read, Write, Append and Close files. Manipulating directories, OS and Sys modules, reading/writing text and numbers, from/to a file; creating and reading a formatted file (csv, tab-separated, etc.). Built-in modules, User-Defined modules, Numpy, SciPy, Pandas, Scikit-learn.					
Practical: Opening, closing, reading and writing in formatted file format and sort data. (Minimum three), Usage of modules and packages to solve problems. (Minimum three), Project (Minimum Two)					

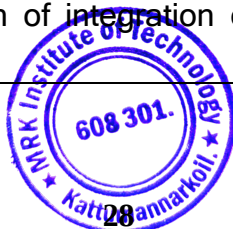


Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%
Methodology for Continuous Assessment: Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%)
References: 1. Matthes, E. (2019). Python crash course: A hands-on, project-based introduction to programming. No Starch Press. 2. Brown, M. C. (2018). Python: The complete reference. McGraw Hill Publishers. 3. Gutttag, J. V. (2016). Introduction to computation and programming using Python: With applications to understanding data. MIT Press. 4. McKinney, W. (2017). Python for data analysis: Data wrangling with pandas, NumPy, and IPython. Shroff/O'Reilly.
E-resources: 1. Official Python Documentation - https://docs.python.org/3/ 2. Python Tutorials - https://www.w3schools.com/python/ 3. NumPy - https://numpy.org/doc/ 4. SciPy - https://scipy.org/ 5. Google's Python class - https://developers.google.com/edu/python/

CO	Description of CO	PO	PSO
CO1	Apply problem-solving techniques to develop algorithms, flowcharts, and Python programs using fundamental programming concepts.	PO1 (3) PO2 (2)	PSO1 (2)
CO2	Develop Python programs using control structures, functions, recursion, and modular programming techniques to solve engineering problems.	PO1 (3) PO3 (2) PO5 (2)	PSO1 (3) PSO2 (2)
CO3	Implement Python applications using strings, lists, tuples, dictionaries, and other collection data types for efficient problem solving.	PO1 (2) PO2 (3) PO5 (3)	PSO1 (2) PSO2 (3)
CO4	Develop Python programs for file handling and utilize built-in and user-defined modules to perform data processing tasks.	PO2 (2) PO3 (2) PO5 (3)	PSO2 (3) PSO3 (2)
CO5	Apply Python packages such as NumPy, Pandas, SciPy, and Scikit-learn to solve engineering and data analysis problems through mini projects.	PO3 (3) PO5 (3) PO12 (2)	PSO2 (3) PSO3 (3)



ME25C04	Makerspace	L 0	T 0	P 4	C 2
Course Objectives: 1. To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques. 2. To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.					
List of Activities					
(A). Dis-assembly & Assembly Practices i. Tools and its handling techniques. ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine. iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators. iv. Dis-assembly and assembly of a Bicycle. (B). Welding Practices i. Welding Procedure, Selection & Safety Measures. ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes. iii. Hands-on session of preparing base material & Joint groove for welding. iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Steel plates / pipes, for fabrication of a simple part. (C). Electrical Wiring Practices i. Electrical Installation tools, equipment & safety measures. ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box. iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells. iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply. (D). Electronics Components / Equipment Practices i. Electronic components, equipment & safety measures. ii. Dis-assembly and assembly of Computers. iii. Hands-on session of Soldering Practices in a Printed Circuit Board. iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier. v. Hands-on session of integration of sensors and actuators with a Microcontroller.					



vi. Demonstration of Programmable Logic Control Circuit.	
(E). Contemporary Systems	
i. Demonstration of Solid Modelling of components. ii. Demonstration of Assembly Modelling of components. iii. Fabrication of simple components / parts using 3D Printers. iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.	
References: 1. Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014. 2. H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1 st edition, 2013. 3. Code of Practice for Electrical Wiring Installations (IS 732:2019)	

CO	Description of CO	PO	PSO
CO1	Demonstrate proper use and handling of basic hand and power tools.	---	---
CO2	Carry out electrical wiring installations and repairs, applying safety measures in domestic applications.	PO1(3)	PSO2(1)
CO3	Develop solid innovative models through software.	PO5(2)	PSO2(2)
CO4	Adapt and follow safety protocols in the work environment.	PO11(2)	PSO3(2)



UC25A01	Life Skills for Engineers – I	L	T	P	C
		1	0	2	1
Course Objectives - To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility. - To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics.					
Personal and Emotional Development: Self-Awareness & Personality, Emotional Intelligence & Empathy, Positive thinking, Right attitude, Stress & Anger Management, Goal-Setting & Time Management, Growth Mindset & Resilience. Activities: Personality tests (MBTI, DISC), reflection journals, Empathy circle, role-playing difficult conversations, Guided mindfulness sessions, stress relief toolkit creation, Vision board creation, weekly time audit and planner, Group challenge scenarios, resilience journal.					
Management Skills: Financial Literacy: Budgeting & Saving, Nutrition, Health, and Hygiene, Digital Literacy & Online Safety, Civic Responsibility & Ethics Activities: Create a monthly budget, financial simulation game, Meal planning workshop, physical wellness challenge, Social media audit, privacy and safety scenarios, Community service, values debate.					
Weightage: Continuous Assessment: 100%					
Methodology for Continuous Assessment: Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)					
References: - Khera, S. (2003). You can win. Macmillan. - Levesque, H. (n.d.). Life skills 101: A practical guide to leaving home and living on your own. (Publication year not specified) - Mitra, B. K. (2017). Personality development & soft skills (3rd impression). Oxford University Press. - ICT Academy of Kerala. (2016). Life skills for engineers. McGraw Hill Education (India) Private Ltd.					



CO	Description of CO	PO	PSO
CO1	Understand personality traits and emotional intelligence, in interpersonal interactions.	---	---
CO2	To work and execute as a team through successful implementation of set goals.	PO7 (1) PO8 (2) PO9 (2)	PSO3(2)
CO3	Develop and implement best practices in day-to-day life, in terms of planning and execution.	PO11 (3)	PSO3(2)



UC25A02	Physical Education - I	L	T	P	C
		0	0	4	1
Course Objectives: - To impart the fundamentals of physical education for development of students' physical, mental, and social well-being. - To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.					
Introduction to physical education: Exercise for Good Posture - Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid Practices.					
Participation of athletic events: Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.					
Skill development in any one of the following outdoor games: Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.					
Skill development in any one of the following indoor games: Shuttle Badminton, Chess and Table Tennis.					
Weightage: Continuous Assessment: 100%					
Methodology for Continuous Assessment: Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)					
References: - Singh, A. (2008). Essentials of physical education. Kalyani Publishers. - Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co. - Mangal, S. K. (2009). <i>Psychology of sports performance</i>. Sports Publication.					
E-resources: https://www.who.int/health-topics/physical-activity					

CO	CO Description	PO	PSO
CO1	Understand and explain the importance of physical activity for mental and physical health.	---	---
CO2	Apply basic principles of exercise science in the routine life.	PO1(3)	PSO1(1)
CO3	Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively.	PO8(3)	PSO3(2)
CO4	Demonstrate independent learning in health, nutrition, and fitness-related topics.	PO11(2)	PSO3(2)

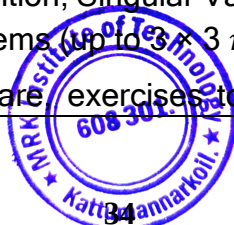


Semester II





MA25C02	Linear Algebra	L	T	P	C
		3	1	0	4
Course Objectives: - To impart foundational knowledge in linear algebra essential for analysing and solving problems in engineering applications. - To provide the knowledge on computation using software and interpret key linear algebra concepts using software.					
Unit I Vector Spaces		12			
Introduction to Vector Spaces, Examples, Subspaces, Linear Combinations, Span, Generating Sets, Linear Dependence and Independence, Basis and Dimension, Dimension of Subspaces.					
Activities: Open-Source software, exercises to test linear dependence and independence using rank, compute span and basis of a set of vectors, determine the dimension of subspaces, and illustrate the concept of subspace and basis in R^2/R^3 with visualization.					
Unit II Linear Transformations and Diagonalization		12			
Null space, Range, Dimension Theorem (statement only), Matrix representation of a linear transformation.					
Activities: Open-Source software, exercises to compute the matrix representation of a linear transformation, find the null space and range of a matrix.					
Unit III Eigen Value Analysis		12			
Eigenvalues & Eigenvectors- Linear Independence of Eigenvectors – Diagonalization of Matrices - Conditions for Diagonalizability - Construction of Modal Matrix - Applications of Diagonalization - Simple problems (up to 3×3 matrices).					
Activities: Open-source software, exercises to compute eigenvalues and eigenvectors of matrices, determine Eigen spaces, verify linear independence of eigenvectors, test the diagonalizability of matrices, construct the modal matrix, and verify diagonalization using computational tools.					
Unit IV Inner Product Spaces		12			
Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to R^3).					
Activities: Open-Source software, exercises to compute inner products and vector norms.					
Unit V Matrix Decomposition		12			
Orthogonal transformation of a symmetric matrix to diagonal form - Positive definite matrices, QR decomposition, Singular Value Decomposition (SVD), Least squares solutions- simple problems (up to 3×3 matrices).					
Activities: Open-Source software, exercises to check if a matrix is positive					



definite, perform QR decomposition and SVD using built-in functions.
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.
Assessment Methodology: Assignment (20%), Software activity (20%), Quiz (20%), Internal Examinations (40%).
TOTAL: 60 PERIODS
References: 1. Friedberg, S. H., Insel, A. J., & Spence, L. E. (2022). <i>Linear algebra</i>. Pearson. 2. Lay, D. C., Lay, S. R., & McDonald, J. J. (2020). <i>Linear algebra and its applications with MATLAB</i>. Pearson. 3. Bronson, R. (2011). <i>Schaum's outline of matrix operations</i>. McGraw-Hill Education. 4. Strang, G., & Thomson, R. (2005). <i>Linear algebra and its applications</i>. Brooks/Cole. 5. Lipschutz, S., & Lipson, M. (2009). <i>Schaum's outline of linear algebra</i>. McGraw-Hill. 6. Kreyszig, E. (2018). <i>Advanced engineering mathematics</i>. Wiley India.

CO	Description of CO	PO	PSO
CO1	Explain the fundamental concepts of Linear Algebra.	---	---
CO2	Apply linear transformations and determine null spaces and ranges.	PO1(3) PO2(3)	PSO1(1)
CO3	Compute and interpret eigenvalues and eigenvectors.	PO1(3) PO2(3) PO3(3) PO4(3)	PSO1(2) PSO2(3)
CO4	Apply inner product concepts and Gram-Schmidt orthogonalization.	PO1 (3) PO2 (3)	PSO2(3)
CO5	Compute least squares solutions of linear system of equations and use MATLAB to implement and validate key linear algebra concepts	PO5 (3) PO11 (2)	PSO1(3) PSO2(3)



ME25C02	Engineering Mechanics	L	T	P	C
		3	1	0	4
Course Objectives: - To introduce the fundamental concepts and principles of statics related to forces acting on particles and rigid bodies. - To develop the ability to formulate and apply equilibrium equations for particles and rigid bodies in two and three dimensions. - To enable students to analyse force systems through vector resolution and calculation of moments and couples.					
Unit-I Forces and Equilibrium of Particles					12
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.					
Unit-II Equilibrium of Rigid Bodies					12
Free Body Diagram, Equivalent force systems, Transmissibility, Moment of force about a point and axis, Couples and force-couple systems, Equilibrium of rigid bodies in two and three dimensions, Principle of virtual work					
Unit-III Centroids and First Moment of Areas					12
First moments of areas and lines, Centroids of composite areas and lines, Pappus-Guldinus theorems.					
Unit-IV Moment of Inertia of Areas and Masses					12
Second moment of area, Parallel axis theorem, Rectangular and Polar Moments of Inertia, Radius of gyration, Product of inertia, Principal axes and principal moments of inertia, Mass moments of inertia of thin plates.					
Unit-V Friction					12
Laws of friction, Coefficient of friction, Angle of friction, Friction problems, Wedges, Ladder friction, Belt friction.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz - 10%, Assignments - 20%, Solving of Competitive Exam questions (20%) and Internal Examinations - 50%					
References: - Beer, F. P., Johnston Jr., E. R., DeWolf, J. T., & Mazurek, D. F. (2015). Mechanics of Materials. McGraw-Hill Education. - Meriam, J. L., & Kraige, L. G. (2018). <i>Engineering Mechanics: Statics and Dynamics</i>. Wiley. - Pytel, A., & Kiusalaas, J. (2014). Engineering Mechanics (Indian Edition). - 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

CO	CO Description	PO	PSO
CO1	Explain the fundamental concepts of forces and apply equilibrium conditions to particles in two- and three-dimensional force systems.	PO1(3)	PSO1(3)
CO2	Analyze rigid bodies using free body diagrams, equivalent force systems, moments, couples, and the principle of virtual work.	PO1(3)	PSO1(3)
CO3	Determine centroids and first moments of simple and composite areas using appropriate engineering principles.	PO2(2)	PSO1(3)
CO4	Calculate area and mass moments of inertia, principal axes, principal moments, and radius of gyration for engineering applications.	PO3(2)	PSO2(3)
CO5	Solve engineering problems involving dry friction, wedges, ladders, and belt friction.	PO3(2)	PSO3(1)



PH25C02	Applied Physics (CE) – II	L	T	P	C
		2	1	0	3
Course Objectives: To provide a comprehensive understanding of physics concepts in Civil engineering applications.					
Unit I Mechanic 9 Elasticity -Types of supports and loads - free body diagrams - Equilibrium of rigid bodies - Types of structures: Beams, frames, trusses -Analysis of trusses - internal forces in members - Moment of inertia and bending- cantilever Activities: Virtual Demonstration of deflection of beams and moment of inertia.					
Unit II Acoustics 9 Reverberation - Loudness -Focusing - Echelon - Noise -Echo - Resonance - Interference -Sabine's formula (Derivation) - Absorption coefficient-Sonometer - Sound insulation. Activities: Virtual Demonstration of sound insulation and resonance.					
Unit III Light 9 Visual field glare, colour - day light calculations -day light design of windows, measurement of day light and use of models and artificial skies - artificial lighting - LED characteristics. Activities: Virtual Demonstration of heat infiltration in glass, glass as building material, LED Characteristics.					
Unit IV Engineering materials 9 Composites - Fibre Reinforced Plastics (FRP) -Fiber Reinforced Metals (FRM) - Fiber Reinforced Bricks (FRB) - Shape memory alloys Activities: Demonstration of Shape memory alloys equipment					
Unit V Ceramic materials 9 Ceramics - Thermal, Mechanical, Electrical and Chemical properties -3D printed construction materials - Nano materials. Activities: Demonstration of 3D printing of materials, Composite fabrication.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz (10%), Assignments (30%), Flipped Class (10%), Internal Examinations (50%)					
		 TOTAL-45 PERIODS			



References:

1. Balasubramaniam, R. (2014). Callister's materials science and engineering. Wiley India Pvt. Ltd.
2. Hibbeler, R. C. (2017). Engineering mechanics. Pearson.
3. Hibbeler, R. C. (2023). Structural analysis. Pearson.
4. Medved, S. (2021). Building physics. Springer.

E-resources:

1. Moment of Inertia: https://youtu.be/fDJeVR0o__w
2. Ceramics: <https://www.youtube.com/watch?v=oeDANQrsnZ0>
3. Sound Insulation: <https://youtu.be/nhE2a4GEOtA>
4. Shape memory alloys:
<https://nescacademy.nasa.gov/video/00a31561480547248033a1c2df6f87831d>
5. White LED: <https://archive.nptel.ac.in/courses/108/108/108108122/>
6. Daylighting and lighting design: <https://youtu.be/vZO09qL-vZs>
7. 3D Printed construction materials_
8. <https://www.youtube.com/watch?v=UntRnpuWBtU>

CO	Description of CO	PO	PSO
CO1	Understand elasticity beam and trusses and analyze structures.	PO1(3), PO2(2)	PSO1(3)
CO2	Explain acoustics and control techniques.	PO1(2), PO2(2)	PSO1(3) PSO2(2)
CO3	Apply lighting principle and understand LED Characteristics	PO1(3), PO5(2)	PSO1(3) PSO2(2)
CO4	Understand engineering material, composites and shape memory alloys	PO1(3), PO2(2)	PSO1(3) PSO2(3)
CO5	Explain ceramics, nanomaterials and 3D Printing materials	PO1(3), PO5(2)	PSO1(3) PSO3(2)



EE25C01	Basic Electrical and Electronics Engineering	L	T	P	C
		3	0	0	3
Course Objectives: To impart foundational knowledge in principles and applications of electrical and electronics engineering.					
UNIT I DC Fundamentals		9			
Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Kirchhoff's law, Series parallel combination of R, L and C components, Voltage Divider and Current Divider Rules.					
Activities: Virtual Demonstration of electrical laws & circuits, Hands-on Breadboarding, Solving GATE questions.					
UNIT II AC Fundamentals		9			
Faraday's Laws of Electro-magnetic Induction, Definition of Self and Mutual Inductances, Generation of sinusoidal voltage, Instantaneous & RMS values of sinusoidal signals, Introduction to 3-phase systems, Electrical Safety, Fuses and Earthing.					
Activities: Virtual Demonstration of electromagnetic induction, Measurement of instantaneous and RMS values of AC signals, Solving GATE questions.					
UNIT III Electric Machines		9			
DC Machines, Transformers, Star and delta Connections, Three phase Induction motors, Synchronous Generators, Single Phase Induction Motors, Stepper Motor, Universal Motor and BLDC motor.					
Activities: Virtual demonstration of step-up and step-down transformers, Virtual working models of Universal and BLDC motors, Solving GATE questions.					
UNIT IV Analog and Digital Electronics		9			
Semiconductor Devices : PN junction diodes, Zener Diode, Voltage regulator, BJT & FET Transistors, Timers, Operational Amplifiers.					
Digital Electronics: Boolean algebra, Basic and Universal Gates, adders, multiplexers, demultiplexers and flip-flops.					
Activities: Virtual demonstration of V-I characteristics of PN junction and Zener diodes using simulation, inverting/non-inverting amplifiers, Online logic gate simulators, Solving GATE questions.					
UNIT V Microcontrollers		9			
Microcontrollers: Introduction, Architecture, Potential Applications.					
Activities: Physical demonstration of a microcontroller and online simulation of microcontroller.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					



Assessment Methodology: Quiz (5%), Assignments (25%), GATE Questions (20%), Internal Examinations (50%)

References:

1. Del Toro, V. (2022). Electrical engineering fundamentals. Pearson Education.
2. Hambley, A. R. (Year). Electrical engineering: Principles and applications (Edition if known). Publisher. (Note: Please provide the year and edition for complete citation)
3. Mehta, V. K., & Mehta, R. (2006). Principles of electrical engineering and electronics. S. Chand Publishing.

E-resources:

1. <https://archive.nptel.ac.in/courses/108/106/108106172/>
2. Circuit Simulator - <https://www.falstad.com/circuit/>

CO	Description of CO	PO	PSO
CO1	Learnt the fundamentals of DC Circuits	PO1(3)	PSO1(1)
CO2	Apply basic and AC circuits calculations in electrical systems.	PO1(3)	PSO1(2)
CO3	Understand the concepts of electrical machines.	PO1(3)	PSO1(2)
CO4	Explain the basic electronics engineering concepts.	PO1(3)	PSO1(1)
CO5	Understand the underlying mechanisms behind the microcontrollers	PO1(3)	PSO1(2)



CY25C02	Applied Chemistry (CE) – II	L 2	T 0	P 0	C 2
Course Objectives To provide comprehensive understanding of chemistry concepts in building materials.					
UNIT - I Building Materials Introduction, Bricks, Glass, Cement, Special Cement, Concrete, Reinforcement. Activities: Virtual demonstration of properties of building materials.					6
UNIT - II Composites Types, Matrix materials, Hybrids, Fiber Reinforcement, Characteristics, PMC, MMC, CM Applications. Activities: Virtual demonstration of fabrication of composite materials.					6
UNIT - III Sustainable Materials Bio-based materials, Product & Technology development, Admixtures, Environmental aspects, energy efficiency. Activities: Calculation of carbon footprint in buildings.					6
UNIT - IV Analytical Method Thermal conductivity, porosity, absorption and emission characteristics of building materials. Activities: Analytical methods with virtual experiments, Hands-on demonstration of any one of the methods.					6
UNIT - V Characterization and Practical Applications Selection of Appropriate Analytical Methods, Performance Evaluation of Building Materials Quality Assessment and Engineering Applications. Activities: Performance analysis and reporting of building material properties.					6
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz (5%), Assignments (20%), Flipped Class (5%), Virtual Practice (20%), Internal Examinations (50%)					
References: - Jain, P. C., & Jain, M. (2022). Engineering chemistry. Dhanpat Rai Publishing Company (P) Ltd. - Eckold, G. (1994). Design and manufacture of composite structures. Woodhead Publishing Ltd.					



3. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. (2022). Fundamentals of analytical chemistry. Cengage Learning India Pvt. Ltd.
4. Spitzer, W. G., & Simonson, K. (2011). Green building materials: A guide to product selection and specification. Wiley

E- resources:

1. <https://archive.nptel.ac.in/courses/112/104/112104229/>
2. <https://nptel.ac.in/courses/103108100>

CO	Description of CO	PO	PSO
CO1	Identify and explain the properties of major building materials.	PO1(3) PO6(2)	PSO1(2) PSO2(2)
CO2	Understand the types, properties, and applications of composite materials.	PO1(3)	PSO1(2)
CO3	Apply concepts of sustainable and eco-friendly materials in construction.	PO2(2) PO6(2)	PSO2(2) PSO3(1)
CO4	Determine thermal, porosity, absorption, and emission characteristics of building materials.	PO3(2)	PSO2(2)
CO5	Select suitable analytical methods and evaluate the performance and quality of building materials.	PO6(2) PO5(2)	PSO1(3)



UC25H02	தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology	L	T	P	C
		1	0	0	1
அலகு I – தெசவு மற்றும் பொனைத் தொழில்நுட்பம்		3			
சங்க காலத்தில் நெசவுத் தொழில், பொனைத் தொழில்நுட்பம், கருப்பு சிவப்பு பொனைகள், பொனைகளில் கீறல் குறியீடுகள்.					
அலகு II – வடிவனமப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்		3			
சங்க காலத்தில் வடிவனமப்பு மற்றும் கட்டுமாணங்கள், சங்க காலத்தில் வீட்டுப் நபாருட்களில் வடிவனமப்பு, சங்க காலத்தில் கட்டுமாணப் நபாருட்களும் ெடுகல்லும், சிலப்பதிகாரத்தில் மமனட அனமப்பு பற்றிய விவரங்கள், மாமல்லபுரச் சிற்பங்களும் மகாவில்களும், மசாழர் காலப் நபருங்கமகாயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள், ொயக்கர் காலக் மகாயில்கள், மாதிரி கட்டனமப்புகள் பற்றி அறிதல், மனர மீண்ட்சி அம்மை ஆலயம் மற்றும் திருமனல ொயக்கர் மஹால், நசட்டிெண்டு வீடுகள், பிரிட்டிஷ் காலத்தில் நசைனையில் இமதா.சாரநசைக் கட்டிடக் கனல-					
அலகு III – உற்பத்தித் தொழில்நுட்பம்		3			
கப்பல் கட்டும் கனல, உமலாகவியல், இரும்புத் தொழிற்சானல, இரும்பு உருக்குதல், எஃகு, வரலாற்றுச் சான்றுகளாக நசம்பு மற்றும் தங்க ொணயங்கள், ெணயங்கள் அச்சிடுதல், மணி உருவாக்கும் தொழிற்சானலகள், கல்மணிகள், கண்ணாடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், எலும்புத்ெண்டுகள், நதாலியல் சான்றுகள், சிலப்பதிகாரத்தில் மணிகளின் வனககள்.					
அலகு IV – வவளாண்ம மற்றும் ெர்ப்பொசைத் தொழில்நுட்பம்		3			
அனண, ஏரி, குளங்கள், மதகு, மசாழர் காலக் குமிழித் தூம்பிண் முக்கியத்வம், காலென்ட பராமரிப்பு, காலென்டகளுக்காக வடிவனமக்கப்பட்ட கிணறுகள், மவளாண்ம மற்றும் மவளாண்ம சார்ெந்த நசயல்பாடுகள், கடல்சார் அறிவு, மீண்வளம், முத்வ மற்றும் முத்வக்குளித்தல், நபருங்கடல் குறித்த பண்னடய அறிவு, அறிவுசார் சமூகம்.					
அலகு V – அறிவியல் தமிழ் மற்றும் கணித்தமிழ்		3			
அறிவியல் தமிழிண் வளர்ச்சி, கணித்தமிழ் வளர்ச்சி, தமிழ் நூல்கள மிண்பதிப்பு நசய்தல், தமிழ் நமைநபாருட்கள் உருவாக்கம், தமிழ் இனணயக் கல்விக்கழகம், தமிழ் மிண் நூலகம், இனணயத்தில் தமிழ் அகராதிகள், நசாற்குனவத் திட்டம்.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz (20%), Assignments (30%), Internal Examinations (50%)					



References

1. தமிழக வரதலொறு, மக்களும் பண்தபொடும், மக.மக. பிள்மள (தவளியீடு: தமிழ்தநொடு தபொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முமனவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – மவமக நதிக்கமரயில் த ங்கதகொல நகர தநொகரிகம் (தததொல்லியல் Fமற தவளியீடு)
4. ததபொருமந, ஆற்றங்கமர தநொகரிகம். (தததொல்லியல் Fமற தவளியீடு)
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.

CO	Description of CO	PO	PSO
CO1	தமிழர்களின் நெசவு மற்றும் பானைத் நதாழில்நுட்பங்களை அறிதல்.	---	---
CO2	தமிழர்களின் வடிவனமப்பு மற்றும் கட்டிடத் நதாழில்நுட்ப வளர்ச்சினயப் புரிெ்நகாள்ளுதல்.	PO1(3) PO2(3)	PSO2(2) PSO3(2)
CO3	தமிழர்களின் உற்பத்தித் நதாழில்நுட்பம், உமலாகவியல் மற்றும் னகவினைத் நதாழில்களை அறிதல்.	PO1(2) PO2(2) PO3(2) PO7(3)	PSO2(2) PSO3(2)
CO4	தமிழர்களின் மவளாண்னம, ெர்ப்பாசைம் மற்றும் கடல்சார் நதாழில்நுட்பங்களைப் புரிெ்நகாள்ளுதல்.	PO2(3) PO6(3)	PSO2(2) PSO3(3)
CO5	அறிவியல் தமிழ், கணித்தமிழ் மற்றும் தமிழ் கணிைித் நதாழில்நுட்பத்திண் வளர்ச்சினய அறிதல்.	PO1(2) PO2 (2) PO5(3)	PSO1(2) PSO2(3) PSO3(3)



UC25H02	Tamils and Technology	L	T	P	C
		1	0	0	1
Weaving and Ceramic Technology: Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.					
Design and Construction Technology: Designing and Structural construction House & Designs in household materials during Sangam Age, Building materials and Hero stones of Sangam age, Details of Stage Constructions in Silappathikaram, Sculptures and Temples of Mamallapuram, Great Temples of Cholas and other worship places, Temples of Nayaka Period, Type study (Madurai Meenakshi Temple), Thirumalai Nayaka rMahal, Chetti Nadu Houses, Indo, Saracenic architecture at Madras during British Period.					
Manufacturing Technology: Art of Ship Building , Metallurgical studies, Iron industry, Iron smelting, steel, Copper and gold Coins as source of history - Minting of Coins, Beads making, industries Stonebeads, Glass beads, Terracotta beads, Shell beads / bone beats, Archeological evidences, Gem stone types described in Silappathikaram.					
Agriculture and Irrigation Technology: Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use , Agriculture and Agro Processing -Knowledge of Sea -Fisheries, Pearl, Conche diving, Ancient Knowledge of Ocean -Knowledge Specific Society.					
Scientific Tamil & Tamil Computing: 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.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz (20%), Assignments (30%), Internal Examinations (50%)					
References 1. தமிழக வரதலொறு, மக்களும் பண்தபொடும், மக.மக. பிள்மள (தவளியீடு: தமிழ்தநொடு தபொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்). 2. கணினித் தமிழ், முமனவர் இல. சுந்தரம். (விகடன் பிரசுரம்). 3. கீழடி, மவமக நதிக்கமரயில் த ங்கதகொல நகர தநொகரிகம் (தததொல்லியல் Fமற தவளியீடு) 4. ததபொருமந, ஆற்றங்கமர தநொகரிகம். (தததொல்லியல் Fமற தவளியீடு) 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)
Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference
Book.

CO	Description of CO	PO	PSO
CO1	Explain the textile and pottery technologies of the Tamils.	---	---
CO2	Describe the development of design and architectural technologies of the Tamils.	PO1(3) PO2(3)	PSO2(2) PSO3(2)
CO3	Examine the manufacturing, metallurgy, and handicraft technologies of the Tamils.	PO1(2) PO2(2) PO3(2) PO7(3)	PSO2(2) PSO3(2)
CO4	Analyze the agricultural, irrigation, and maritime technologies of the Tamils.	PO2(3) PO6(3)	PSO2(2) PSO3(3)
CO5	Explore the development of Scientific Tamil and Computational Tamil.	PO1(2) PO2 (2) PO5(3)	PSO1(2) PSO2(3) PSO3(3)



CE25201	Construction Materials and Technology	L 3	T 0	P 0	C 3
Course Objectives: - To impart fundamental knowledge of traditional and modern building materials used in construction. - To introduce methods of construction such as masonry, formwork, scaffolding, plastering, and joints.					
Unit I Stones, Bricks and Concrete Blocks: 9 Stone as building material, Criteria for selection, Tests on stones, Deterioration and preservation of stonework. Bricks, Classification, Manufacturing of clay bricks, Tests on bricks, Compressive strength, Water absorption, Efflorescence, Bricks for special uses, Refractory bricks. Concrete blocks, Types, Hollow and solid blocks, Lightweight concrete blocks, Applications. Activities: Visit to brick / block manufacturing plant.					
Unit II Lime, Cement, Aggregates and Mortar: 9 Types, Preparation of lime mortar, Applications. Cement, Ingredients, Manufacturing process, Types and grades, Properties: hydration, compressive and tensile strength, soundness, consistency, setting time. Fine aggregates, River sand, crushed stone sand (M and P-Sand), Properties. Coarse aggregates, Crushing strength, impact strength, flakiness and elongation index, abrasion resistance, Grading. Mortar, Cement and lime mortars, Uses and proportions. Activities: Virtual Demonstration of Cement Manufacturing.					
Unit III Timber, Metals and Other Materials: 9 Timber, Market forms, Industrial timber, Plywood, Laminated panels. Metals, Steel, Aluminum, Composition, properties, Market forms, Mechanical treatment, Aluminum composite panels. Surface finishes, Paints, Varnishes, Distempers, Bituminous products. Sealants for joints, Insulating materials, Acoustic and thermal insulation, Fire protection, Damp proofing, Ventilation, Air conditioning.					
Unit IV Construction Technology and Construction Practices: 9 Masonry construction, Brick and stone masonry. Formwork, Centering, shuttering, Scaffolding, Shoring, Underpinning. Construction joints, Contraction, construction and expansion joints. Plastering, Pointing, Cavity and diaphragm walls. Activities: Virtual Demonstration of different types of masonry works.					



Unit V Advanced Construction Materials, Equipment and Planning:**9**

Advanced materials, Glass, Solar Panels - Ceramics, Clay products, Refractories, Fibre reinforced plastics, Fibre textiles, Geomembranes, Geotextiles. Composite materials, Types, Laminar composites, Applications in construction, Construction equipment, Selection for earthwork, concreting, material handling, dewatering and pumping. Construction planning.

Activities: Visit to Construction sites, virtual demonstration of FRP, Case Study in Concrete Mixing Plan.

Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%

Methodology for Continuous Assessment: Quiz (10%), Assignments (40%) and Internal Examinations (50%)

References:

1. Varghese, P. C. (2015). Building materials. PHI Learning Pvt. Ltd.
2. Arora, S. P., & Bindra, S. P. (2013). Building construction. Dhanpat Rai Publications.
3. Punmia, B. C. (2008). Building construction. Laxmi Publications Pvt. Ltd.
4. Peurifoy, R. L., Schexnayder, C. J., Shapira, A., & Schmitt, R. (2011). Construction planning, equipment and methods. Tata McGraw-Hill.
5. Srinath, L. S. (2001). PERT and CPM: Principles and applications. Affiliated East-West Press.

Rangwala, S. C. (2017). Building materials. Charotar Publishing House Pvt. Ltd.

CO	CO Description	PO Mapping	PSO
CO1	Explain the properties, classifications, and applications of stones, bricks, concrete blocks, and other conventional building materials.	---	---
CO2	Evaluate the quality and suitability of lime, cement, aggregates, and mortar using standard tests and specifications.	PO1 (3)	PSO1 (3) PSO2 (2)
CO3	Apply knowledge of timber, metals, paints, sealants, insulating materials, and other building materials in construction works.	PO2 (2)	PSO1 (2) PSO3 (1)
CO4	Apply construction practices such as masonry, formwork, scaffolding, shoring, joints, plastering, and wall construction in building projects.	PO3 (2) PO5 (2)	PSO2 (3)
CO5	Explain the applications of advanced construction materials and select appropriate construction equipment and planning techniques for effective project execution.	PO2 (3) PO3 (2)	PSO2 (3) PSO3 (2)



EN25C02	English Essentials – II	L	T	P	C
		1	0	2	2
Course Objectives • Enable learners to improve fluency and accuracy in spoken and written communication. • Develop learners’ ability to articulate ideas clearly and effectively in formal and informal spoken interactions. • Help learners construct well-organised written documents relevant to academic and workplace contexts.					
Unit I Oral Communication 9 Types - Verbal and Nonverbal, Interpersonal and Group communication, Telephonic conversation. Suggested Activities: Short presentations, Listen and respond to short podcasts.					
Unit II Conversational Skills 9 Formal Speeches, Welcome Address, Vote of Thanks and Introducing Chief guests, Brainstorming and Group discussions. Suggested Activities: Debates, Role Play.					
Unit III Business Correspondence 9 Email Communication, Formal Letters & Types - Complaint, Request and Permission Letters, Business Meeting. Suggested Activities: Agenda, Minutes of the Meeting.					
Unit IV Academic Writing 9 Paraphrasing, Summarizing, Essay Writing - Cause and Effect, Argumentative, Persuasive, Instructions and Recommendations. Suggested Activities: User guides/ manuals, Policy document.					
Unit V Team Work 9 Leadership Skills - Team building, Team Leader, Team player, Negotiation and Problem solving skills. Suggested Activities: SWOT Analysis.					
Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%					
Methodology for Continuous Assessment: Worksheets (10%), Group Activity (20%), Report Writing (20%), Internal Examinations (50%)					



References:

1. Koneru Aruna. (2020). English Language Skills for Engineers. McGraw Hill Education.
2. Taylor, Shirley & Chandra .V. (2010). Communication for Business A Practical Approach. India: Pearson Longman.
3. Ian Badger, et al., (2014). Listening: B2 (Collins English for Life: Skills), Collins.
4. Raymond Murphy (2019), Grammar in Use, Cambridge University Press.

E-resources:

1. Communication for Business Success - <https://open.umn.edu/opentextbooks/textbooks/8>
2. TED Talks - <https://www.ted.com/>

CO	Description of CO	PO	PSO
CO1	Understand the importance of communication and drafting skills in engineering and technology.	---	
CO2	Apply listening strategies to comprehend spoken English in various contexts.	PO1(3)	PSO3(2)
CO3	Participate actively in group discussions by analysing critically from different views.	PO2(2) PO8(1)	PSO3(3)
CO4	Create written reports coherently for various purposes.	PO9(2)	PSO3(2)
CO5	Adapt communication styles to global, multicultural environments.	PO11(1)	PSO2(2)



ME25C05	Re-Engineering for innovation	L 0	T 0	P 4	C 2
Course Objectives: - To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications. - To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.					
Bootcamp 1: Introduction to Product Development, Reverse Engineering, Overview of the product lifecycle, Hands-on disassembly of simple products, Practice of basic measurements and sketching, Introduction to CAD modeling of disassembled parts, Virtual assembly of parts.					
Bootcamp 2: Embedded System Programming (Open-source platforms), Practice of interfacing sensors, reading data, automation in home, healthcare and agriculture.					
Reverse Engineering: Sketch and prototype alternative designs, Group brainstorming sessions, Manufacture prototype parts using 3D printing and / or workshop tools, Assemble prototype product.					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%					
Methodology for Continuous Assessment: Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)					
References: - Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press. - Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects. O'Reilly Media.					
E-Resources: - GrabCAD - https://grabcad.com/ - GitHub - https://github.com/					

CO	Description of CO	PO	PSO
CO1	Understand the product development lifecycle, including stages such as concept generation, design, prototyping, and testing.	---	
CO2	Apply reverse engineering techniques to analyze and document existing products.	PO1 (3) PO2 (2)	PSO1(2)
CO3	Collaborate in teams to fabricate prototypes using appropriate tools.	PO5 (2) PO8 (1) PO9 (1)	PSO3(3)
CO4	Engage in independent learning and continuously adapt to emerging technologies in product design	PO11(2)	PSO2(2) PSO3(2)



UC25A03	Life Skills for Engineers – II	L	T	P	C
		1	0	2	1
Course Objectives: To impart and cultivate analytical reasoning, innovative thinking, effective collaboration, and ethical leadership to prepare students for complex challenges in professional and personal environments.					
Critical Thinking: Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence. Activities: Two-Brainstorm Method, “30 Circles” Challenge, “Desert Survival” Simulation, Lateral thinking riddles and puzzles, "What If?" Scenario Writing, Fast vs. Slow Thinking Game, Creativity Myth Busters					
Problem Solving: Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking. Activities: Case study analysis, Escape Room challenge.					
Leadership: Leadership Styles & Self-Assessment, Communication & Active Listening, Decision-Making & Responsibility, Teamwork & Delegation, Empathy, Integrity & Conflict Management, Vision, Motivation & Goal-Setting. Activities: Crisis Leadership Simulation, Tower Challenge, Leadership Dilemmas Role-Play, Team Vision Board					
Weightage: Continuous Assessment: 100%					
Methodology for Continuous Assessment: Assignments (20%), Flipped Class & Worksheets (10%), Practical (30%), Internal Examinations (40%)					
References: - De Bono, E. (2017). <i>Six thinking hats</i>, Little, Brown Book Group. - Facione, P. A. (2015). <i>Critical thinking: What it is and why it counts</i>. Insight Assessment. - Kahneman, D. (2011). <i>Thinking, fast and slow</i>. Farrar, Straus and Giroux. - Whetten, D. A., & Cameron, K. S. (2016). <i>Developing management skills</i>. Pearson.					



CO	Description of CO	PO	PSO
CO1	Explain the importance of leadership and management skills in life.	---	
CO2	Apply and demonstrate creative thinking techniques to generate innovative solutions.	PO7 (3)	PSO1(1) PSO2(1)
CO3	Exhibit effective collaboration and communication skills through teamwork, active listening, and conflict resolution strategies.	PO8 (2)	PSO3(3)
CO4	Integrate scientific temperament and logical reasoning into problem solving in engineering and real-world contexts.	PO11 (2)	PSO2(1) PSO3(2)



UC25A04	Physical Education - II	L 0	T 0	P 4	C 1
Course Objectives: To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game.					
Basic gymnastics exercises: Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.					
Upskilling in any one of the athletics: Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.					
Advance skills in any one of the indoor/outdoor games, which has been opted by the student in the I semester.					
Weightage: Continuous Assessment: 100%					
Methodology for Continuous Assessment: Attendance (60%), Quiz (10%), Participation in Sports and Games (20%) and Viva Voce (10%)					
References: - Singh, A. (2008). Essentials of physical education. Kalyani Publishers. - Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co. - Mangal, S. K. (2009). <i>Psychology of sports performance</i>. Sports Publication. - Kandappan, K. (2004). <i>Foundations of physical education</i>. Friends Publications.					
E-resources: https://www.who.int/health-topics/physical-activity					

CO	CO Description	PO	PSO
CO1	Understand and explain the importance of physical activity for mental and physical health.	---	
CO2	Apply safety principles and methods during sports activities.	PO1(3)	PSO3(1)
CO3	Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively.	PO8 (3)	PSO3(2)
CO4	Demonstrate the advanced technical skills and strategic understanding in the game of their interest.	PO11(1)	PSO3(2)



Foreign Language^

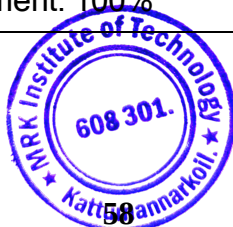
UC25F01	Deutsch – I	L 1	T 0	P 2	C 1
Course Objectives: To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.					
Basics & Introduction: German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße..., Wer bist du?), Numbers 1-100 and days of the week, Personal pronouns (ich, du, er, sie...), Sentence structure (SVO word order). Activities: Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.					
Grammar Essentials & Everyday Vocabulary: Present tense of regular verbs (spielen, arbeiten, machen...), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary. Activities: Conjugate regular and irregular verbs, “Question Chain” game, Create a simple family tree.					
Everyday Communication in German: Asking for and giving directions, Telling the time and talking about schedules, Ordering food and drinks at a café or restaurant, Talking about hobbies, weather, and daily routines, Listening to short conversations and responding appropriately, Introduction to German culture and formal/informal language use (du vs Sie). Activities: Ordering food and drinks, Give directions, Formal / Informal greetings, Do's and Don'ts.					
Weightage: Continuous Assessment: 100%					
Methodology for Continuous Assessment: Assignments (30%), Quiz (10%) and Internal Examinations 60%					
References: Funk, H., Kuhn, C., & Demme, S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag.					



CO	CO Description	PO	PSO
CO1	Understand simple spoken Deutsch in everyday contexts.	---	
CO2	Communicate with widely used Deutsch words effectively.	PO9 (2)	PSO3(2)
CO3	Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language.	PO11 (1)	PSO3(2)



UC25F02	Japanese – I	L	T	P	C
		1	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 speech 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.					
Weightage: Continuous Assessment: 100%					



Methodology for Continuous Assessment: Assignments (30%), Quiz (10%) and Internal Examinations 60%

References:

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

CO	CO Description	PO	PSO
CO1	Understand simple spoken Japanese in everyday contexts.	---	
CO2	Communicate with widely used Japanese words effectively.	PO9 (2)	PSO3(2)
CO3	Develop the skills necessary for self-directed learning and continuous improvement in Japanese language.	PO11 (1)	PSO3(2)



UC25F03	Korean – I	L	T	P	C
		1	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).					
Activities: 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).					
Activities: 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 speech 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.					
Activities: Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.					
Weightage: Continuous Assessment: 100%					
Methodology for Continuous Assessment: Assignments (30%), Quiz (10%) and Internal Examinations 60%					
References: - King, R., Yeon, J., & Brown, A. (2015). Elementary Korean. Tuttle Publishing. - Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., & Sohn, S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai'i Press.					



CO	CO Description	PO	PSO
CO1	Understand simple spoken Korean in everyday contexts.	---	
CO2	Communicate with widely used Korean words effectively.	PO9 (2)	PSO3(2)
CO3	Develop the skills necessary for self-directed learning and continuous improvement in Korean language.	PO11 (1)	PSO3(2)

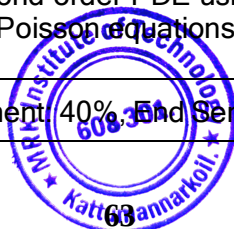


Semester III





MA25C03	Computational Differential Equations	L	T	P	C
		3	1	0	4
Course Objectives: The Objectives of the course are to equip students with the ability to formulate and solve various types of Ordinary and Partial Differential Equations (ODEs & PDEs) and to develop proficiency in applying numerical methods and computational tools for solving differential equations encountered in engineering problems.					
UNIT I First Order Ordinary Differential Equations 9					
Basic concepts of ordinary differential equations – Formation of first order differential equations from physical problems - First order and first-degree ODE: Variables separable-Exact equations-Leibnitz’s equation - Bernoulli’s equation					
Activities: Application and Visualization of the first order ODE using open-source software and solving Competitive Examination questions					
UNIT II Numerical Methods for Solving Ordinary and Partial Differential Equations 9					
Solving first order ODE by Euler's formula, Taylor series and Runge-Kutta method of 4 th order - Solving second order ODE by Runge Kutta method of 4 th order and finite difference method - Numerical Methods for first order PDE by Method of lines with Runge-Kutta method of order fourth.					
Activities: solving ordinary differential equations using open-source software and solving of Competitive Examination questions					
UNIT III Higher Order Ordinary Differential Equations 9					
Formation of second order differential equations from physical problems-Linear equations of second and higher order with constant coefficients – Euler’s linear equations – Method of variation of parameters -					
Activities: solving ordinary differential equations using open-source software and solving of Competitive Examination questions					
UNIT IV First Order Partial Differential Equations 9					
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of PDE by variable separable method – Solution of standard types of first order partial differential equations (excluding reducible to standard types) - Lagrange’s linear equation					
Activities: Application and Visualization of the Partial Differential Equations using open-source software and solving Competitive Examination questions					
UNIT V Higher Order Partial Differential Equations 9					
Linear homogeneous partial differential equations of second and higher order with constant coefficients. Numerical Methods: Finite difference techniques for the solution of two-dimensional Laplace’s and Poisson’s equations on rectangular domain – Solution of one-dimensional heat equation using Bender Schmidt and Crank Nicholson difference schemes – Solution of one-dimensional wave equation by explicit scheme.					
Activities: Application of the second order PDE using open-source software of 1-D wave, 1-D heat equations, Laplace and Poisson equations and Solving Competitive Examination questions					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%.					



Assessment Methodology: Assignments (20%), Solution to application-oriented problems using software (20%), Solving Competitive Examination questions (20%), Internal Examinations (40%).

References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, (11th ed.), John Wiley & Sons, USA, 2025.
2. Joe D. Hoffman, *Numerical Methods for Engineers and Scientists* (3rd ed.). CRC Press (Taylor & Francis Group), 2001.
3. Steven C. Chapra and Raymond P. Canale. *Numerical Methods for Engineers* (8th ed.). McGraw-Hill Education, 2021.
4. William E. Boyce and Richard C. DiPrima. *Elementary Differential Equations and Boundary Value Problems*, (11th ed.). John Wiley & Sons, USA, 2017.
5. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 45th Edition, 2026.
6. Randall J. LeVeque, *Finite Difference Methods for Ordinary and Partial Differential Equations*, SIAM, 2007.

E-resources:

1. <https://ocw.mit.edu/courses/18-03-differential-equations-spring-2010/>
2. https://archive.nptel.ac.in/content/syllabus_pdf/111107063.pdf
3. <https://github.com/patrickwalls/mathematicalpython>

CO	Description of CO	PO	PSO
CO1	Explain first and higher-order ODEs using appropriate analytical and numerical	-	-
CO2	Explain first order and 4th order ODE Numerical techniques.	PO1(3) PO5(3)	PSO2(1)
CO3	Solve c PDEs using classical and finite difference methods.	PO1(3) PO5(3)	PSO1(2)
CO4	Apply various solution methods to differential equations arising in engineering contexts.	PO1(3) PO5(3)	PSO2(1)
CO5	Interpretation of numerical solutions for partial differential equations and using open-source software.	PO2(3) PO5(3) PO11(2)	PSO2(1)



CE25C02	Fluid Mechanics and Machinery	L	T	P	C
		3	1	0	4
Course objective: To introduce fundamental principles of fluid mechanics and apply them to analyze and solve practical civil engineering problems/					
UNIT I Fluid Properties and Statics 9 Fluid properties - methods of analysis - system and control volume - pressure measurement - Forces on plane and curved surfaces - buoyancy, flotation, and metacentric height. Activity: Construct simple floating models to study buoyancy, metacentric height, and hydrostatic forces.					
UNIT II Fluid Flows 9 Flow classification, streamline concepts, stream function, flow nets; conservation laws (mass, energy, momentum), continuity equation, Euler's and Bernoulli's equations, and applications to flow measurement and pipe bends. Laminar flow, Reynolds experiment, Hagen-Poiseuille equation, Darcy-Weisbach equation, Moody diagram, pipe losses, and pipes in series and parallel. Activity: Review of Competitive Exam questions on pipe flow, discharge/velocity calculations, and pipe losses.					
UNIT III Dimensional Analysis 9 Fundamental dimensions, dimensional homogeneity, Rayleigh's method, Buckingham Pi theorem, dimensionless parameters, similitude, model studies, and applications Activity: Quiz on dimensional analysis.					
UNIT IV Boundary Layers 9 Boundary layer concepts, laminar and turbulent flow, momentum integral equation, drag, lift, separation, and control measures. Turbines: Impact of jets, velocity triangles, rotodynamic machine theory, turbine classification, working principles of Pelton, Francis, and Kaplan turbines, work done, efficiencies, draft tube, specific speed, performance curves, and governing. Activity: Prepare a poster on turbine working principles, performance, and efficiency.					
UNIT V Pumps 9 Pump classification, centrifugal pumps, solar pumps - working principle, heads and efficiencies, velocity triangles, impeller work, performance curves; reciprocating pumps, indicator diagram, air vessels, and rotary pumps. Activity: Visit a pump installation or water treatment plant and prepare a report					



Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%

Methodology for Continuous Assessment: Quiz - 10%, Poster presentation - 15%; Report preparation from Site visit - 10%, Assignment - 15%, Internal Examinations - 50%

References

1. Jain A. K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi, 2021.
2. Modi P.N and Seth S.M. Hydraulics and Fluid Mechanics including Hydraulic Machines, 23rd Ed., Standard Book House, New Delhi, 2022.
3. Subramanya K. Theory and Applications of Fluid Mechanics, Tata McGraw Hill Education, New Delhi, 2019.
4. Som S.K., Gautam Biswas and Chakraborty S. Introduction to Fluid Mechanics and Fluid Machines, 3rd Ed., Tata McGraw Hill Education Pvt. Ltd., 2019
5. Pani B.S. Fluid Mechanics: A Concise Introduction, Prentice Hall of India Private Ltd, 2016.
6. Ojha C.S.P., Berndtsson R. and Chandramouli P.N. Fluid Mechanics and Machinery, Oxford University Press, 2010.
7. IS 5120:1969: Code of practice for hydraulic turbines – Testing

E-Resources:

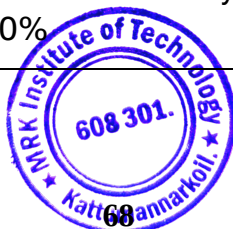
1. NPTEL Course: Fluid Mechanics
<https://nptel.ac.in/courses/112/105/112105093/>
2. NPTEL Course: Hydraulic Machines-
<https://nptel.ac.in/courses/112/106/112106121/>
3. Interactive Tools: Fluid Flow Demo (Sim Scale/Flow Lab) –
<https://www.simscale.com/>



CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Explain fundamental concepts of fluid properties, statics, and hydrostatics, including pressure measurement, buoyancy, and metacentric height.	-	-	-	-
CO2	Apply fluid flow principles, Bernoulli's and momentum equations, and pipe flow calculations to solve engineering problems	PO1 (3) PO2 (3)	3	2	1
CO3	Analyze dimensional analysis, boundary layers, and fluid flow behavior to evaluate drag, lift, and similitude in model studies.	PO1 (2) PO2 (3)	2	-	-
CO4	Design and evaluate turbines and rotodynamic machines considering efficiency, performance curves, and operational parameters.	PO1 (2) PO2 (2) PO3 (3)	3	-	1
CO5	Design and evaluate pumps performance curves, and operational parameters	PO1 (2) PO2 (2) PO3 (3)	3	-	1



AG25C01	Engineering Geology	L 3	T 0	P 0	C 3
Course objective: To impart knowledge on Earth's structure, minerals, and rocks; geological processes; geophysical investigations; and landslide mitigation.					
UNIT I Physical Geology 9 Role of geology in civil engineering, branches of geology, Earth structure and composition, weathering and soil formation, geomorphic processes (river, wind, groundwater, sea), plate tectonics, earthquakes, and seismic zones in India. Activity: Seminar using photographs, satellite images, or field observations to study weathering and landforms.					
UNIT II Mineralogy 9 Physical properties of minerals; study of major minerals (quartz, feldspar, pyroxene, amphibole, mica, calcite, gypsum, clay minerals); Performance and decay of rock minerals.					
UNIT III Petrology 9 Rock classification; igneous, sedimentary, and metamorphic rocks; engineering properties and uses of common rocks (granite, basalt/dolerite, sandstone, limestone, laterite, shale, quartzite, marble, gneiss, schist), quality testing of rocks. Activity: Site visit to nearby quarry/mine					
UNIT IV Structural Geology 9 Geological maps, attitude of beds, structural features (folds, faults, joints) and their engineering significance.					
UNIT V Geophysical Methods and Geological Applications 9 Seismic and electrical techniques for subsurface investigations. Remote sensing in civil engineering; geological considerations in dams, reservoirs, tunnels, road cuttings, buildings and coastal structures; landslides—causes and mitigation. Activity: Quiz on geophysical methods Case study on a dam/tunnel/road cutting/coastal structure/buildings focusing on geological issues and investigation.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz - 10%, Site visit report - 15%; Report preparation from Case study - 10%, Seminar report - 15%, Internal Examinations - 50%					



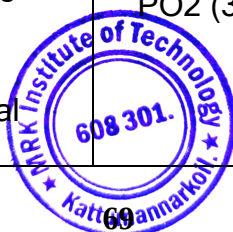
References

1. Varghese, P.C., Engineering Geology for Civil Engineering, Prentice Hall of India Learning Private Limited, New Delhi, 2012.
2. Venkat Reddy. D., Engineering Geology, Vikas Publishing House Private Limited, 2024.
3. Chenna Kesavulu N., Textbook of Engineering Geology, Macmillan India Limited, India, 2009.
4. Parbin Singh. A., Text book of Engineering and General Geology, Katson Publishing house, Ludhiana, 2023.

E-Resources:

1. NPTEL Course: *Geology for Engineers*
<https://nptel.ac.in/courses/113/101/113101053/>
2. Virtual Rock Lab: Rock Identification Guide - <https://geology.com/rocks/>

CO	CO Description	PO Mapping	PSO	PSO2	PSO3
CO1	Explain fundamental geological processes, landforms, and plate tectonics with relevance to civil engineering.	-	-	-	-
CO2	Identify minerals and rocks and evaluate their engineering properties.	PO1 (3), PO2 (2)	3	2	-
CO3	Analyze geological structures and apply geophysical methods for subsurface investigation.	PO1 (2), PO2 (3)	2	3	-
CO4	Apply geological knowledge in the design of civil engineering projects and mitigation of natural hazards.	PO1 (2), PO2 (3)	3	1	1
CO5	Apply geological knowledge in the design of civil engineering projects and mitigation of natural hazards.	PO1 (2), PO2 (3)	3	1	1



CE25301	Strength of Materials I	L	T	P	C
		3	0	2	4
Course Objective: This course provides a foundational understanding of stress, strain, and deformation in solids, while developing analytical skills to evaluate internal forces, deflections, and torsional behaviour in structural members, springs, and pin-jointed plane trusses.					
UNIT I Simple Stresses and Strains					9
Stress-strain concepts, Hooke's law, elastic constants, stress-strain behavior of materials, axial deformation.					
Practical: - Tension Test on Mild Steel / HYSD Steel - Determination of Elastic Constants (E, G, ν) using bar / torsion tests. - Hardness testing of metals using: – Brinell hardness test and Rockwell hardness test					
UNIT II Complex Stress Conditions and Mohr's Circle					9
Uniaxial, biaxial, and triaxial states of stress, thermal stresses in axially loaded composite bars, stresses on inclined planes, principal stresses and planes, Mohr's circle.					
Activity: Prepare a poster explaining construction of Mohr's circle					
UNIT III Shear Force and Bending Moment					9
Beam types - loads (point load, UDL, UVL, effects of applied moments (concentrated and distributed) - SFD and BMD for cantilever, simply supported, and overhanging beams.					
Activity: Review of Competitive exam Questions related to SFD and BMD					
Bending and Shear Stresses: Bending theory, bending equation, stress distribution in beams and sections.					
Practical: Determination of ultimate shear stress of a mild steel rod by conducting a double shear test.					
UNIT IV Deflection of Beams					9
Double integration method - Macaulay's method - Area moment method - Conjugate beam method for computation of slopes and deflections of determinant beams.					
Determination of Young's modulus of a beam with rectangular cross section (metal and wooden specimens) by conducting deflection tests.					



UNIT V Torsion, Springs, and Trusses**9**

Torsion equation and assumptions, analysis of solid and hollow circular shafts, torsional rigidity, combined torsion and bending, shafts in series and parallel; helical springs (open and closed-coiled); analysis of determinate pin-jointed plane trusses using method of joints, sections.

Practical:

3. Open and Closed Coiled Helical Springs – Determine stiffness and deflection under load.

Tasks:

1. Plot SFD and BMD for different beam configurations using MS-EXCEL or equivalent open-source simulation tools.
2. Conduct/compile results from key lab tests (tension, torsion, spring test) and interpret material properties and structural behavior.
3. Design a simple structural/mechanical system (e.g., shaft, spring, or truss)

considering strength, stiffness, and safety, and justify the design with calculations.

Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%

Methodology for Continuous Assessment: Quiz (5%), Project (15%), Assignment Programs (25%), Practical (25%), Internal Examinations (30%)

References

1. Rajput. R. K., Strength of Materials, S. Chand and Co, New Delhi, 2025.
2. Bansal. R.K, Strength of Materials, Laxmi Publications, New Delhi, 2024.
3. Punmia. B. C., Ashok Kumar Jain and Arun Kumar Jain, SMTS –I Strength of materials, Laxmi publications. New Delhi, 2018.
4. Ramamrutham S and Narayanan R, *Strength of Materials*, New Revised and Enlarged Edition, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2025.
5. Singh. D.K., Strength of Materials, Ane Books Pvt. Ltd., New Delhi, 2021.
6. Kazimi S.M.A, Solid Mechanics, Tata McGraw-Hill Publishing Co., New Delhi, 2017.
7. IS 1608 (Part 1):2022: Metallic Materials - Tensile Testing - Method of Test at Room Temperature.
8. IS 1586 (Part 1):2018: Metallic Materials - Rockwell Hardness Test – Test Method.
9. IS 1717:2012: Metallic Materials - Brinell Hardness Test - Method of Test.



E-Resources:

1. NPTEL Course: *Strength of Materials*
<https://nptel.ac.in/courses/112/105/112105099/>
2. YouTube Lectures: “Shear Force and Bending Moment Diagrams” - IIT/NPTEL playlists
3. <https://sm-nitk.vlabs.ac.in/>

CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Explain stress, strain, material properties, and elastic behavior of solids.	-	-	-	-
CO2	Analyze complex stress conditions, thermal stresses, and stress transformation using Mohr's circle.	PO1 (3), PO2 (3), PO4 (3)	3	2	1
CO3	Evaluate shear force, bending moment, and stress distribution in beams.	PO2 (2), PO4 (3), PO5 (3)	3	2	1
CO4	Analyze the deflection of beams slopes and deflections of determinant beams.	PO1 (3), PO3 (3), PO4 (2)	3	2	2
CO5	Apply concepts of torsion, springs, and trusses for structural analysis and design.	PO1 (3), PO3 (3), PO4 (2)	3	2	2



CE25C03	Surveying and Geomatics	L	T	P	C
		3	0	0	3
Course Objective: To study the various methods of surveying and understand the concept of control, control and modern surveying and also to use various survey instruments.					
UNIT I Levelling		9			
Chain Surveying, Datum, benchmarks, levelling methods (fly and check), booking and reduction, contouring					
UNIT II Theodolite Surveying		10			
Horizontal and vertical angle measurements - Temporary and permanent adjustments - Trigonometric levelling - Single and double plane methods - Stadia tacheometry - Subtense method - Tangential tacheometry.					
Activity: Review of Competitive Exam Questions related to levelling and theodolite surveying.					
UNIT III Total station		10			
Components, working, errors, applications; Bathymetry, GPS - components, data acquisition, errors, applications					
UNIT IV Modern Surveying		7			
Introduction to drone surveying and LiDAR.					
Activity: Case study report on GPS applications.					
UNIT V Control Surveying, Adjustment		9			
Horizontal and vertical control, triangulation, traversing, trilateration, coordinate computation; errors, weights, and adjustment of observations.					
Activity: Seminar on control surveying.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz - 10%, Case study report - 20%; Seminar report - 20%, Internal Examinations - 50%					
References 1. Kanetkar.T. P and Kulkarni.S. V, Surveying and Levelling, Parts1 & 2, Pune Vidyar Griha Prakashan, Pune, 2010 2. Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, Surveying Vol.I & II, Lakshmi Publications Pvt Ltd, New Delhi, 2016. 3. Subramanian.R., Surveying and Levelling, Second Edition, Oxford University Press, 2012. 4. Bannister and Raymond.S, Surveying, Seventh Edition, Longman 2004 5. Roy.S. K, Fundamentals of Surveying, Second Edition, Prentice' Hall of India, 2011					



6. Arora.K. R, Surveying Vol I & II, Standard Book house, Twelfth Edition, 2013.
7. IS 12843:1989: Specification for electronic total stations for surveying
8. IS 12762:1994: Specification for global positioning system (GPS) receivers for surveying
9. IS 4880 (Part 1-4):1975: Code of practice for design of control surveys for civil engineering projects

E-Resources:

1. <https://nptel.ac.in/courses/105/104/105104101/>
2. <https://www.britannica.com/technology/surveying>
3. <http://egyankosh.ac.in/handle/123456789/39480>
4. <https://www.isro.gov.in/spacecraft/satellite-navigation>

CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Explain principles of levelling, theodolite surveying, and contouring.	-	-	-	-
CO2	Apply surveying techniques to determine heights, distances, and field measurements.	PO1 (3) PO2 (2) PO4 (3)	3	2	1
CO3	Analyze Total Station and GPS.	PO1 (2) PO2 (3) PO5 (3)	2	3	-
CO4	Analyze modern surveying methods and remote sensing tools.	PO1 (2) PO2 (3) PO5 (3)	2	3	-
CO5	Apply control surveying methods and adjust observations for accurate surveying results.	PO1 (3) PO2 (2)	3	2	-



CE25302	Computer-aided Building Drawing	L	T	P	C
		0	0	4	2
Course objective: The objective of this course is to introduce civil engineering students to the principles of building planning and architectural drawing. The course aims to develop proficiency in preparing accurate 2D and 3D building drawings using computer-aided drafting tools in accordance with standard building practices.					
List of Experiments 1. CAD Fundamentals CAD interface, coordinate systems, units, layers, basic draw and modify commands, annotation and dimensioning. 2. Building Components Drawing of walls, doors, windows, staircases, columns, lintels, roof truss (wood and steel) and other standard components. 3. Single-Storied Building Drawing Preparation of 2D plan, elevation, and sectional view of a residential building. 4. Multi-Storied Building Drawing Preparation of plans, elevations, and sections for multi-storied buildings with circulation and zoning. 5. 3D Modelling, Rendering Isometric drawings, 3D modelling, rendering, layout preparation, and plotting.					
Tasks (Perform any 3 tasks): Task 1: Prepare a 2D drawing using standard layers, dimensions, and annotations. Task 2: Create a detailed drawing sheet of standard building components as per specifications. Task 3: Develop complete drawings (plan, elevation, section) for a single-storied house. Task 4: Prepare multi-storey building drawings with staircases and structural details. Task 5: Create a 3D model with rendering and present drawings with title blocks.					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%					



CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Apply CAD tools and commands for drafting basic engineering and building components with proper standards and conventions.	PO5 (3) PO7 (3) PO8 (2) PO9 (2)	2	1	-
CO2	Prepare detailed 2D drawings including plans, elevations, and sectional views for single and multi-storeyed buildings.	PO5 (3) PO8 (2) PO9 (2)	3	3	1
CO3	Develop 3D building models, renderings, and plot layouts for effective visualization and presentation of engineering drawings.	PO5 (3) PO8 (2) PO9 (2)	3	2	1



CE 25C04	Surveying and Geomatics Laboratory	L 0	T 0	P 4	C 2
Course Objective: To provide hands on experience in calibration of flow meters, performance characteristics of pumps and turbines.					
List of Experiments: Levelling Operations: Fly levelling, check levelling, and benchmark transfer. Contouring and Mapping: Grid levelling, contour mapping, and cut & fill volume estimation. Theodolite Surveying: Measurement of horizontal angles by repetition and reiteration methods. Total Station Surveying: Angle, distance, coordinate measurement, orientation, and resection methods. Height and Distance Measurement: Determination of height using REM/trigonometric methods. GPS Surveying: Navigation and feature collection using handheld GPS.					
Tasks: (Perform any 2 tasks) Task 1: Site Levelling and Earthwork Estimation: Perform levelling and contour mapping to estimate cut and fill volumes for a construction site. Task 2: Precision Survey and Layout: Measure horizontal angles using theodolite methods and apply them for setting out a simple structure. Task 3: Total Station Mapping: Conduct a topographic survey using Total Station and prepare contour and feature maps for planning. Task 4: Height and GPS Survey: Determine heights using REM method and integrate GPS data for mapping infrastructure features.					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%					
Methodology for Continuous Assessment: Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)					
References: - Subramanian. R., Surveying and Levelling, Oxford University Press, Second Edition, 2013. - Bannister and Raymond. S., Surveying, Seventh Edition, Longman 2004. - Roy.S. K, Fundamentals of Surveying, Second Edition, Prentice' Hall of India 2011. - Arora.K.R., Surveying Vol I & II, Standard Book house, Twelfth Edition.2018.					



E-Resources

1. Surveying Virtual Lab - <https://vlab.co.in>
2. MIT Open Course Ware - <https://ocw.mit.edu>

CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Perform levelling and angular measurements using conventional surveying instruments.	PO1 (2) PO4 (3) PO5 (3) PO8 (2)	2	1	-
CO2	Apply modern surveying tools (Total Station and GPS) for field data collection and mapping.	PO1 (3) PO4 (2) PO5 (3) PO8 (2)	3	3	1
CO3	Analyze survey data to prepare maps, contours, and compute elevations and distances.	PO1 (2) PO2 (2) PO4 (3) PO5 (3)	3	2	1



EN25C03	English Communication Skills Laboratory– I	L	T	P
		0	0	2
Course Objectives: The objectives of the course are to foster students’ confidence and fluency in professional and social communication and to bridge the gap between academic English and industry expectations.				
List of Activities				
A. Elements of Effective Speaking and Listening (i) Sharing life experience/ turning point in their life - SATORI (ii) Situational Conversation - eg. Talking to a Senior about Internship Tips (iii) Welcoming a Guest Speaker at a Seminar (iv) Pictography to represent data using images or symbols (v) B2-C1 Listening exercises include lectures, interviews, and discussions.				
B. Mastering Presentations (i) Presentation Skills - Non-verbal communication (ii) Mini-Presentations: Topics like “My Dream Project,” “Engineering in 2050,” 3-minute technical pitches with logical flow (iii) Technical Presentations with PPT				
C. Group Discussion Strategies: (i) Introduction to Group Discussions - Key skills for effective participation (ii) Phases in a GD and Conversational Phrases in GD. (iii) Group Discussions - Abstract and Factual topics				
D. Resume & LinkedIn Optimization (i) Building LinkedIn Profile - Drafting headlines and summaries (ii) Social Media Optimisation (iii) Preparing Video Resume				
E. Podcast-Based Language Learning: (i) Listening to podcast (motivational, career oriented, success stories) (ii) Podcast Preparation – Purpose – Topic – Structure – Recording Tips - Publication of the Podcast				



F. Mock Interviews and Communication Strategies:

- (i) Listening - Job interview
- (ii) Speaking - Mock interviews

Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%.

Internal Assessment: 1. Listening (20 marks)

- 2. Video Resume (20 marks)
- 3. Creating a Podcast (30 marks)
- 4. Mock interview (30 marks)

End Semester Assessment: 1. Presentation with PPT (50 marks)

- 2. Group Discussion (50 marks)

References:

1. Floyd Kory, "Interpersonal Communication", McGraw Hill Publication, 2023.
2. Bharadwaj Apoorva, "Leadership Communication Skills for Intercultural Management: Strategies for Effective Intercultural Management (Contemporary Themes in Business and Management)", Routledge India; 1st edition, 2024.
3. Helen Spencer-Oatey and Domna Lazidou, "Making Working Relationships Work: The TRIPS Toolkit for Handling Relationship Challenges and Promoting Rapport", Castledown Publishers, 2023.
4. Presentations - Cambridge
5. Speaking Extra -
6. Listening Extra - Miles Craven by Cambridge University Press
- CVs, Resumes, and LinkedIn: A Guide to Professional English – Springer International Publishing

E-resources:

1. Train your mind to perform under pressure- Simon Sinek
<https://curiosity.com/videos/simon-sinek-on-training-your-mind-to-perform-under-pressure-capture-your-flag/>
2. Brilliant way one CEO rallied his team in the middle of layoffs
<https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-before-numbers.html>
3. Will Smith's Top Ten rules for success
<https://www.youtube.com/watch?v=bBsT9omTeh0>



CO	Description of CO	PO	PSO1
CO1	Communicate effectively in everyday professional situations with confidence	-	-
CO2	Deliver well-organised and effective presentations.	PO9(3)	PSO1(1) PSO3(2)
CO3	Participate in group discussions and express ideas clearly and confidently.	PO8(2) PO9(3)	PSO3(2)
CO4	Create professional video resumes and participate in interviews effectively.	PO9(2)	PSO3(3)
CO5	Create, record and publish motivational podcasts.	PO9(2) PO11(1)	PSO2(2) PSO3(3)



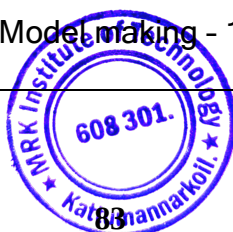


Semester IV





CE25401	Strength of Materials II	L	T	P	C
		3	0	0	3
Course Objective: The course imparts knowledge on energy methods for deflection analysis, and equips students to analyse indeterminate beams, columns, and pressure vessels. It also develops understanding of three-dimensional stress, failure theories, and advanced bending in curved and unsymmetrical members.					
UNIT I Energy Methods, and Deflection Analysis 9 Strain energy (axial load, shear, flexure, torsion) - Castigliano's theorems, Maxwell's reciprocal theorem, principle of virtual work, unit load method - deflection of determinate beams, frames, and trusses. Activity: Seminar on energy methods for deflection analysis.					
UNIT II Indeterminate Beams 9 Analysis of propped cantilever, fixed and continuous beams; fixed end moments, theorem of three moments, analysis of continuous beams, sinking of supports. Activity: Quiz on analysis methods and bending moment diagrams.					
UNIT III Columns and Pressure Vessels 9 Euler's theory, Rankine-Gordon formula, eccentrically loaded columns; middle third rule. Thin and thick cylinders and spheres, compound thick cylinders, Shrinking on stresses. Activity: Flipped classroom on column theories with problem-solving.					
UNIT IV 3D Stress, Failure Theories 9 Stress components, principal stresses, stress invariants, and failure theories. Activity: Poster presentation on failure theories and stress states.					
UNIT V Advanced Bending, Curved Structures 9 Unsymmetrical bending, curved beams, Winkler-Bach theory, Stresses in links and hooks. Activity: Model making to demonstrate bending and curved beam behavior.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz - 10%, Poster presentation - 15%; Seminar report - 10%; Model making - 15%; Internal Examinations - 50%					



References

1. Rajput. R.K., Strength of Materials, Chand. S and Co, New Delhi, 2018.
2. Bansal. R.K., Strength of Materials, Laxmi Publications, New Delhi, 2024.
3. Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, SMTS -I Strength of materials, Laxmi publications. New Delhi, 2025.
4. Basavarajiah and Mahadevapa, Strength of Materials, University press, Hyderabad, 2016
5. Bhavikatti, S. S. *Strength of Materials*, 5th Edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2025.

E Resources

1. NPTEL material <https://archive.nptel.ac.in/courses/105/105/105105108/>
2. <https://sm-nitk.vlabs.ac.in/>

CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Explain concepts of strain energy, indeterminate structures, columns, pressure vessels, and three- dimensional stress.	-	-	-	-
CO2	Apply energy methods and principles to determine deflections in beams, frames, and trusses.	PO1 (3), PO2 (3), PO3 (2)	3	2	-
CO3	Analyze statically indeterminate beams, columns, and pressure vessels under various loading conditions.	PO1 (3), PO2 (3), PO3 (3)	3	2	-
CO4	Evaluate structural behavior using 3 D stress failure theories	PO1 (3), PO2 (2), PO3 (2)	3	3	2
CO5	Evaluate advanced bending concepts in curved and unsymmetrical members and Winkler Bach theory	PO1 (3), PO2 (2), PO3 (2)	3	3	2



CE25402	Soil Mechanics	L	T	P	C
		3	0	0	3
Course objective: To enable the students to acquire the essential knowledge about the index and engineering properties of soils and their practical relevance.					
UNIT Soil Classification and Soil Compaction					9
Soil formation, structure, clay minerals, phase relationships, index properties, classification of soils (BIS, Unified).Theory - Laboratory and field tests - Field Compaction methods - Factors influencing compaction of soils.					
Activity: Collect soil samples and perform visual identification.					
UNIT II Effective Stress, Permeability					9
Soil water - Effective stress, capillarity, Darcy’s law, hydraulic conductivity, laboratory and field permeability tests, seepage, quicksand, and flow nets.					
Activity: Review of Competitive Exam questions related to simple flow nets for sheet pile or weir problems.					
UNIT III Stress Distribution					9
Stress distribution in homogeneous and isotropic medium – Boussinesq theory - (Point load, Line load and udl) - Use of New marks influence chart.					
Consolidation Settlement: Terzaghi’s one dimensional consolidation theory – Computation of rate of settlement - $\sqrt{t}$ and log t methods- e-log p relationship.					
Activity: Quiz on stress distribution					
UNIT IV Shear Strength					9
Shear strength of soils, Mohr-Coulomb theory, shear tests (direct shear, triaxial, UCC, vane shear), pore pressure parameters, liquefaction.					
Activity: Poster on shear strength tests and applications.					
UNIT V Slope Stability					9
Infinite slopes and finite slopes - Total stress analysis for saturated clay - Friction circle method – Use of stability number – Method of slices – Fellenius method - Slope protection measures.					
Activity: Case study on slope failure and mitigation.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz - 10%, Poster presentation - 15%; Seminar report - 10%; Model making - 15%; Internal Examinations – 50%					



References

1. Murthy V.N.S., Soil Mechanics and Foundation Engineering, CBS Publishers Distribution Ltd., New Delhi. 2020.
2. Gopal Ranjan and Rao, A.S.R., Basic and Applied Soil Mechanics, New Age Ltd. International Publisher New Delhi (India) 2020.
3. Coduto, D.P., Geotechnical Engineering - Principles and Practices, Prentice Hall of India Pvt. Ltd. New Delhi, 2015.
4. Das, B.M., Principles of Geotechnical Engineering, Cengage Learning India Private Limited, 8th Edition, 2017.
5. Punmia, B. C. Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundations*, 18th Edition, Laxmi Publications Pvt. Ltd., New Delhi, 2024.
6. IS 1498:1970 Classification and Identification of Soils for General Engineering Purposes.

E-resources

1. NPTEL web courses on Soil Mechanics -
<https://nptel.ac.in/courses/105101084>
2. NPTEL web courses on Geotechnical Engineering -
<https://archive.nptel.ac.in/courses/105/101/105101201/>
3. <https://smfe-iiith.vlabs.ac.in/>



CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Explain soil properties, classification and compaction characteristics to assess their suitability for engineering applications.	-	-	-	-
CO2	Apply effective stress, permeability, and seepage concepts to analyze soil-water interaction and groundwater flow problems.	PO1 (3), PO2 (3)	3	2	1
CO3	Analyze stress distribution, consolidation behavior, and settlement of soils under various loading conditions.	PO1 (3), PO2 (3)	3	2	-
CO4	Evaluate shear strength of soils using appropriate theories, laboratory parameters, and analytical methods.	PO1 (3), PO2 (3), PO3 (2)	3	2	2
CO5	Evaluate slope stability of soils and analytical methods.	PO1 (3), PO2 (3), PO3 (2)	3	2	2



CE25C05	Water Supply Engineering	L	T	P	C
		3	0	0	3
Course objective: To enable students to understand the planning, design, treatment, and distribution of safe and sustainable water supply systems, including source selection, water quality assessment, treatment technologies, and distribution networks in accordance with codal provisions.					
UNIT I Sources, Quality of Water Collection, Conveyance		9			
Planning of water supply, population forecasting, water demand, sources (surface & groundwater), water quality and standards - Intake structures, pipe materials, hydraulics of pipe flow, Transmission main design – Laying, jointing and testing of pipes, pumps and appurtenances.					
Activity: Poster on water sources and quality comparison for a town, Model Making of an intake and conveyance system.					
UNIT II Conventional Water Treatment		9			
Unit operations and processes – Principles, functions, and design of water treatment plant units, aerators, flash mixers, Coagulation and flocculation - Design of Clarifloccuator-Plate and tube settlers - Pulsator clarifier - sand filters - Disinfection - Residue Management – Operation and Maintenance aspects.					
UNIT III Advanced Water Treatment		9			
Sequencing Batch Reactor - Moving bed biofilm Reactor - Membrane Bioreactor - UASB - Biogas recovery - Reclamation and Reuse of sewage - Constructed Wetland - Nutrient removal systems - Desalination.					
Activity: Site Visit to a municipal water treatment plant.					
UNIT IV Distribution Systems		9			
Components - Selection of pipe material - Service reservoirs Functions - Network design - Analysis of distribution networks - Appurtenances - Leak detection.					
UNIT V Building Water Supply		9			
House service connection – Fixtures and fittings, systems of plumbing and types of plumbing- relevant NBC provisions.					
Activity: Case-based exercise on building water supply design.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					



Methodology for Continuous Assessment: Quiz - 10%, Poster presentation - 15%; Site visit report - 10%; Model making - 15%; Internal Examinations - 50%

References

1. Garg, S.K. Environmental Engineering, Khanna Publishers, New Delhi, 2018.
2. Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2021.
3. Punmia, B.C., Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi, 2012.
4. Manual on Water Supply and Treatment Systems, CPHEEO, Ministry of Housing and Urban Affairs, Government of India, New Delhi, 2023.
5. IS 10500:2012 Drinking Water - Specification.
6. IS 2065:1983 Code of Practice for Water Supply in Buildings.

E-Resources

1. <https://mohua.gov.in/publication/manual-on-water-supply-and-treatment-systems>
2. CPHEEO Manual on Operation & Maintenance of Water Supply Systems
3. <https://gwe-nitk.vlabs.ac.in/>



CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Explain water sources, quality parameters, and planning aspects of water supply systems as per Standards, intake design, conveyance, and pipe flow to design water transmission systems.	-	-	-	-
CO2	Design of water treatment plant, aerators, Coagulation and flocculation, Disinfection and Maintenance aspects	PO1 (3), PO2 (3), PO3 (2)	3	1	1
CO3	Analyze conventional and advanced water treatment processes and evaluate their performance.	PO1 (3), PO2 (3), PO3 (2)	3	2	1
CO4	Evaluate water distribution systems and analysis of distribution networks	PO1 (3), PO2 (3), PO3 (2)	3	2	2
CO5	Design components ensuring safe and sustainable supply	PO1 (3), PO2 (3), PO3 (2)	3	2	2



CE25403	Introduction to Standards in Civil Engineering	L	T	P	C
		1	0	0	1
Course Objective: To familiarize students with important BIS, IRC, environmental, and structural codes and enable their effective application in planning, design, construction, and infrastructure management.					
UNIT I Overview of Standards Basic concepts of standardization; Purpose of Standardization, marking and certification of articles and processes; Importance of standards to industry, policy makers, trade, sustainability and innovation. Objectives, roles and functions of BIS, Bureau of Indian Standards Act, ISO/IEC Directives; WTO Good Practices for Standardization. Important Indian and International Standards. Activity: Quiz on accreditation and certification bodies					3
UNIT II Structural Engineering National Building Construction Standards (NBCS) IS 875 (1-5) Code of Practice for Design Loads (Other Than Earthquake) For Buildings and Structures IS 800 General Construction using Hot Rolled Steel Sections IS 456 Code of practice: Plain and Reinforced Concrete Design IS 1893 Code of Practice: Criteria for Earthquake Resistant Design of Structures- General Provisions and Buildings IS 1343 Code of Practice for Prestressed Concrete					3
UNIT III Soil Mechanics and Foundation Engineering Soil Engineering Terms (IS2809) - Soil Testing and Characterization (IS 2720) - Soil Identification and Classification (IS1498) - Subsurface Exploration (IS 1892) - Field Testing for Bearing Capacity (IS2131, IS4968, IS1888) - General Requirements of Foundations (IS1904) – Bearing Capacity of Shallow Foundations (IS 6403) - Settlement of Foundation (IS 8009) - Pile Foundations (IS2911) - Raft Foundations (IS2650). Transportation Engineering: Road safety Audit (IRC: SP-88) –Pedestrian Facilities (IRC:103) - Parking Facilities (IRC: SP:12) - Cycle track (IRC 11) Indo- Highway Capacity Manual- Case Studies.					3
UNIT IV Water Resources Engineering IS 4986 Installation of Rain gauge (Non-Recording Type) and Measurement of Rain and Code of Practice IS 15797 Roof top rainwater harvesting IS 15896 Manual methods for measurement of groundwater level in a well IS 15792 code guide lines for Artificial recharge to groundwater IS 7113 Code of practice for Soil – Cement lining for canals					3



UNIT V Environmental Engineering**3**

BIS - Drinking water specifications (IS:10500) National Ambient Air Quality Standards Minimal National Standards (MINAS) for Industry Noise limits for vehicles Airport Noise Notification

Activity: Flipped classes for codes

Assessment Weightage: Internal Assessment :100%

Methodology for Continuous Assessment: Quiz - 25%, Flipped classes - 25%, Internal Examinations - 50%

References

1. Relevant IS/IRC/ISO Codes

E-Resources

1. Bureau of Indian Standards (BIS) - Official portal for Indian standards, list of codes, ISO/IEC directives & certification information - <https://www.bis.gov.in/>
2. National Building Code of India (NBC 2016) – <https://www.bis.gov.in/index.php/standards/technical-manuals-codes-of-practice/national-building-code/>
3. IRC Standards & Manuals (Indian Roads Congress) – Road safety, pedestrian & parking codes - <https://irc.org.in/ircstds>



CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Understand the principles, objectives, and institutional frameworks of standardization, accreditation, and certification at national and international levels.	-	-	-	-
CO2	Apply relevant Indian and international standards in civil engineering disciplines to ensure safety, quality, sustainability, and regulatory compliance in engineering practice.	PO1 (3) PO6 (2) PO7 (3)	3	3	2
CO3	Analyze the testing, classification and safe design of earth works and structural bases.	PO1 (3)	3	3	2
CO4	Design criteria, drinking water quality, and structural safety guidelines	PO1 (3)	3	3	2
CO5	Guidelines for water quality, wastewater testing, and sanitation design	PO1 (3)	3	3	2



CE 25C06	Concrete Technology	L	T	P	C
		3	0	2	4
Course objective: To impart fundamental knowledge of concrete materials, mix proportioning, and testing as per IS codes, and to develop the ability to design, evaluate, and apply conventional and special concretes for safe, durable, and sustainable construction practices.					
UNIT I Concrete Materials					9
Cement types, composition, properties, tests as per IS codes; aggregates (fine and coarse), properties, grading, and tests; quality of water for concrete.					
Practical: 1. Tests on Cement (fineness, consistency, setting time, specific gravity); 2. Tests on aggregate (grading, specific gravity, bulk density, impact, crushing, flakiness, elongation).					
UNIT II Admixtures and Fibres					9
Chemical admixtures (accelerators, retarders, plasticizers, superplasticizers, water proofers); mineral admixtures (fly ash, silica fume, GGBS, metakaolin); fibres and their effects on concrete properties.					
Activity: Flipped classroom on mineral admixtures					
UNIT III Concrete Mix Design					9
Principles of mix proportioning, nominal and design mix (with and without admixtures), BIS method, material properties for mix design, quality control and assurance.					
Activity: Concrete mix proportioning and fresh concrete testing (IS 516).					
UNIT IV Fresh and Hardened Concrete					9
Workability tests (slump, compaction factor), segregation, bleeding, NDT tests (rebound hammer, UPV), compressive and flexural strength, modulus of elasticity, durability studies.					
Practical: 3. Determination of slump of concrete 4. Determination of compressive strength of concrete					
UNIT V Special Concretes					9
High strength concrete, HPC, SCC, fiber reinforced concrete, ferrocement, ready mix concrete, shotcrete, polymer concrete, geopolymer concrete, sustainable concrete, 3D printing.					
Activity: Poster presentation on special concretes.					



Tasks:

1. Evaluate the properties of cement, aggregates, and water through laboratory testing and compare the results with IS code requirements.
2. Design and prepare a concrete mix for a specified grade using BIS guidelines and assess its fresh concrete properties.
3. Cast concrete specimens, determine compressive strength, and interpret the quality and durability characteristics of concrete.
4. Study a special concrete technology and present its materials, properties, applications, and sustainability benefits in construction.

Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%

Methodology for Continuous Assessment: Quiz (5%), Project (15%), Assignment (25%), Practical (25%), Internal Examinations (30%)

References

1. Gupta.B.L., Amit Gupta, Concrete Technology, Jain Book Agency, 2010.
2. Shetty, M. S, Concrete Technology, Chand.S and Company Ltd, New Delhi, 2026
3. Neville, A.M; Properties of Concrete, Pitman Publishing Limited, London,2011
4. Gambhir.M.L., Concrete Technology, Fifth Edition, McGraw Hill Education,2017.
5. Job Thomas., Concrete Technology, Cengage learning India Private Ltd, New Delhi, 2018.
6. IS 456:2000 Plain and Reinforced Concrete - Code of Practice.
7. IS 10262:2019 Concrete Mix Proportioning - Guidelines.
8. IS 2386 (Part 4):1963 Methods of Test for Aggregates for Concrete – Mechanical Properties.
9. IS 516 (Part 1/Sec 1):2021 Methods of Tests for Strength of Concrete.
10. SP 23:1982 Handbook on Concrete Mixes.

E-Resources

1. NPETL-Concrete Technology
<https://nptel.ac.in/courses/105106186>
2. Bureau of Indian Standards (BIS) - IS codes related to cement, aggregates, concrete and testing - <https://www.bis.gov.in>
3. <https://ct-dei.vlabs.ac.in/>



CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Evaluate the properties of cement, aggregates, and water through standard laboratory tests as per relevant IS codes.	PO2 (2) PO4 (3) PO5 (2) PO7 (3) PO8 (2)	2	2	1
CO2	Analyze the influence of chemical admixtures, mineral admixtures, and fibres on the fresh and hardened properties of concrete.	PO2 (2) PO4 (3) PO5 (2) PO8 (2)	3	2	1
CO3	Design and proportion concrete mixes using BIS methods and assess workability and quality control parameters.	PO1 (3) PO3 (3) PO7 (2) PO8 (2)	3	3	2
CO4	Determine the strength, durability, and performance of concrete in non-destructive testing methods.	PO1 (3) PO4 (3) PO5 (2) PO8 (3)	3	3	1
CO5	Determine the strength and durability, special concretes,	PO1 (3) PO4 (3) PO5 (2) PO8 (3)	3	3	1



CE25404	Design of Reinforced Cement Concrete Elements	L	T	P	C
		3	0	0	3
Course Objective To introduce the different design philosophy and thorough knowledge about reinforced concrete structural elements such as beams, column, roof slab, foundation and water tanks.					
UNIT I Design Concepts, Beams 9 Design concepts - Concept of elastic method, ultimate load method and limit state method - Advantages of limit state method over other methods - Design of rectangular beam section by working stress method - Limit state method of design of singly reinforced, doubly reinforced and flanged beams - Use of design aids for flexure. Activity: Design assignment on singly and doubly reinforced beams.					
UNIT II Slabs, Staircase 9 Analysis and design of cantilever, one way simply supported and continuous slabs and supporting Beams-Two-way slab- Design of simply supported and continuous slabs using IS code coefficients- Types of Staircases - Design of dog-legged Staircase. Activity: Problem-based learning on slab and staircase design.					
UNIT III Columns 9 Types of columns -Axially Loaded, Uni axial and Bi axial bending columns - Design of short rectangular axial, Uni-axial and Bi-axial bending columns. Activity: Bar bending schedule using Excel.					
UNIT IV Footings and Foundations 9 Concepts of Proportioning footings - Design of axially loaded footing- Wall footings- Combined footings (Rectangular, Circular and Trapezoidal)- Strap footing- Design principles of Raft footing. Activity: Quiz on footing design concepts.					
UNIT V Retaining Structures 9 Types of retaining walls - Applications- Structural behaviour of retaining walls- Stability requirements of retaining wall - Design of Cantilever retaining wall and Counterfort retaining wall – detailing of reinforcement. Activity: Model making of retaining wall systems.					
Weightage: Continuous Assessment: 40%, End Semester Examinations: 60%					
Methodology for Continuous Assessment: Quiz - 10%, Poster presentation - 15%; Site visit report - 10%; Model making - 15%; Internal Examinations - 50%					



References

1. Neelam Sharma, Reinforced Cement Concrete Design, 2nd Edition, S. K. Kataria & Sons, New Delhi, 2024.
2. Sinha, S.N., Reinforced Concrete Design, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2017
3. Unnikrishnan Pillai, S., Devdas Menon, Reinforced Concrete Design, Tata McGraw Hill Publishing Company Ltd., 2021
4. Punmia B.C., Ashok Kumar Jain, Arun Kumar Jain, Limit State Design of Reinforced Concrete, Laxmi Publication Pvt. Ltd., New Delhi, 2016
5. Shah V L Karve S R., Limit State Theory and Design of Reinforced Concrete, Structures Publications, Pune, 2013.
6. Gambhir.M.L., Fundamentals of Reinforced Concrete Design, Prentice Hall of India Private Limited, New Delhi, 2006.
7. Krishnaraju.N., Design of Reinforced Concrete Structures, CBS Publishers & Distributors Pvt. Ltd., New Delhi.
8. IS 456:2000 Plain and Reinforced Concrete - Code of Practice.
9. IS 875 (Part 1 & 2):1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures
10. IS 875 (Part 3):2015 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures – Wind Loads.
11. SP 16:1980 Design Aids for Reinforced Concrete to IS 456:1978.
12. SP 34:1987 Handbook on Concrete Reinforcement and Detailing.

E- resources

1. Concrete Structures - Limit State Design (I.S. 456:2000) (NPTEL Course Materials)
2. SP-16 Design Aids for Reinforced Concrete to IS 456:2000 Codes (BIS handbook)
https://www.services.bis.gov.in/cmd/cmd_handbook/SP16%20-%20Design%20Aids/
3. <https://drccs-coep.vlabs.ac.in/>



CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Explain design philosophies and behavior of reinforced concrete structural elements.	-	-	-	-
CO2	Apply limit state design principles to design beams, slabs, and staircases.	PO1 (2) PO2 (3) PO3 (3)	3	2	-
CO3	Analyze and design columns under different loading conditions.	PO1 (2) PO2 (3) PO3 (3)	3	2	-
CO4	Design of footings under different loading conditions.	PO1 (2) PO2 (3) PO3 (3)	3	2	-
CO5	Evaluate and design retaining structures ensuring stability and safety requirements.	PO1 (2) PO2 (3) PO3 (3)	3	3	2



CE25405	Highway Engineering	L	T	P	C
		3	0	2	4
Course objective: To provide a comprehensive understanding of highway engineering, including planning, alignment, geometric design, pavement materials and design, as well as construction, distresses, and maintenance of pavements for efficient and sustainable transportation systems.					
UNIT I Highway Planning and Alignment		9			
History of road development in India - Classification of highways - Institutions for Highway planning, design and construction at different levels - factors influencing highway alignment - Road ecology - engineering surveys (conventional and modern).					
Activity: Quiz on Highway Planning and Alignment					
UNIT II Geometric Design of Highways		9			
Typical Cross sections, sight distances, horizontal alignment (super elevation, transition curves), vertical alignment (gradients, summit and valley curves).					
Activity: Poster presentation on geometric design elements. Poster presentation on geometric design of highways					
UNIT III Flexible Pavement Design		9			
Desirable properties of subgrade soil, road aggregates and bituminous materials, testing methods - Pavement components and their functions - Factors influencing the design of pavements - IRC guidelines.					
Practical: 1. Tests on bitumen (specific gravity, penetration, viscosity, softening point, ductility) 2. Demonstration of Marshall test.					
UNIT IV Rigid Pavement Design		9			
Components, stresses (Westergaard theory), temperature and frictional stresses, joints, dowel and tie bars, IRC guidelines.					
Activity: Field visit to pavement construction site.					
UNIT V Highway Construction and Maintenance		9			
Construction of pavement layers, sustainable materials, methods and machinery, Highway drainage - Special considerations for hilly roads; Pavement failures - Types and causes of failures in flexible and rigid pavements, Evaluation and Maintenance of Pavements.					
Activity: Case study on pavement failures and maintenance methods.					



Tasks: (Any 2 tasks)**Task 1: Highway Alignment and Geometric Design**

Select a route and design horizontal and vertical alignment with proper sight distance and cross-sectional elements.

Task 2: Flexible Pavement Design

Design a flexible pavement using IRC guidelines based on given traffic and soil data.

Task 3: Rigid Pavement Design

Analyze stresses and design a rigid pavement slab with joints and reinforcement details.

Task 4: Pavement Evaluation and Maintenance Plan

Identify pavement distresses from a case study and propose suitable maintenance and rehabilitation measures.

Weightage: Continuous Assessment: 50%, End Semester Examinations: 50%

Methodology for Continuous Assessment: Quiz - 10%, Poster presentation - 15%; Site visit report - 10%; Model making - 15%; Internal Examinations - 50%

References

1. Khanna, S.K., Justo, C.E.G. G. and Veeraragavan A., Highway Engineering, Nem Chand and Bros, Roorkee, 2015(latest reprint available in 2024-2025).
2. Kadiyali, L.R., and Lal, N.B. Principles and Practice of Highway Engineering, Khanna Publishers, Reprint Edition, 2023.
3. Indian Road Congress (IRC), Guideline for design of flexible pavements-IRC:37-2018
4. Indian Road Congress (IRC), Guidelines for the Design of Plain Jointed Rigid Pavements for Highways-IRC:58-2015.
5. Khanna, S.K., Justo. C.E.G. and Veeraragavan A. Highway Materials and Pavement Testing, Nem Chand and Bros., Roorkee, Revised Fifth Edition, 2022 reprint available.
6. IRC:73-1980 - Geometric Design of Highways
7. IRC:37-2018 - Flexible Pavement Design
8. IRC:58-2015 - Rigid Pavement Design
9. IRC: SP:11-2015 - Quality Control in Highway Construction

E-Resources

1. <https://ts-nitk.vlabs.ac.in/> (Virtual labs)
2. National Highways Authority of India manuals and circulars : <https://nhai.gov.in/>



CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Explain the principles of highway planning, alignment, and geometric design considering traffic, safety, environmental, and ecological factors.	-	-	-	-
CO2	Design flexible and rigid pavements using IRC guidelines based on material properties, traffic loading, and subgrade characteristics.	PO2 (2) PO3 (3) PO7 (3)	3	2	1
CO3	Evaluate highway materials and pavement performance through standard laboratory tests, field studies, and failure analysis.	PO2 (2) PO4 (3) PO5 (2) PO8 (2)	3	2	-
CO4	Analyze highway construction, maintenance, and rehabilitation practices using modern materials, equipment, and technologies.	PO2 (2) PO4 (2) PO5 (3)	3	2	2
CO5	Apply suitable construction, drainage, maintenance and rehabilitation techniques for highway pavements considering pavement failures.	PO1(3), PO3(2), PO5(2)	3	3	2



CE25C07	Fluid Mechanics and Machinery Laboratory	L	T	P	C
		0	0	4	2
Course Objective: To provide hands on experience in calibration of flow meters, performance characteristics of pumps and turbines.					
List of Experiments: 1. Flow Measurement Devices Calibration of rotameter and flow measurement using venturimeter/orifice meter/notches. 2. Bernoulli's Theorem - Verification of Bernoulli's equation. 3. Losses in Pipes - Determination of friction factor and minor losses. 4. Pumps - Performance characteristics of centrifugal and reciprocating pump. 5. Turbines -Performance characteristics of Pelton and Francis turbine. 6. Metacentric Height - Determination of metacentric height of floating bodies.					
Tasks: (Perform any 2 tasks) Task 1: Compare discharge values obtained from different devices and analyze errors. Task 2: Evaluate major and minor losses in the system and Compare experimental results with theoretical/Moody chart values. Task 3: Plot performance curves and determine the specific speed of a centrifugal pump Task 4: Plot characteristic curves (H-Q, η -Q) and determine efficiency of a reciprocating pump. Task 5: Assess stability conditions and compare with theoretical values.					
Weightage: Continuous Assessment: 60%, End Semester Examinations: 40%					
Methodology for Continuous Assessment: Project (30%), Assignment (10%), Practical (30%), Internal Examinations (30%)					
References: 1. Hydraulic Laboratory Manual, Centre for Water Resources, Anna University, 2015. 2. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics. Standard Book House. New Delhi, 2022. 3. Subramanya.K, Fluid Mechanics and Hydraulic Machines, Tata McGraw Hill Edu. Pvt. Ltd. 2019.					
E-Resources 1. https://vlab.co.in 2. https://fmvlab.iitkgp.ac.in					



CO	CO Description	PO Mapping	PSO1	PSO2	PSO3
CO1	Perform fluid mechanics experiments and obtain relevant measurements.	PO4 (3) PO5 (2) PO8 (2) PO9 (2)	2	2	1
CO2	Analyze experimental data to evaluate flow behavior, losses, and energy principles.	PO2 (2) PO4 (3) PO5 (2) PO9 (2)	3	2	1
CO3	Evaluate the performance of hydraulic machines and interpret results for practical applications.	PO2 (2) PO4 (3) PO6 (2) PO9 (2)	3	3	1



EN25C04	English Communication Skills Laboratory– II	L	T	P	C
		0	0	2	1
Course Objectives: The objectives of the course are to build students' advanced communication skills for workplace readiness and develop intercultural competence for effective collaboration in global and virtual teams. Prepare students for competitive exams with focused skill-building and test-oriented practice.					
List of Activities					
Stage Ready – Impactful Public Speaking . (i) Simulate a formal event such as an academic conference, convocation, or awards ceremony, where students roles including Master of Ceremonies (MC), Role as a dignitary, and a Commentator (ii) Visual Prompt Storytelling: Use random images to create spontaneous stories, focusing on plot, setting, and character, (iii) Digital Presentation - Record a short video explaining a project or technical concept, using slides, voiceover, and visual aids (to be uploaded using google classroom or drive link)					
Professional and Application-Oriented Writing (i) Résumé Preparation: Design ATS-friendly résumés tailored to various job descriptions, using action verbs and quantifiable impact. · (ii) Design engaging content for poster presentation relevant to their domain.					
Receptive Skills in Workplace Communication· (i) Reading articles related to their domain and discuss in groups (ii) Visit company websites, make inferences and present in the class (iii) Listen to recorded mock interviews and take detailed notes. Summarise key points and action items in a professional format and make a presentation.					
Intercultural Communication (i) Assertive vs Aggressive communication (ii) Role play activities - workplace communication in intercultural/crosscultural contexts					
From Campus to Career: Industry Skills and Global Exam Preparation (i) Participate in HR interviews using AI tools or peer interviewers, responding to behavioural questions using methods like STAR (Situation, Task, Action, Result) (ii) Practice Verbal Ability in competitive exams like UPSC, SSC, CDS, TNPSC, etc.					
Weightage: Continuous Assessment: 60%, End Semester Lab Examinations: 40%.					
Internal Assessment Methodology: 1. Oral story telling using visual prompts (30 marks)					



2. Poster presentation (40 marks) 3. ATS resume writing (30 marks)	
End Semester Assessment: 1. Interview (50 marks) 2. Verbal Ability test (50 marks) (students must bring the resume but evaluation must be done based on the performance in the interview)	
References: 1. Lucas, Stephen, and Paul Stob. The Art of Public Speaking. Thirteenth edition, McGraw- Hill Education, 2020. 2. Abrahams, Matt. Think Faster, Talk Smarter: How to Speak Successfully When You're Put on the Spot. Simon & Schuster, 2023. 3. Beshara, Tony. Powerful Phrases for Successful Interviews, Rev. ed., McGraw-Hill, 2023. 4. Papalia, Anna. Interviewology: The New Science of Interviewing. Harper Business, 2024. 5. Verbal Ability and Reading Comprehension by Ajay Singh McGraw Hill Education 2020	
E-Resources: 1. Purdue OWL - Online Writing Lab (Academic and professional writing help) https://owl.purdue.edu/ 2. Canva Resume Builder (Creative, ATS-friendly resume design) https://www.canva.com/resumes/ 3. BBC Learning English - Pronunciation https://www.bbc.co.uk/learningenglish/english/features/pronunciation 4. India Bix website.	

CO	Description of CO	PO	PSO1
CO1	Understand basic industry-related reading materials.	-	-
CO2	Design and present a domain specific poster	PO9(3)	PSO1(2) PSO3(3)
CO3	Deliver effective digital presentations	PO9(3)	PSO2(1)
CO4	Communicate appropriately in intercultural/cross cultural contexts	PO9(3)& PO11(1)	PSO3(3)
CO5	Perform in interviews and competitive exams successfully	PO9(3)	PSO3(1)



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