



Learn Beyond

**KPR Institute of
Engineering and
Technology**

(Autonomous, Affiliated to Anna University)

CURRICULUM AND SYLLABI REGULATIONS – 2025

**Department of
Civil Engineering**

I. Vision and Mission of the Institute

Vision

To become a premier institute of academic excellence by imparting technical, intellectual and professional skills to students for meeting the diverse needs of industry, society, the nation and the world at large

Mission

- Commitment to offer value-based education and enhancement of practical skills
- Continuous assessment of teaching and learning processes through scholarly activities
- Enriching research and innovation activities in collaboration with industry and institutes of repute
- Ensuring the academic processes to uphold culture, ethics and social responsibilities

II. Vision and Mission of the Department

Vision

To be recognised in Civil Engineering through quality education, research and innovation for the sustainable development

Mission

The mission of the department is to

- Provide holistic education to students on emerging technologies in Civil Engineering
- Promote research and consultancy activities
- Instill in individuals a sense of ethical values and lifelong learning

III. Program Educational Objectives (PEOs)

The Program Educational Objectives (PEOs) of the CIVIL ENGINEERING (CE) represent major accomplishments that the graduates are expected to achieve after three to five years of graduation.

PEO1: Acquire adequate knowledge in the core areas of Civil Engineering, with relevant communication and presentation skills and excel in their chosen profession

PEO2: Engage in research activities, conduct innovative studies and contribute to the advancement of knowledge in the fields of Civil Engineering

PEO3: Exhibit commitment to ethical behaviour and integrity, upholding professional and moral values in their profession

IV. Program Outcomes (POs)

Graduates of the CIVIL ENGINEERING will be able to

- PO1:** Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems
- PO2:** Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development (WK1 to WK4)
- PO3:** Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required (WK5)
- PO4:** Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions (WK8)

h/t
30/7/2024
HEAD OF THE DEPARTMENT

Department of Civil Engineering

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Araán, Coimbatore - 641 407.

- PO5:** Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems (WK2 and WK6)
- PO6:** The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment (WK1, WK5, and WK7)
- PO7:** Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws (WK9)
- PO8:** Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/ multi-disciplinary teams
- PO9:** Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
- PO10:** Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments
- PO11:** Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (WK8)

Knowledge and Attitude Profile (WK)

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

V. Program Specific Outcomes (PSOs)

Graduates of the CIVIL ENGINEERING will be able to

- PSO1:** Construct civil engineering systems ensuring safety and cost-effective execution
- PSO2:** Develop sustainable and environmental-friendly solutions by adopting green building concepts

VI. PEO / PO Mapping


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 Arcot, Chennai - 601 105

Following three levels of correlation should be used:

- 1: Low
- 2: Medium
- 3: High

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
PEO 1	3	3	3	2	3	2	2	3	3	3	3	3	3
PEO 2	2	3	3	3	3	2	2	2	2	3	3	2	2
PEO 3	2	2	2	1	1	3	3	2	2	3	2	2	3

VII. Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
I	English Proficiency I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Matrices and Calculus	✓	✓	-	✓	✓	-	-	-	-	-	-	-	-
	Engineering Physics	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-
	Applied Chemistry for Civil Engineers	✓	✓	✓	✓	-	-	-	✓	✓	-	✓	✓	✓
	Problem Solving using C	✓	✓	✓	✓	✓	-	-	-	-	-	✓	-	-
	Digital Technologies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
	Civil Engineering Perspectives	✓	✓	-	-	-	-	-	✓	✓	-	-	✓	✓
	Chinese for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	French for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Japanese for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Hindi for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	German for Engineers - I	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Induction Program - Universal Human Values I	-	-	-	-	-	✓	✓	✓	-	-	✓	✓	✓
	Heritage of Tamils	-	-	-	-	-	-	✓	✓	-	✓	-	-	-
	Design Thinking	✓	✓	✓	✓	-	-	-	-	✓	✓	✓	-	-
	Biology for Engineers	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	-	-
	Computer Fundamentals and Coding Essentials	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	-	-
II	English Proficiency II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Mathematical Transforms	✓	✓	-	✓	✓	-	-	-	-	-	-	-	-
	Physics for Civil Engineers	✓	✓	✓	✓	-	-	-	-	-	-	-	✓	✓
	Environmental Science and Sustainability	✓	✓	✓	✓	-	-	✓	✓	✓	-	✓	✓	✓
	Programming with Python	✓	✓	✓	✓	✓	-	-	-	-	-	✓	-	-
	Basics of Mechanical Engineering	✓	✓	-	-	✓	✓	-	✓	✓	-	-	-	-
	Basics of Electrical Engineering	✓	✓	-	-	-	-	-	-	-	-	✓	-	-
	Basics of Electronics Engineering	✓	✓	✓	✓	✓	-	-	✓	✓	-	✓	-	-
	Engineering Graphics	✓	✓	-	-	✓	-	✓	✓	✓	-	✓	✓	-
	Engineering Mechanics for Civil Engineers	✓	✓	-	-	✓	-	✓	-	-	-	-	✓	-

Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
	Chinese for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Hindi for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	French for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Japanese for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	German for Engineers - II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Universal Human Values II	-	-	-	-	-	-	-	✓	✓	-	✓	-	-
	Tamils and Technology	-	-	-	-	-	-	✓	✓	-	✓	-	-	-
	Design Thinking	✓	✓	✓	✓	-	-	-	-	✓	✓	✓	-	-
	Biology for Engineers	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	-	-
	Computer Fundamentals and Coding Essentials	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	-	-
III	Probability and Statistics	✓	✓	-	-	✓	-	-	-	-	-	-	-	-
	Strength of Materials	✓	✓	✓	✓	-	✓	-	-	-	-	✓	✓	-
	Construction Materials and Techniques	✓	✓	✓	✓	-	✓	-	-	-	-	✓	✓	✓
	Engineering Survey	✓	✓	✓	✓	✓	✓	-	-	-	-	✓	✓	-
	Concrete Technology	✓	✓	✓	✓	-	✓	✓	✓	✓	-	✓	✓	✓
	Materials Testing Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	✓	✓
	Surveying Laboratory	✓	✓	✓	-	✓	-	✓	✓	-	-	-	-	-
	Essence of Indian Traditional Knowledge	-	✓	-	✓	-	-	✓	-	-	-	-	-	-
	Professional Skill Development - I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IV	Numerical Methods and Partial Differential Equations	✓	✓	-	-	-	-	-	-	-	-	-	-	-
	Fluid Mechanics and Hydraulic Engineering	✓	✓	✓	✓	-	✓	-	-	-	-	✓	✓	-
	Highway Engineering	✓	✓	✓	✓	-	✓	✓	-	-	-	-	✓	✓
	Water Supply and Wastewater Engineering	✓	✓	✓	✓	-	✓	✓	-	-	-	-	✓	✓
	Geotechnical Engineering I	✓	✓	✓	✓	-	✓	✓	✓	-	-	✓	✓	-
	Water and Wastewater Analysis Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓	✓
	Hydraulic Engineering Laboratory	✓	✓	✓	✓	-	✓	✓	✓	-	-	-	✓	-
	Indian Constitution	-	-	-	-	-	✓	✓	✓	-	-	-	-	-
	Professional Skill Development - II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

30/1/2026

CIVIL ENGINEERING
Regulations 2025
For the students admitted from 2025 onwards
CHOICE BASED CREDIT SYSTEM
CURRICULUM FOR I - VIII SEMESTERS

**SEMESTER I**

No	Course Code	Title	Category	Type	L	T	P	J	C
1	U25ENG01	English Proficiency I	HSMC	L	-	-	2	-	1
2	U25MA102	Matrices and Calculus	BSC	TwL	2	-	2	-	3
3	U25PH101	Engineering Physics	BSC	TwL	2	-	2	-	3
4	U25CY104	Applied Chemistry for Civil Engineers	BSC	TwL	2	-	2	-	3
5	U25CSG02	Problem Solving using C	ESC	TwL	2	-	2	-	3
6	U25CSG03	Digital Technologies	ESC	T	1	-	-	-	1
7	U25CE101	Civil Engineering Perspectives	PCC	TwL	1	-	4	-	3
8	U25LEG01	German for Engineers - I	HSMC	TwL	1	-	2	-	2
	U25LEG02	Japanese for Engineers - I							
	U25LEG03	French for Engineers - I							
	U25LEG04	Hindi for Engineers - I							
	U25LEG09	Chinese for Engineers - I							
Total									19
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
9	U25MCC01	Induction Program - Universal Human Values I	MCC	MCC	2	1	-	-	3
10	U25MCC02	Heritage of Tamils	MCC	Tamil Courses	1	-	-	-	1
11	U25MCC03	Design Thinking	MCC	MCC	1	-	2	-	2
	U25MCC04	Computer Fundamentals and Coding Essentials @							
	U25MCC05	Biology for Engineers \$							
Total									6

\$ - For Non-Biology Students, @ - For Biology Students

SEMESTER II

No	Course Code	Title	Category	Type	L	T	P	J	C
1	U25ENG02	English Proficiency II	HSMC	L	-	-	2	-	1
2	U25MA204	Mathematical Transforms	BSC	TwL	2	-	2	-	3
3	U25PH203	Physics for Civil Engineers	BSC	TwP	2	-	-	2	3
4	U25CY201	Environmental Science and Sustainability	BSC	TwL	1	-	2	-	2
5	U25CSG06	Programming with Python	ESC	TwL	2	-	2	-	3
6	U25ECG01	Basics of Electronics Engineering	ESC	TwL	1	-	2	-	2
	U25EEG01	Basics of Electrical Engineering							
	U25MEG02	Basics of Mechanical Engineering							
7	U25MEG03	Engineering Graphics	ESC	L	-	-	4	-	2

No	Course Code	Title	Category	Type	L	T	P	J	C
8	U25CE201	Engineering Mechanics for Civil Engineers	ESC	T	3	-	-	-	3
9	U25LEG05	German for Engineers - II	HSMC	TwL	1	-	2	-	2
	U25LEG06	Japanese for Engineers - II							
	U25LEG07	French for Engineers - II							
	U25LEG08	Hindi for Engineers - II							
	U25LEG10	Chinese for Engineers - II							
Total									21
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
10	U25MCC06	Universal Human Values II	MCC	MCC	2	1	-	-	3
11	U25MCC07	Tamils and Technology	MCC	Tamil Courses	1	-	-	-	1
12	U25MCC03	Design Thinking	MCC	MCC	1	-	2	-	2
	U25MCC04	Computer Fundamentals and Coding Essentials @							
	U25MCC05	Biology for Engineers \$							
Total									6

\$ - For Non-Biology Students, @ - For Biology Students

\$ - For Non-Biology Students, @ - For Biology Students

SEMESTER III

No	Course Code	Title	Category	Type	L	T	P	J	C
1	U25MA302	Probability and Statistics	BSC	TwL	2	-	2	-	3
2	U25CE301	Strength of Materials	PCC	T	3	1	-	-	4
3	U25CE302	Construction Materials and Techniques	PCC	T	3	-	-	-	3
4	U25CE303	Engineering Survey	PCC	T	3	-	-	-	3
5	U25CE304	Concrete Technology	PCC	TwL	3	-	2	-	4
6	U25CE305	Materials Testing Laboratory	PCC	L	-	-	4	-	2
7	U25CE306	Surveying Laboratory	PCC	L	-	-	4	-	2
Total									21
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
8	U25MNC02	Essence of Indian Traditional Knowledge	MNC	MNC	1	-	-	-	-
9	U25MCC08	Professional Skill Development - I	MCC	MCC	-	-	-	-	1
Total									1

SEMESTER IV

No	Course Code	Title	Category	Type	L	T	P	J	C
1	U25MA403	Numerical Methods and Partial Differential Equations	BSC	T	3	-	-	-	3
2	U25CE401	Fluid Mechanics and Hydraulic Engineering	PCC	T	3	-	-	-	3
3	U25CE402	Highway Engineering	PCC	T	3	-	-	-	3
4	U25CE403	Water Supply and Wastewater Engineering	PCC	T	3	-	-	-	3
5	U25CE404	Geotechnical Engineering I	PCC	TwL	3	-	2	-	4
6	U25CE405	Water and Wastewater Analysis Laboratory	PCC	LWP	-	-	2	2	2

T - Theory, L - Laboratory, TwL - Theory with Laboratory, TwP - Theory with Project

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Arasur, Coimbatore - 641 407.



SEMESTER I

U25ENG01	English Proficiency I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		0	0	2	0	1

COURSE OBJECTIVES:

- Comprehend technical vocabulary
- Apply reading strategies to understand academic and professional texts

COURSE OUTCOMES:

CO 1: Comprehend technical and professional documents using vocabulary and strategies

Remember

CO 2: Evaluate the understanding from technical reports and case studies

Understand

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	2	3	-	2	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	2	-	-

LIST OF EXPERIMENTS

1. Contextual lexicon – Discourse markers – Strategies for reading – Read aloud: stress and intonation – Interpretive Reading and narrative analysis – Critical reading of abstracts and conclusions from research articles / magazines / blogs
2. Newspaper: Opinions, Editorials and Columns – Short Story: The Bet – Anton Chekhov – Science Fiction: Never Let Me Go – Kazuo Ishiguro
3. Reading Standard Operating Procedures (SOPs) – Manuals – Case Studies (Field Work) Evaluation – Sustainability Practices in Industry: A Case Study – Biographies of Popular Engineers and Inventors – Success Stories of Start-ups and Entrepreneurs

CONTACT PERIODS:

Lecture: - Periods Tutorial: - Periods Practical: 30 Periods Project: - Periods Total: 30 Periods

TEXTBOOKS:

1. Meenakshi Raman and Sangeeta Sharma, "Technical Communication: Principles and Practice", 3rd Edition, Oxford University Press, 2015
2. Debra Daise and CharlNorloff, "Q Skills for Success: Q: Skills for Success: Reading and Writing, Level 4", 3rd Edition, Oxford University Press, 2019

REFERENCES:

1. Sudharshana N P and Savitha C, "English for Technical Communication", 1st edition, Cambridge University Press, 2016
2. Thomas L. Means, "English and Communication for Colleges", 4th Edition, Cengage India Private Limited, 2017

SEMESTER I

U25MA102	Matrices and Calculus (Common to CE, CH, ME, MI)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To build competence in using matrices for solving systems and modeling physical systems
- To apply techniques of calculus for engineering analysis involving rates of change, motion, and area/volume estimation
- To interpret real-world problems in terms of calculus and matrix methods for design and analysis

COURSE OUTCOMES:

- CO 1: Solve engineering problems involving systems of equations and matrix-based methods Apply
- CO 2: Use differential calculus to solve and optimize engineering processes Apply
- CO 3: Apply integration techniques to find areas and volumes in engineering models Apply
- CO 4: Interpret physical scenarios like motion and system changes using calculus concepts Apply
- CO 5: Understand and apply concepts of matrix transformations and characteristic values to engineering models Understand
such as vibrations and stability

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 5	2	2	-	2	1	-	-	-	-	-	-	-	-

SYLLABUS:

UNIT I: MATRIX METHODS FOR ENGINEERING PROBLEMS

6 + 6

Review of matrix operations – Determinant – based methods for inverse computation – Solving systems of equations using inverse method and Cramer's rule – Applications to circuit analysis and structural systems

UNIT II: CALCULUS FOR MAXIMA MINIMA

6 + 6

Applications of Derivative in optimization: maxima and minima – Rate of change in physical systems (e.g., flow rate, motion) – Higher – order derivatives in design and behavior analysis

UNIT III: TECHNIQUES AND APPLICATIONS OF INTEGRATION

6 + 6

Definite integrals for area under curves and between curves – Volume calculation by integration (e.g., rotating objects, storage tanks) – Techniques: Substitution and integration by parts – Engineering application-based examples

UNIT IV: CALCULUS OF DYNAMICS AND OPTIMIZATION

6 + 6

Motion along a line: position, velocity, acceleration – Time – rate problems in machines, piping systems – Models for Improving Engineering Efficiency – Cost and Design Criteria

UNIT V: MATRIX APPLICATIONS IN SYSTEM BEHAVIOUR**6 + 6**

Matrix-based transformations in 2D/3D systems – Characteristic values (eigenvalues) and characteristic directions (eigenvectors) – Applications: Vibrations in mechanical systems, system stability in control processes

LIST OF EXPERIMENTS

1. System Solving using Matrices – Implement and solve matrix systems arising from real applications – Visualize and interpret results
2. Rate-Based and Design Improvement Modeling – Model and solve rate-based engineering problems using derivatives (e.g., fluid flow, heat transfer) – Apply calculus to optimize designs (e.g., beam dimensions, tank volume)
3. Integration for Design Computations – Estimate areas/volumes for components – Plot 2D and 3D integrated shapes
4. Motion and System Dynamics Visualization. – Plotting and Analyzing Motion – Dynamic System Simulation
5. Characteristic Value Applications – Compute eigenvalues/eigenvectors for simple systems – Apply to stability and vibration models

CONTACT PERIODS:**Lecture:** 30 Periods**Tutorial:** - Periods**Practical:** 30 Periods**Project:** - Periods**Total:** 60 Periods**TEXTBOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley, 10th Ed., 2018
2. Gilbert Strang, Introduction to Applied Mathematics, Wellesley-Cambridge Press, 2016

REFERENCES:

1. George B. Thomas, Thomas' Calculus, Pearson, 13th Ed., 2018
2. Grewal, B.S. Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017
3. Dennis G. Zill, Advanced Engineering Mathematics, Cengage, 2012

SEMESTER I

U25PH101	Engineering Physics (Common to all programmes)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To understand the fundamental mechanical and thermal properties of solids and fluids for real-world engineering applications
- To explore advanced concepts in ultrasonic waves and their applications in imaging, testing, and sensing technologies
- To gain insights into semiconductor physics and photonics for their role in modern electronic and optical systems

COURSE OUTCOMES:

- CO 1:** Explain the modulus of elasticity and stress-strain behavior of materials to infer the elastic properties of materials Understand
- CO 2:** Examine the heat transfer in thermal systems and properties of fluids Analyze
- CO 3:** Apply the principles of ultrasonics in testing, imaging, and communication technologies Apply
- CO 4:** Estimate charge carrier transport in semiconductors and the performance of devices such as Hall effect sensors and Schottky diodes Apply
- CO 5:** Organise the principles of laser and fiber optics for industrial and medical applications Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	3	2	2	-	-	-	-	-	-	-	-	-
CO 3	3	2	1	1	-	-	-	-	-	-	-	-	-
CO 4	3	2	1	1	-	-	-	-	-	-	-	-	-
CO 5	3	2	1	1	-	-	-	-	-	-	-	-	-

SYLLABUS:

UNIT I: MECHANICAL PROPERTIES OF SOLIDS

6 + 6

Modulus of Elasticity – Stress-strain diagram – Poisson's ratio – Elastic and plastic deformation – Stress-strain behaviour in metals, polymers and ceramics – Bending Moment – Cantilever – Applications (GIRDERS, MEMS)

UNIT II: FUNDAMENTALS OF HEAT TRANSFER AND FLUIDS

6 + 6

Heat transfer – Thermal expansion – Heat conductivity – Lee's Disc method – Surface tension – Viscosity – Coefficient of viscosity using Poiseuille's flow experiment – Solar water heater – Microwave oven – Heat exchangers – Radiators – Cooling towers

UNIT III: ULTRASONICS AND ITS APPLICATIONS

6 + 6

Properties of Ultrasonic waves – Production of ultrasonic waves – Piezoelectric Oscillator – Magnetostriction Oscillator – Velocity measurement of Ultrasonic waves – SONAR – Non-Destructive Testing – Ultrasound imaging in medicine – Ultrasonic scanning methods

UNIT IV: SEMICONDUCTOR PHYSICS**6 + 6**

Properties – Direct and Indirect bandgap-semiconductor – Intrinsic and extrinsic Semiconductors – Carrier concentration in n-type semiconductor – P-type semiconductor – Carrier Transport in Semiconductor – Hall effect – Ohmic contacts – Schottky diode

UNIT V: PHOTONICS**6 + 6**

Interaction of Radiation with Matter – Laser Characteristics – Population Inversion – CO₂ laser – Semiconductor Diode Laser – Laser applications – Total Internal Reflection – Structure and working principle of Optical fibre – Fiber optic Endoscopy – Fiber optic sensors

LIST OF EXPERIMENTS

1. Determine the moduli of elasticity of the given beams and evaluate them for different structural applications. (High/Medium/Low modulus)
2. Evaluate the shear moduli of the different materials and rank them for suitable applications with reference to their strength
3. Select the most effective thermal insulation material from mica, cardboard, and glass for optimal heat protection
4. Determine the Viscosity of Liquids Using Poiseuille's Method and Identify the Fastest-Flowing Liquid
5. Measure the speed of ultrasound in liquids and calculate their compressibility for different hydraulic purposes
6. Categorize the specified semiconducting materials according to their energy bandgap values
7. Determine a semiconducting material's Hall coefficient and identify its type
8. Determination of wavelength of given laser and the particle size of the given samples using diffraction method
9. Use an optical fiber to measure its light-gathering capacity and calculate the propagation angle
10. Calculate the surface tension of different liquids and examine how surfactants affect it
11. Determination of wavelength of various spectral lines by using spectrometer and grating
12. Determination of velocity of light passing through glass medium using spectrometer

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. M.N. Avadhanulu, P.G. Kshirsagar, and T.V.S. Arun Murthy, "A Textbook of Engineering Physics", 11th edition, S. Chand Publishing, New Delhi, 2022
2. R.K. Gaur and S.L. Gupta, "Engineering Physics", 8th edition, Dhanpat Rai Publications, New Delhi, 2017

REFERENCES:

1. Harald Ibach and Hans Luth, "Solid State Physics: An Introduction", 4th edition, Springer-Publications, 2020
2. Charles Kittel, revised by David Pines (Editor) "Introduction to Solid State Physics", 9th edition, Wiley & Sons, US, 2020
3. H.K. Malik and A.K. Singh "Engineering Physics" Publisher: McGraw Hill Education India 2022
4. <https://onlinecourses.nptel.ac.in/noc20cy17/preview>

SEMESTER I

U25CY104	Applied Chemistry for Civil Engineers	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To introduce the synthesis, properties, processing, and applications of polymers, composites, and modern materials used in engineering
- To describe water purification techniques and corrosion prevention techniques
- To explain various materials used as protective coatings and adhesives for construction

COURSE OUTCOMES:

- CO 1:** Execute polymer synthesis, molecular weight determination using viscometry, and the structure–functional behavior of polymers in electronic applications. Apply
- CO 2:** Identify suitable techniques to assess water quality parameters and industrial water purification methods. Apply
- CO 3:** Implement appropriate metallic coatings and surface treatments to minimize corrosion in engineering materials. Apply
- CO 4:** Develop coatings, specialty paints, and adhesives for industrial applications Apply
- CO 5:** Execute the chemical concepts to optimize the manufacturing and properties of construction materials. Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	-	-	1	1	-	1	2	1
CO 2	3	2	1	1	-	-	-	1	1	-	1	1	2
CO 3	3	2	1	1	-	-	-	1	1	-	1	2	-
CO 4	3	2	1	1	-	-	-	1	1	-	1	2	2
CO 5	3	2	1	1	-	-	-	1	1	-	1	1	1

SYLLABUS:

UNIT I: POLYMERS & COMPOSITES

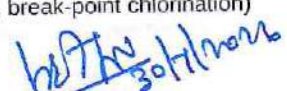
6 + 6

Introduction, Synthesis, properties and applications of PMMA, ABS, Teflon, Moulding Techniques – Compression, Injection, Extrusion, 3D printing, Rapid prototyping Conductive and Photoactive Polymers – Synthesis – PANI, PEDOT(Poly-3,4-ethylenedioxythiophene), conduction mechanisms, exciton generation, properties and applications – Geo & Green polymers – aluminosilicates, PLA, PHA, types, synthesis and applications, Composites – Types, fabrication, GFRP (Glass Fiber Reinforced Polymer), CFRP (Carbon Fiber Reinforced Polymer) – properties, processing and applications, Smart polymers – Self-healing and shape memory polymers

UNIT II: WATER AND ITS TREATMENT

6 + 6

Water – Water quality parameters (turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic), BIS and WHO drinking water standards, Hardness, Water treatment for industrial purpose, External conditioning-Lime Soda process, softening by Ion-exchange process, Desalination Techniques – Electro dialysis and Reverse osmosis, Municipal and sewage water treatment- process, disinfection (UV, Ozonation, break-point chlorination)



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UNIT III: CORROSION & ALLOYS**6 + 6**

Corrosion – Types, factors influencing corrosion, control methods (Cathodic protection – Sacrificial anode and impressed current method) – Alloys – significance of alloying, functions and properties of alloying elements, Heat Treatment process, Thermo-Mechanically Treated bars, grades-Fe-415D, Fe500D, Fe550D, Fe600 and its applications – Ferrous-Stainless steel, Non-Ferrous alloys –Duralumin – Composition, properties and uses – Advanced Surface Treatments – Electroplating, Hot Dipping, Galvanizing, Tinning, Phosphating

UNIT IV: PROTECTIVE COATINGS AND ADHESIVES**6 + 6**

Paint – Characteristics, Constituents Oil & Emulsion paints and their functions, Types, Defects and Failure of Paints – Specialty Paints and Finishes (Heat resistant, fire retardant, water repellent- Antifouling, luminous paints, Anti-Corrosive -Zinc-rich, phosphate-based, epoxy-based coatings, UV-Resistant coatings. Adhesives – Characteristics, Classification, composition, bonding mechanism, applications in building construction, in electrical industry, conductive adhesives, structural adhesives in aerospace industry, adhesives in automobile industry

UNIT V: CHEMISTRY IN CONSTRUCTION**6 + 6**

Refractories – Classification, Properties and applications, Ultra-high temperature ceramics (UHTCs) – manufacture and applications, Cement – types, special cements, water proof cement, high-alumina cement, classification and properties, manufacturing – Wet method, chemical requirements (as per IS: 269:2013), process of setting and hardening of cement, additives for cement (Accelerators, Retarders, Extenders & dispersants), Chemistry involved in Concrete, Decay of concrete, RCC. Glass – Types, Basic processes of glass making – Batch process, Continuous process

LIST OF EXPERIMENTS

1. Synthesis of Polyaniline (PANI) and Bakelite
2. Determination of Molecular Weight and Degree of Polymerisation of a given polymer using an Ostwald Viscometer
3. Determination of pH, TDS and COD of water sample
4. Determination of chloride content in water sample
5. Determination of rate of corrosion of mild steel by weight loss method
6. Potentiometric estimation of Fe present in corrosion medium
7. Preparation of synthetic adhesive
8. Testing of cement (% of CaO by EDTA method)
9. Determination of iron in cement using spectrophotometer/colorimetry

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 30 Periods Project: - Periods Total: 60 Periods

TEXTBOOKS:

1. S.S. Dara and S.S. Umare, "A Textbook of Engineering Chemistry", 12th edition, Chand Publishing, New Delhi, 2024
2. Wiley India Pvt. Ltd. "Engineering Chemistry", 2nd edition, Wiley India Pvt. Ltd., New Delhi: 2013
3. R.V. Gadag and A. Nityananda Shetty, "Engineering Chemistry", 3rd edition, I.K. International Publishing House, New Delhi, 2014
4. Sunita Rattan, "Experiments in Applied Chemistry", 3rd edition, S.K. Kataria & Sons, New Delhi, 2021

REFERENCES:

1. Fred W Billmeyer, "Textbook of Polymer Science", 4th edition, John Wiley & Sons, New York, 1999
2. Lieng-Huang Lee, "Conductive Polymers and Plastics: In Industrial Applications", 1st edition, Springer, New York, 1990

B.E. - CE - R2025 - CBCS

3. M.F. Ashby and D.R.H. Jones, "Engineering Materials 2: An Introduction to Microstructures, Processing and Design", 4th edition, Elsevier, UK, 2012
4. Kirby W Beard, "Linden's Handbook of Batteries", 5th edition, McGraw Hill, New York, 2019
5. Ira N Levine, "Quantum Chemistry" 7th edition, Pearson, Boston, 2013
6. G.A Ozin and C.A. Andre, "Nanotechnology: A Chemical Approach to Nanomaterials. 2nd edition", Royal Society of Chemistry, Cambridge, 2005
7. A. K. De, "Environmental Chemistry", 8th edition, New Age International (P) Ltd, 2017

SEMESTER I

U25CSG02	Problem Solving using C (Common to CE, CH, ME)	Category: ESC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To provide exposure to problem-solving through programming
- To develop computational thinking perspective of one's discipline
- To write, compile and debug programs using the C language

COURSE OUTCOMES:

- CO 1:** Describe the basic organization of computers and number systems, and construct flowcharts, algorithms, Understand and pseudocode to represent solutions for real-world problems
- CO 2:** Develop C programs using variables, data types, operators, control structures, and input/output functions Apply to solve basic scientific and statistical problems
- CO 3:** Implement one-dimensional and two-dimensional arrays and perform string operations such as searching, Apply sorting, and matrix manipulations
- CO 4:** Design modular programs using functions, recursion, and pointers for efficient memory usage and Apply structured data handling
- CO 5:** Construct and manipulate programs using structures and unions to model and solve real-world problems Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	2	1	1	-	-	-	-	-	-	2	-	-
CO 3	3	2	1	1	-	-	-	-	-	-	2	-	-
CO 4	3	2	1	1	-	-	-	-	-	-	2	-	-
CO 5	3	2	1	1	1	-	-	-	-	-	2	-	-

SYLLABUS:

UNIT I: INTRODUCTION

6 + 6

Generation and Classification of Computers – Basic Organization of a Computer – Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart

UNIT II: C PROGRAMMING BASICS

6 + 6

Problem formulation – Problem Solving - Introduction to 'C' programming – Structure of a 'C' program – Compilation and linking processes – Constants, Variables – Data Types – Expressions using operators – Managing Input and Output operations – Decision Making and Branching – Looping statements – Solving simple scientific and statistical problems

UNIT III: ARRAYS AND STRINGS

6 + 6

Arrays – Initialization – Declaration – One-dimensional and Two-dimensional arrays. String- String operations – String Arrays. Simple programs – sorting – searching – matrix operations

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 HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Arasur, Coimbatore – 641 407.

UNIT IV: FUNCTIONS AND POINTERS

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers – Definition – Initialization – Pointers arithmetic – Pointers and arrays – Example Problems

UNIT V: STRUCTURES AND UNIONS

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives

LIST OF EXPERIMENTS

1. Program Using Basic Input/Output and Arithmetic Expressions
2. Program to Solve a Scientific Problem using Decision Making and Looping
3. Program for Sorting Elements in a One-Dimensional Array
4. Program for Matrix Addition using Two-Dimensional Arrays
5. Program for String Manipulation using Standard String Functions
6. Program using User Defined Functions with Pass by Value and Reference
7. Program using Structures and Nested Structures
8. Program using String and Arrays for Solving Engineering Problems
9. Program using User Defined Functions for Solving Engineering Problems
10. Program using Structures for Solving Engineering Problems

CONTACT PERIODS:

Lecture: 30 Periods	Tutorial: - Periods	Practical: 30 Periods	Project: - Periods	Total: 60 Periods
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TEXTBOOKS:

1. David D. Railey and Kenny A.Hunt , "Computational Thinking for Modern problem Solver", 1st Edition, CRC Press, 2014
2. Brian W. Kernighan and Dennis Ritchie, " The C Programming Language", 2nd Edition, Pearson, 2015

REFERENCES:

1. Paolo Ferragina and Fabrizio Luccio, "Computational Thinking First Algorithms", Then Code" ,1st Edition, Springer International Publishing, 2018
2. Reema Thareja, "Programming in C", 2nd Edition, Oxford University Press, 2016
3. Paul Deitel and Harvey Deitel, "C How to Program", 7th Edition, Pearson Publication, 2015
4. Juneja, B. L and Anita Seth, "Programming in C", 1st Edition, Cengage Learning India Pvt. Ltd., 2011
5. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", 1st Edition, Oxford University Press, 2009

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Aracur, Coimbatore - 641 407.



SEMESTER I

U25CSG03	Digital Technologies (Common to all programmes)	Category: ESC				
		L	T	P	J	C
		1	0	0	0	1

COURSE OBJECTIVES:

- To explain the foundational concepts of AI, IoT, cloud, cybersecurity, and blockchain technologies
- To apply practical knowledge of OpenAI, RPA, and digital marketing strategies effectively
- To analyse interconnected smart systems, big data, and evolving digital landscapes
- To evaluate ethical implications of AI, data privacy, and societal impact of technologies

COURSE OUTCOMES:

- CO 1: Understand the foundational concepts of AI, ML, DL, and key OpenAI generative tools Understand
- CO 2: Explain the interplay of AI, wearables, and big data in emerging technologies like the Metaverse and Edge AI Understand
- CO 3: Describe the key components and uses of IoT, cloud computing, and cybersecurity, including common threats Understand
- CO 4: Interpret the core principles and practical uses of blockchain, RPA, and digital marketing strategies Understand
- CO 5: Recognize the key concepts and applications of 3D printing, digital manufacturing, AR/VR, Metaverse, and ethical considerations in AI Understand

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	2	1	1	1	-	-	-	-	1	-	-
CO 2	3	3	2	2	1	1	-	1	1	1	1	-	-
CO 3	3	2	3	1	2	1	-	1	2	2	1	-	-
CO 4	3	2	1	3	3	1	-	1	-	1	-	-	-
CO 5	3	2	1	1	2	1	1	1	-	1	1	-	-

SYLLABUS:

UNIT I: MODERN ARTIFICIAL INTELLIGENCE AND OPENAI TOOLS

6

An Overview of Artificial Intelligence – Introduction to Machine Learning and Deep Learning – ChatGPT – GPT 4 – OpenAI Tools: AI Text Classifier – OpenAI Tools: Point-E – Text to Image Generator – DALL-E

UNIT II: MART SYSTEMS AND ANALYTICS

6

Intelligent Wearables – AI and Metaverse – Edge AI / TinyML – Evolution of Big Data Analytics – Applications of Big Data Analytics

UNIT III: IOT, CLOUD, CYBERSECURITY ESSENTIALS

6

Internet of Things – Applications of IoT – Industrial Internet of Things or IIoT – Digital Payments – Overview of Cloud Computing – Applications of Cloud Computing – Service Models in Cloud Computing – Overview of Cybersecurity – Applications of Cybersecurity – Types of Cyber Attacks – Data Privacy and User Data Control – Deepfake



SEMESTER I

U25CE101	Civil Engineering Perspectives	Category: PCC				
		L	T	P	J	C
		1	0	4	0	3

COURSE OBJECTIVES:

- To provide foundational knowledge of Civil Engineering and its various disciplines
- To familiarize students with key construction materials
- To introduce the importance of National Building Code (NBC) and byelaws in construction practices

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	-	-	-	-	-	-	-	-	-	2	1
CO 2	3	3	-	-	-	-	-	2	-	-	-	2	1
CO 3	3	3	-	-	-	-	-	2	2	-	-	2	1
CO 4	3	2	-	-	-	-	-	2	2	-	-	2	1
CO 5	3	2	-	-	-	-	-	3	3	-	-	1	1

SYLLABUS:

UNIT I: INTRODUCTION TO CIVIL ENGINEERING

7 + 30

Overview of Civil Engineering – Role of Civil Engineers – Importance of Civil Engineering in infrastructure development – Building Materials – Cement, Bricks, Steel and Aggregates – Types, Properties and Applications

UNIT II: UNIT CONVERSIONS AND CODAL PROVISIONS

8 + 30

Basic unit conversions – Buildings and structures in general – Functional requirements of buildings and necessity of byelaws – Importance of National Building Code – Indian Standard Codal provisions for Materials and testing – Cement, Fine aggregate, Coarse aggregate and Water

LIST OF EXPERIMENTS

1. Visit to Renowned structures
2. Identification of Construction Materials
3. Bricks – Compressive strength, Water absorption
4. Layout Marking of a Simple Building Plan
5. Campus Mapping using GIS Tools
6. Identification of plumbing tools and fittings
7. Visit to Experience Engineering – Study of Materials
8. Learn It Masonry Yard – Types of Brick Bonds
9. Site visit to RMC Plant
10. Bridge / Flyover / Road Construction Site Visit
11. Material Testing Lab – Exposure to industrial practices
12. Study of drawings

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UNIT IV: DIGITAL INNOVATION AND AUTOMATION

6

Evolution of Blockchain – Applications of Blockchain in Finance Industry – Impact of Blockchain on Workforce & Workplace – Getting Started with Robotic Process Automation – Applications of Robotic Process Automation in Banking & Insurance Industry – Web, Mobile Development and Marketing – 5Ds of Digital Marketing – Digital Storytelling

UNIT V: DIGITAL DESIGN AND RESPONSIBILITY

6

3D Printing Modelling – Digital Manufacturing – Augmented Reality and Virtual Reality – Pre-requisites for Augmented Reality & Virtual Reality – Metaverse – Applications of Augmented Reality – Virtual Reality in – AI Ethics – Ethical Considerations of Generative AI

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: - Periods Project: - Periods Total: 30 Periods

TEXTBOOKS:

1. Faheem Syeed Masoodi, Zubair Sayeed Masoodi, Khalid Bashir Dar, "Digital and Technological Solutions: Exploring the Foundations of Digitization", 1st Edition, BPB Publications, 2024

REFERENCES:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", 4th Edition, Pearson, 2020
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach" Universities Press, 2014
3. Dieter Schmalstieg, Tobias Hollerer, "Augmented Reality: Principles and Practice", Addison-Wesley, 2016
4. Daniel Drescher, "Blockchain Basics: A Non-Technical Introduction in 25 Steps" Apress, 2017
5. Xiaofei Wang, Yunchuan Sun, "Edge AI: Convergence of Edge Computing and Artificial Intelligence", Wiley, 2022
6. Mark Coeckelbergh, "AI Ethics", MIT Press, 2020
7. <https://www.futureskillsprime.in/journey/digital-101-30-hours/> - Digital 101 Futureskills Prime Course by NASSCOM

CONTACT PERIODS:

Lecture: 15 Periods Tutorial: - Periods Practical: 60 Periods Project: - Periods Total: 75 Periods

TEXTBOOKS:

1. B C Punmia, "Building Construction", Laxmi Publications Limited, New Delhi. 2016
2. S K Duggal, "Building Materials", Sixth Edition, New Age International Publishers, 2025

REFERENCES:

1. P C Varghese, "Building Materials", Second Edition, PHI Learning Ltd, 2015
2. M S Shetty, "Concrete Technology", S Chand and Company Limited, New Delhi, 2017
3. National Building of India, published by Bureau of Indian Standards (BIS), part 1-12, 2016
4. G S Birdie, T D Ahuja, "Building Construction and construction materials", Dhanpatrai publishing company, New Delhi, 2012

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Department of Civil Engineering
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Arasur, Coimbatore - 641 407.

SEMESTER I

U25LEG01	German for Engineers - I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of German grammatical structures to support communication and comprehension
- Gain introductory insights into German cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1:	Acquire familiarity in the German alphabet & basic vocabulary	Understand
CO 2:	Listen and identify individual sounds of German	Understand
CO 3:	Use basic sounds and words while speaking	Apply
CO 4:	Read and understand simple advertisements, brochures and invitations	Understand
CO 5:	Use basic grammar and appropriate vocabulary in completing language tasks	Remember

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: INTRODUCTION TO GERMAN LANGUAGE AND SOUNDS

6 + 3

Alphabet and pronunciation (phonetics and name-spelling) – Basic greetings and farewells – Asking for and giving personal information – Countries – Languages – Professions – Numbers (0–100) – Cultural focus: German-speaking countries

UNIT II: GRAMMAR FOUNDATIONS AND SENTENCE BUILDING

 $6 + 3$

Formal vs. informal register: Sie vs. du – Personal pronouns: ich - du -Sie - er - sie - es – Verb conjugation in Präsens (regular and irregular) – Verbs: sein - haben (to be - to have) – Questions: wo -wer - wie - was - etc – Yes/No questions (Ja-/Nein-Fragen) – Cultural focus: Formal vs. informal speech

UNIT III: DAILY LIFE AND ROUTINES

 $6 + 3$

Describing daily activities and routines – Talking about time – Days – Routine verbs and nouns – Grammar: Separable verbs (aufstehen - mitkommen) – Modal verbs (intro): können - müssen – Negation: nicht - kein – Cultural focus: Typical German daily schedules

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UNIT IV: GRAMMAR – CASES AND STRUCTURE**6 + 3**

Accusative case: articles and pronouns – Dative case: definite and indefinite articles – Grammar focus: Prepositions with dative (in, auf, bei, mit, zu) – Cultural focus: Office hours and punctuality in German culture

UNIT V: NAVIGATION AND PUBLIC INTERACTION**6 + 3**

Asking for/giving directions – Describing locations and surroundings – Places in the city: Supermarkt, Bahnhof – Post – Kino – Reading and understanding public signs – Maps – Timetables – Grammar: Imperative (basic usage for giving directions) – Cultural focus: Public transportation – City services in German-speaking countries

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Buscha- A & Szita, S-Begegnungen Deutsch als Fremdsprache A1+: Integriertes Kurs- und Arbeitsbuch- 1st Edition, 2021
2. Brüseke, R., "Grammatik leicht A1," 1st Edition-2019

REFERENCES:

1. Netzwerk Deutsch als Fremdsprache A1, 1st Edition: BlueNBells, 2012
2. Huber, K., & Keller, F., "DaF kompakt A1: Deutsch als Fremdsprache," 3rd Edition, Langenscheidt, 2018

SEMESTER I

U25LEG02	Japanese for Engineers - I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of Japanese grammatical structures to support communication and comprehension
- Gain introductory insights into Japanese cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1: Acquire familiarity in the Japanese alphabet and basic vocabulary	Understand
CO 2: Listen and identify individual sounds of Japanese	Understand
CO 3: Use basic sounds and words while speaking	Apply
CO 4: Read and understand simple advertisements, brochures and invitations	Understand
CO 5: Use basic grammar and appropriate vocabulary in completing language tasks	Remember

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: INTRODUCTION TO JAPANESE WRITING AND GREETINGS

6 + 3

Hiragana Mastery – Basic greetings & expressions – Desu (~です) – Particles: は (wa), の (no), か (ka) – Basic vocabulary: Professions, countries, school related terms – Cultural note: Bowing – Formal vs. informal speech

UNIT II: KATAKANA AND BASIC COMMUNICATION

6 + 3

Katakana Mastery – Numbers -time - and age expressions – Vocabulary: Objects, locations and daily expressions – Particles: を (wo), に (ni) - で (de) – Grammar: Arimasu / Imasu (existence) – Negation: じゃありません / ではありません – Cultural note: Japanese use of numbers and time in daily life

UNIT III: VERB BASICS AND SENTENCE STRUCTURE

6 + 3

Verb sentence structure – Verb conjugation basics: Non-past affirmative/negative – Asking about objects – Time and location expressions – Vocabulary: Places - classroom items - basic actions – Cultural note: School and work environments in Japan

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 HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Kovvur, Coimbatore – 641 407.

UNIT IV: DAILY ACTIVITIES AND VOCABULARY EXPANSION**6 + 3**

Daily routine verbs: おきます, たべます, ねます, etc., – Days of the week – Frequency expressions – Vocabulary: Food - drink - daily routine – Common locations: Library - school - station – Particles: は, を, に, で, も, へ – Cultural note: Japanese daily life and food habits

UNIT V: INTRODUCTION TO KANJI AND PRACTICAL USE**6 + 3**

Kanji: Recognition (~50), Writing (~30) – Practical reading and writing exercises using learned Kanji – Review of particles in context – Integration of all skills through short dialogues and written practice – Cultural note: Importance of Kanji in Japanese society and signage

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. 3A Corporation, "Minna no Nihongo Shokyū I: Main Textbook," 2nd Indian Edition, Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2018
2. Banno, Eri, Yutaka Ohno, Yoko Sakane, Chikako Shinagawa, and Kyoko Tokashiki, "Genki I: An Integrated Course in Elementary Japanese," 3rd Edition, The Japan Times Publishing, Tokyo, 2020

REFERENCES:

1. Yamada, M., & Fujita, T., "Japanese for Beginners: A Practical Approach," 1st Edition, Tuttle Publishing, 2019
2. Takahashi, A., & Sato, M., "Nihongo Pro: Japanese for N5 Level," 1st Edition, KADOKAWA, 2018


HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Arasur, Coimbatore - 641 407.

SEMESTER I

U25LEG03	French for Engineers - I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of French grammatical structures to support communication and comprehension
- Gain introductory insights into French cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1: Acquire familiarity in the French alphabet and basic vocabulary	Understand
CO 2: Listen and identify individual sounds of French	Understand
CO 3: Use basic sounds and words while speaking	Apply
CO 4: Read and understand simple advertisements, brochures and invitations	Understand
CO 5: Use basic grammar and appropriate vocabulary in completing language tasks	Remember

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: INTRODUCTION TO FRENCH LANGUAGE AND BASICS 6 + 3

Alphabet and pronunciation: French sounds – Accents – Spelling names – Greeting people and introducing yourself and others – Asking about someone: names – Nationalities, and countries – Grammar: Subject pronouns (je, tu, il, elle...) - être (to be) - s'appeler (to be called) – Articles: definite/indefinite (le, la, un, une) - Gender and number of nouns – Cultural focus: French-speaking countries – forms of address (tu vs. vous)

UNIT II: DESCRIBING PEOPLE AND BACKGROUND 6 + 3

Describing yourself and others: nationality – profession – Age – Asking and answering personal questions – Numbers: 0–69 – Talking about languages spoken – Grammar: Verbs avoir (to have) parler (to speak) – Negation: ne...pas – Cultural focus: Francophone diversity – naming conventions (nom, prénom)

UNIT III: GRAMMAR AND AGREEMENT IN DESCRIPTIONS 6 + 3

Gender agreement of adjectives and professions – Asking questions: Interrogative expressions (Où, Quoi, Qui, Quel(le)) – Practice with personal descriptions – More on sentence structure and simple dialogues – Cultural focus: Intercultural identity – Polite introductions and small talk

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UNIT IV: TALKING ABOUT DAILY LIFE

6 + 3

Describing a typical day – Talking about daily activities and frequency – Saying what you like/don't like doing – Talking about schedules and routines – Cultural focus: A typical day in France – school/work life in Francophone countries

UNIT V: TIME, VERBS, AND DAILY EXPRESSIONS

6 + 3

Telling time – grammar: Regular -er verbs in present tense – The verb aller (to go) and expressions with faire – Prepositions: à -chez - en - au -Cultural focus: French meal times – Weekend habits – Transportation

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Marie-José Lopes & Jean-Thierry Bougnec, "Inspire 2 A1-A2 Méthode de français," 1st Edition, Hachette Français Langue Etrangère, 2020
2. Gibbe, C., Berthet, A., & Hugot, C., "Édito A2: Méthode de français," 1st Edition, Didier, 2024

REFERENCES:

1. Chantal Fougères & Marc de la Harpe, "Le Nouveau Sans Frontières 2: Méthode de français A2," 1st Edition, Hachette FLE, 2020
2. Xavier Maingueneau, "Le Français pour les Nuls: A2-B1," 3rd Edition, Wiley, 2021

SEMESTER I

U25LEG04	Hindi for Engineers - I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of Hindi grammatical structures to support communication and comprehension
- Gain introductory insights into Hindi cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1: Acquire familiarity in the Hindi alphabet and basic vocabulary	Understand
CO 2: Listen and identify individual sounds of Hindi	Understand
CO 3: Use basic sounds and words while speaking	Apply
CO 4: Read and understand simple advertisements, brochures and invitations	Understand
CO 5: Use basic grammar and appropriate vocabulary in completing language tasks	Remember

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: UNIT I INTRODUCTION TO HINDI SCRIPT AND CULTURE

6 + 3

Devanagari script basics (vowels and consonants) – Hindi sound system (aspirated/unaspirated, retroflex sounds) – Basic greetings and self-introduction – Sentence ending with है (hai) – Vocabulary: Professions – Nationalities – Countries – Family members – Grammar: Personal pronouns (मैं, तुम, आप, वह, यह) – Use of है and क्या (kya) for yes/no questions – Simple nominal sentences – Cultural note: Indian naming conventions – Forms of address (तुम vs. आप) – Gestures like namaste and head nods – Sociolinguistic formality

UNIT II: SENTENCE STRUCTURE AND EVERYDAY CONTEXTS

6 + 3

Introducing others – Talking about objects and places – Yes/no and WH- questions – Negation using नहीं – Use of यह (yeh) – वह (voh) – Vocabulary: Everyday objects – Common locations – Classroom and household terms – Grammar: Postpositions में (mein), से (se), का/की/के (possessives) – Verb basics with है and नहीं है, Subject-object-verb (SOV) structure – Cultural note: Spatial metaphors in Hindi, gestures with demonstratives, plural forms, and respect levels

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UNIT III: DESCRIBING DAILY LIFE AND HABITS

6 + 3

Describing daily routines like waking – Eating – Going – Returning – Sleeping – Vocabulary: Daily activities – Time expressions – Common verbs – Talking about routines in present tense – Adverbs of frequency: हमेशा - कभी-कभी - कभी नहीं – Grammar: Present tense of जाना - खाना - करना - उठना - सोना – Verb agreement by gender and number – Use of को (ko) as object marker – Cultural note: Time perception – Daily routines in Indian homes – Lifestyle differences – Typical student/professional day

UNIT IV: EXPANSION OF VERB USE AND QUESTIONS

6 + 3

Extended verb usage in different contexts – Asking and answering questions with Wh-words – Expressing possession – Giving simple commands and requests – Vocabulary: Verbs of movement – Expression – Need – Grammar: Imperatives – Compound verbs – Continued use of postpositions – Sentence expansion using connectors – Cultural note: Politeness in commands – Body language in communication – Informal/formal tone shift

UNIT V: PRACTICAL COMMUNICATION AND REVIEW

6 + 3

Role-plays: shopping – Traveling, introducing family – Speaking about preferences and opinions – Listening to simple dialogues and identifying key points – Vocabulary: Common nouns – Adjectives – Survival phrases – Grammar: Review of present tense – Pronouns – Postpositions – Negation – Cultural note: Real-life communication scenarios – Marketplace culture – Indian transportation and hospitality norms

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Pavithra Publications, "Spoken Hindi: Through Tamil," 2nd Edition, Pavithra Publications, Chennai, 2015
2. Dakshina Bharat Hindi Prachar Sabha, "Prathamik Text Book: New Syllabus," 1st Edition, Dakshina Bharat Hindi Prachar Sabha, Madras, 2023

REFERENCES:

1. Ganga, K., & Ramesh, V., "Learn Hindi in 30 Days: A Beginner's Guide," 3rd Edition, Hindi Academy, 2020
2. Vyas, S., "Spoken Hindi for Beginners," 1st Edition, Orient BlackSwan, 2018

HEAD OF THE DEPARTMENT

Department of Civil Engineering
KPR Institute of Engineering and Technology
Arasur, Coimbatore - 641 407.



SEMESTER I

U25LEG09	Chinese for Engineers - I (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- Gain basic proficiency in listening, speaking, reading, and writing - understanding everyday conversations, speaking in survival situations, reading short texts, and writing simple sentences
- Acquire essential knowledge of Chinese grammatical structures to support communication and comprehension
- Gain introductory insights into Chinese cultural norms, practices, and everyday life

COURSE OUTCOMES:

CO 1: Acquire familiarity in the Chinese alphabet & basic vocabulary	Understand
CO 2: Listen and identify individual sounds of Chinese	Understand
CO 3: Use basic sounds and words while speaking	Apply
CO 4: Read and understand simple advertisements, brochures and invitations	Understand
CO 5: Use basic grammar and appropriate vocabulary in completing language tasks	Remember

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: FUNDAMENTAL CHINESE FOR BEGINNERS

6 + 3

Introduction to Mandarin Chinese, daily greetings – Learning Mandarin alphabet initials, finals, 4 tones and tone change rules (Pinyin 拼音) – Learning numbers 0–20 – Learning basic in-class vocabulary and phrases

UNIT II: NUMBERS AND VOCABULARY EXPANSION

6 + 3

Learning numbers up to 999 – Learning country names and nationalities – Learning personal pronouns and Subject-Verb-Object (SVO) sentence structure – Practice with short dialogues and self-introductions

UNIT III: THE NEW CLASSMATE

6 + 3

Learning vocabulary related to names and introductions – Learning the differences among 是 (to be), 叫 (to be called), 姓 (to have a surname) – Learning how to form questions with 吗 – Learning abbreviated questions with 呢 – Practice dialogues: exchanging names and personal details

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UNIT IV: TIME AND POSSESSION**6 + 3**

What time do you go to the university? – Learning vocabulary for time, dates, and days of the week – Learning grammar: placement of time words (S + Time word + V) – Learning to express possession with 有 / 沒有 – Learning the usage of 的 as a possessive particle – Practice with daily schedules and activities

UNIT V: COMMUNICATION AND REVIEW**6 + 3**

Grammar consolidation: auxiliary verbs and sentence order – Forming positive-negative questions (e.g., 是不是, 有沒有) – Conversational practice: greetings, introductions, time, possession – Role-play in real-life scenarios – Cultural notes: politeness and forms of address – Final review and integrated practice of Units I–IV

LIST OF EXPERIMENTS

1. Prepare a family tree chart
2. Record a self-intro video
3. Describe your college
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Mandarin Training Centre, National Taiwan Normal University, Modern Chinese I 時代華語 I, Edited by Chih-Ping Chou, Taipei: Cheng Chung Book Company Ltd., 2019
2. Huayu101 / 華語101, Taiwan Ministry of Education, Taiwan Mandarin Educational Resources Centre, 2018

REFERENCES:

1. Cheng Chung Book Company Ltd, 時代華語 I 教師手冊 [Modern Chinese I Teacher's Manual, 2019
2. www.lmit.edu.tw/bag

SEMESTER I

U25MCC01	Induction Program - Universal Human Values I (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		2	1	0	0	3

COURSE OBJECTIVES:

- Development of a holistic perspective based on self-exploration about themselves (human beings), family, society, and nature/existence
- Understanding (or developing clarity) of the harmony in the human being, family, society, and nature/existence
- Strengthening of self-reflection
- Development of commitment and courage to act

COURSE OUTCOMES:

CO 1: Recognize the essentials of human values and skills	Understand
CO 2: Analyse connection between profession and happiness	Understand
CO 3: Develop appropriate technologies and management patterns to create harmony in family and society	Understand
CO 4: Evaluate the significance of trust, mutually satisfying human behaviour, and enriching interaction with nature	Understand
CO 5: Demonstrate professional and ethical responsibility	Understand

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	3	3	-	-	-	3	-	-
CO 2	-	-	-	-	-	3	3	3	-	-	3	-	-
CO 3	-	-	-	-	-	3	3	-	-	-	3	-	-
CO 4	-	-	-	-	-	3	3	-	-	-	3	-	-
CO 5	-	-	-	-	-	3	3	3	-	-	3	1	1

SYLLABUS:

UNIT I: INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT, AND PROCESS FOR VALUE EDUCATION 6 + 3

Purpose and motivation for the course – Self-Exploration: what is it – Its content and process; 'Natural Acceptance' and Experiential Validation – as the mechanism for self-exploration – Continuous Happiness and Prosperity – A look at basic Human Aspirations – Right understanding, Relationship, and Physical Facilities – the basic requirements for the fulfillment of aspirations of every human being with their correct priority – Understanding Happiness and Prosperity correctly – A critical appraisal of the current scenario – Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT II: HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF 6 + 3

Understanding human beings as a co-existence of the sentient 'I' and the material 'Body' – Understanding the needs of Self ('I') and 'Body' – Happiness and Convenience – Understanding the Body as an instrument of 'I' (I being the doer, seer, and enjoyer) – Understanding the harmony of I with the Body: Self-control and Welfare; correct appraisal of Physical needs – Meaning of Prosperity in detail – Programs to ensure Self-control and Welfare

UNIT III: HARMONY IN THE FAMILY AND SOCIETY**6 + 3**

Understanding values in human – Human relationships; the meaning of Justice (nine universal values in relationships) and the program for its fulfillment to ensure satisfaction – Trust and Respect as the foundational values of relationship – Understanding the meaning of Trust – Difference between intention and competence – Understanding the meaning of Respect – The Difference between respect and differentiation; and the other salient values in relationship – Understanding the harmony in the society (society being an extension of the family): Peace, Prosperity, Courage, and Coexistence as comprehensive Human Goals – Visualizing a universal harmonious order in society – Undivided Society – Universal Order from family to world family

UNIT IV: HARMONY IN THE NATURE AND EXISTENCE**6 + 3**

Understanding the harmony in Nature, Interconnectedness, and mutual fulfillment among the four orders of nature – Recyclability and self-regulation in nature – Understanding Existence as a Co-existence of mutually interacting units in an all-pervasive space – Holistic perception of harmony at all levels of existence – Practice sessions to discuss human beings as the cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology, etc

UNIT V: HARMONY ON PROFESSIONAL ETHICS**6 + 3**

Natural acceptance of human values – Definitiveness of Ethical Human Conduct – Basic for Humanistic Education – Humanistic Constitution, and Humanistic Universal Order – Competence in professional ethics – Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people, friendly and eco-friendly production systems, and Ability to identify and develop appropriate technologies and management patterns for the above production systems – Case studies of typical holistic technologies, management models, and production systems – Strategy for a transition from the present state to Universal Human Order – At the level of the individual: as socially and ecologically responsible engineers, technologists, and managers – At the level of society: as mutually enriching institutions and organizations

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** 15 Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. R R Gaur, R. Asthana , G P Bagaria, A Foundation course in Human Values and Professional Ethics, 3rd Edition, Excel Books, New Delhi, 2024
2. Prof. K. V. Subba Raju, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition, 2013

REFERENCES:

1. Ivan Illich, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA, 1974
2. E. F. Schumacher, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain, 1973



SEMESTER I

U25MCC02	Heritage of Tamils (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	0	0	1

COURSE OBJECTIVES:

- Learn the extensive literature of classical Tamil
- Review the fine arts heritage of Tamil culture
- Realize the contribution of Tamils in Indian freedom struggle

COURSE OUTCOMES:

CO 1:	Understand the extensive literature of Tamil and its classical nature	Understand
CO 2:	Understand the heritage of sculpture, painting and musical instruments of ancient people	Understand
CO 3:	Review on folk and martial arts of Tamil people	Understand
CO 4:	Realization of Thina concepts, trade and victory of Chozha dynasty	Understand
CO 5:	Understand the contribution of Tamils in Indian freedom struggle, Self-esteem movement and siddha medicine	Understand

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 2	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 3	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 4	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 5	-	-	-	-	-	-	3	3	-	2	-	-	-

SYLLABUS:

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 Bharathiyaar 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

Tattooing, basket weaving, Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance – Sports and Games of Tamils

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 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Arasur, Coimbatore – 641 407.

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

CONTACT PERIODS:

Lecture: 15 Periods Tutorial: - Periods Practical: - Periods Project: - Periods Total: 15 Periods

TEXTBOOKS:

1. Jayanthi Ravikrishna K, Heritage of Tamils, Sri Krishna publications, First Edition, 2023
2. S. Priyadarshini, Heritage of Tamils, V. K. Publications

REFERENCES:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை, International Institute of Tamil Studies, C.P.T Campus, Chennai
2. கணினித் தமிழ் - முனைவர். இல. சுந்தரம், விகடன் பிரசுரம், அண்ணா சாலை, சென்னை, திசம்பர் 2016
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, தமிழ்நாடு அரசு, சென்னை, ஆறாம் பதிப்பு 2020
4. Social Life of Tamils, Dr. K. K. Pillay, A joint publication of TNTB & ESC and RMRL (in print) University of Madras, Chennai, Second Edition 1975
5. The Contributions of the Tamils to Indian Culture, Dr.M.Valarmathi, International Institute of Tamil Studies, C.I.T Campus, Tharamani, Chennai, First Edition 1995

SEMESTER I & II

U25MCC03	Design Thinking (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To understand the basics of Design Thinking, its principles, processes, and tools used
- To empathize with stakeholders and frame problems using structured tools and techniques
- To generate ideas, create prototypes, and present solutions effectively using design tools

COURSE OUTCOMES:

Understand

CO 1: Explain purpose and features of design thinking process

Apply

CO 2: Use required tools to empathize with the stockholders to identify the problem

Apply

CO 3: Define the identified problem elaborately and clearly

Apply

CO 4: Develop prototypes for conceptual solutions

Apply

CO 5: Present the identified solution to all the stakeholders

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	1	2	3	2	-	-	-	-	1	1	1	-	-
CO 2	1	2	3	2	-	-	-	-	1	1	1	-	-
CO 3	1	2	3	2	-	-	-	-	1	1	1	-	-
CO 4	1	2	3	2	-	-	-	-	1	1	1	-	-
CO 5	1	2	3	2	-	-	-	-	1	1	1	-	-

SYLLABUS:

3 + 6

UNIT I: FUNDAMENTALS OF DESIGN THINKING

Introduction to Design Thinking: Definition, relevance, and applications – Contexts and situations where Design Thinking is most effective – Core process of implementing Design Thinking – Stakeholders involved in a Design Thinking approach – Design Thinking – Personal Visualization, The Wheel of Life, and Balancing Priorities – Understanding and appreciating the concept of 'Design' – The 3 Laws of Design Thinking

3 + 6

UNIT II: THE EMPATHIZE STAGE

Understanding Stakeholders – Role of Empathy in Design Thinking – Tools: Persona, Journey Mapping, Stakeholder Mapping, CATWOE, Cartographic Perspective (LO), Empathy Map – Case Study

3 + 6

UNIT III: THE DEFINE STAGE

Problem Framing and Reframing – Role of a Design Thinker – Tools: Five Whys, Anti-Pattern, Problem Paraphrasing, Challenge Mapping – Introduction to LORD Skillset – Case Study

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 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Arasur, Coimbatore – 641 407.

UNIT IV: THE DIVERGENCE AND CONVERGENCE STAGE**3 + 6**

Ideation through Divergent and Convergent Thinking – Tools: Brainstorming, Metaphor, Random Association, End-State Visualization, 10gm–100gm–1000gm – Prototyping Basics – Wire framing – Case Study – Communicating for Effective Outcome

UNIT V: THE COMMUNICATION STAGE**3 + 6**

Presenting and Packaging Design Outcomes – Tools: 4Cs Framework, Naming, Packaging, Storyboarding, Presentation Techniques, Distribution Methods

LIST OF EXPERIMENTS

1. Personal Visualization
2. 3 Laws of Design Thinking®
3. Persona
4. Journey Mapping
5. Cartographic Perspective
6. Anti-Pattern, Problem Paraphrasing
7. Brainstorming
8. 10gm–100gm–1000gm
9. Prototyping Basics
10. Storyboarding
11. Presentation Techniques

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd., 2018
2. Idris Mootee, Design Thinking for Strategic Innovation, John Wiley & Sons Inc, 2013
3. Arun Jain, UnMukt: Science & Art of Design Thinking, School of Design Thinking, 2020

REFERENCES:

1. Roger Martin, The Design of Business: Why Design Thinking is the Next Competitive Advantage, Harvard Business Press, 2009
2. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), Design Thinking: Understand – Improve– Apply, Springer, 2011
3. Liedtka , Andrew King, Kevin Bennett , Book - Solving Problems with Design Thinking - Ten Stories of What Works, Columbia Business School Publishing, 2013
4. Maurício Vianna, Ysmar Vianna, Isabel K. Adler, Brenda Lucena, Beatriz Russo, Design thinking: Business Innovation, MJV Press, 2011
5. Burgelman, Christensen, and Wheelwright, Strategic Management of Technology and Innovation, 5th Edition, McGraw Hill Publications, 2017

SEMESTER I & II

U25MCC04	Computer Fundamentals and Coding Essentials (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To develop an understanding of fundamental computing concepts such as data types, variables, operators and algorithmic problem-solving.
- To enable students to write, debug, and execute simple programs in C using control structures, arrays and strings for solving basic scientific and engineering problems.
- To introduce the basic structure and functioning of computer systems, including hardware, software, operating systems and file management.

COURSE OUTCOMES:

- CO 1:** Build basic computational concepts such as data types, variables, operators, algorithms to solve simple problems **Apply**
- CO 2:** Develop simple programs using input/output operations, control structures, arrays, and strings in C language **Apply**
- CO 3:** Describe the fundamental components of a computer system and explain the role of operating systems and file management in computing **Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	2	2	-	-	-	-	-	-	2	-	-
CO 2	3	3	3	-	2	2	-	-	-	-	2	-	-
CO 3	3	2	-	-	2	-	-	-	-	-	-	-	-

SYLLABUS:

UNIT I: FUNDAMENTALS OF COMPUTING

3 + 5

Introduction to algorithms and flowcharts –Data types, variables, and operators

UNIT II: INTRODUCTION TO PROGRAMMING

6 + 5

Programming languages overview - Input/output, conditional statements, loops - Basic data structures: arrays and strings - Overview of Logic gates and basic digital circuits - System software

UNIT III: INTRODUCTION TO COMPUTERS

6 + 5

Evolution of Computers - Overview of computer hardware and software - Number Systems - Understanding input/output devices, memory, storage – Basics of operating systems and file management

LIST OF EXPERIMENTS

1. Identifying computer components
2. Installation and debugging of Operating System
3. Programs using variables and data types

huffy
 HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Arasur, Coimbatore - 641 407.

4. Programs using Conditional Statements
5. Programs using Loops and Iterations
6. Program using Nested Loops & Pattern Printing

CONTACT PERIODS:

Lecture: 15 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 30 Periods

TEXTBOOKS:

1. Glenn Brookshear J and Dennis Brylow, "Computer Science: An Overview", 13th Edition, Perarson, 2020
2. Rajaraman V and Neeharika Adabala "Fundamentals of Computers", 6th Edition PHI Learning Private Limited, 2015
3. Yashavant Kanetkar, "Let Us C", 17th Edition, BPB Publications, 2020

REFERENCES:

1. Reema Thareja, "Programming in C", 2nd Edition, Oxford University Press, 2016
2. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", 1st Edition, Oxford University Press, 2009

SEMESTER I & II

U25MCC05	Biology for Engineers (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To understand the biological concepts from an engineering perspective
- To understand the importance of human physiology and sensing techniques
- To perform the various laboratory tests with the relevant instruments / equipment

COURSE OUTCOMES:

CO 1:	Interpret the biological concepts of cell and its structure	Understand
CO 2:	Describe the importance of human physiology	Understand
CO 3:	Summarize the various sensing techniques and assistive devices	Understand
CO 4:	Utilize the instruments / equipment to perform the microbial growth and laboratory tests	Precision
CO 5:	Apply the principles to demonstrate the microbial growth and laboratory test	Precision

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	1	-	-
CO 2	2	1	-	-	-	-	-	-	-	-	1	-	-
CO 3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO 4	3	2	1	1	-	-	-	1	2	1	1	-	-
CO 5	3	2	1	1	-	-	-	1	2	1	1	-	-

SYLLABUS:

UNIT I: BASICS OF CELL 5

Cell structure and function – Cell division – Mitosis – Meiosis – Cell Membrane potential

UNIT II: HUMAN PHYSIOLOGY 5

Circulatory system – Respiratory system – Digestive system – Neurology system Carbohydrates – Proteins and amino acid – Nucleic acid (DNA and RNA)

UNIT III: SENSING TECHNIQUES AND ASSISTIVE DEVICES 5

Sensory organs: Eyes and ears – Visual aids – Hearing aids – Electronic nose – Electronic tongue – Electronic skin

UNIT IV: BIOINSPIRATION 15

Demonstration on bionic principles in nature-inspired design – Exploration of biomimetic materials and their engineering applications – Identification of natural structures mimicked in robotics and sensors – Observation and analysis of bioinspired prototypes (e.g., soft actuators, lotus-effect surfaces)

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30/1/2024
HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPR Institute of Engineering and Technology
Arasur, Coimbatore - 641 407.

UNIT V: BASIC LABORATORY TESTS

15

Separation of serum – Identification of blood groups – Estimation of blood pressure – Measurement of pH – Acquisition of ECG signals – Introduction to bioinformatics for biomedical data interpretation: visualization of gene/protein sequences, exploration of databases such as NCBI and UniProt, and understanding their applications in clinical diagnostics and personalized medicine

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Campbell N.A., Reece J.B., Urry L., Cain M.L. and Wasserman S.A., "Biology: A global approach", 12th edition, Pearson Education Ltd, 2020
2. Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., "Biology for Engineers", 1st edition, Tata McGraw-Hill, 2018
3. Elaine N. Marieb and Suzanne. M. Keller, "Essential of Human Anatomy and Physiology", 12th edition, Pearson Education, 2017

REFERENCES:

1. Leslie Cromwell, Erich A. Pfeiffer, Fred J. Weibell, "Biomedical Instrumentation", 2nd Edition, Prentice Hall, 2011
2. Arthur T Johnson, "Biology for Engineers", 1st edition, CRC press, 2011
3. David. L. Nelson, Michael. M. Cox, "Lehninger Principles of Biochemistry", 7th edition, WH Freeman, 2017
4. John Enderle and Joseph Bronzino, "Introduction to Biomedical Engineering", 3rd edition, Academic Press, 2012

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HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPR Institute of Engineering and Technology
Aravali, Coimbatore - 641 407.

SEMESTER II

U25ENG02	English Proficiency II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		0	0	2	0	1

COURSE OBJECTIVES:

- Be an active listener for better comprehension and retention
- Identify main points in spoken materials such as lectures, podcasts, and conversations

COURSE OUTCOMES:

Remember

Understand

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	2	3	-	2	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	2	-	-

LIST OF EXPERIMENTS

1. **Listening to Lectures: Structure and Emphasis** – Note-making Techniques: capturing main ideas and details – Conversations, Dialogues and Identifying Opinions – Podcasts and Interviews – Active Listening Skills: Overcoming Barriers and Improving Focus
2. **Listening for Specific Information: Facts, Figures, and Sequences** – Global Accents: British, American, Australian – Following Instructions and Procedures: Task-based listening – Listening to Technical Explanations: Engineering Concepts – Short Writing Task: Summary or outline from technical input
3. **Listening to Workplace Conversations: Meetings, Calls and Voice Notes** – Listening to News & Current Events: Identifying Main Ideas and Recognizing – Colloquial Expressions and Idioms in Context: Enhancing comprehension of informal speech

CONTACT PERIODS:

Lecture: - Periods Tutorial: - Periods Practical: 30 Periods Project: - Periods Total: 30 Periods

TEXTBOOKS:

1. Rob Freire and Tamara Jones, "Q: Skills for Success: Listening & Speaking", Level 4, 3rd edition, Oxford University Press, 2019
2. Ashraf M. Rizvi and Priyadarshi Patnaik, "Effective Technical Communication", 3rd Edition, McGraw Hill, 2024

REFERENCES:

1. Nixaly Leonardo, "Active Listening Techniques:30 Practical Tools to Hone Your Communication Skills", Embassy Books, 2022
2. Heather R. Younger, "The Art of Active Listening: How People at Work Feel Heard, Valued, and Understood", Berrett-Koehler Publishers, 2023

W. A. K. K. K.
HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPN Institute of Engineering and Technology
Arasur, Coimbatore - 641 407.

SEMESTER II

U25MA204	Mathematical Transforms (Common to CE, CH, EE, ME, MI)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To understand Fourier analysis for periodic and aperiodic signals
- To apply Laplace transforms for solving linear ODEs with initial conditions
- To use Z-transforms for analyzing discrete – time systems

COURSE OUTCOMES:

- CO 1:** Understand and construct Fourier series representations of periodic functions, and apply them to solve Understand basic signal analysis and engineering problems
- CO 2:** Apply Fourier transform techniques to analyze and interpret continuous-time signals in the frequency domain Apply
- CO 3:** Compute Laplace transforms of standard functions and use them to model and analyze engineering systems involving differential equations Apply
- CO 4:** Use inverse Laplace transforms and convolution theorem to solve ordinary differential equations with initial conditions in engineering applications Apply
- CO 5:** Apply discrete-time systems using Z-transforms, and solve difference equations relevant to digital signal processing and control systems Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 4	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 5	2	2	-	2	1	-	-	-	-	-	-	-	-

SYLLABUS:

UNIT I: FOURIER SERIES

6 + 6

Dirichlet's conditions – General Fourier series – Even and odd functions – Half-range sine and cosine series – Parseval's identity

UNIT II: FOURIER TRANSFORM

6 + 6

Fourier transform pair – Sine and cosine transforms – Basic properties – Transforms of standard functions – Convolution theorem

UNIT III: LAPLACE TRANSFORM

6 + 6

Standard functions – Unit step and delta functions – Derivatives and integrals – Transform of periodic functions

UNIT IV: INVERSE LAPLACE TRANSFORM

6 + 6

Inverse Laplace methods – Convolution theorem – Solution of linear ODEs with constant coefficients

UNIT V: Z-TRANSFORM

6 + 6

Z-transforms – Properties – Inverse Z-transform – Initial/final value theorems – Solution of difference equations

LIST OF EXPERIMENTS

1. Fourier Series – Fourier Series Approximation – Even/Odd Functions and Half-Range Expansions
2. Fourier Transforms – FFT and Spectral Analysis. – Convolution Theorem
3. Laplace Transforms – Laplace of Basic Functions – System Response Using Laplace
4. Inverse Laplace and ODE Solving – Inverse Laplace Transform – ODE Solving Using Laplace
5. Z-Transform Applications – Z-Transform and Sequence Analysis – Digital Filter Design and Stability

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 30 Periods Project: - Periods Total: 60 Periods

TEXTBOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th ed., Wiley India, 2018
2. Wylie C. R. & Barrett L. C., Advanced Engineering Mathematics, Tata McGraw-Hill, 2016
3. Grewal B. S., Higher Engineering Mathematics, 44th ed., Khanna Publishers, 2017

REFERENCES:

1. Andrews, L.C & Shivamoggi, B., Integral Transforms for Engineers, SPIE Press, 2016
2. Bali N. P. & Manish Goyal, Engineering Mathematics, 12th ed., Laxmi Publications, 2016
3. Peter V. O'Neil, Advanced Engineering Mathematics, Cengage, 2016
4. James G., Advanced Modern Engineering Mathematics, 3rd ed., Pearson, 2013

hettas
HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Arany, Coimbatore - 641 407.

SEMESTER II

U25PH203	Physics for Civil Engineers	Category: BSC				
		L	T	P	J	C
		2	0	0	2	3

COURSE OBJECTIVES:

- To understand the principles of thermal performance, acoustical behavior, and lighting design in buildings to enhance indoor environmental quality and energy efficiency
- To analyze the properties, functions, and potential applications of smart materials in modern construction and building systems
- To analyze the thermal insulation, lighting of a building and study the effect of natural, man-made hazards and implementation of safety measures

COURSE OUTCOMES:

CO 1:	Classify the different types of smart materials and explain their properties and applications.	Understand
CO 2:	Estimate the heat gain/loss in buildings and explain methods for improving thermal insulation and ventilation	Apply
CO 3:	Apply the principles of lighting design, including photometry and vision aspects, to optimize daylight and artificial lighting in buildings.	Apply
CO 4:	Outline the factors affecting building acoustics and identify sound insulation methods and remedies	Apply
CO 5:	Organise the natural and manmade hazards and recommend suitable construction materials and safety measures for hazard mitigation	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	-	2	-
CO 2	3	2	1	1	-	-	-	-	-	-	-	1	-
CO 3	3	2	1	1	-	-	-	-	-	-	-	1	1
CO 4	3	2	1	1	-	-	-	-	-	-	-	1	1
CO 5	3	2	1	1	-	-	-	-	-	-	-	1	1

SYLLABUS:

UNIT I: SMART MATERIALS

6 + 6

Composites – Classification, properties and applications of fiber reinforced plastics (FRP) and fiber reinforced metals (FRM) – Metallic glasses – Shape memory alloys – Ceramics – Types, properties and applications (High alumina ceramics)

UNIT II: THERMAL PROPERTIES OF BUILDINGS

6 + 6

Thermal insulation and its benefits – Heat gain and heat loss estimation – Factors affecting the thermal performance of buildings – Central heating – Principle and design of natural ventilation – Ventilation measurement – Smoke tube method

h27n 30/7/2026

HEAD OF THE DEPARTMENT

Department of Civil Engineering

KPR Institute of Engineering and Technology

Arasur, Coimbatore – 641 407.

Phone: 0426-2551000, 2551001, 2551002, 2551003, 2551004, 2551005, 2551006, 2551007, 2551008, 2551009, 2551010, 2551011, 2551012, 2551013, 2551014, 2551015, 2551016, 2551017, 2551018, 2551019, 2551020, 2551021, 2551022, 2551023, 2551024, 2551025, 2551026, 2551027, 2551028, 2551029, 2551030, 2551031, 2551032, 2551033, 2551034, 2551035, 2551036, 2551037, 2551038, 2551039, 2551040, 2551041, 2551042, 2551043, 2551044, 2551045, 2551046, 2551047, 2551048, 2551049, 2551050, 2551051, 2551052, 2551053, 2551054, 2551055, 2551056, 2551057, 2551058, 2551059, 2551060, 2551061, 2551062, 2551063, 2551064, 2551065, 2551066, 2551067, 2551068, 2551069, 2551070, 2551071, 2551072, 2551073, 2551074, 2551075, 2551076, 2551077, 2551078, 2551079, 2551080, 2551081, 2551082, 2551083, 2551084, 2551085, 2551086, 2551087, 2551088, 2551089, 2551090, 2551091, 2551092, 2551093, 2551094, 2551095, 2551096, 2551097, 2551098, 2551099, 2551100, 2551101, 2551102, 2551103, 2551104, 2551105, 2551106, 2551107, 2551108, 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2551997, 2551998, 2551999, 2552000, 2552001, 2552002, 2552003, 2552004, 2552005, 2552006, 2552007, 2552008, 2552009, 2552010, 2552011, 2552012, 2552013, 2552014, 2552015, 2552016, 2552017, 2552018, 2552019, 2552020, 2552021, 2552022, 2552023, 2552024, 2552025, 2552026, 2552027, 2552028, 2552029, 2552030, 2552031, 2552032, 2552033, 2552034, 2552035, 2552036, 2552037, 2552038, 2552039, 2552040, 2552041, 2552042, 2552043, 2552044, 2552045, 2552046, 2552047, 2552048, 2552049, 2552050, 2552051, 2552052, 2552053, 2552054, 2552055, 2552056, 2552057, 2552058, 2552059, 2552060, 2552061, 2552062, 2552063, 2552064, 2552065, 2552066, 2552067, 2552068, 2552069, 2552070, 2552071, 2552072, 2552073, 2552074, 2552075, 2552076, 2552077, 2552078, 2552079, 2552080, 2552081, 2552082, 2552083, 2552084, 2552085, 2552086, 2552087, 2552088, 2552089, 2552090, 2552091, 2552092, 2552093, 2552094, 2552095, 2552096, 2552097, 2552098, 2552099, 2552100, 2552101, 2552102, 2552103, 2552104, 2552105, 2552106, 2552107, 2552108, 2552109, 2552110, 2552111, 2552112, 2552113, 2552114, 2552115, 2552116, 2552117, 2552118, 2552119, 2552120, 2552121, 2552122, 2552123, 2552124, 2552125, 2552126, 2552127, 2552128, 2552129, 2552130, 2552131, 2552132, 2552133, 2552134, 2552135, 2552136, 2552137, 2552138, 2552139, 2552140, 2552141

UNIT III: LIGHTING DESIGNS**6 + 6**

Radiation and spectral quantities – Photometry: Cosines law, Inverse square law – Vision: Photopic, mesopic and scotopic visions – Luminous efficiency function – Visual field glare, colour – Day light calculations – Daylight design of windows – Principle of artificial lighting

UNIT IV: ACOUSTICS**6 + 6**

Classification of sound – Decibel – Weber-Fechner law – Sabine's formula – Growth and decay method – Absorption coefficient and its determination – Factors affecting acoustics of buildings – Remedies – Sound insulation and its measurements

UNIT V: NATURAL AND MANMADE HAZARDS**6 + 6**

Seismology and seismic waves – Earthquake ground motion – Magnitude and intensity – Cyclone and flood hazards – Fire hazards and fire protection – Materials for Fire proof – Prevention and safety measures

LIST OF PROJECTS

1. Model of Shape Memory Alloy (SMA) in Action
2. Comparative Study of FRP and FRM Materials
3. Metallic Glasses Research Poster
4. High-Alumina Ceramics Use in Industry
5. Miniature House Model with Thermal Insulation
6. Heat Gain and Loss Estimation for a Room
7. Natural Ventilation Design for a Classroom
8. Ventilation Rate Measurement using Smoke Tube
9. Measurement of Light Intensity Using a Lux Meter App
10. Daylight Window Design Model
11. Artificial vs Natural Light Study in a Room
12. Visual Comfort Survey and Analysis
13. DIY Sound Absorption Test
14. Sabine's Formula Demonstration with a Model Room
15. Sound Level Mapping in a Classroom

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** 30 Periods **Total:** 60 Periods

TEXTBOOKS:

1. Kenneth G. Budinski and Michael K. Budinski., "Engineering Materials Properties and Selection, 9th edition, Pearson Education, 2010
2. William D. Callister Jr. and David G. Rethwisch., "Materials Science and Engineering: An Introduction", 10th edition, John Wiley and Sons, London, 2020

REFERENCES:

1. Stevens W. R., "Building Physics: Seeing in the Artificial Environment", 1st edition, Pergaman Press, 2013
2. Mohsen Shahinpoor., "Fundamentals of Smart Materials", 1st edition, Royal Society of Chemistry, 2020
3. Brain Culshaw, "Smart Structures and Materials", 1st edition, Boston: Artech House, London, 2004

4. <https://archive.nptel.ac.in/noc/courses/105/>



SEMESTER II

U25CY201	Environmental Science and Sustainability (Common to all programmes)	Category: BSC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To provide the basic concepts of ecosystems, biodiversity, air and water systems and how to protect them
- To analyze the effects of human activities on the lithosphere, waste generation, and environmental health, and evaluate disaster management and technological solutions
- To apply the principles of sustainable living and green technologies in alignment with the UN Sustainable Development Goals

COURSE OUTCOMES:

- CO 1:** Utilize the ecosystem and biodiversity conservation concepts to address environmental issues Apply
- CO 2:** Implement atmospheric and hydrospheric concepts for water quality parameter determination. Apply
- CO 3:** Develop effective strategies to manage land-use challenges, agricultural issues, and waste management practices Apply
- CO 4:** Utilize technological tools to monitor environmental issues, resource recovery, and pollution control processes Apply
- CO 5:** Implement sustainable development strategies for green practices and waste management Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	-	2	1	1	-	1	-	2
CO 2	3	2	1	1	-	-	2	1	1	-	1	1	2
CO 3	3	2	1	1	-	-	2	1	1	-	1	1	2
CO 4	3	2	1	1	-	-	2	1	1	-	1	1	2
CO 5	3	2	1	1	-	-	2	1	1	-	1	-	2

SYLLABUS:

UNIT I: ENVIRONMENTAL SCIENCE AND BIODIVERSITY

3 + 6

Ecosystems – Classification, Structure, Energy Flow, Ecological Succession – Biodiversity – Importance, Values and Levels – India as a Mega-diversity Nation – Red Data Book, Hotspots and Conservation of Biodiversity Self-Learning and Case Studies – Wildlife Crime in India (Poaching) – Man and Wildlife Conflict (e.g., Elephant-Human conflict in Odisha or Assam)

UNIT II: ATMOSPHERE AND HYDROSPHERE

3 + 6

Atmosphere – Structure, Climatic Zones, Air Quality Standards (National & WHO), Air Pollution – Causes, effects, control measures, Carbon Emissions – Greenhouse Effect, Global Warming. Hydrosphere – Hydrological Cycle – Water Quality Parameters, water pollution – Causes, effects, control measures, Overutilization of Ground Water – Water Conservation Strategies, Microplastics as emerging pollutants-Causes, effects and control measures Self-Learning and Case Studies – Atmosphere – Urban air quality (Delhi, Beijing case), Hydrosphere – (National Water Mission (NAPCC), NRCP, Jal Shakti Abhiyan – Cape Town Water Crisis (2017–2018)

HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 K. J. Somaiya Institute of Engineering and Technology
 V. P. Arasu, Coimbatore - 641 407.

UNIT III: LITHOSPHERE AND SOLID WASTE MANAGEMENT

3 + 6

Lithosphere – Composition, Plate tectonics, continental drift, Soil Nutrients, Nitrogen cycles, Soil Pollution – Causes, effects (Land degradation, desertification) and control measures, Agriculture – Problems of modern agriculture. E-waste-causes, effects and control measures. Solid Waste Management – Types & Sources of waste, waste management processes. Self-Learning and Case Studies - (Land degradation – Rajasthan - Soil erosion – Narmada River Basin, MP – Desertification – Thar Desert – Eco buddy program).

UNIT IV: GLOBAL ISSUES, HUMAN WELFARE AND ROLE OF TECHNOLOGY

3 + 6

Disasters & Disaster management cycle – Floods, Landslides, Land Clearing Projects – Dam sites, Highways projects. Resettlement and Rehabilitation (R&R). Population – Global and national growth patterns, Population explosion, Role of information Technology (IT) in Environmental studies and human health monitoring. Self-Learning and Case Studies – Use of IT in environmental monitoring (GIS, Remote Sensing, sensors, data loggers) Pollution Monitoring – Water, Air.

UNIT V: SUSTAINABLE DEVELOPMENT AND GREEN PRACTICES

3 + 6

Sustainable Development – Introduction, Concepts and Strategies, Sustainable Practices and Circular Economy – 5Rs, Zero Waste Lifestyle Sustainable Development – Introduction, Concepts and Strategies, Sustainable Practices and Circular Economy – 5Rs, Zero Waste Lifestyle. Sustainable Agriculture, Green Technologies – Green Chemistry and reagent in industries, Environmental Management – ISO 14001:2004, energy efficiency, sustainable transport, carbon sequestration. Self-Learning and Case Studies - Overview of United Nations SDGs (focus on SDGs 6, 7, 11, 12, 13), Role of India in implementing SDGs, Ambikapur, Chhattisgarh – Zero waste city model, Pune, Maharashtra – Integrating informal waste sector, Delhi Metro – Energy efficiency, carbon credits from regenerative braking, solar power use, Kochi, Kerala – Sustainable urban transport with water metro and public transit integration.

LIST OF EXPERIMENTS

1. Estimation of hardness (total, temporary, permanent) in water samples
2. Iodometric / Argentometric determination of available chlorine in a sample of bleaching powder.
3. Estimation of dissolved oxygen in water.
4. Determination of nitrate/ammonium estimation — colorimetric tests for nitrate/ammonium to study N availability
5. Recovery of Aluminum from waste materials.
6. Photocatalytic degradation of dye using TiO₂.
7. Synthesis of biodiesel from vegetable oil.
8. Coir pith composting and application study.
9. Determination of conductivity, TDS and turbidity test for potable water

CONTACT PERIODS:

Lecture: 15 Periods Tutorial: - Periods Practical: 30 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. E. Bharucha, "Environmental Studies for Undergraduate Courses", 2nd edition, Hyderabad, University Press (India) Pvt. Ltd., 2005
2. R. Rajagopalan, "Environmental Studies: From Crisis to Cure", 3rd edition, New Delhi: Oxford University Press, 2016
3. A. Kaushik and C. P. Kaushik, "Environmental Science and Engineering" 5th edition, New Delhi: New Age International Publishers, 2019
4. R. R. Hiremath, "Sustainable Development", 1st edition, New Delhi: Himalaya Publishing House, 2008

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HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Aravali, Coimbatore - 641 407.

5. P. D.Sharma, "Ecology and Environment" 13th edition, Meerut: Rastogi Publications, 2020

REFERENCES:

1. P. Meenakshi, "Elements of Environmental Science and Engineering" 1st edition, New Delhi: Prentice Hall of India, 2005
2. G. R. Chatwal and Harish Sharma, "A Textbook of Environmental Studies" 3rd edition, Mumbai: Himalaya Publishing House, 2018
3. A. Kumar, "Environmental Studies", Revised edition, Patna: Bharati Bhawan Publishers & Distributors, 2019
4. V. Desai, "Environment and Sustainable Development" 1st edition, Mumbai: Himalaya Publishing House, 2009
5. G. K. Taneja, Gopal and S. C. Sharma, "Environmental Sustainability and Development", 2nd edition, New Delhi: Deep and Deep Publications, 2010

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THE HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPR Institute of Engineering and Technology

SEMESTER II

U25CSG06	Programming with Python (Common to CE, ME)	Category: ESC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

- To understand the syntax and semantics of Python programming
- To implement programs using Python data structures
- To gain expertise in using Python libraries for solving real-time problems

COURSE OUTCOMES:

CO 1:	Describe the basic operations of tokens, data types, and operators in Python	Understand
CO 2:	Demonstrate the use of control statements for decision-making and iteration in Python programs	Apply
CO 3:	Develop programs using Python data structures such as strings, lists, tuples, sets, and dictionaries	Apply
CO 4:	Implement exception handling and file operations in Python programs	Apply
CO 5:	Apply Python libraries such as NumPy and Pandas to analyze and solve real-world data problems	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	2	1	1	-	-	-	-	-	-	2	-	-
CO 3	3	2	1	1	-	-	-	-	-	-	2	-	-
CO 4	3	2	1	1	-	-	-	-	-	-	2	-	-
CO 5	3	2	1	1	1	-	-	-	-	-	2	-	-

SYLLABUS:

UNIT I: LANGUAGE BASICS

6 + 6

Python interpreter and interactive mode – Tokens – Data types – Numbers and math functions – Input and Output operations – Comments – Reserved words – Indentation – Operators and expressions – Precedence and associativity – Type conversion – Debugging – Common errors in Python

UNIT II: CONTROL STATEMENTS

6 + 6

Selection – Conditional branching statements – if – if-else – Nested-if – if-elif-else statements – Iterative statements – while – for loop – break – continue and pass statements

UNIT III: FUNCTIONS AND MODULES

6 + 6

Functions – Function Definition and Function call – Variable scope and Lifetime – Return statement – Lambda functions or Anonymous functions – Recursion – Custom Modules and Packages

UNIT IV: PYTHON DATA STRUCTURES**6 + 6**

Strings – Slicing – Immutability – Built-in string methods and functions – Concatenating – Appending and Multiplying strings – String modules – List – Creation – Accessing values – Slicing – List methods – In-built functions for Lists – Tuples – Creation – Operations on tuples – Traversing – Indexing and Slicing – Tuple assignment – In-built functions for tuples – Sets – Creation – Operations – Dictionaries – operations and methods

UNIT V: EXCEPTION, FILE HANDLING AND PACKAGES**6 + 6**

Exceptions – Errors and Exceptions – Handling exception – Built-in and User-defined exceptions – Files – Types – Operations – Open – Read – Write – Close. Packages – Numpy and Pandas

LIST OF EXPERIMENTS

1. Python Program Demonstrating Language Basics: Data Types, Operators, and Expressions
2. Python Program Demonstrating Control Statements: Conditional and Iterative Statements
3. Python Program Demonstrating Functions and Recursion
4. Python Program Demonstrating Lambda Functions and Custom Modules
5. Python Program Demonstrating String and List Operations
6. Python Program Demonstrating Tuple, Set, and Dictionary Operations
7. Python Program Demonstrating Exception Handling and File Operations
8. Python Program using Strings and Lists for Solving Engineering Problems
9. Python Program using User Defined Functions for Solving Engineering Problems
10. Python Program Using CSV for Data Interchange in Engineering Projects

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 30 Periods Project: - Periods Total: 60 Periods

TEXTBOOKS:

1. Reema Thareja, "Python programming: Using problem solving approach", 1st Edition, Oxford Press, 2017
2. William McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, 2nd Edition, Shroff/O'Reilly Publication, 2017

REFERENCES:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
2. Ashok Namdev Kamthane and Amit Ashok Kamthane, "Programming and Problem Solving with Python", 2nd Edition, McGrawHill Education, 2018
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", 1st Edition, Pearson India Education Services Pvt. Ltd., 2016

harpith
 HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Arasur, Coimbatore – 641 407.

SEMESTER II

U25ECG01	Basics of Electronics Engineering (Common to AD, AM, BM, CB, CE, CS, IT, SC)	Category: ESC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To study about the basic electronics components and their applications
- To explore operational amplifiers for different applications
- To introduce Arduino programming

COURSE OUTCOMES:

CO 1: Analyze the characteristics of diodes & BJT and implement simple applications

Analyze

CO 2: Construct various applications using operational amplifier

Apply

CO 3: Implement simple applications using Arduino controller

Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	2	2	-	-	-	2	2	-	1	-	-
CO 2	3	2	1	1	-	-	-	2	2	-	1	-	-
CO 3	3	2	1	1	2	-	-	2	2	-	1	-	-

SYLLABUS:

UNIT I: BASIC ELECTRONIC COMPONENTS AND APPLICATIONS

5 + 10

PN junction diode and Zener diode – Bipolar Junction Transistor – Metal Oxide Semiconductor Field Effect Transistor – Applications of PN diode – SMPS

UNIT II: OPERATIONAL AMPLIFIER

5 + 10

Operational amplifier – Ideal characteristics – Inverting and non-inverting amplifier – Applications of op-amp – Adder, subtractor, integrator, differentiator and comparator

UNIT III: ARDUINO PROGRAMMING

5 + 10

Introduction to microprocessor and microcontroller – Arduino UNO – Architecture, pin diagram – I/O functions

LIST OF EXPERIMENTS

1. Plot V-I characteristics of PN diode and Zener diode
2. Plot input and output characteristics of BJT
3. Construct a half wave and full wave rectifier using PN diode
4. Design the power supply circuits using passive and active components
5. Verify the operation of adders and subtractor circuit using op-amps
6. Simple application program using Arduino UNO

CONTACT PERIODS:

Lecture: 15 Periods

Tutorial: - Periods

Practical: 30 Periods

Project: - Periods

Total: 45 Periods

TEXTBOOKS:

1. S. Salivahanan, N. Sureshkumar, A. Vallavaraj, "Electronic Devices and Circuits", 3rd edition, Tata McGraw Hill, 2010
2. Donald A Neaman, "Semiconductor Physics and Devices", 4th edition, Tata McGraw Hill, 2012

REFERENCES:

1. R. S. Sedha, "A Textbook of Applied Electronics", 3rd edition, S.Chand & Company Ltd, 2013
2. Robert L Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", 11th edition Pearson India Education Services (P) Ltd., 2015
3. Roy Chaudary, "Linear Integrated Circuits", 6th edition, New Age International Publishers, 2021
4. J.M. Hughes, "Arduino: A Technical Reference", 1st edition, O'Reilly Media Inc, 2016

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THE HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPR Institute of Engineering and Technology
KPR Nagar, Chennai - 641 407.

SEMESTER II

U25EEG01	Basics of Electrical Engineering (Common to AD, AM, BM, CB, CE, CS, EC, IT, SC)	Category: ESC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To introduce the fundamentals of electric circuits, power systems, and basic electrical measurements
- To provide an understanding of electrical machines and SMPS with relevance to computing applications
- To create awareness of electrical installations, safety practices, and protective systems in practical environments

COURSE OUTCOMES:

CO 1:	Analyse basic electrical circuits using Ohm's and Kirchhoff's laws	Analyze
CO 2:	Measure electrical quantities using appropriate instruments	Understand
CO 3:	Explain the working principles and applications of Electrical Machines and SMPS	Understand
CO 4:	Identify the components of residential electrical installations	Apply
CO 5:	Apply electrical safety procedures and identify protective devices used in electrical systems	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	-	-	-	-	-	-	-	-	2	-	-
CO 2	3	2	-	-	-	-	-	-	-	-	2	-	-
CO 3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO 4	3	2	-	-	-	-	-	-	-	-	2	-	-
CO 5	3	2	-	-	-	-	-	-	-	-	2	-	-

SYLLABUS:

UNIT I: FUNDAMENTALS OF ELECTRIC CIRCUITS AND MEASUREMENTS 5 + 10

Ohm's Law, Kirchhoff's Laws (KVL, KCL) – Series and parallel circuits, voltage and current division – Introduction to AC and DC supply – Power, energy, and power factor – Basic measuring instruments: Voltmeter, Ammeter, Wattmeter, Energy Meter

UNIT II: ELECTRICAL MACHINES AND POWER CONVERSION DEVICES 5 + 10

Single Phase Transformer, DC Machines and Three Phase Induction Motor: Working principle, types, and applications – Stepper and Servo motors: Basics and applications – Switched Mode Power Supply: concept, types (buck, boost, buck-boost), and applications

UNIT III: ELECTRICAL INSTALLATIONS AND SAFETY 5 + 10

Components of a simple electrical installation – Earthing, Fuses, MCB, ELCB – Single-line diagram of a residential system – Introduction to batteries, UPS and inverters – Electrical safety measures and shock preventions

LIST OF EXPERIMENTS

- Verification of Ohm's Law and Kirchhoff's Laws
- Measurement of voltage, current, and power in DC circuits
- Load test on a single-phase transformer

4. Speed control of DC motor
5. Starting and reversal of direction of a three-phase induction motor
6. Demonstration of SMPS and UPS operation

CONTACT PERIODS:

Lecture: 15 Periods Tutorial: - Periods Practical: 30 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. D.P. Kothari and I.J. Nagrath, "Basic Electrical Engineering", 4th edition, Tata McGraw Hill, 2024
2. V.K. Mehta & Rohit Mehta, "Principles of Electrical Engineering and Electronics", 2nd revised edition, S. Chand, 2019

REFERENCES:

1. D.P. Kothari and I.J. Nagrath, "Basic Electrical and Electronics Engineering", 2nd edition, Tata McGraw Hill, 2020
2. M.H. Rashid, "Power Electronics: Circuits, Devices and Applications", 4th edition, Pearson Education, 2023
3. Hughes, "Electrical and Electronic Technology", Pearson Education, 12th edition, 2016

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HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPR Institute of Engineering and Technology
KPR 143 - 641 407
Coimbatore - 641 407.

SEMESTER II

U25MEG02	Basics of Mechanical Engineering (Common to AD, AM, BM, CB, CE, CS, EC, EE, IT, SC)	Category: ESC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To provide the fundamental knowledge of mechanical elements, actuation systems, and manufacturing processes essential for engineering applications
- To develop an understanding of energy conversion, thermodynamics, heat transfer, fluid mechanics, and power generation systems for solving practical problems

COURSE OUTCOMES:

- CO 1:** Identify the mechanical elements and actuation systems used in basic engineering applications Understand
- CO 2:** Classify various manufacturing processes and distinguish between shaping, joining, and additive manufacturing methods Understand
- CO 3:** Interpret the concepts of thermodynamics, heat transfer, and fluid mechanics to practical engineering problems Understand
- CO 4:** Identify the various conventional and non-conventional methods of power generation Understand

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	1	-	1	1	-	-	-	-
CO 2	2	1	-	-	1	1	-	1	1	-	-	-	-
CO 3	2	1	-	-	-	-	-	1	1	-	-	-	-
CO 4	2	1	-	-	-	1	-	1	1	-	-	-	-

SYLLABUS:

UNIT I: MECHANICAL ELEMENTS AND ACTUATION SYSTEMS

3 + 8

Mechanical elements – Gears, chains, shaft, keys, coupling, bolts, nuts, screws, spring, bearings – Actuators – Hydraulics actuators, pneumatics actuators

UNIT II: FUNDAMENTALS OF MANUFACTURING PROCESSES

4 + 4

Introduction to manufacturing – Classification of manufacturing processes – Shaping processes – Casting, molding, powder metallurgy, additive manufacturing (FDM, SLA) – Joining processes – Arc welding, brazing and soldering

UNIT III: BASICS OF THERMAL AND FLUID SYSTEMS

4 + 12

Basic thermodynamics concepts – System, surroundings, properties, state, process, cycle, laws of thermodynamics and its application – Heat transfer basics – Modes of heat transfer – Conduction, convection, and radiation (basic explanation with examples) – Properties of fluids – Density, specific gravity, viscosity, surface tension, capillarity – Pressure and measurements, pascal's law – Types of fluid flow – Introduction to pumps and its types

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UNIT IV: ENERGY CONVERSION SYSTEMS**4 + 6**

Introduction to IC and EC Engines – General layout and working of electric vehicle – Power plant – Working and types – Thermal power plant – Hydro power plant – Nuclear power plant – Gas power plant

LIST OF EXPERIMENTS

1. Determine the velocity ratio using simple and compound gear trains
2. Construct and demonstrate a basic pneumatic circuit using single-acting and double-acting cylinders
3. Demonstrate the working of 3D printer by printing a simple object
4. Determination of heat transfer coefficient under natural convection from vertical cylinder
5. Verification of Bernoulli's theorem
6. Performance characteristics of a centrifugal pump
7. Demonstration on IC engine components

CONTACT PERIODS:

Lecture: 15 Periods Tutorial: - Periods Practical: 30 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Pravin Kumar, "Basic Mechanical Engineering", 3rd Edition, Pearson Education India, 2018
2. H. S. Bawa, "Manufacturing Processes", Latest Edition, Tata McGraw-Hill Education, 2004

REFERENCES:

1. P. K. Nag, "Engineering Thermodynamics", 6th Edition, Tata McGraw Hill Education, 2017
2. Godfrey C. Onwubolu, "Mechatronics: Principles and Applications", 1st Edition, Elsevier, 2006
3. P. K. Nag, "Power Plant Engineering", 4th Edition, McGraw Hill Education, 2017


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 Department of Civil Engineering
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SEMESTER II

U25MEG03	Engineering Graphics (Common to CE, CH, EC, EE, ME)	Category: ESC				
		L	T	P	J	C
		0	0	4	0	2

COURSE OBJECTIVES:

- To impart knowledge of BIS standards and conventions in engineering graphics for the accurate construction of curves, projections and developments
- To develop the ability to visualize and represent 3D objects in 2D space through orthographic projections, sectional views and development of surfaces
- To enhance the drafting skills to interconvert between isometric and orthographic views for practical engineering application using CAD Software

COURSE OUTCOMES:

- CO 1:** Illustrate engineering curves with BIS standards for effective engineering communication Understand
- CO 2:** Apply the principles of orthographic projection to represent points, straight lines, plane surfaces, and solids Understand
on engineering drawing sheets
- CO 3:** Construct projections of truncated and frustums solids and develop the lateral surfaces of solids Understand
- CO 4:** Convert the isometric views of simple objects to orthographic views and vice versa Understand

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	-	-	-	-	2	1	2	-	2	3	-
CO 2	3	1	-	-	-	-	1	1	2	-	-	3	-
CO 3	3	1	-	-	2	-	-	1	2	-	-	3	-
CO 4	3	2	-	-	2	-	2	1	2	-	2	3	-

LIST OF EXPERIMENTS

- Introduction, drawing instruments and its uses, sheet layout, BIS conventions, lines, lettering and dimensioning practices lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. agency, parallelism, inclination and perpendicularity (Not for Exam)
- Manual construction of ellipse, parabola, and hyperbola by eccentricity method
- Construction of involute of square and circle by manual drafting
- Projection of points in all four quadrants by manual drafting
- Projection of lines inclined to both horizontal and vertical planes by manual drafting
- Projection of planes inclined to both horizontal and vertical planes by manual drafting
- Projection of solids inclined to one plane and parallel to other planes using AUTOCAD
- Section of solids with base resting on HP using AUTOCAD
- Development of lateral surfaces of solids with base on HP using AutoCAD
- Construction of isometric views of simple and truncated solids using AutoCAD
- Sketching orthographic views from pictorial representation of 3D objects using AutoCAD

CONTACT PERIODS:

Lecture: - Periods **Tutorial:** - Periods **Practical:** 60 Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. N.D. Bhatt and V.M. Panchal, "Engineering Drawing", Charotar Publishing House, Gujarat, 55th edition, 2025
2. K. Venugopal and V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 2022
3. D.M.Kulkarni, A.P.Rastogi and A.K.Sarkar, "Engineering Graphics with AutoCAD", PHI Learning Private Limited, New Delhi, Revised Edition, 2021

REFERENCES:

1. K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2017
2. Sam Tickoo, "AutoCAD 2024 for Engineers and Designers", Dreamtech Press, 2024

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SEMESTER II

U25CE201	Engineering Mechanics for Civil Engineers	Category: ESC				
		L	T	P	J	C
		3	0	0	0	3

COURSE OBJECTIVES:

- To apply principles of equilibrium to analyze rigid body systems in 2D space
- To evaluate the first and second moment of area of composite plane figures
- To comprehend the effects of friction in mechanical systems
- To understand the different methods to analyze the forces acting on trusses

COURSE OUTCOMES:

CO 1:	Compute the resultant and analyze equilibrium of the system of forces acting on particles and rigid bodies in plane and space.	Apply
CO 2:	Calculate the geometry-dependent properties like center of gravity and moment of inertia	Apply
CO 3:	Examine the laws of friction to distinguish between different types of friction in practical scenarios.	Apply
CO 4:	Solve problems related to the dynamics of rigid bodies in plane motion	Apply
CO 5:	Predict the internal forces of the members of the trusses and frames	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	-	-	-	3	-	-	-	-	-	-	-
CO 2	3	2	-	-	-	3	-	-	-	-	-	2	-
CO 3	3	2	-	-	-	2	-	-	-	-	-	-	-
CO 4	3	2	-	-	-	2	-	-	-	-	-	2	-
CO 5	3	2	-	-	-	2	-	-	-	-	-	1	-

SYLLABUS:

UNIT I: STATICS AND EQUILIBRIUM OF RIGID BODIES

9

Fundamental concepts and principles – Resolution of a Force – Resolution of forces in a plane – Free body diagram – System of forces – Principle of transmissibility – Moment of force about a point and axis – Varignon's theorem – Moment of a couple – Couples and force-couple system – Equilibrium of a rigid bodies in two and three dimensions – Types of beams – Reactions and supports

UNIT II: GEOMETRY DEPENDENT PROPERTIES

9

Centre of gravity, Centre of mass and Centroid – Parallel axis and Perpendicular axis theorem – Moment of Inertia of simple and complex areas – Radius of gyration – Polar moment of inertia – Product of inertia

UNIT III: FRICTION

9

Friction – Frictional forces – Laws of Coulomb's friction – Co-efficient of friction – Ladder friction – Belt friction – Wedge friction

UNIT IV: DYNAMICS OF PARTICLES AND RIGID BODIES

9

Kinematics – Displacement, Velocity and Acceleration – Rectilinear motion – Projectile motion – Tangential and Normal components. Kinetics – Equations of motion – Newton's Second Law – Energy and Momentum – Principle of work and energy – Principle of Impulse and Momentum – Impact

UNIT V: ANALYSIS OF TRUSSES

9

Introduction to trusses and frames – Classification – Methods of truss analysis – Analysis of plane trusses – Method of joints – Method of sections

CONTACT PERIODS:

Lecture: 45 Periods Tutorial: - Periods Practical: - Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Hibbeler, R.C., "Engineering Mechanics: Statics and Engineering Mechanics: Dynamics", 15th edition, Prentice Hall, 2022
2. Beer, Ferdinand P., E. Russell Johnston, David Mazurek, Phillip Cornwell, and Brian Self., "Vector Mechanics for Engineers: Statics and Dynamics", New Delhi, 2024

REFERENCES:

1. Russel C Hibbeler, "Engineering Mechanics: Statics and Dynamics", 14th Edition, Pearson Education Inc, Prentice Hall, 2016.
2. Dhiman A.K, Dhiman P, Kulshreshtha D.C, "Engineering Mechanics: Statics and Dynamics", McGraw Hill Education, 2017.
3. Meriam JL, Craige and Bolton, "Engineering Mechanics: Statics and Dynamics", John Willey and Son's publication, 9th Edition, 2018.
4. Timoshenko S, Young D H, Rao J V and Sukumar Pati, "Engineering Mechanics", 5th Edition, McGraw Hill Higher Education, 2013.
5. <https://ocw.mit.edu/>


 HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPN Institute of Engineering and Technology
 Arasik, Coimbatore – 641 407.

U25LEG05	German for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

- CO 1:** Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases **Remember**
- CO 2:** Describe people, homes, weather, and daily routines using structured sentences with correct grammar **Understand**
- CO 3:** Read and interpret simple texts such as product labels, menus, signs, and weather updates **Understand**
- CO 4:** Write short messages or descriptions related to everyday topics like hobbies, weather, or family **Understand**
- CO 5:** Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:**UNIT I: EVERYDAY SHOPPING AND DINING****6 + 3**

Shopping for groceries and clothes – Ordering food and drinks at a restaurant – Talking about prices and quantities – Expressing preferences – Reading menus, labels, and receipts – Grammar: Accusative case review with articles and adjectives, Plural forms of nouns, Adjective endings in nominative and accusative – Cultural Focus: Eating habits in Germany, Austria, and Switzerland – Supermarket etiquette – Restaurant culture – Tipping practices

UNIT II: PEOPLE AND PERSONAL INTERESTS**6 + 3**

Talking about family and relationships – Describing people's appearance and personality – Hobbies and free time activities – Likes and dislikes – Grammar: Possessive pronouns - Adjective endings with possessive pronouns – Word order in main clauses – Cultural Focus: Family structures – Popular hobbies and sports – Work-life balance in German-speaking countries

[Signature]
HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPN Institute of Engineering and Technology
 Arasur, Coimbatore - 641 407.
 T: 0202-2811100, 2811101

UNIT III: HOME AND LIVING**6 + 3**

Describing your home and rooms – Furniture and household items – Talking about home layout and comfort – Grammar: Two-way prepositions with accusative/dative – Use of es gibt – Describing location vs. movement – Cultural Focus: Typical German homes – Living arrangements – Interior design norms

UNIT IV: SEASONS AND WEATHER**6 + 3**

Talking about weather and seasons – Seasonal activities – Preferences for seasons – Grammar: Temporal phrases – Review of present tense verb usage with seasonal context – Use of weil (because) – Cultural Focus: Seasonal festivals like Weihnachten and Oktoberfest – Weather patterns in German speaking countries

UNIT V: PUTTING IT TOGETHER – DAILY LIFE**6 + 3**

Combining shopping – Personal life – Home, and seasonal activities into daily routines – Conversational practice across units – Grammar: Practice of main and subordinate clauses – Sentence structure review – Verb position with weil and prepositions – Cultural Focus: Daily routines in Germany – Overview of regional variations in culture and habits

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Buscha, A., & Szita, S., "Begegnungen Deutsch als Fremdsprache A1+: Integriertes Kurs- und Arbeitsbuch," 1st Edition, 2021
2. Brüseke, R., "Grammatik leicht A1," 1st Edition, 2019

REFERENCES:

1. Netzwerk Deutsch als Fremdsprache A1, 1st Edition: BlueNBells, 2012
2. Huber, K., & Keller, F., "DaF kompakt A1: Deutsch als Fremdsprache," 3rd Edition, Langenscheidt, 2018


HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Araur, Coimbatore - 641 407.

SEMESTER II

U25LEG06	Japanese for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

- CO 1: Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases **Remember**
- CO 2: Describe people, homes, weather, and daily routines using structured sentences with correct grammar **Understand**
- CO 3: Read and interpret simple texts such as product labels, menus, signs, and weather updates **Understand**
- CO 4: Write short messages or descriptions related to everyday topics like hobbies, weather, or family **Understand**
- CO 5: Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: SHOPPING AND QUANTITIES

6 + 3

Shopping-related expressions – Asking prices and quantities – Counting objects with counters: ～つ, ～人, ～枚, ～本 – Describing wants using ～がほしいです – Offering and requesting using ～をください – Grammar: Verbs in -masu form (かいます, かります, あげます, もらいます) – Particles: と, や, から, まで – Sentence structures: ～があります / ～がいます, ～は～にあります – Vocabulary: Money, items, colors, shops – Kanji: Numbers (一～十), Days (日, 月, 火) – Basic shopping terms – Cultural note: Japanese currency – Store etiquette – Giving/receiving customs

UNIT II: DAILY LIFE AND TIME EXPRESSIONS

6 + 3

Talking about schedules and habits – Expressing future plans using time expressions and verb tense – Grammar: Verb conjugation (non-past affirmative/negative) – Introduction to te-form: ～てください, ～てもいいです – Sequence with ～てから – Frequency expressions: ～まいにち, ～ときどき, ～よく – Vocabulary: School/work schedule, leisure activities, public places, transportation – Kanji: Days of the week (月, 火, 水, 木, 金, 土, 日) – Time-related (時, 分, 半) – Motion verbs (行く, 来る, 帰る) – Cultural note: Japanese daily routines – Work-life balance, punctuality

UNIT III: MAKING REQUESTS AND SEQUENCING ACTIONS

6 + 3

Talking about likes and dislikes: ～が好きです / ～がきらいです – Describing abilities: ～がじょうずです / ～がへたです – Vocabulary: Hobbies, sports, entertainment terms – Inviting someone using ～ませんか – Accepting or declining invitations: いいですね / ちょっと – Grammar: Verb forms for expressing preference and intention – Particle: が for subject in expressions of ability and preference – Kanji: Verbs related to hobbies (見, 聞, 読, 書, 食) – Nouns related to interests – Cultural note: Popular hobbies in Japan – Seasonal pastimes – Communication norms in social invitations

UNIT IV: HOBBIES AND PREFERENCES

6 + 3

Asking and giving directions – Describing locations of people and things – Using maps and signs – Grammar: Particles に and で for location and direction – Expressions: ～のまえに, ～のとなりに, ～のなかに – Vocabulary: Places in town – Transportation terms – Directional phrases – Kanji: Location and place words (駅, 右, 左, 上, 下, 中) – Common public signs – Cultural note: Navigating Japanese cities – Polite phrases for asking directions – Public transport norms

UNIT V: ABILITIES AND SOCIAL INTERACTIONS

6 + 3

Review of shopping – Preferences, routines, and directions – Roleplays: at the store, planning a weekend – Inviting a friend – Asking for help and giving opinions – Grammar: Integrated use of learned verb forms and particles – Vocabulary: Reinforcement through conversation – Kanji: Mixed use in real-life contexts – Cultural note: Everyday conversation etiquette – Blending formal and informal speech – Real-life scenarios in Japan

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. 3A Corporation, "Minna no Nihongo Shokyū I: Main Textbook," 2nd Indian Edition, Goyal Publishers & Distributors Pvt. Ltd., New Delhi, 2018
2. Banno, Eri, Yutaka Ohno, Yoko Sakane, Chikako Shinagawa, and Kyoko Tokashiki, "Genki I: An Integrated Course in Elementary Japanese," 3rd Edition, The Japan Times Publishing, Tokyo, 2020

REFERENCES:

1. Yamada, M., & Fujita, T., "Japanese for Beginners: A Practical Approach," 1st Edition, Tuttle Publishing, 2019
2. Takahashi, A., & Sato, M., "Nihongo Pro: Japanese for N5 Level," 1st Edition, KADOKAWA, 2018

SEMESTER II

U25LEG07	French for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

- CO 1:** Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases **Remember**
- CO 2:** Describe people, homes, weather, and daily routines using structured sentences with correct grammar **Understand**
- CO 3:** Read and interpret simple texts such as product labels, menus, signs, and weather updates **Understand**
- CO 4:** Write short messages or descriptions related to everyday topics like hobbies, weather, or family **Understand**
- CO 5:** Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: FOOD AND SHOPPING ESSENTIALS

6 + 3

Food items – Quantities – Packaging – Prices – Navigating markets and stores – Asking for prices and quantities – Expressing preferences and choices – Grammar: Partitive articles (du - de la - des) – Expressions of quantity (un kilo de - beaucoup de - etc.) – Use of il y a – Verb prendre (to take) – Vouloir (to want) – Acheter (to buy) in the present tense – Cultural Focus: French culinary culture – Market etiquette – Typical meals and menus

UNIT II: DINING OUT AND CAFÉ CULTURE

6 + 3

Ordering in a café or restaurant – Understanding menus – Making polite requests – Expressing likes and dislikes – Talking about meals – Grammar: Adjective placement and agreement with nouns – Review of present tense verbs – Questions and polite forms – Cultural Focus: Café culture in France and Francophone regions – Dining customs – Tipping practices

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 KPR Institute of Engineering and Technology
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UNIT III: DESCRIBING HOME AND SURROUNDINGS**6 + 3**

Talking about where you live – Describing your home and rooms – Locating objects in a room – Discussing furniture and appliances – Grammar: Prepositions of place (sur - sous - devant - derrière - entre) – Demonstrative adjectives (ce - cette - ces) – Verb habiter and other -er verbs – Cultural Focus: Types of housing in France – Apartment etiquette – Real estate ads in Francophone cities

UNIT IV: DAILY ROUTINES AND PERSONAL DESCRIPTIONS**6 + 3**

Describing people – Talking about daily routines – Introduction to reflexive verbs – Using adverbs of place (ici - là-bas) – Giving simple directions – Grammar: Reflexive verbs (s'habiller, se lever) – Adverbs of place – Review of verb placement – Cultural Focus: Urban vs. rural living – Typical neighborhood life in French cities

UNIT V: LEISURE, WEATHER, AND SOCIAL LIFE**6 + 3**

Talking about hobbies and sports – Weekend activities – Making and responding to invitations – Expressing preferences and future intentions – Grammar: Verbs faire, aimer, préférer, sortir, aller – Contractions with à and de (au, du) – Near future tense (futur proche: aller + infinitive) – Use of on – Cultural Focus: Leisure activities in Francophone countries – Popular sports and pastimes – Social norms around outings and gatherings

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

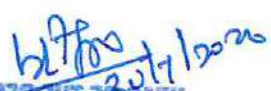
Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Marie-José Lopes & Jean-Thierry Bougnec, "Inspire 2 A1-A2 Méthode de français," 1st Edition, Hachette Français Langue Etrangère, 2020
2. Gibbe, C., Berthet, A., & Hugot, C., "Édito A2: Méthode de français," 1st Edition, Didier, 2024

REFERENCES:

1. Chantal Fougères & Marc de la Harpe, "Le Nouveau Sans Frontières 2: Méthode de français A2," 1st Edition, Hachette FLE, 2020
2. Xavier Maingueneau, "Le Français pour les Nuls: A2-B1," 3rd Edition, Wiley, 2021


HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Araur, Coimbatore - 641 407.

SEMESTER II

U25LEG08	Hindi for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

- CO 1:** Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases Remember
- CO 2:** Describe people, homes, weather, and daily routines using structured sentences with correct grammar Understand
- CO 3:** Read and interpret simple texts such as product labels, menus, signs, and weather updates Understand
- CO 4:** Write short messages or descriptions related to everyday topics like hobbies, weather, or family Understand
- CO 5:** Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: SHOPPING LANGUAGE AND NUMBER USAGE

6 + 3

Interacting in markets and shops – Asking prices and quantities – Expressing need and preference – Vocabulary: Fruits – Vegetables – clothes – Money terms – Numbers (1–100) – Classifiers: किलो - दर्जन – Use of polite requests – Grammar: Verbs चाहना - लेना - देना in present tense – Use of कुछ and कितना – Postpositions: के लिए - के पास – Emphatic words: ही - भी – Cultural note: Indian market etiquette – Bargaining norms – Respectful phrases for shopkeepers – Currency handling

UNIT II: DESCRIBING PEOPLE AND RELATIONSHIPS

6 + 3

Talking about family and people – Describing physical appearance and personality – Expressing family relations – Vocabulary: Family members – Descriptive adjectives – Colors – Body parts – Grammar: Adjective agreement by gender and number – Possessives with का/की/के – Verb होना in past tense (था/थी/थे) – Using का रिश्ता for relationships – Honorary subject-verb agreement – Cultural note: Kinship terms – Family address norms – Formal/informal differences – Indian respect systems

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HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
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UNIT III: HOBBIES, LIKES, AND SOCIAL LANGUAGE**6 + 3**

Talking about hobbies and free time – Expressing likes and dislikes – Making suggestions and invitations – Vocabulary: Leisure activities – hobbies – entertainment words – Days of the week – Grammar: पसंद होना constructions – Compound verb use with करना (e.g., किताब पढ़ना) – Use of मुझे X पसंद है – Use of को for preferences – Future tense basics with गा/गी/गे – Cultural note: Indian leisure culture – Film and music – Inviting friends – Group social etiquette

UNIT IV: EVERYDAY CONVERSATIONS AND NEEDS**6 + 3**

Describing needs and routines in daily life – Making polite offers and requests – Talking about simple problems and solutions – Vocabulary: Basic needs – Services – Tools – simple household and health terms – Grammar: Requests with क्या आप...? – Use of चाहिए – Conditional phrases with अगर (if) – More on present vs. future tense use – Cultural note: Navigating services in India – Polite refusals – Help seeking expressions

UNIT V: RECAP AND REAL-LIFE PRACTICE**6 + 3**

Conversational roleplays: shopping – Family introductions – Hobby discussion – Describing routines and asking for help – Combining sentence structures from previous units – Vocabulary: Review and integrate all learned sets – Grammar: Review of verb tenses – Question structures – Postpositions – Honorifics – Cultural note: Integrating cultural etiquette with language use – Real-world scenarios for communication in Hindi

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Pavithra Publications, "Spoken Hindi: Through Tamil," 2nd Edition, Pavithra Publications, Chennai, 2015
2. Dakshina Bharat Hindi Prachar Sabha, "Prathamik Text Book: New Syllabus," 1st Edition, Dakshina Bharat Hindi Prachar Sabha, Madras, 2023

REFERENCES:

1. Ganga, K., & Ramesh, V., "Learn Hindi in 30 Days: A Beginner's Guide," 3rd Edition, Hindi Academy, 2020
2. Vyas, S., "Spoken Hindi for Beginners," 1st Edition, Orient BlackSwan, 2018

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HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPN Institute of Engineering and Technology
 Araur, Coimbatore - 641 407.

SEMESTER II

U25LEG10	Chinese for Engineers - II (Common to all programmes)	Category: HSMC				
		L	T	P	J	C
		1	0	2	0	2

COURSE OBJECTIVES:

- To improve comprehension of real-life conversations in familiar everyday situations (shopping, dining, describing spaces, etc.)
- To develop fluency in expressing preferences, describing people, homes, and daily routines using basic sentence structures
- To build competence in writing short, structured texts such as messages, descriptions, and informal communications

COURSE OUTCOMES:

- CO 1:** Engage in simple conversations while shopping, dining, or asking for information using appropriate vocabulary and phrases **Remember**
- CO 2:** Describe people, homes, weather, and daily routines using structured sentences with correct grammar **Understand**
- CO 3:** Read and interpret simple texts such as product labels, menus, signs, and weather updates **Understand**
- CO 4:** Write short messages or descriptions related to everyday topics like hobbies, weather, or family **Understand**
- CO 5:** Apply core grammatical rules such as adjective endings, possessive pronouns, and prepositions of place with improved accuracy **Apply**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: WOULD YOU LIKE TO HAVE COFFEE OR TEA?

6 + 3

Learning transposed objects – Learning how to express “too”, “also” with 也 – Learning how to express “excessively” with 太.....了 – Learning numerical system in Chinese – Learning how to express “more than” with 多

UNIT II: WHERE IS MY WALLET?

6 + 3

Learning 在 as a verb with a place word – Learning location of an action (S + 在 + 處所詞 (PW) + 動作 (V)) – Learning how to express suggestion with 吧 – Learning noun + directional word as a place word – Learning existential sentences with 有

UNIT III: LET'S PLAY TENNIS THIS WEEKEND!

6 + 3

Learning how to express acquired skills with 會 (know how to) – Learning complement marker 得 – Learning 有(一)點(兒) as an adverb – Learning auxiliary verb 可以

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UNIT IV: HOW MUCH IS THIS?

6 + 3

Learning new vocabulary for shopping – Learning measure words (個, 本, 張, 件) – Learning how to ask and answer about prices (多少錢). Using 塊, 毛, 分 for money – Practicing shopping dialogues

UNIT V: WHAT'S YOUR FAVORITE FOOD?

6 + 3

Learning new vocabulary for food and drinks – Learning common verbs for eating and drinking (吃, 喝) – Expressing preferences with 喜歡 / 不喜歡 – Using 還是 to make choices – Role-play: ordering food in a restaurant

LIST OF EXPERIMENTS

1. Prepare a city map
2. Video: Talk about your daily routine
3. Describe your school (using past tense)
4. Presentation related to culture
5. Dialogue roleplay
6. Mock interview

CONTACT PERIODS:

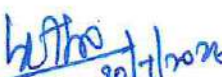
Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Mandarin Training Centre, National Taiwan Normal University, Modern Chinese I 時代華語 I, Edited by Chih-Ping Chou, Taipei: Cheng Chung Book Company Ltd., 2019
2. Huayu101 / 華語101, Taiwan Ministry of Education, Taiwan Mandarin Educational Resources Centre, 2018

REFERENCES:

1. Cheng Chung Book Company Ltd, 時代華語 I 教師手冊 [Modern Chinese I Teacher's Manual, 2019]
2. www.lmit.edu.tw/bag


 30/11/2026
 THE HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KJ Somaiya Institute of Engineering and Technology
 Aurang, Coimbatore - 641 407.

SEMESTER II

U25MCC06	Universal Human Values II (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		2	1	0	0	3

PRE-REQUISITES:

- U25MCC01 - Universal Human Values I

COURSE OBJECTIVES:

- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature

COURSE OUTCOMES:

- CO 1:** Evaluate the significance of value inputs in formal education and start applying them in their life and profession **Understand**
- CO 2:** Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc **Understand**
- CO 3:** Analyze the value of harmonious relationship based on trust and respect in their life and profession **Understand**
- CO 4:** Examine the role of a human being in ensuring harmony in society and nature **Understand**
- CO 5:** Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession **Understand**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 2	-	-	-	-	-	-	-	2	3	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	3	-	1	-	-
CO 4	-	-	-	-	-	-	-	2	3	-	1	-	-
CO 5	-	-	-	-	-	-	-	2	3	-	1	-	-

SYLLABUS:

UNIT I: INTRODUCTION-BASIC HUMAN ASPIRATION, ITS FULFILLMENT THROUGH ALL ENCOMPASSING6 + RESOLUTION 3

The basic human aspirations and their fulfillment through Right understanding and Resolution – Right understanding and Resolution as the activities of the Self-self being central to Human Existence – All encompassing Resolution for a Human Being – Its details and solution of problems in the light of Resolution

UNIT II: RIGHT UNDERSTANDING - KNOWER, KNOWN & THE PROCESS 6 + 3

The domain of right understanding starting from understanding the human being and extending up to understanding nature/ existence – its interconnectedness and co-existence – and finally understanding the role of human being in existence (human conduct)


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UNIT III: UNDERSTANDING HUMAN BEING**6 + 3**

Understanding the human being comprehensively as the first step and the core theme of this course – Human being as co-existence of the self and the body – The activities and potentialities of the self-basis for harmony/contradiction in the self

UNIT IV: UNDERSTANDING NATURE AND EXISTENCE**6 + 3**

A comprehensive understanding about the existence – Nature being included – The need and process of inner evolution – Particularly awakening to activities of the Self: Realization – Understanding and Contemplation in the Self

UNIT V: UNDERSTANDING HUMAN CONDUCT, ALL-ENCOMPASSING RESOLUTION & HOLISTIC WAY OF LIVING **6 + 3**

Understanding Human Conduct – Different aspects of all encompassing Resolution – Holistic way of living for Human Being with all encompassing resolution covering all four dimensions of human endeavor viz., realization, thought, behavior and work leading to harmony at all levels from Self to Nature and entire Existence

CONTACT PERIODS:

Lecture: 30 Periods **Tutorial:** 15 Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019

REFERENCES:

1. E G Seebauer & Robert L. Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press, 2000
2. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
3. B P Banerjee, Foundations of Ethics and Management, Excel Books, 2005
4. B L Bajpai, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008

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HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
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SEMESTER II

U25MCC07	Tamil and Technology (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		1	0	0	0	1

COURSE OBJECTIVES:

- To learn weaving, ceramic and construction technology of Tamils
- To understand the agriculture, irrigation and manufacturing technology of Tamils
- To realize the development of scientific Tamil and Tamil computing

COURSE OUTCOMES:

CO 1:	Understand the weaving and ceramic technology of ancient Tamil people nature	Understand
CO 2:	Understand the construction technology, building materials in Sangam period and case studies	Understand
CO 3:	Infer the metal process, coin and beads manufacturing with relevant archeological evidence	Understand
CO 4:	Realize the agriculture methods, irrigation technology and pearl diving	Understand
CO 5:	Apply the knowledge of scientific Tamil and Tamil computing	Understand

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 2	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 3	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 4	-	-	-	-	-	-	3	3	-	2	-	-	-
CO 5	-	-	-	-	-	-	3	3	-	2	-	-	-

SYLLABUS:

UNIT I: WEAVING AND CERAMIC TECHNOLOGY

3

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

UNIT II: DESIGN AND CONSTRUCTION TECHNOLOGY

3

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

UNIT III: MANUFACTURING TECHNOLOGY

3

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

UNIT IV: AGRICULTURE AND IRRIGATION TECHNOLOGY**3**

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

UNIT V: SCIENTIFIC TAMIL & TAMIL COMPUTING**3**

Development of Scientific Tamil – The role of journals in the development of scientific Tamil – Scientific Tamil vocabulary – Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project

CONTACT PERIODS:

Lecture: 15 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 15 Periods

TEXTBOOKS:

1. Tamils and Technology, K. Jayanthi Ravikrishna, Sri Krishna publications, Mahalakshmi Nagar, Velappanchavadi, Chennai – 600 007, First Edition 2023
2. Tamils and Technology, S. Priyadharshini, V. K. Publications, 55, Gopuram Colony, Sivakasi – 626 124

REFERENCES:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை, International Institute of Tamil Studies, C.P.T Campus, Chennai
2. கணினித் தமிழ் - முனைவர். இல. சுந்தரம், விகடன் பிரசுரம், அண்ணா சாலை, சென்னை, திசம்பர் 2016
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, தமிழ்நாடு அரசு, சென்னை, ஆறாம் பதிப்பு 2020
4. The Contributions of the Tamils to Indian Culture, Dr. M. Valarmathi, International Institute of Tamil Studies, C.I.T Campus, Tharamani, Chennai, First Edition 1995
5. Studies in the History of India with Special Reference to Tamil Nadu, Dr. K. K. Pillay, 1979

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HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPR Institute of Engineering and Technology
Arundhathi Nagar, Chennai - 601 407.

SEMESTER III

U25MA302	Probability and Statistics (Common to BM, CE, CH, EC, EE, ME, MI)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- U25MA101 - Calculus and Differential Equations / U25MA101 - Multivariable Calculus and Applications

COURSE OBJECTIVES:

- To introduce the fundamental concepts of probability and statistics relevant to engineering
- To facilitate with students, use their understanding of statistical methods for data analysis and inference in their areas of study
- To develop probabilistic models to handle uncertainty and charts to check for quality control in engineering systems

COURSE OUTCOMES:

CO 1:	Explain the fundamental concepts of probability and examine discrete probability distributions	Understand
CO 2:	Apply suitable continuous distributions, such as uniform, exponential and normal to interpret and analyse statistical data	Apply
CO 3:	Calculate and evaluate covariance and correlation to examine the relationship between two random variables using pairs of random variables	Apply
CO 4:	Determine the estimation theory of parameters, testing of hypotheses for means and apply the Chi-square test for attribute independence	Apply
CO 5:	Perform analysis of variances to compare the means of multiple samples and apply control charts to check for quality control	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	1	-	-	-	-	-	-	-	-
CO 2	3	2	-	-	2	-	-	-	-	-	-	-	-
CO 3	3	2	-	-	2	-	-	-	-	-	-	-	-
CO 4	3	2	-	-	2	-	-	-	-	-	-	-	-
CO 5	3	2	-	-	2	-	-	-	-	-	-	-	-

SYLLABUS:

UNIT I: ONE-DIMENSIONAL DISCRETE RANDOM VARIABLES

6 + 6

Probability – Conditional probability, independence – Baye's theorem – Discrete random variables, probability mass functions – Cumulative distribution functions – Mean and variance – Binomial, Poisson and geometric distributions

UNIT II: ONE-DIMENSIONAL CONTINUOUS RANDOM VARIABLES

6 + 6

Continuous random variables – Probability density functions – Cumulative distribution functions – Mean and variance – Uniform, exponential, normal distributions

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HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
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UNIT III: TWO-DIMENSIONAL PROBABILITY DISTRIBUTIONS

6 + 6

Two dimensional discrete and continuous random variables – Marginal probability distributions – Independence – Covariance – Correlation

UNIT IV: INFERENCE STATISTICS

6 + 6

Estimation - Point estimation – Interval estimation – Hypothesis testing – Hypotheses concerning means – Large, small samples - Chi square test for independence of attributes

UNIT V: ANOVA AND STATISTICAL QUALITY CONTROL

6 + 6

Analysis of variance – Completely randomized designs – Randomized block designs – Control charts for measurements ($\bar{X}$, R charts) – Control charts for attributes (p, np)

LIST OF EXPERIMENTS

1. One-Dimensional Discrete Random Variables – Mean and Variance of discrete RVs. – Discrete Probability distributions
2. One-Dimensional Continuous Random Variables – Mean and Variance of Continuous RVs. – Continuous Probability distributions
3. Two- Dimensional Probability Distributions – Marginal Probability distributions – Covariance and Correlation
4. Inferential Statistics – Estimation theory – Testing of hypotheses
5. ANOVA and SQC – Analysis of Variance. – Control charts ($\bar{X}$, R, p, np)

CONTACT PERIODS:

Lecture: 30 Periods Tutorial: - Periods Practical: 30 Periods Project: - Periods Total: 60 Periods

TEXTBOOKS:

1. Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", Wiley, 2018
2. Richard A. Johnson, "Miller & Freund's Probability and Statistics for Engineers", Pearson Education, New Delhi, 2017

REFERENCES:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, "Probability & Statistics for Engineers & Scientists", Pearson Education, New Delhi, 2016
2. Jay L. Devore, "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi 2020
3. Sheldon M Ross, "Introduction to Probability and Statistics for Engineers and Scientists", Academic press, USA, 2020
4. Robert V. Hogg, Elliot Tanis and Dale Zimmerman, "Probability and Statistical Inference", Pearson Education, USA, 2014

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30/1/2025
HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPR Institute of Engineering and Technology
Arasur, Coimbatore - 641 407.

SEMESTER III

U25CE301	Strength of Materials	Category: PCC				
		L	T	P	J	C
		3	1	0	0	4

COURSE OBJECTIVES:

- To learn the fundamental concepts of stress, strain and deformation.
- To evaluate the shear force, bending moment and deflection.
- To comprehend the stress distribution mechanism of beams.
- To know the different failure theories adopted in designing of structural members.

COURSE OUTCOMES:

CO 1:	Compute the stress and strain of deformable bodies	Apply
CO 2:	Examine the shear force, bending moment and deflection in beams	Analyze
CO 3:	Determine the flexural and shear stresses for various beam sections	Apply
CO 4:	Solve load carrying capacity of columns with different end conditions	Apply
CO 5:	Predict the stresses due to know symmetrical and unsymmetrical bending of beams	Analyze

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	-	-	-	-	-	-	2	-
CO 2	3	3	2	2	-	2	-	-	-	-	2	2	-
CO 3	3	2	1	1	-	-	-	-	-	-	1	1	-
CO 4	3	2	1	1	-	-	-	-	-	-	2	1	-
CO 5	3	3	2	2	-	2	-	-	-	-	-	2	-

SYLLABUS:

UNIT I: STRESSES AND STRAINS ON DEFORMABLE BODIES

9 + 3

Concept of Stress and Strain – Principle of Superposition – Hooke's law – St. Venant's Principle – Stress under Tension, Compression and Shear – Bars of varying section – Composite bars – Thermal stresses – Relation between Elastic constants – Poisson's ratio – Principal stresses and strains

UNIT II: SHEAR FORCE, BENDING MOMENTS AND DEFLECTION

9 + 3

Types of beams – Loads, Supports and Reactions – Concept of Shear force and bending moment – SFD and BMD for cantilever, simply supported with and without overhangs subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of these loads – Point of contraflexure – Slope and deflection of beam – Double integration and Macaulay's method

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HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Arasur, Coimbatore – 641 407.
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UNIT III: FLEXURAL AND SHEAR STRESSES**9 + 3**

Flexural stresses: Theory of simple bending – Assumptions – Bending equation – Section modulus – Determination of flexural bending stresses of rectangular and circular sections (Solid, Hollow), I, T, Angle and Channel sections Shear stresses and Torsion: Shear stress at a section – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T, angle and channel sections – Theory of torsion – Torsion of circular and hollow circular shafts – Shear stresses due to torsion – Helical springs

UNIT IV: COLUMNS AND THEORIES OF FAILURES**9 + 3**

Columns: Long and short columns – Stability of columns – Euler's formula – Rankine formula – Combined bending and direct stresses – Middle third rule Theories of Failure: Maximum Principal Stress Theory – Maximum Principal Strain Theory – Maximum Shear Stress Theory – Maximum Strain Energy Theory – Maximum Shear Strain Energy Theory

UNIT V: UNSYMMETRICAL BENDING**9 + 3**

Unsymmetrical bending of beams – Symmetrical and unsymmetrical sections – Shear centre – Curved bars – Resultant stresses due to direct and bending stresses

CONTACT PERIODS:

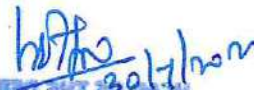
Lecture: 45 Periods **Tutorial:** 15 Periods **Practical:** - Periods **Project:** - Periods **Total:** 60 Periods

TEXTBOOKS:

1. Ferdinand, P., E. Russell Johnson Jr., John DeWolf, T., David Mazurek, F., "Mechanics of Materials", McGraw Hill Education, 8th Edition, 2020
2. Russell C. Hibbeler., "Mechanics of materials", Pearson Education Inc, 9th Edition, 2018

REFERENCES:

1. Rajput, R K., "Strength of Materials (Mechanics of Solids)", 4th Edition, S. Chand & Company Ltd, New Delhi, 2019.
2. Bansal, R K., "Strength of Materials", Laxmi Publications Pvt. Ltd., 7th Edition, 2024
3. Khurmi, R.S., Khurmi, N., "A Textbook of Strength of Materials (Mechanics of Solids)", 26th Edition, S. Chand & Company Ltd, New Delhi, 2018
4. Gere, J M., Goodno, B.J., "Mechanics of Materials", Cengage Learning India Pvt., 9th Edition, 2019


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 Department of Civil Engineering
 KPR Institute of Engineering and Technology
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SEMESTER III

U25CE302	Construction Materials and Techniques	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

COURSE OBJECTIVES:

- To develop a comprehensive understanding of advanced construction materials, their performance characteristics.
- To familiarize with the latest construction, modern construction techniques used in sub-structure, super-structure, equipment usage and demolition works.
- To select suitable materials, methods, and equipment applying safety, economy, and environmental considerations.

COURSE OUTCOMES:

- CO 1:** Explain the properties and applications of advanced construction materials Understand
- CO 2:** Interpret modern and sustainable construction materials based on durability, functional performance, and life-cycle sustainability criteria Understand
- CO 3:** Identify modern sub-structure construction techniques and foundation methods Apply
- CO 4:** Illustrate super-structure construction techniques, equipment, and digital technologies used in construction projects Apply
- CO 5:** Select safe, sustainable demolition techniques and circular construction practices Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	2	2	2
CO 2	2	1	-	-	-	-	-	-	-	-	2	2	2
CO 3	3	2	1	1	-	1	-	-	-	-	2	2	2
CO 4	3	2	1	1	-	1	-	-	-	-	2	2	2
CO 5	3	2	1	1	-	1	-	-	-	-	2	2	2

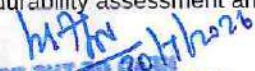
SYLLABUS:

UNIT I: ADVANCED CONSTRUCTION MATERIALS 9

Fibre Reinforced Polymer (FRP) composites using glass, carbon and aramid fibres with polymer matrices – Manufacturing methods such as pultrusion, filament winding and hand lay-up – Structural and infrastructure applications – Geopolymer-based construction materials produced using industrial by-products as binders – Engineered timber products including Cross Laminated Timber (CLT), Glued Laminated Timber (GLT) and Laminated Veneer Lumber (LVL) – Performance characteristics, advantages and limitation

UNIT II: MODERN AND SMART CONSTRUCTION MATERIALS 9

Nano-engineered construction materials and surface coatings for improved strength and durability – Phase Change Materials (PCM) for thermal energy storage and temperature regulation in buildings – Shape Memory Alloys (SMA) and piezoelectric materials for sensing and actuation – Bio-based construction materials derived from natural resources – Recycled and waste-derived construction materials – Environmental impact, durability assessment and life-cycle assessment methods


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UNIT III: SUB-STRUCTURE CONSTRUCTION TECHNIQUES

9

Excavation practices for shallow foundations – Construction of bored cast-in-situ piles and driven piles – Diaphragm wall construction procedure including panels, slurry support and concreting – Ground improvement techniques such as stone columns and jet grouting – Dewatering systems for deep excavations – Health, safety and quality control in sub-structure works

UNIT IV: SUPER-STRUCTURE CONSTRUCTION TECHNIQUES

9

Prefabricated and modular building construction sequence – High-rise construction using reinforced concrete core wall systems – Composite structural construction combining steel and concrete elements – Tower cranes, concrete pumps and mechanized material handling equipment – Application of Building Information Modelling (BIM), drones, robotics and Internet of Things (IoT) in super-structure execution

UNIT V: DEMOLITION AND CIRCULAR CONSTRUCTION

9

Selective demolition and deconstruction methodology – Robotic demolition systems for hazardous environments – Construction and demolition waste segregation – Recovery, reuse and recycling of materials including concrete, steel and timber under circular construction practices

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** - Periods **Project:** - Periods **Total:** 45 Periods

TEXTBOOKS:

1. Sarkar, S.K. & Saraswati, S., "Construction Technology", Oxford University Press, New Delhi, 2nd Edition, 2023
2. Peurifoy, R.L., Schexnayder, C.J. & Shapira, A., "Construction Planning, Equipment and Methods", McGraw-Hill Education, 10th Edition, 2023
3. Arora, S.P. & Bindra, S.P., "Building Construction, Planning Techniques and Methods of Construction", Dhanpat Rai & Sons, 2021

REFERENCES:

1. Kibert, C.J., "Sustainable Construction: Green Building Design and Delivery", John Wiley & Sons, 5th Edition, 2022
2. Deodhar, S.V., "Construction Equipment and Job Planning", Khanna Publishers, New Delhi, Revised Edition, 2021
3. Velumani, P., "Construction Techniques and Practices", SIA Publishers & Distributors Pvt Ltd, 2nd Edition, 2022
4. Sharma, S.C., "Construction Equipment and Management", Khanna Publishers, New Delhi, 2023
5. Mamlouk, M.S. & Zaniewski, J.P., "Materials for Civil and Construction Engineers", Pearson, 5th Edition, 2023


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SEMESTER III

U25CE303	Engineering Survey	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

COURSE OBJECTIVES:

- To study the various methods of surveying
- To understand the concept of control, astronomical and modern survey
- To use various survey instruments

COURSE OUTCOMES:

CO 1:	Explain the fundamental principles of surveying and demonstrate the use of basic surveying instruments	Understand
CO 2:	Interpret terrain features using appropriate levelling and contouring methods	Apply
CO 3:	Apply tachometric principles to find angles and distances using theodolite instruments	Apply
CO 4:	Make use of Total Station and GPS for data acquisition, processing and mapping	Apply
CO 5:	Utilize modern surveying techniques such as DGPS and Drone-based surveys for advanced spatial data collection and analysis	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	1	1	-
CO 2	3	2	1	1	-	-	-	-	-	-	1	1	-
CO 3	3	2	1	1	-	-	-	-	-	-	-	1	-
CO 4	3	2	1	1	1	1	-	-	-	-	2	2	-
CO 5	3	2	1	1	2	1	-	-	-	-	2	2	-

SYLLABUS:

UNIT I: FUNDAMENTALS OF SURVEYING

9

Definition – Classification - Principles – Equipment and accessories used for ranging and chaining – Methods of ranging – Compass Surveying – Types – Bearing – System and conversions – Plane table Surveying

UNIT II: LEVELLING

9

Datum – Benchmarks – Levels – Temporary and permanent adjustments – Methods of levelling – Fly levelling – Check levelling – Booking – Reduction – Contouring – Characteristics of contours – Methods of contouring – Area and volume calculation.

UNIT III: THEODOLITE SURVEYING

9

Theodolite survey – Horizontal and Vertical angle Measurements and Distance – Temporary and permanent adjustments – Tangential and Stadia tachometric – Analytical lens

UNIT IV: HYDROGRAPHIC SURVEYING AND TOTAL STATION

9

Hydrographic surveying – Tides – MSL – Sounding methods – EDM – Principles – Total stations – Parts and accessories – Advantages and applications – Working principles – Errors

UNIT V: MODERN SURVEYING

9

Photogrammetric surveying – GPS Surveying – Segments – Applications – GIS – Objectives – Data structures – Errors – Remote Sensing – Concepts – Applications – DGPS – Working principles – Drone Survey – Concept

CONTACT PERIODS:

Lecture: 45 Periods Tutorial: - Periods Practical: - Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Punmia, B.C., Jain, A.K., & Jain, A.K., "Surveying (Vol. 1 & 2)", Laxmi Publications, 17th Edition, 2021
2. Kanetkar, T.P. & Kulkarni, S.V., "Surveying and Levelling", Pune Vidyarthi Griha Prakashan, 24th Edition, 2019

REFERENCES:

1. Basak N N, "Surveying & Levelling", 2nd Edition, Tata McGraw-Hill Education, 2014
2. Venkatramaiah, "Text book of Surveying", 1st edition, University press, New Delhi, 2014
3. Bhavikatti, S.S., "Surveying and Levelling, Vol. I and II", 2nd Edition, I.K. International, 2016
4. Madhu, N, Sathiskumar, R and Satheesh Gobi, "Advanced Surveying: Total Station, GIS and Remote Sensing", 2nd Edition, Pearson India, 2017

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SEMESTER III

U25CE304	Concrete Technology	Category: PCC				
		L	T	P	J	C
		3	0	2	0	4

COURSE OBJECTIVES:

- To learn the characteristics on various concrete making materials as per IS codal provisions and to understand their properties
- To explore various methods of mix design for concrete
- To understand the microstructure of concrete and its influence on physical, mechanical and durability properties

COURSE OUTCOMES:

CO 1:	Explain the various requirements of cement, aggregate and water for making concrete	Understand
CO 2:	Choose admixtures to enhance the properties of concrete	Apply
CO 3:	Design the concrete mix using IS methods	Apply
CO 4:	Determine the physical, mechanical and durability properties of concrete	Apply
CO 5:	Identify the importance and application of special concrete	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	3	3	-	2	2	2
CO 2	3	2	1	1	-	-	1	1	-	-	2	2	2
CO 3	3	2	1	1	-	2	3	3	3	-	2	2	2
CO 4	3	2	1	1	-	2	2	3	2	-	2	2	1
CO 5	3	2	1	1	-	2	-	2	-	-	2	2	2

SYLLABUS:

UNIT I: CONSTITUENT MATERIALS

9 + 6

Cement: Types of cement – Chemical composition – Standard consistency test – Setting time – Fineness – Hydration process and products, Aggregates: Classification of aggregates – Physical and Mechanical properties – Tests on aggregates as per IS standards, Water: General requirements – Quality of water for mixing and curing – Permissible limits of impurities

UNIT II: ADMIXTURES

9 + 6

Types of Admixtures – Classification and functions – Mineral Admixtures: Fly ash, GGBS, silica fume, rice husk ash – Properties and influence on concrete – Chemical Admixtures: Accelerators, retarders, water reducers, superplasticizers, high-range water reducers – Viscosity-modifying admixtures

UNIT III: MIX PROPORTIONS

9 + 6

Factors influencing the selection of mix proportions and performance requirements – Exposure conditions and durability considerations – BIS method of mix design – Mix design concepts for high strength concrete and self-compacting concrete.



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UNIT IV: PROPERTIES OF CONCRETE**9 + 6**

Fresh Concrete: Workability – Tests – Segregation and bleeding – Curing methods. Hardened Concrete: Mechanical properties – Durability parameters – Water absorption, Chemical resistance. Microstructural Aspects: Hydration products, C-S-H gel formation, Pore structure and characteristics of the Interfacial Transition Zone (ITZ).

UNIT V: SPECIAL CONCRETE**9 + 6**

High performance concrete – Lightweight concrete – Pervious concrete: concepts, applications, and performance parameters – Fibre reinforced concrete – Geopolymer concrete: materials, reaction mechanisms and properties – Self curing concrete – Principles and applications

LIST OF EXPERIMENTS

1. Specific gravity of cement
2. Specific gravity of fine aggregate
3. Specific gravity of coarse aggregate
4. Water absorption of fine and coarse aggregate
5. Sieve analysis of fine aggregate and coarse aggregate
6. Workability of concrete by slump test
7. Compressive strength of concrete
8. Modulus of Elasticity

CONTACT PERIODS:

Lecture: 45 Periods **Tutorial:** - Periods **Practical:** 30 Periods **Project:** - Periods **Total:** 75 Periods

TEXTBOOKS:

1. Shetty M S, "Concrete Technology", 8th edition, S.Chand and Company Limited, New Delhi, 2020
2. Neville A M, "Properties of Concrete", 5th edition, Pearson India, New Delhi, 2016

REFERENCES:

1. Gambhir M L, "Concrete Technology", 2nd edition, Tata Mc. Graw Hill Publishers, New Delhi, 2017
2. Santhakumar A R, "Concrete Technology", 2nd edition OXFORD University Press India, New Delhi, 2018
3. IS10262-2019, "Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards", New Delhi
4. EFNARC, "Specification and Guidelines for Self-Compacting Concrete", European Federation of Producers and Applicators of Specialist Building Products for Concrete, Association House, 99 West Street, Farnham, UK, 2005
5. <https://nptel.ac.in/courses/105102012>

SEMESTER III

U25CE305	Materials Testing Laboratory	Category: PCC				
		L	T	P	J	C
		0	0	4	0	2

PRE-REQUISITES:

- U25CE301 - Strength of Materials

COURSE OBJECTIVES:

- To understand and determine the fundamental engineering properties of materials such as steel, bricks, aggregates, and bitumen through experimental methods
- To develop practical knowledge of testing procedures, equipment usage, and interpretation of test data for evaluating material performance
- To correlate laboratory findings with theoretical concepts and standards for assessing the suitability of materials for various civil engineering applications

COURSE OUTCOMES:

- CO 1:** Examine the physical and mechanical properties of Engineering materials using standard laboratory test methods **Analyze**
- CO 2:** Compute the behavior and characteristics of materials based on experimental observations and standard testing procedures **Analyze**
- CO 3:** Experiment standard laboratory tests to assess the consistency, quality and suitability of construction materials as per relevant codes **Analyze**
- CO 4:** Predict the material quality and suitability based on experimental results for Civil Engineering works **Analyze**
- CO 5:** Develop professional laboratory skills, teamwork, safety and effective technical report writing **Analyze**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	2	2	1	-	3	3	-	-	1	2	1
CO 2	3	3	2	2	1	-	3	3	-	-	1	2	2
CO 3	3	3	2	2	1	-	3	3	-	-	1	1	2
CO 4	3	3	2	2	1	1	1	3	-	-	1	2	-
CO 5	3	3	2	2	-	1	-	3	-	-	1	2	-

LIST OF EXPERIMENTS

- Tensile Strength Test on Steel Specimen
- Torsion Test on Steel Specimen
- Impact test on Coarse aggregate
- Crushing strength test on Coarse aggregate
- Abrasion test on coarse aggregate
- Compressive strength test on Bricks/blocks
- Impact Test on metal specimen (Izod and Charpy)


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8. Hardness test on metal specimen (Rockwell and Brinell Hardness tests)
9. Penetration test on bitumen
10. Specific gravity test of bitumen
11. Ductility test of bitumen
12. Viscosity test of bitumen
13. Softening point test of bitumen

CONTACT PERIODS:

Lecture: - Periods Tutorial: - Periods Practical: 60 Periods Project: - Periods Total: 60 Periods

REFERENCES:

1. Gambhir ML, Neha Jamwal, "Lab Manual – Building and Construction Materials – Testing and Quality Control", McGraw Hill Education, New Delhi, 2017
2. Venkatappa Rao G, Ramachandra Rao K, Kausik Pahari, Bhavanna Rao DV, "Highway Material Testing and Quality Control", Wiley Publication, 2019
3. Syed Danish Hasan, "Civil Engineering Materials and their testing", Narosa Book Distributors, 2020
4. IS 2386 (Part IV):1963, Reaffirmed year (2021) – Specifications for testing Aggregate Impact Value and Crushing Strength
5. Virtual Labs at NITK Surathkal, "Strength of Materials Lab", <https://sm-nitk.vlabs.ac.in/>
6. Virtual Labs at NITK Surathkal, "Theory of Structures Lab", <https://ts-nitk.vlabs.ac.in>

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SEMESTER III

U25CE306	Surveying Laboratory	Category: PCC				
		L	T	P	J	C
		0	0	4	0	2

COURSE OBJECTIVES:

- To impart practical skills in the use of basic and advanced surveying instruments
- To develop the ability to collect, analyze, and interpret field data for, determining elevations, distances, angles and areas

COURSE OUTCOMES:

- CO 1:** Perform basic surveying operations such as ranging, chaining, and offset measurements using standard field procedures Analyze
- CO 2:** Calculate bearings, angles, and reduced levels from field observations using conventional surveying instruments. Analyze
- CO 3:** Conduct theodolite and tacheometric surveys to determine distances, elevations, and horizontal angles Analyze
- CO 4:** Utilize total station and DGPS data for mapping, positioning, and surveying applications Analyze
- CO 5:** Prepare field books, contour plans, profiles, and maps for civil engineering projects with acceptable accuracy. Analyze

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	-	3	-	1	3	-	-	-	-	-
CO 2	3	2	1	-	3	-	1	3	-	-	-	-	-
CO 3	3	2	1	-	3	-	1	3	-	-	-	-	-
CO 4	3	2	1	-	3	-	1	3	-	-	-	-	-
CO 5	3	2	1	-	3	-	1	3	-	-	-	-	-

LIST OF EXPERIMENTS

- Aligning, Ranging, Chaining and marking by perpendicular offsets
- Study of Bearings and determination of Included angle by Prismatic Compass
- Determination of Reduced Level by Check and Fly leveling
- Determine Longitudinal and cross sectioning using dumpy level
- Measurement of Horizontal angle by Repetition and Reiteration Method
- Determination of tacheometric constant
- Determine the height of the building using theodolite
- Determination of elevation of an object using single plane method when base is Accessible / inaccessible.
- Determination of Area by Total Station
- Determination of Topography using Total Station
- Determination of REM by Total Station
- Location of a point using GPS

CONTACT PERIODS:


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Lecture: - Periods

Tutorial: - Periods

Practical: 60 Periods

Project: - Periods

Total: 60 Periods

REFERENCES:

1. Basak, N., "Surveying and Levelling", McGraw Hill Education, 2nd Edition, 2014
2. Punmia, B.C., Jain, A.K., & Jain, A.K., "Surveying (Vol. 1 & 2)", Laxmi Publications, 17th Edition, 2021
3. Kanetkar, T.P. & Kulkarni, S.V., "Surveying and Levelling", Pune Vidyarthi Griha Prakashan, 24th Edition, 2019
4. Arora, K.R., "Surveying (Vol. 1 & 2)", Standard Book House, 12th Edition, 2018

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SEMESTER III

U25MNC02	Essence of Indian Traditional Knowledge (Common to all programmes)	Category: MNC				
		L	T	P	J	C
		1	0	0	0	0

COURSE OBJECTIVES:

- Understand the Concept of culture in ancient, medieval and modern period.
- Know the need and importance of Indian languages and Literature.
- Understand the various religion and philosophy in various periods.

COURSE OUTCOMES:

CO 1: Understand Philosophy of Indian culture

Understand

CO 2: Distinguish the Indian languages and literature.

Understand

CO 3: Learn the philosophy of ancient, medieval and modern Indian

Remember

CO 4: Acquire the information about the fine arts in India

Apply

CO 5: Know the contribution of scientists different eras

Understand

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PS01	PS02
CO 1	-	2	-	1	-	-	3	-	-	-	-	-	-
CO 2	-	2	-	1	-	-	3	-	-	-	-	-	-
CO 3	-	2	-	1	-	-	3	-	-	-	-	-	-
CO 4	-	2	-	-	-	-	-	-	-	-	-	-	-
CO 5	-	2	-	1	-	-	3	-	-	-	-	-	-

SYLLABUS:

UNIT I: INTRODUCTION TO CULTURE

5

Culture, Civilization, Culture and heritage, General characteristics of culture, Importance of culture in human literature, Indian culture, Ancient India, Medieval India, Modern India

UNIT II: INDIAN LANGUAGES AND LITERATURE

5

Indian Languages and Literature-I: The role of Sanskrit, Significance of scriptures to current society, Indian philosophies, other Sanskrit literature, Literature of south India Indian Languages and Literature-II: Northern Indian Languages & literature, Temples and Temple types, Sculptors' specialties, Temples Individualities Festivals and hopes

UNIT III: RELIGION AND PHILOSOPHY

5

Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (Selected Movements only)

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UNIT IV: ARTS, SCIENCE, TECHNOLOGY& ENGINEERING IN INDIA

5

Indian painting, Handicrafts, Music, Divisions of Indian classical music, Modern Indian music, Dance and drama, Indian architecture (ancient, medieval and modern), Science and technology in India, Development of science in different periods, Sushruta and Charaka, sages of South India, herbal treatments, Surgery methods of healers, Yoga and pranayama practices, Herbal usages and medication-making methods.

UNIT V: EDUCATION SYSTEM IN INDIA

5

Education in ancient, Medieval and modern India, Aims of education, subjects, languages, science and scientists of Ancient India, Medieval India and Modern India

CONTACT PERIODS:

Lecture: 25 Periods Tutorial: - Periods Practical: - Periods Project: - Periods Total: 25 Periods

TEXTBOOKS:

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005.
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN: 978-8187276333, 2007.

REFERENCES:

1. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989.
2. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, ISBN: 9788120810990, 2014.
3. S. Narain, "Examinations in Ancient India", Arya Book Depot, 1993.
4. NCERT, "Position Paper on Arts, Music, Dance and Theatre", 2000.
5. B. Kumar Mohanta & Vipin Kumar Singh, "Traditional Knowledge System and Technology in India", 2012.

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HEAD OF THE DEPARTMENT
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SEMESTER III

U25MCC08	Professional Skill Development - I (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		15 hours				1

COURSE OUTCOMES:

- CO 1:** Demonstrate technical skill competency through attainment of industry-relevant certifications, participation in competitions, internships, and project-based learning activities Apply
- CO 2:** Apply research, innovation, and problem-solving skills to develop impactful solutions through projects, publications, patents, and higher education preparation Apply
- CO 3:** Exhibit leadership, ethical responsibility, community engagement, and professional digital presence to enhance career readiness and lifelong learning Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	2	-	3	1	-	-	2	2	-	1	2
CO 2	2	2	3	3	2	2	-	-	1	1	-	1	2
CO 3	-	-	3	-	-	2	2	3	3	3	2	1	2

GUIDELINES:

- Certifications and Skill Credentials - Free awareness certs, NPTEL/Coursera, Associate-level, Professional-level, Expert-level
- Competitions, Hackathons, and Technical Challenges - Online, institution, state, national, international competitions and hackathons, Kaggle medals
- GATE Preparation and Performance - Study plan, mock tests, registration, appearing, score percentile
- Academic, Industry, and Innovation Projects - Mini-projects, intermediate projects, industry-grade deployed projects, funded or published projects
- Internships and Industrial Training - Virtual, on-site short, core role, CoE on-campus, PPO, PPO converted to offer
- Research Publications, Patents, Intellectual Property - Reading journals, survey papers, conference papers, Scopus/WoS, Q1/Q2 journals, patents from provisional to granted
- Leadership, Community, Digital Presence - Club membership, event roles, office bearer, president, outreach, LinkedIn, GitHub, portfolio, Google Scholar

CONTACT PERIODS:

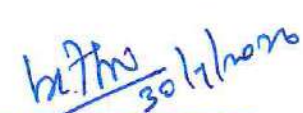
Lecture: - Periods

Tutorial: - Periods

Practical: - Periods

Project: - Periods

Total: 0 Periods


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SEMESTER IV

U25MA403	Numerical Methods and Partial Differential Equations (Common to CE, EE, ME, MI)	Category: BSC				
		L	T	P	J	C
		3	0	0	0	3

PRE-REQUISITES:

- U25MA101 - Calculus and Differential Equations / U25RMA101 - Multivariable Calculus and Applications

COURSE OBJECTIVES:

- To provide knowledge of numerical methods for solving nonlinear equations, systems of linear equations, interpolation, differentiation, and integration problems
- To develop the ability to formulate and solve partial differential equations using standard analytical techniques
- To impart an understanding of Fourier series and boundary value problems arising in heat flow and wave propagation

COURSE OUTCOMES:

- CO 1: Apply numerical methods to solve systems of linear equations and compare the efficiency of various solution techniques Apply
- CO 2: Apply interpolation techniques to estimate unknown values and analyze the accuracy of the approximations Apply
- CO 3: Implement numerical differentiation and integration methods to obtain approximate solutions and evaluate their accuracy Apply
- CO 4: Apply standard methods to solve partial differential equations and interpret the resulting solutions under given conditions Apply
- CO 5: Apply Fourier series and partial differential equation techniques to solve heat and wave equations under different boundary conditions Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PS01	PS02
CO 1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 4	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 5	3	2	-	-	-	-	-	-	-	-	-	-	-

SYLLABUS:

UNIT I: SYSTEM OF EQUATIONS

9

Solution of nonlinear equations – Newton Raphson method, Regular false – Solution of system of linear equations – Gauss elimination method, Iterative solution of linear systems by Gauss-Seidel method

UNIT II: INTERPOLATION

9

Interpolation with equal intervals – Newton's forward and backward difference formulae, Interpolation with unequal intervals – Lagrange Interpolation

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UNIT III: NUMERICAL DIFFERENTIATION AND INTEGRATION

9

Approximation of derivatives using interpolation polynomials for an equal interval – Numerical Integration – Trapezoidal rule, Simpson's 1/3 rule, evaluation of double integrals by Trapezoidal rule

UNIT IV: PARTIAL DIFFERENTIAL EQUATIONS

9

Formation of Partial Differential Equations – Lagrange's linear equation – Solution of second-order homogeneous partial differential equations with constant coefficients

UNIT V: BOUNDARY VALUE PROBLEM

9

Fourier Series solutions – One-dimensional wave equation – One-dimensional heat flow equation (unsteady state) – Two-dimensional heat flow equation (Steady state, Cartesian form only)

CONTACT PERIODS:

Lecture: 45 Periods Tutorial: - Periods Practical: - Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Steven C Chapra and Raymond P Canale, "Numerical Methods for Engineers", Tata McGraw Hill, New Delhi, 2021
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th edition, Wiley India Pvt Ltd, New Delhi, 2018

REFERENCES:

1. Curtis F Gerald and Patrick O Wheatly, "Applied Numerical Analysis", Pearson Education, New Delhi, 2017
2. Grewal, B S and Grewal J S, "Numerical Methods in Engineering and Science", , Khanna Publishers, New Delhi, 2015
3. Bali N.P., & Manish Goyal, "Engineering mathematics", 12th edition, Lakshmi Publication, 2016
4. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage, 2016

SEMESTER IV

U25CE401	Fluid Mechanics and Hydraulic Engineering	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

COURSE OBJECTIVES:

- To understand fluid properties, fluid statics, and apply the principles of kinematics and dynamics for analyzing fluid flow.
- To analyze flow behavior in pipes and boundary layers, including flow losses and flow characteristics.
- To apply dimensional analysis and similitude concepts, and analyze open channel flow conditions such as critical flow and hydraulic jump.

COURSE OUTCOMES:

CO 1: Identify the fluid properties and pressure forces on submerged surfaces	Apply
CO 2: Apply fluid kinematics and dynamics concepts to measure discharge in pipes	Apply
CO 3: Calculate energy losses in pipe flow and analyze boundary layer systems	Apply
CO 4: Apply the Principles of dimensional and model analysis in fluids	Apply
CO 5: Analyze the most economical channel sections and the behavior of non-uniform flow	Analyze

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	1	-	-	-	-	1	1	-
CO 2	3	2	1	1	-	1	-	-	-	-	1	1	-
CO 3	3	2	1	1	-	1	-	-	-	-	1	1	-
CO 4	3	2	1	1	-	1	-	-	-	-	1	1	-
CO 5	3	3	2	2	-	1	-	-	-	-	1	2	-

SYLLABUS:

UNIT I: PROPERTIES OF FLUIDS AND HYDROSTATICS

9

Basic concepts of fluid mechanics – Fluid properties – Density, specific weight, specific volume, specific gravity, viscosity, surface tension, compressibility, capillarity – Types of fluids – Total pressure and centre of pressure on submerged surfaces

UNIT II: FLUID KINEMATICS AND DYNAMICS

9

Fluid Kinematics – Classification of fluid flows – Continuity equation – Stream line, streak line, path line – Potential function and stream function. Fluid Dynamics – Euler's equation, Bernoulli's equation and its application. Flow Measurements – Discharge measurement in pipes using Venturimeter and Orifice meter – Momentum equation

UNIT III: FLOW THROUGH PIPES AND BOUNDARY LAYERS

9

Laminar and turbulent flow – Major and minor losses of flow in pipes – Total energy line and Hydraulic gradient line – Pipes in series and in parallel. Concept of boundary layer and its growth – Types of boundary layer thickness

UNIT IV: DIMENSIONAL ANALYSIS

9

Units and dimensions – Dimensional homogeneity – Rayleigh's method and Buckingham Pi- theorem – Dimensionless parameters – Similitude and model studies

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UNIT V: FLOW IN OPEN CHANNELS

Types of flow in channels - Chezy's and Manning's equation – Hydraulically most efficient channel section – Energy depth relationships, specific energy, critical flow – Hydraulic jump and backwater curves

CONTACT PERIODS:

Lecture: 45 Periods Tutorial: - Periods Practical: - Periods Project: - Periods Total: 45 Periods

TEXTBOOKS:

1. Bansal R.K., "Fluid Mechanics and Hydraulics Machines", 5th edition, Laxmi Publications Pvt. Ltd, New Delhi, 2025
2. Rajput, R. K., "A Text Book of Fluid Mechanics and hydraulic Machines", 3rd edition, S. Chand & Co., New Delhi, 2019

REFERENCES:

1. Jain A. K. "Fluid Mechanics including Hydraulic Machines", 12th edition, Khanna Publishers, 2024
2. Modi P.N and Seth " Hydraulics and Fluid Mechanics including Hydraulic Machines", 23rd edition, Standard Book House New Delhi. 2022
3. Chandramouli P.N., "Applied Hydraulic Engineering", 2nd edition Yes Dee Publishing Pvt. Ltd., 2022
4. Subramanya K., "Flow in open channels", 5th edition Tata McGraw Hill, New Delhi, 2019
5. Ramamrutham, S., "Hydraulics, Fluid Mechanics and Fluid Machines", 4th edition, Dhanpat Rai and Sons, Delhi, 2015

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SEMESTER IV

U25CE402	Highway Engineering	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

COURSE OBJECTIVES:

- To understand the concept of Highway planning and alignment
- To evaluate pavement design, construction and maintenance techniques
- To identify the pavement failures and its strengthening methods

COURSE OUTCOMES:

CO 1: Explain highway planning and alignment

Understand

CO 2: Build geometric design of highways

Apply

CO 3: Design flexible pavement as per IRC standards

Apply

CO 4: Identify the materials and equipment used in highway construction

Apply

CO 5: Solve the methods of pavement maintenance and strengthening techniques

Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	-	1	-
CO 2	3	2	1	1	-	1	2	-	-	-	-	2	-
CO 3	3	2	1	1	-	1	2	-	-	-	-	3	-
CO 4	3	2	1	1	-	1	1	-	-	-	-	3	1
CO 5	3	2	1	1	-	1	1	-	-	-	-	2	-

SYLLABUS:

UNIT I: HIGHWAY PLANNING AND ALIGNMENT

9

Introduction to Highway Engineering – Scope – Highway Development and planning in India – Highway Alignment – Engineering surveys for Highway alignment – Classification of Highways – Highway cross sectional elements – Ongoing highway projects in India

UNIT II: GEOMETRIC DESIGN OF HIGHWAY

9

Sight Distance – Design of Horizontal Alignment – Super elevation – PIEV Theory – Extra Widening on Curves – Horizontal transition curves – Design of Vertical Alignments – Gradients & Curves

UNIT III: DESIGN OF HIGHWAY PAVEMENTS

9

Flexible pavements – Components and functions – Factors affecting design and performance of flexible pavements – Stresses in flexible pavements – Flexible pavement design methods as per IRC recommendations – Rigid pavements – Components and functions – Factors affecting design and performance of CC Pavements – Stresses in Rigid pavements

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9

UNIT IV: HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE

Materials used in Highway construction – Properties and testing of Highway materials – Modern materials: Glass, Fiber, Plastic, Geo-textiles, Geo-membrane – Features of Highway construction – Construction equipment's: Excavators, Graders, Compactors/Rollers, Pavers, Stabilisers

9

UNIT V: PAVEMENT MAINTENANCE EVALUATION AND STRENGTHENING

Types of maintenance – Defects in Flexible pavements and Rigid pavements –Types of failures, Causes and Treatment – Pavement evaluation techniques – Strengthening of pavements – Highway Project Formulation

CONTACT PERIODS:

Lecture: 45 Periods	Tutorial: - Periods	Practical: - Periods	Project: - Periods	Total: 45 Periods
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TEXTBOOKS:

1. Khanna K., Justo C E G, "Highway Engineering", Khanna Publishers, Roorkee, 2023
2. Kadiyali L.R., "Principles and Practice of Highway Engineering", Khanna Technical Publications, New Delhi, 2019

REFERENCES:

1. Yang H. Huang., "Pavement Analysis and Design", Pearson Education Inc, Ninth Impression, South Asia, 2012
2. Ian D. Walsh., "ICE manual of highway design and management", ICE Publishers, 1st Edition, USA, 2011
3. Indian Road Congress (IRC), "Guidelines for the Design of Flexible Pavements", (Third Revision), IRC: 37-2012
4. Subramanian K.P., "Highways, Railways, Airport and Harbour Engineering", SciTech Publications (India), Chennai, 2018.
5. Geometric Design of Highways - https://onlinecourses.nptel.ac.in/noc22_ce94/preview

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HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 Arasur, Coimbatore - 641 407.

SEMESTER IV

U25CE403	Water Supply and Wastewater Engineering	Category: PCC				
		L	T	P	J	C
		3	0	0	0	3

COURSE OBJECTIVES:

- To understand the principles of water demand estimation, water quality assessment, and the design of water treatment and distribution systems
- To study the generation, collection, and conveyance of wastewater, along with its physical, chemical, and biological characteristics
- To learn the various treatment processes for wastewater, sludge management, effluent disposal, and reuse in an environmentally sustainable manner

COURSE OUTCOMES:

CO 1: Estimate water demand and assess quality as per standards	Apply
CO 2: Develop basic components of water treatment and distribution systems	Apply
CO 3: Plan and design sewerage systems for urban areas	Apply
CO 4: Identify unit processes in wastewater treatment and evaluate performance	Apply
CO 5: Apply the concepts of effluent reuse and sludge handling to sustainable environmental management	Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	1	2	-	-	-	-	1	2
CO 2	3	2	1	1	-	2	-	-	-	-	-	1	2
CO 3	3	2	1	1	-	2	-	-	-	-	-	1	2
CO 4	3	2	1	1	-	2	-	-	-	-	-	-	1
CO 5	3	2	1	1	-	2	-	-	-	-	-	-	1

SYLLABUS:

UNIT I: FUNDAMENTALS OF WATER SUPPLY ENGINEERING

8

Importance and scope of Environmental Engineering – Sources of water and water demand for different uses – Population forecasting and design periods – Types of water demands and factors affecting demand – Variations in water demand and fire demand estimation – Quality of water: physical, chemical, and biological characteristics – Water quality standards (BIS 10500, WHO) and sampling methods.

UNIT II: WATER TREATMENT AND DISTRIBUTION SYSTEMS

9

Objectives and classification of water treatment processes – Aeration, sedimentation, coagulation, flocculation, filtration, and disinfection – Design of sedimentation and filtration units – Layout and operation of conventional water treatment plant – Water distribution system: methods of distribution, layouts, House service connection and plumbing system.

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UNIT III: WASTEWATER GENERATION AND SEWERAGE SYSTEMS

Wastewater sources and classification – Quantity estimation of domestic sewage and storm water; variation factors – Types of sewerage systems – Hydraulic design of sewers: flow estimation, gradients, self-cleansing velocity – Sewer appurtenances – Layout and components of sewerage system – Characteristics of sewage – physical, chemical, biological parameters.

10

UNIT IV: WASTEWATER TREATMENT PROCESSES

Objectives and levels of treatment – Screening, grit removal, sedimentation tanks – Biological treatment processes: Process design parameters: detention time, F/M ratio, MLSS, SRT, Suspended-growth systems: Activated Sludge Process, secondary clarifiers – Attached-growth systems: Trickling filters, rotating biological contactors (RBC) – Introduction to anaerobic treatment

9

UNIT V: WASTEWATER DISPOSAL AND SLUDGE MANAGEMENT

Tertiary treatment and safe disposal – Disinfection methods and effluent discharge standards (CPCB) – Concepts of wastewater reuse and recycling, onsite sanitation – Septic tank design and sustainable sanitation practices – Case studies and emerging technologies (membrane processes, decentralized systems). Sludge characteristics, thickening, digestion – Sludge dewatering and drying methods

CONTACT PERIODS:

Lecture: 45 Periods	Tutorial: - Periods	Practical: - Periods	Project: - Periods	Total: 45 Periods
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TEXTBOOKS:

1. S.K. Garg, "Water Supply Engineering (Environmental Engineering Vol. I)", 37th Edition, Khanna Publishers, New Delhi, 2022
2. S.K. Garg, "Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. II)", 28th Edition, Khanna Publishers, New Delhi, 2022

REFERENCES:

1. Bureau of Indian Standards (BIS) – IS 10500, "Drinking Water Specifications (with latest amendments)", New Delhi, 2012.
2. Central Pollution Control Board (CPCB), "Effluent Discharge Standards", New Delhi (latest version available on cpcb.nic.in)
3. P.N. Khanna, "Water Supply and Sewerage Engineering", Latest Revised Edition, Khanna Publishers, New Delhi, 2022
4. Metcalf & Eddy, Inc., George Tchobanoglous, Franklin L. Burton, H. David Stensel, "Wastewater Engineering: Treatment and Resource Recovery", 5th Edition, McGraw-Hill Education, 2014
5. Howard S. Peavy, Donald R. Rowe, George Tchobanoglous, "Environmental Engineering", 7th Reprint, McGraw-Hill Education, 2013

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HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
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SEMESTER IV

U25CE404	Geotechnical Engineering I	Category: PCC				
		L	T	P	J	C
		3	0	2	0	4

COURSE OBJECTIVES:

- To classify soil types and its properties based on Standard Engineering criteria.
- To evaluate consolidation and compaction processes influencing soil behaviour.
- To determine effective stress and shear strength for geotechnical applications.

COURSE OUTCOMES:

CO 1: Identify the soil formation, soil structure, phase relationships, and index properties	Apply
CO 2: Solve permeability and seepage behavior in soils using laboratory tests and field Methods	Apply
CO 3: identify soil compaction characteristics and consolidation behavior using standard laboratory tests and consolidation theories	Apply
CO 4: Compute the stresses in soil under various loading conditions	Apply
CO 5: Examine slope stability for different soil conditions and suggest suitable stabilization and protection measures	Analyze

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	1	1	-	1	1	3	-	-	1	1	-
CO 2	3	2	1	1	-	1	1	3	-	-	1	1	-
CO 3	3	2	1	1	-	1	1	3	-	-	1	1	-
CO 4	3	2	1	1	-	1	1	3	-	-	1	1	-
CO 5	3	3	2	2	-	1	1	-	-	-	1	1	-

SYLLABUS:

UNIT I: SOIL AND ITS PROPERTIES

9 + 6

Origin and formation of soils – Soil structure – Phase relationship in soil – Index properties of soil – Indian standard soil classification system

UNIT II: PERMEABILITY AND SEEPAGE

9 + 6

One dimensional flow through soil – Permeability – Darcy's Law – Field and laboratory permeability tests – Factors affecting permeability – Capillary actions in soil – Flow through stratified soils – Uplift pressure and piping – Seepage – Seepage flow – Introduction to flow nets – Quick sand phenomenon

UNIT III: COMPACTION AND CONSOLIDATION

9 + 6

Compaction – Proctor's test – Moisture – Density relations – Field compaction methods – Factors affecting compaction – Effect of compaction on soil properties – California Bearing Ratio (CBR) test – Consolidation – Terzaghi's theory of one dimensional consolidation (no derivation) – Laboratory test – Determination of co-efficient of consolidation

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9 + 6

UNIT IV: STRESS DISTRIBUTION AND SHEAR STRENGTH

Stresses in soils – Concept of effective and neutral stresses – Stress distribution in soil media – Boussinesq and Westergaard equation – Pressure bulb – Shear strength of soils – Total and effective shear strength parameters – Factors affecting shear strength – Shear strength tests: Direct shear test, Unconfined Compression (UCC) test, Triaxial compression tests, and Field vane shear test – Mohr coulomb's theory and its failure

9 + 6

UNIT V: SLOPE STABILITY

Stability of slopes – Factor of safety – Use of stability number – Friction circle method – Infinite slopes and finite slopes – Slope protection measures

LIST OF EXPERIMENTS

1. Specific gravity of soil solids
2. Grain size distribution – Sieve analysis and hydrometer analysis
3. Atterberg limits of soil
4. Field density Test (Sand replacement method and core cutter method)
5. Permeability determination (constant head and falling head methods)
6. Determination of moisture – density relationship using standard Proctor compaction test
7. California Bearing Ratio Test
8. Direct shear test in cohesionless soil
9. Unconfined compression test in cohesive soil

CONTACT PERIODS:

Lecture: 45 Periods	Tutorial: - Periods	Practical: 30 Periods	Project: - Periods	Total: 75 Periods
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TEXTBOOKS:

1. Arora K R, "Soil Mechanics and Foundation Engineering", 7th edition, Standard Publishers, New Delhi, 2019
2. Punmia B.C, "Soil Mechanics and Foundations", 17th edition, Laxmi Publications Pvt. Ltd., 2018

REFERENCES:

1. Modi P N, "Soil Mechanics and Foundation Engineering", 7th edition, Standard Book house, New Delhi, 2019
2. Murthy V.N.S, "Soil Mechanics and Foundation engineering", 5th edition, CBS publishers & Distributors, 2009
3. Das, B.M., "Principles of Geotechnical Engineering", 9th Edition, Cengage Learning, 2018
4. Gopal Ranjan and Rao, A.S.R., "Basic and Applied Soil Mechanics", 3rd Edition, New Age International Publishers, 2016.
5. https://onlinecourses.nptel.ac.in/noc26_ce14/preview

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SEMESTER IV

U25CE405	Water and Wastewater Analysis Laboratory	Category: PCC				
		L	T	P	J	C
		0	0	2	2	2

COURSE OBJECTIVES:

- To provide practical knowledge of sampling and testing of water and wastewater
- To get adequate knowledge on standard laboratory procedures for determining physical, chemical and biological parameters
- To develop analytical and interpretive skills for assessing water quality as per BIS and CPCB standards

COURSE OUTCOMES:

CO 1: Analyze physical, chemical and biological characteristics of water and wastewater	Analyze
CO 2: Examine major quality parameters using standard analytical methods	Analyze
CO 3: Compare measured values with BIS/CPCB standards to assess suitability	Analyze
CO 4: Assume correct laboratory techniques and safety procedures	Analyze
CO 5: Inference the results and prepare technical reports for environmental assessment	Analyze

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	2	2	2	3	3	3	1	-	-	1	2
CO 2	3	3	2	2	2	3	3	3	1	-	-	1	2
CO 3	3	3	2	2	-	-	3	3	2	-	-	1	1
CO 4	3	3	2	2	-	-	1	3	2	-	-	1	1
CO 5	3	3	2	2	1	2	1	3	3	-	-	1	1

LIST OF EXPERIMENTS

- Determination of pH, Electrical Conductivity and Turbidity
- Determination of Total Solids, Suspended Solids, and Dissolved Solids
- Determination of Hardness of water
- Determination of Chloride Content in water
- Determination of Alkalinity and Acidity of water
- Determination of Residual Chlorine in treated water
- Determination of Optimum Dose of Coagulant
- Determination of Dissolved Oxygen (DO)
- Determination of Biochemical Oxygen Demand (BOD)
- Determination of Chemical Oxygen Demand (COD)
- Determination of Nitrate and Phosphate Concentration in wastewater
- Determination of Sulphate Content

CONTACT PERIODS:

Lecture: - Periods

Tutorial: - Periods

Practical: 30 Periods

Project: 30 Periods

Total: 60 Periods

REFERENCES:

1. S.K. Garg, "Laboratory Manual in Environmental Engineering", Khanna Publishers, New Delhi, 37th Edition, 2022
2. APHA, AWWA, WEF, "Standard Methods for the Examination of Water and Wastewater", 24th Edition, American Public Health Association, Washington D.C., 2023
3. IS 3025, "Methods of Sampling and Testing (Physical and Chemical) for Water and Wastewater", 2009

SEMESTER IV

U25CE406	Hydraulic Engineering Laboratory	Category: PCC				
		L	T	P	J	C
		0	0	2	0	1

COURSE OBJECTIVES:

- To measure flow in pipes and determine frictional losses
- To develop characteristic curves of pumps and turbines

COURSE OUTCOMES:

- CO 1: Apply fundamental fluid mechanics principles to conduct experiments and obtain key hydraulic parameters **Analyze**
- CO 2: Make use of laboratory equipment safely and systematically to collect accurate experimental data **Analyze**
- CO 3: Solve the relationship between theoretical concepts and experimental results using appropriate calculations and graphs **Analyze**
- CO 4: Identify the sources of error, uncertainties, and performance variations in hydraulic experiments through critical interpretation of results **Analyze**
- CO 5: Develop clear and structured technical reports that communicate experimental methods, findings, and conclusions effectively **Analyze**

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	3	2	2	-	1	1	3	-	-	-	3	-
CO 2	3	3	2	2	-	1	1	3	-	-	-	3	-
CO 3	3	3	2	2	-	1	1	3	-	-	-	3	-
CO 4	3	3	2	2	-	1	1	3	-	-	-	3	-
CO 5	3	3	2	2	-	1	1	3	-	-	-	3	-

LIST OF EXPERIMENTS

- Calibration of Rotameter
- Calibration of Venturi meter
- Calibration of Orifice meter
- Bernoulli's Experiment
- Determination of friction factor in pipes
- Determination of minor losses
- Characteristics of Centrifugal pump
- Characteristics of Reciprocating pump
- Characteristics of Pelton wheel turbine
- Characteristics of Francis turbine

CONTACT PERIODS:

Lecture: - Periods

Tutorial: - Periods

Practical: 30 Periods

Project: - Periods

Total: 30 Periods

REFERENCES:

HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPR Institute of Engineering and Technology
Araur, Coimbatore - 641 497.

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1. Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", 22nd edition, Standard Book House New Delhi. 2018
2. Sarbjit Singh "Experiments in Fluid mechanics", 2nd edition, Prentice hall of India Pvt Ltd, Delhi, 2012
3. Virtual labs at IIIT Hyderabad – "Hydraulics and Fluid Mechanics Lab", <https://eerc03-iiith.vlabs.ac.in>
4. Virtual Labs at IIT Patna – "Virtual Fluid Laboratory", <https://me.iitp.ac.in/Virtual-Fluid-Laboratory>

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HEAD OF THE DEPARTMENT
Department of Civil Engineering
KPN Institute of Engineering and Technology
Arasur, Coimbatore - 641 487
Toll free - 1800-123-4567



SEMESTER IV

U25MNC03	Indian Constitution (Common to all programmes)	Category: MNC				
		L	T	P	J	C
		1	0	0	0	0

COURSE OBJECTIVES:

- To understand the evolution and importance of the Constitution.
- To understand salient features of the Indian Constitution and philosophy of Fundamental Rights
- To gain the knowledge about the state government and local level administration

COURSE OUTCOMES:

- CO 1: Understand the historical background of the Constitution making and its importance for building a democratic India Understand
- CO 2: Understand the value of Fundamental Rights and Duties for becoming a good citizen of India Understand
- CO 3: Analyze the powers of the Central Government Analyze
- CO 4: Understand the role and responsibilities of State and Local Administration Understand
- CO 5: Apply knowledge in strengthening constitutional institutions like Election Commission and UPSC for sustaining democracy Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	-	-	-	-	-	1	2	3	-	-	-	-	-
CO 2	-	-	-	-	-	1	2	3	-	-	-	-	-
CO 3	-	-	-	-	-	1	2	3	-	-	-	-	-
CO 4	-	-	-	-	-	1	2	3	-	-	-	-	-
CO 5	-	-	-	-	-	1	2	3	-	-	-	-	-

SYLLABUS:

UNIT I: HISTORICAL BACKGROUND OF INDIAN CONSTITUTION

5

Introduction to Indian Constitution: Constitution Meaning of the term, History of Making of the Indian Constitution, Evolution of the Indian Constitution, Drafting Committee (Composition and Working).

UNIT II: FEATURES OF INDIAN CONSTITUTION

5

Philosophy and salient features of the Indian Constitution, Citizenship, Fundamental Rights, Duties and their significance, Directive Principles of State Policy, Rights Protective Mechanisms in India; Right to Education Act 2009; Right to Information 2005.

UNIT III: UNION GOVERNMENT

5

Union Legislature (Parliament), Lok Sabha and Rajya Sabha (with Powers and Functions), Union Executive, President of India (with Powers and Functions), Prime Minister and Council of Ministers (with Powers and Functions), Cabinet and Central Secretariat, Union Judiciary (Supreme Court).

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5

UNIT IV: STATE GOVERNMENT AND LOCAL ADMINISTRATION

Governor, Chief Minister and Council of Ministers, State Secretariat – Roles and Responsibilities, District Administration, Head, Municipalities – Mayor and Role of Elected Representatives, Panchayati Raj, Zila Panchayat – Roles and Responsibilities, Block Level and Village Level Organizational Hierarchy

5

UNIT V: CONSTITUTIONAL INSTITUTIONS

Election Commission of India – Powers and Functions, Electoral Process in India, Methods of Constitutional Amendments and their Limitations, Important Constitutional and Emergency Provisions. Case Studies.

CONTACT PERIODS:

Lecture: 25 Periods	Tutorial: - Periods	Practical: - Periods	Project: - Periods	Total: 25 Periods
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TEXTBOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice Hall of India Pvt. Ltd., New Delhi.
2. Subash Kashyap, "Indian Constitution", National Book Trust.

REFERENCES:

1. M. Laxmikanth, "Indian Polity", McGraw Hill Education India, 2013.
2. M. P. Jain, "Indian Constitution Law," 7th Edition, Lexis Nexis, 2014.
3. Raj Kumar, "Ambedkar and Constitution", Commonwealth Publication Pvt. Ltd., New Delhi, 2011


THE HEAD OF THE DEPARTMENT
 Department of Civil Engineering
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SEMESTER IV

U25MCC09	Professional Skill Development - II (Common to all programmes)	Category: MCC				
		L	T	P	J	C
		15 Hours				1

COURSE OUTCOMES:

- CO 1: Demonstrate technical skill competency through attainment of industry-relevant certifications; participation in competitions, internships, and project-based learning activities Apply
- CO 2: Apply research, innovation, and problem-solving skills to develop impactful solutions through projects, publications, patents, and higher education preparation Apply
- CO 3: Exhibit leadership, ethical responsibility, community engagement, and professional digital presence to enhance career readiness and lifelong learning Apply

CO - PO MAPPING:

Particular	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO 1	3	2	2	-	3	1	-	-	2	2	-	1	2
CO 2	2	3	3	3	2	2	-	-	1	1	-	1	2
CO 3	-	-	3	-	-	2	2	3	3	3	2	1	2

GUIDELINES:

- Certifications and Skill Credentials - Free awareness certs, NPTEL/Coursera, Associate-level, Professional-level, Expert-level
- Competitions, Hackathons, and Technical Challenges - Online, institution, state, national, international competitions and hackathons, Kaggle medals
- GATE Preparation and Performance - Study plan, mock tests, registration, appearing, score percentile
- Academic, Industry, and Innovation Projects - Mini-projects, intermediate projects, industry-grade deployed projects, funded or published projects
- Internships and Industrial Training - Virtual, on-site short, core role, CoE on-campus, PPO, PPO converted to offer
- Research Publications, Patents, Intellectual Property - Reading journals, survey papers, conference papers, Scopus/WoS, Q1/Q2 journals, patents from provisional to granted
- Leadership, Community, Digital Presence - Club membership, event roles, office bearer, president, outreach, LinkedIn, GitHub, portfolio, Google Scholar

CONTACT PERIODS:

Lecture: - Periods Tutorial: - Periods Practical: - Periods Project: - Periods Total: 0 Periods

THE HEAD OF THE DEPARTMENT
 Department of Civil Engineering
 KPR Institute of Engineering and Technology
 501A Road, Coimbatore - 641 407.

