

MOUNT ZION

COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

(Approved by AICTE, Affiliated to Anna University & Accredited by NAAC with A+ Grade)

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Curriculum and Syllabus Handbook

B.E – Civil Engineering [Regulation 2025]

[CHOICE BASED CREDIT SYSTEM]

Approved by Academic Council on 24.06.2026

INSTITUTE VISION AND MISSION	
VISION	• To be the preferred choice of students who aspire to become Engineers of the highest calibre.
MISSION	• Provide world-class physical and digital infrastructure and learning environment. • Develop the competencies of students to make them job-ready and entrepreneurs. • Facilitate mental, physical, emotional and spiritual development of students and ensure their holistic development. • Preserve the environment through the implementation of eco-friendly and sustainable practices. • Serve the community through skill development and other need-based services. • Establish sustainable partnerships with industries and R and D laboratories for mutual benefit.

DEPARTMENT OF CIVIL ENGINEERING	
VISION	Committed to producing competent Civil Engineers who cater to society's needs and inculcate innovation, research and entrepreneurship in diverse fields of Civil Engineering.
MISSION	- Impart high-quality education and essential skills with modern teaching aids to transform students into professional Civil Engineers. - Establish state-of-the-art infrastructure for teaching and research in emerging fields. - Carry out high-quality research which is beneficial to society - Impart essential knowledge and skills to the students in entrepreneurship. - Produce graduates with high professional and ethical standards.
PROGRAMME EDUCATIONAL OBJECTIVES (PEO)	The graduates of Civil Engineering will PEO1: Graduates will adapt to the modern engineering tools for planning, design, execution and maintenance of works with sustainable development in the Civil engineering profession. PEO2: Graduates will use innovative materials, practices and techniques for sustainable, eco-friendly and life-line infrastructures. PEO3: To promote graduates to work collaboratively on multidisciplinary projects and make them engage in the life-long learning process throughout their professional life.
PROGRAMME SPECIFIC OUTCOMES (PSO)	Students will be able to PSO1: The graduates will plan, draw, write design specifications, and prepare cost estimates. PSO2: The graduates will interact with employers and customers efficiently and ensure quality in site work and construction work through modern tools. PSO3: The graduates with mathematics and physical sciences skills will excel in the core areas such as structural, environmental, water resources engineering, transporting engineering and construction engineering.

PROGRAM OUTCOMES

At the end of this programme the students will be able to

PO NO.	GRADUATE ATTRIBUTES	PROGRAMME OUTCOMES
PO1	Engineering Knowledge	Apply math, science, and engineering fundamentals to complex problems
PO2	Problem Analysis	Identify and analyse complex problems using research and sustainability principles.
PO3	Design Solutions	Design systems and processes considering health, safety, cost, culture, and environment.
PO4	Investigation	Use experiments, modelling, and data analysis to reach valid conclusions.
PO5	Engineering Tools	Apply modern tools for modelling and problem-solving, recognizing their limits
PO6	Society and Environment	Assess societal, legal, and environmental impacts of engineering solutions.
PO7	Ethics	Commit to ethics, human values, diversity, and legal compliance.
PO8	Teamwork	Work effectively as an individual and in multidisciplinary teams.
PO9	Communication	Communicate clearly in reports, presentations, and documentation across diverse groups.
PO10	Management and Finance	Apply management and economic principles in projects and teamwork.
PO11	Lifelong Learning	Engage in continuous learning, adapt to new technologies, and think critically.

**MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES
WITH PROGRAMME OUTCOMES**

PEO	PROGRAMME OUTCOMES										
	1	2	3	4	5	6	7	8	9	10	11
1	3	2	3	2	3	3	1	1	1	2	2
2	2	2	3	2	2	3	1	1	1	1	2
3	1	1	1	1	1	1	2	3	3	2	3

**MAPPING OF PROGRAMME SPECIFIC OBJECTIVES WITH
PROGRAMME OUTCOMES**

PSO	PROGRAMME OUTCOMES										
	1	2	3	4	5	6	7	8	9	10	11
1	3	2	3	1	2	1	1	1	1	3	1
2	1	2	2	2	3	2	2	2	3	2	1
3	3	3	3	2	2	2	1	1	1	1	2

3: High Correlation

2: Average Correlation

1: Low Correlation

MOUNT ZION COLLEGE OF ENGINEERING AND TECHNOLOGY
AUTONOMOUS
REGULATIONS 2025
CHOICE BASED CREDIT SYSTEM
B.E. CIVIL ENGINEERING
CURRICULUM

SEMESTER-I									
S. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	C
					L	T	P		
THEORY AND LAB INTERGATED THEORY									
1.	MA25C01	Applied Calculus	T	BSC	3	1	0	4	4
2.	CE25C01	Introduction to Civil Engineering	T	ESC	3	0	0	3	3
3.	PH25C01	Applied Physics- I	LIT	BSC	2	0	2	4	3
4.	CY25C01	Applied Chemistry-I	LIT	BSC	2	0	2	4	3
5.	ME25C01	Engineering Drawing	LIT	ESC	2	0	4	6	4
6.	UC25H01	தமிழர் மரபு / Heritage of Tamils	T	HSMC	1	0	0	1	1
7.	EN25C01	English Essentials-I	T	HSMC	2	0	0	2	2
8.	CS25C02	Computer Programming: Python	LIT	ESC	2	0	2	4	3
9.	UC25A01	Life Skills for Engineers-I*	---	HSMC	1	0	2	3	1
10.	UC25A02	Physical Education-I*	---	HSMC	0	0	4	4	1
PRACTICALS									
11.	ME25C04	Maker space	L	ESC	0	0	4	4	2
NON-CREDIT COURSES									
12.	---	NCC/NSS/NSO	---	---	0	0	0	0	0
TOTAL					18	1	20	39	27

SEMESTER-II

S. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	C
					L	T	P		
THEORY AND LAB INTERGATED THEORY									
1.	MA25C02	Linear Algebra	T	BSC	3	1	0	4	4
2.	ME25C02	Engineering Mechanics	T	ESC	3	1	0	4	4
3.	PH25C02	Applied Physics (CE)-II	T	BSC	2	1	0	3	3
4.	EE25C01	Basic Electrical and Electronics Engineering	T	ESC	3	0	0	3	3
5.	CY25C02	Applied Chemistry (CE)-II	T	BSC	2	0	0	2	2
6.	UC25H02	தமிழர்களும் தொழில்நுட்பமும் / Tamils and Technology	T	HSMC	1	0	0	1	1
7.	CE25201	Construction Materials and Technology	T	ESC	3	0	0	3	3
8.	EN25C02	English Essentials-II	LIT	HSMC	1	0	2	3	2
9.	UC25A03	Life Skills for Engineers- II	---	HSMC	1	0	2	3	1
10.	UC25A04	Physical Education-II	---	HSMC	0	0	4	4	1
11.		Foreign Language^	LIT	HSMC	1	0	2	3	1
PRACTICALS									
12.	ME25C05	Re-Engineering for Innovation	L	ESC	0	0	4	4	2
TOTAL					20	3	14	37	27

^ Deutsch / Japanese / Korean *Audit Course

SEMESTER–III									
S. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	C
					L	T	P		
THEORY AND LAB INTERGATED THEORY									
1.	MA25301	Transforms and Partial Differential Equations	T	BSC	3	1	0	4	4
2.	CE25301	Concrete Technology	LIT	PCC	2	0	2	4	3
3.	CE25302	Fluid Mechanics	T	PCC	3	0	0	3	3
4.	CE25303	Engineering Geology	T	PCC	3	0	0	3	3
5.	CE25304	Strength of Materials	T	PCC	3	0	0	3	3
6.	CE25305	Surveying and Levelling	T	PCC	3	0	0	3	3
PRACTICALS									
7.	CE25306	Strength of Materials Laboratory	L	PCC	0	0	4	4	2
8.	CE25307	Surveying and Levelling Laboratory	L	PCC	0	0	4	4	2
TOTAL					17	1	10	28	23

SEMESTER-IV									
S. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	C
					L	T	P		
THEORY									
1.	CE25401	Applied Hydraulics Engineering	T	PCC	3	1	0	4	4
2.	CE25402	Water Supply and Wastewater Engineering	T	PCC	3	0	0	3	3
3.	CE25403	Soil Mechanics	T	PCC	3	0	0	3	3
4.	CE25404	Design of Reinforced Concrete Structural Elements	T	PCC	3	0	0	3	3
5.	CY25401	Environmental Sciences and Sustainability	T	BSC	3	0	0	3	3
PRACTICALS									
6.	CE25405	Hydraulic Engineering Laboratory	L	PCC	0	0	4	4	2
7.	CE25406	Water and Wastewater Analysis Laboratory	L	PCC	0	0	4	4	2
8.	CE25407	Soil Mechanics Laboratory	L	PCC	0	0	4	4	2
TOTAL					15	1	12	28	22

SEMESTER– V									
S. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	C
					L	T	P		
THEORY									
1.	CE25501	Structural Analysis I	T	PCC	3	0	0	3	3
2.	CE25502	Foundation Engineering	T	PCC	3	0	0	3	3
3.	CE25503	Highway and Railway Engineering	T	PCC	3	0	0	3	3
4.	***	Open Elective I	T	OEC	3	0	0	3	3
5.	CE25P**	Professional Elective I	T	PEC	3	0	0	3	3
6.	CE25P**	Professional Elective II	T	PEC	3	0	0	3	3
7.	MX255**	Mandatory course I	T	MC	3	0	0	3	Non Credit Course
PRACTICALS									
8.	CE25504	Highway Engineering Laboratory	L	PCC	0	0	4	4	2
9	CE25505	Building Drawing and Detailing Laboratory	L	PCC	0	0	4	4	2
10.	CE25506	Survey Camp (2 weeks)	L	EEC	0	0	0	0	1
11.	EN25501	Technical Seminar	L	EEC	0	0	2	2	1
TOTAL					18	0	10	31	24

SEMESTER –VI

S. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	C
					L	T	P		
THEORY									
1.	CE25601	Design of Steel Structural Elements	T	PCC	3	0	0	3	3
2.	CE25602	Structural Analysis II	T	PCC	3	0	0	3	3
3.	CE25603	Estimation, Costing and Valuation Engineering	T	PCC	3	0	0	3	3
4.	***	Open Elective II	T	OEC	3	0	0	3	3
5.	CE25P**	Professional Elective III	T	PEC	3	0	0	3	3
6.	CE25P**	Professional Elective IV	T	PEC	3	0	0	3	3
7.	MX256**	Mandatory course II	T	MC	3	0	0	3	Non Credit Course
PRACTICALS									
8.	CE25604	3D Modelling Laboratory	L	PCC	0	0	4	4	2
9.	EN25601	Professional Communication	L	EEC	0	0	2	2	1
TOTAL					18	0	6	27	21

SEMESTER –VII									
S. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	C
					L	T	P		
THEORY									
1.	MG25701	Principles of Management	T	HSMC	3	0	0	3	3
2.	MG25702	Human Values and Ethics	T	HSMC	2	0	0	2	2
3.	***	Open Elective III	T	OEC	3	0	0	3	3
4.	***	Open Elective IV	T	OEC	3	0	0	3	3
5.	CE25P**	Professional Elective V	T	PEC	3	0	0	3	3
6.	CE25P**	Professional Elective VI	T	PEC	3	0	0	3	3
PRACTICALS									
7.	CE25701	Mini Project	L	EEC	0	0	4	4	2
8.	CE25702	Summer Internship (4 weeks)	-	EEC	0	0	0	0	2
TOTAL					17	0	4	21	21

SEMESTER –VIII									
S. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	C
					L	T	P		
PRACTICALS									
1.	CE25801	Project Work	L	EEC	0	0	16	16	8
TOTAL					0	0	16	16	8

TOTAL CREDITS:173

MANDATORY COURSES I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MX25501	Introduction to Women and Gender Studies	MC	3	0	0	3	0
2	MX25502	Elements of Literature	MC	3	0	0	3	0
3.	MX25503	Film Appreciation	MC	3	0	0	3	0
4.	MX25504	Disaster Risk Reduction and Management	MC	3	0	0	3	0

MANDATORY COURSES II

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MX25601	Well Being with Traditional Practices Yoga, Ayurveda and Siddha	MC	3	0	0	3	0
2	MX25602	History of Science and Technology in India	MC	3	0	0	3	0
3.	MX25603	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0
4.	MX25604	State, Nation Building and Politics in India	MC	3	0	0	3	0
5.	MX25605	Industrial Safety	MC	3	0	0	3	0

*** Mandatory Courses are offered as Non-Credit Course**

PROFESSIONAL ELECTIVES

Domain Name	V Semester		VI Semester		VII Semester	
	Professional Elective I	Professional Elective II	Professional Elective III	Professional Elective IV	Professional Elective V	Professional Elective VI
Structures	Prefabricated Structures	Concrete Structures	Prestressed Concrete Structures	Rehabilitation /Heritage Restoration	Introduction to Finite Element Method	Infrastructure Planning and Management
Construction Techniques And Practices	Construction Equipment and Automation	Sustainable Construction and Lean Construction	Construction Management and Safety	Advanced Construction Techniques	Construction Equipment and Machinery	Energy Efficient Buildings
Geo Technical	Geo Environmental Engineering	Ground Improvement Techniques	Rock Mechanics	Earth and Earth Retaining Structures	Pile Foundation	Tunneling Engineering
Geo-Informatics	Total Station and GPS Surveying	Remote Sensing Concepts	Spatial Analysis and Applications	Hydrographic Surveying	Geographical Information System	Satellite Image Processing
Transportation Infrastructure	Traffic Engineering and Management	Urban Planning and Development	Airports and Harbours	Intelligent Transportation Systems	Pavement Engineering	Transportation Planning Process
Environment	Climate Change Adaptation and Mitigation	Air and Noise Pollution Control Engineering	Watershed Conservation and Management	Industrial Wastewater Management	Integrated Water Resources Management	Solid and Hazardous Waste Management
Water Resources	Irrigation Engineering and Drawing	Ground Water Engineering	Water Resources Systems Engineering	Watershed Conservation and Management	Water Quality and Management	Hydrology and Water resources Engineering
Ocean Engineering	Ocean Wave Dynamics	Marine Geotechnical Engineering	Coastal Engineering	Off Shore Structures	Coastal Hazards and Mitigation	Coastal Zone Management and Remote Sensing

SEMESTER V
PROFESSIONAL ELECTIVES – I

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CE25P01	Prefabricated Structures	PEC	3	0	0	3	3
2.	CE25P02	Construction Equipment and Automation	PEC	3	0	0	3	3
3.	CE25P03	Geo Environmental Engineering	PEC	3	0	0	3	3
4.	CE25P04	Total Station and GPS Surveying	PEC	3	0	0	3	3
5.	CE25P05	Traffic Engineering and Management	PEC	3	0	0	3	3
6.	CE25P06	Climate Change Adaptation and Mitigation	PEC	3	0	0	3	3
7.	CE25P07	Irrigation Engineering and Drawing	PEC	3	0	0	3	3
8.	CE25P08	Ocean Wave Dynamics	PEC	3	0	0	3	3

PROFESSIONAL ELECTIVES – II

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CE25P09	Concrete Structures	PEC	3	0	0	3	3
2.	CE25P10	Sustainable Construction and Lean Construction	PEC	3	0	0	3	3
3.	CE25P11	Ground Improvement Techniques	PEC	3	0	0	3	3
4.	CE25P12	Remote Sensing Concepts	PEC	3	0	0	3	3
5.	CE25P13	Urban Planning and Development	PEC	3	0	0	3	3
6.	CE25P14	Air and Noise Pollution Control Engineering	PEC	3	0	0	3	3
7.	CE25P15	Ground Water Engineering	PEC	3	0	0	3	3
8.	CE25P16	Marine Geotechnical Engineering	PEC	3	0	0	3	3

SEMESTER VI**PROFESSIONAL ELECTIVES – III**

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CE25P17	Prestressed Concrete Structures	PEC	3	0	0	3	3
2.	CE25P18	Construction Management and Safety	PEC	3	0	0	3	3
3.	CE25P19	Rock Mechanics	PEC	3	0	0	3	3
4.	CE25P20	Spatial Analysis and Applications	PEC	3	0	0	3	3
5.	CE25P21	Airports and Harbours	PEC	3	0	0	3	3
6.	CE25P22	Watershed Conservation and Management	PEC	3	0	0	3	3
7.	CE25P23	Water Resources Systems Engineering	PEC	3	0	0	3	3
8.	CE25P24	Coastal Engineering	PEC	3	0	0	3	3

PROFESSIONAL ELECTIVES – IV

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CE25P25	Rehabilitation/Heritage Restoration	PEC	3	0	0	3	3
2.	CE25P26	Advanced Construction Techniques	PEC	3	0	0	3	3
3.	CE25P27	Earth and Earth Retaining Structures	PEC	3	0	0	3	3
4.	CE25P28	Hydrographic Surveying	PEC	3	0	0	3	3
5.	CE25P29	Intelligent Transportation Systems	PEC	3	0	0	3	3
6.	CE25P30	Industrial Wastewater Management	PEC	3	0	0	3	3
7.	CE25P31	Watershed Conservation and Management	PEC	3	0	0	3	3
8.	CE25P32	Off Shore Structures	PEC	3	0	0	3	3

SEMESTER VII
PROFESSIONAL ELECTIVES – V

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CE25P33	Introduction to Finite Element Method	PEC	3	0	0	3	3
2.	CE25P34	Construction Equipment and Machinery	PEC	3	0	0	3	3
3.	CE25P35	Pile Foundation	PEC	3	0	0	3	3
4.	CE25P36	Geographical Information System	PEC	3	0	0	3	3
5.	CE25P37	Pavement Engineering	PEC	3	0	0	3	3
6.	CE25P38	Integrated Water Resources Management	PEC	3	0	0	3	3
7.	CE25P39	Water Quality and Management	PEC	3	0	0	3	3
8.	CE25P40	Coastal Hazards and Mitigation	PEC	3	0	0	3	3

PROFESSIONAL ELECTIVES – VI

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CE25P41	Infrastructure Planning and Management	PEC	3	0	0	3	3
2.	CE25P42	Energy Efficient Buildings	PEC	3	0	0	3	3
3.	CE25P43	Tunneling Engineering	PEC	3	0	0	3	3
4.	CE25P44	Satellite Image Processing	PEC	3	0	0	3	3
5.	CE25P45	Transportation Planning Process	PEC	3	0	0	3	3
6.	CE25P46	Solid and Hazardous Waste Management	PEC	3	0	0	3	3
7.	CE25P47	Hydrology and Water resources Engineering	PEC	3	0	0	3	3
8.	CE25P48	Coastal Zone Management and Remote Sensing	PEC	3	0	0	3	3

OPEN ELECTIVES

OPEN ELECTIVES – I

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AI25X01	Generative AI	OEC	3	0	0	3	3
2.	AI25X02	Fuzzy Logic and Expert Systems	OEC	3	0	0	3	3
3.	CS25X01	Information Retrieval	OEC	3	0	0	3	3
4.	CS25X02	Business Intelligence and its Applications	OEC	3	0	0	3	3
5.	EC25X01	IOT Processors	OEC	3	0	0	3	3
6.	EC25X02	MEMS	OEC	3	0	0	3	3
7.	EE25X01	Measurements and Instrumentation	OEC	3	0	0	3	3
8.	EE25X02	Smart System Automation	OEC	3	0	0	3	3
9.	IT25X01	Human Computer Interaction	OEC	3	0	0	3	3
10.	IT25X02	Video Creation and Editing	OEC	3	0	0	3	3
11.	ME25X01	Hydraulics and Pneumatics	OEC	3	0	0	3	3
12.	ME25X02	Sustainable Manufacturing	OEC	3	0	0	3	3
13.	MG25X01	Project Management	OEC	3	0	0	3	3
14.	MG25X02	Retail Marketing	OEC	3	0	0	3	3

OPEN ELECTIVES – II

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AI25X03	Reinforcement Learning	OEC	3	0	0	3	3
2.	AI25X04	Genetic Algorithms	OEC	3	0	0	3	3
3.	CS25X03	Information Security	OEC	3	0	0	3	3
4.	CS25X04	Digital Marketing Analytics	OEC	3	0	0	3	3
5.	EC25X03	Image Processing	OEC	3	0	0	3	3
6.	EC25X04	DSP Architecture and Programming	OEC	3	0	0	3	3
7.	EE25X03	Electric Vehicle Architecture	OEC	3	0	0	3	3
8.	EE25X04	Intelligent Control of Electric Vehicles	OEC	3	0	0	3	3
9.	IT25X03	Multimedia and Animation	OEC	3	0	0	3	3
10.	IT25X04	Multimedia Data Compression and Storage	OEC	3	0	0	3	3
11.	ME25X03	Manufacturing Process	OEC	3	0	0	3	3
12.	ME25X04	Power Plant Engineering	OEC	3	0	0	3	3
13.	MG25X03	International Human Resource Management	OEC	3	0	0	3	3
14.	MG25X04	Product and Brand Management	OEC	3	0	0	3	3

OPEN ELECTIVES – III

S.N O.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AI25X05	Explainable AI	OEC	3	0	0	3	3
2.	AI25X06	Web Intelligence	OEC	3	0	0	3	3
3.	CS25X05	Intelligent Systems	OEC	3	0	0	3	3
4.	CS25X06	Predictive Data Analytics	OEC	3	0	0	3	3
5.	EC25X05	Wearable Devices	OEC	3	0	0	3	3
6.	EC25X06	Medical Imaging Devices	OEC	3	0	0	3	3
7.	EE25X05	Energy Management and Auditing	OEC	3	0	0	3	3
8.	EE25X06	Substation Engineering and Automation	OEC	3	0	0	3	3
9.	IT25X05	Green Computing	OEC	3	0	0	3	3
10.	IT25X06	Serverless Computing	OEC	3	0	0	3	3
11.	ME25X05	Non-traditional Machining Processes	OEC	3	0	0	3	3
12.	ME25X06	Non-Destructive Testing	OEC	3	0	0	3	3
13.	MG25X05	Management Concepts and Organizational Behavior	OEC	3	0	0	3	3
14.	MG25X06	Quality Management	OEC	3	0	0	3	3

OPEN ELECTIVES – IV

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	AI25X07	Stream Data Analytics	OEC	3	0	0	3	3
2.	AI25X08	Computational Neuroscience	OEC	3	0	0	3	3
3.	CS25X07	Distributed Computing	OEC	3	0	0	3	3
4.	CS25X08	Decision Support Systems	OEC	3	0	0	3	3
5.	EC25X07	Satellite Communication	OEC	3	0	0	3	3
6.	EC25X08	Underwater Communication	OEC	3	0	0	3	3
7.	EE25X07	Protection and Switchgear	OEC	3	0	0	3	3
8.	EE25X08	Underground Cable Engineering	OEC	3	0	0	3	3
9.	IT25X07	E- Learning Techniques	OEC	3	0	0	3	3
10.	IT25X08	Edge and Fog Computing	OEC	3	0	0	3	3
11.	ME25X07	Additive Manufacturing	OEC	3	0	0	3	3
12.	ME25X08	Lean Manufacturing	OEC	3	0	0	3	3
13.	MG25X07	Marketing Management	OEC	3	0	0	3	3
14.	MG25X08	Supply Chain and Logistics Management	OEC	3	0	0	3	3

Open Electives – Shall be Chosen from the list of open electives offered by other Programmes

OPEN ELECTIVES OFFERED BY THE CIVIL DEPARTMENT

OPEN ELECTIVE I

S. NO	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	TOTAL CONTACT PERIODS	CREDITS
1	CE25X01	Air And Noise Pollution Control Engineering	T	OEC	3	0	0	3	3
2	CE25X02	Prefabricated Structures	T	OEC	3	0	0	3	3

OPEN ELECTIVE II

S. NO	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	TOTAL CONTACT PERIODS	CREDITS
1	CE25X03	Airports and Harbours	T	OEC	3	0	0	3	3
2	CE25X04	Industrial Wastewater Management	T	OEC	3	0	0	3	3

OPEN ELECTIVE III

S. NO	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	TOTAL CONTACT PERIODS	CREDITS
1	CE25X05	Geographical Information System	T	OEC	3	0	0	3	3
2	CE25X06	Construction Equipment and Machinery	T	OEC	3	0	0	3	3

OPEN ELECTIVE IV

S. NO	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	TOTAL CONTACT PERIODS	CREDITS
1	CE25X07	Advanced Construction Techniques	T	OEC	3	0	0	3	3
2	CE25X08	Solid And Hazardous Waste Management	T	OEC	3	0	0	3	3

SUMMARY

Name of the Programme: B.E. Civil Engineering												
S. No.	Subject Area	Credits per Semester								Total Credits		
		I	II	III	IV	V	VI	VII	VIII	AICTE	AU	MZCET
1	HSMC	5	6	-	-	-	-	5	-	6	12	16
2	BSC	10	9	4	3	-	-	-	-	24	25	26
3	ESC	12	12	-	-	-	-	-	-	20	19	24
4	PCC	-	-	19	19	13	11	-	-	58	65	62
5	PEC	-	-	-	-	6	6	6	-	26	18	18
6	OEC	-	-	-	-	3	3	6	-	12	12	12
7	EEC	-	-	-	-	2	1	4	8	18	15	15
Total		27	27	23	22	24	21	21	8	164	166	173

ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)

- A student may optionally register for additional courses totalling 18 credits and become eligible for the award of a B.E. / B.Tech. (Honours) or a Minor Degree.
- For B.E. / B.Tech. (Honours), a student shall register for the additional courses (18 credits) from Semester V onwards. These courses shall be selected from the same domain or from a combination of different domains within the same programme of study.
- For a Minor Degree, a student shall register for the additional courses (18 credits) from Semester V onwards. All these courses shall be from a specific domain of any one of the other programmes of study.

I SEMESTER

MA25C01	APPLIED CALCULUS	L	T	P	C
		3	1	0	4
Course Objectives:	- To provide technical competence of modelling engineering problems using calculus. - To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Understand the fundamental concepts of limits, continuity, and differentiation and apply them to solve basic problems in calculus.				K2
C02	Apply techniques of differentiation to analyse maxima, minima, and optimization problems in practical applications.				K3
C03	Apply definite and indefinite integrals to evaluate areas, volumes, and other engineering-related problems.				K3
C04	Analyse functions of several variables and compute partial derivatives for solving multivariable problems.				K4
C05	Apply multiple integrals to evaluate double and triple integrals in engineering and real-life applications.				K3

Unit I - Differential Calculus	9+3
Functions, Graph of functions, New functions from old functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.	
Unit II - Functions of Several Variables	9+3
Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.	
Unit III - Integral Calculus	9+3
Fundamental theorem of calculus, Indefinite integrals and the net change theorem, Improper integrals, Arc length, Area of region, Area of surface of revolution.	
Unit IV - Double Integrals and Coordinate Transformations	9+3
Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, Change of variables between Cartesian and Polar coordinates.	
Unit V- Triple Integrals and 3D Coordinate Systems	9+3
Evaluation of triple integrals, Change of variables between Cartesian and cylindrical and spherical co-ordinates.	
TOTAL (L:45, T:15): 60 PERIODS	

Textbooks:

1. Anton, H., Bivens, I. C., and Davis, S., "Calculus: Early transcendentals", John Wiley and Sons, 2021.
2. Ron Larson and David C. Falvo, "Calculus: an Applied Approach", Cengage Learning, 2013.

References:

1. Stewart, J., Clegg, D., and Watson, S., "Calculus: Early transcendentals", 2019. Thomas, G. B., Jr., Weir, M. D., Hass, J., and Heil, C. "Thomas' calculus: Early transcendentals", Pearson, 2018.

Mapping of COs with POs / PSOs

POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	-	-	-	-	-	-	-	-	1	-	-	-
2	3	3	1	-	-	-	-	-	-	-	1	-	-	-
3	3	2	1	-	-	-	-	-	-	-	1	-	-	-
4	3	3	1	-	-	-	-	-	-	-	1	-	-	-
5	3	2	1	-	-	-	-	-	-	-	1	-	-	-
Avg.	3	2.4	1	-	-	-	-	-	-	-	1	-	-	-

CE25C01	INTRODUCTION TO CIVIL ENGINEERING	L	T	P	C
		3	0	0	3
Course Objectives:	To impart the significance of the Civil Engineering and provide insight to the essentials of components of infrastructure.				
Course Outcomes				Knowledge Level	
The students will be able to					
C01	Explain the role of civil engineers in society, professional ethics, Stages of civil engineering projects, and the scope and specifications involved in project execution.			K2	
C02	Describe the major fields of civil engineering including structural, geotechnical, transportation, environmental, construction, and water resources engineering, along with basic concepts of engineering geology and seismology.			K2	
C03	Identify and discuss the properties, uses, and applications of civil engineering materials such as bricks, stones, cement, concrete, steel, timber, glass, gypsum, and modern construction materials.			K2	
C04	Explain the components of buildings including planning, setting out, foundations, masonry, beams, columns, lintels, roofing, flooring, plastering, and basic concepts of building codes.			K2	
C05	Describe various infrastructure systems such as bridges, dams, water supply networks, rainwater harvesting, solid waste management, highways, railways, and principles of green buildings.			K2	

Unit I - Overview of Civil Engineering	9
Role of civil engineers in society, Ethics in Civil Engineering Practice, Outstanding accomplishments of the profession, Future trends Types of projects, Stages of projects, Specification and scope.	
Unit II - Fields of Civil Engineering	9
Overview of Structural, Construction, Geotechnical, Environmental, Transportation, Water resources and Environmental engineering –Introduction to engineering geology and seismology.	
Unit III – Civil Engineering Materials	9
Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel – Timber, Glass - Modern materials, Thermal and Acoustic insulating materials, Decorative panels, Water proofing materials. Modern uses of gypsum, Pre-fabricated building components.	
Unit IV - Building Components	9
Building plans – Setting out of a building - Foundations: Types of foundations - Bearing	

capacity and settlement – Brick masonry – Stone masonry – Beams – Columns – Lintels – Roofing – Flooring – Plastering- NBC.	
Unit V – Infra structure	9
Types of bridges and dams –Water supply network - Rain water harvesting – Solid waste management system- Introduction to highways and railways - Introduction to green buildings.	
TOTAL: 45 PERIODS	
Textbooks: 1. Ramamrutham,S. "Basic civil engineering", Dhanpat Rai Publishing Co.(P) Ltd., 2013. 2. Seetharaman, S. "Basic civil engineering", Anuradha Agencies, 2005.	
References: 1. Kumar,S, "Building construction", Standard Publishers, 2001. 2. Rangwala, S. C. "Building materials", 27th Edition, Charotar Publishing House Pvt. Ltd., 2009.	
E-resources: 1. https://www.borntoengineer.com/resources/what-is-civil-engineering	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	1	-	1	-	-	-	3	-	-	-	2	2	1
2	3	2	-	1	-	-	-	-	-	-	-	1	1	3
3	3	2	1	2	-	-	-	-	-	-	-	2	2	2
4	3	2	1	1	-	-	-	-	-	-	-	3	2	2
5	2	2	2	.	-	-	-	-	-	-	-	2	2	3
Avg.	3	2	1.3	1	-	-	-	3	-	-	-	2	1.8	2.2

PH25C01	APPLIED PHYSICS – I	L	T	P	C
		2	0	2	3
Course Objectives:	To impart knowledge and expose the essentials of physics in various engineering applications.				
Course Outcomes				Knowledge Level	
The students will be able to					
C01	Explain the mechanical properties of matter and relate them to practical applications like bridges and buildings.			K2	
C02	Apply the principles of simple harmonic motion and torsional pendulum to analyze oscillatory systems			K3	
C03	Describe the concepts of electromagnetic wave propagation using Maxwell's equations and their applications in communication systems.			K2	
C04	Apply the fundamental principles of quantum mechanics, and quantum tunnelling to microscopic systems.			K3	
C05	Apply the principles of interference, fiber optics and laser technology in optical communication systems, and modern optical devices.			K3	

Unit I - Properties of Matter	6
Elasticity, Cantilever –Young's modulus (non-uniform bending), Girders: Bridges and buildings, Viscosity: Stokes method – Surface tension: drop weight method, Thermal expansion, Thermal stress, Bimetallic strips, Expansion joints.	
Unit II - Oscillations	6
Simple harmonic motion, Torsional pendulum, Couple per unit twist, Damped and Forced oscillation	
Unit III - Electromagnetic Waves	6
Waves on a stretched string, Energy and Power, standing waves, Ultrasonics, piezo-electric method, Acoustic grating, Electromagnetic waves: Maxwell equation, Production of EM waves by dipole antenna, Propagation of EM waves in free space, wave equation, Cell phone reception.	
Unit IV - Quantum Mechanics	6
Black body radiation, Photoelectric effect, de Broglie hypothesis - Schrodinger wave equation, Particle in a box (infinite potential well, three-dimensional box), Barrier penetration and quantum tunnelling.	
Unit V- Applied Optics	6
Interference: Air wedge, Michelson's Interferometer, Fiber optics: Structure of a fiber – Fiber optic communication system – Fiber sensors (Virtual demo) – Displacement, pressure sensor and Temperature sensor - Einstein Co-efficient - Nd:YAG laser, CO ₂ laser (construction, functioning and applications), dye laser.	
TOTAL: 30 PERIODS	
List of Experiments:	
1. Non-Uniform bending - Young's modulus of the material.	

2. Torsional pendulum - Rigidity modulus of the wire and moment of inertia of the disc. 3. Melde's string experiment – Frequency of an electrically vibrating metal tip 4. Photo-electric effect 5. Determination of Planck's constant 6. Ruling width of Compact disc using Laser. 7. Thickness of a thin sheet/wire using Air Wedge Method.
TOTAL: 30 PERIODS
Textbooks: 1. Young, H. D., and Freedman, R. A. "University physics with modern physics", Pearson, 2020. 2. Gaur, R. K., and Gupta, S. L. "Engineering physics", Dhanpat Rai Publications, 2022.
References: 1. Mathur, D. S. "Elements of properties of matter", S. Chand Publishing, 2010. 2. Griffiths, D. J. "Introduction to quantum mechanics" Cambridge University Press, 2018. 3. Silfvast, W. T. "Laser fundamentals", 2 nd Edition, Cambridge University Press, 2008.
E-resources: 1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/11510409/ 2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview 3. CO2 Laser : https://onlinecourses.nptel.ac.in/noc25_ph03/preview 4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk 5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA 6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I 7. Optical Sensors _ https://auece.digimat.in/nptel/courses/video/108106173/L02.html 8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA

Mapping of COs with POs / PSOs														
COs	POs											PSOs		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	-	1	-	1	-	-	-	-	1	-	-	-
2	3	2	-	1	-	-	-	-	-	-	1	-	-	-
3	3	2	-	1	1	-	-	-	-	-	1	-	-	-
4	3	2	-	1	-	-	-	-	-	-	1	-	-	-
5	3	2	-	1	2	-	-	-	-	-	1	-	-	-
Avg.	3	2	-	1	1.5	1	-	-	-	-	1	-	-	-

CY25C01	APPLIED CHEMISTRY – I	L	T	P	C
		2	0	2	3
Course Objectives:	- To provide students with a solid understanding of the chemical principles for engineering applications. - To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems. - To impart practical applications of chemistry in commonly used engineering devices.				
Course Outcomes The students will be able to				Knowledge Level	
CO1	Understand the quality of water from quality parameter and international standard.				K2
CO2	Classify nanomaterials based on their structure and determination, analyses their size dependent properties.				K2
CO3	Explain the working principles of electrochemical cells, determine electrode potentials.				K2
CO4	Identify the types and mechanism of chemical and electrochemical corrosion, interpret the galvanic series.				K2
CO5	Compare conventional, contemporary and emerging battery technologies.				K2

Unit I - Water Technology	6
Water quality parameters and standards. Industrial feed water – Remediation. Municipal water treatment. Desalination.	
Unit II - Nano-chemistry	6
Classification, Size-dependent properties. Preparation of nanomaterials – Top-down and Bottom-Up approaches, Applications.	
Unit III - Electrochemistry	6
Electrochemical cell - Electrode potential- Redox reaction. Conductivity of electrolytes – Factors.	
Unit IV - Corrosion and Control	6
Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and inorganic coating.	
Unit V- Batteries	6
Conventional, Contemporary and emerging battery storage technologies, Primary and secondary batteries, Battery pack, Battery materials, Performance parameters, Testing, Safety aspects.	

TOTAL: 30 PERIODS														
List of Experiments:														
1. Analysis of alkalinity, hardness and dissolved oxygen. 2. Preparation of nanoparticles by Sol-Gel method. 3. Conductometric titrations 4. Corrosion study by weight loss and salt spray method. 5. Potentiometry/UV-visible spectrophotometer. 6. Measurement of EMF, Internal Resistance, Charge and Discharge Characteristics.														
TOTAL: 30 PERIODS														
Textbooks:														
1. Jain, P. C., and Jain, M., "Engineering Chemistry", 17 th Edition, Dhanpat Rai Publishing Company (P) Ltd, 2015. 2. Dara, S. S. "A Textbook of Engineering Chemistry", Chand Publications, 2004.														
References:														
1. Sachdeva, M. V. "Basics of Nano Chemistry", Anmol Publications Pvt Ltd., 2011. 2. Friedrich, E. "Engineering Chemistry", Medtech, 2014.														
E-resources:														
1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) - https://nptel.ac.in/courses/105106202 . 2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) - https://nptel.ac.in/courses/113106028 . 3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) - https://nptel.ac.in/courses/112104088 4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) - https://nptel.ac.in/courses/115106130 5. Resource on all battery types, testing, and safety - 6. https://batteryuniversity.com/articles														

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	3	2	2	2	3	-	-	2	-	2	-	-	-
2	3	3	2	3	3	-	-	-	2	-	2	-	-	-
3	3	3	2	3	3	2	-	-	2	-	2	-	-	-
4	3	3	3	3	3	2	2	-	2	-	2	-	-	-
5	3	3	3	3	3	2	-	-	2	-	2	-	-	-
Avg.	3	3	2.4	2.8	2.8	2.3	2	-	2	-	2	-	-	-

ME25C01	ENGINEERING DRAWING	L	T	P	C
		2	0	4	4
Course Objectives:	- To impart knowledge on dimensions and drawing standards. - To explore the orthographic projection of lines and solids. - To provide the understanding of orthographic, isometric and perspective views.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Apply engineering drawing principles to prepare technical drawings.				K3
C02	Apply standard conventions to produce accurate engineering drawings.				K3
C03	Apply interpretation skills to construct and analyze engineering views.				K3
C04	Apply CAD tools to create and modify 2D and 3D models.				K3
C05	Apply design requirements to develop engineering models.				K3

Unit I - Fundamentals	6+12
Drawing instruments, Drawing standards (BIS), Lettering in engineering, Sheet layout, elements of dimensioning, Systems of dimensioning. Free hand sketching of 2D and 3D objects, Conics – Ellipse, Parabola and Hyperbola.	
Unit II - Orthographic Projection	6+12
First angle projection, Projection of points, Straight lines and planes.	
Unit III - Projection of Solids	6+12
Simple solids, Section of solids, Development of surfaces	
Unit IV - Isometric Projection	6+12
Isometric scale, Projection of simple solids.	
Unit V- Perspective Projection	6+12
Simple solids projection	
TOTAL (L:30, P:60): 90 PERIODS	
Textbooks: 1. Natarajan, K. V. "A Text Book of Engineering Graphics", Dhanalakshmi Publisher, 2025.	
References: 1. Venugopal, K., and Prabhu Raja, V. " Engineering Drawing + AutoCAD", New Age International Publishers, 2022.	
E-resources: 1. CAD Software – https://www.freecadweb.org/ 2. Engineering Drawing and Computer Graphics, Prof. Rajaram Lakkaraju (IIT Kharagpur) – https://onlinecourses.nptel.ac.in/noc22_me105/preview 3. MIT Design Handbook: Engineering Drawing and Sketching –	

https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	-	-	-	-	-	-	-	2	-	-	3	1	2
2	2	2	-	-	-	-	-	-	2	-	-	3	1	2
3	2	2	-	-	-	-	-	-	2	-	-	3	1	2
4	2	-	2	2	-	-	2	-	2	-	-	3	1	2
5	2	2	2	-	2	-	-	-	2	-	-	3	1	2
Avg.	2	2	2	2	2	--	2	-	2	-	-	2	1	2

UC25H01	தமிழர் மரபு	L	T	P	C
		1	0	0	1
Course Objectives:	To enable students to understand the heritage of the Tamil civilization.				
Course Outcomes					Knowledge Level
The students will be able to					
CO1	Understand the language families of India.				K2
CO2	Understand the artistic and cultural heritage of Tamils				K2
CO3	Describe traditional folk arts, performing arts, martial arts, and cultural practices of Tamils.				K2
CO4	Explain the Thinaï concept, Aham-Puram concepts, and Aram philosophy.				K2
CO5	Understand the contribution of Tamils to the Indian freedom struggle, cultural influence across India.				K2

அலகு I - மமத ாழி மற்றும ு இலக்கியம ு	3
இந்திய மமத ாழிக் குடும ுபங்கள், திதரொவிட மமத ாழிகள், தமிழ் ஒரு தமம ுமமத ாழி, தமிழ் தமவ்விலக்கியங்கள், த ங்க இலக்கியத்தின் த மதய் த த ார்பற்ற தன்மம, த ங்க இலக்கியத்தில் பகிர்தல் அறம ு, திருக்குறளில் மமதலொண்மமக் கருத்Fக்கள், தமிழ்க் தகொப்பியங்கள், தமிழகத்தில் தமண மதபௌத்த தமயங்களின் ததொக்கம ு, பக்தி இலக்கியம ு, ஆழ்தவொர்கள் மற்றும் தநொயன்மத ார்கள், சிற்றிலக்கியங்கள், தமிழில் நவீன இலக்கியத்தின் வளர்த ுசி, தமிழ் இலக்கிய வளர்த ுசியில் தபொரதிதயொர் மற்றும் தபொரதிதொத ன் ஆகிமதயொரின் பங்களிப்பு.	
அலகு II - ா ாற ஓவியங்கள் முதல் நவீன ஓவியங்கள் வறற - சிற் க் கறல	3
நடுகல் முதல் நவீன சிற்பங்கள் வமர, ஐம ுமதபொன் சிமலகள், பழங்குடியினர் மற்றும் அவர்கள் ததயொரிக்கும மகவிமனப் மதபொருட்கள், மதபொம ுமமிகள், மதர் தமய்யும ுகமல, சுடுமண் சிற்பங்கள், தநொட்டுப்புறத் மதய்வங்கள், குமரிமுமனயில் திருவள்ளுவர் சிமல, இதமக் கருவிகள், மிருதங்கம ு, பமற, வீமண, தயொழ், தநொதஸ்வரம ு, தமிழர்களின் த மூக மதபொருதலொதொர தவொழ்வில் மதகொவில்களின் பங்கு.	
அலகு III - ாநாட்டு ுபுறக் கறலகள் மற்றும் ுவீற விறலொயாட்டுகள்	3
மதருக்கூத்F, கரதகொட்டம ு, வில்லுப்தபொட்டு, கணிதயொன் கூத்F, ஓயிதலொட்டம ு, மததொல்தபொமவக் கூத்F, சிலம ு்தபொட்டம ு, வளரி, புலிதயொட்டம ு, தமிழர்களின் விமளதயொட்டுகள்.	
அலகு IV - தமிழ்களின் திறறக் கொகாட்டு ாடுகள்	3

தமிழகத்தின் ததொவரங்களும ு, விலங்குகளும ு, மததொல்தகொப்பியம ு மற்றும் ு த ங்க இலக்கியத்தில் அகம ு மற்றும் ு புறக் மதகொட்தபொடுகள், தமிழர்கள் மதபொற்றிய அறக்மதகொட்தபொடு, த ங்கதகொலத்தில் தமிழகத்தில் எழுத்தறிவும ு, கல்வியும ு, த ங்கதகொல நகரங்களும ு Fமற முகங்களும ு, த ங்கதகொலத்தில் ஏற்றுமதி மற்றும் ு இறக்குமதி, கடல்கடந்த தநொடுகளில் ததமொழர்களின் மவற்றி.	
அலகு V - இந்திய கதசிய இயக்கம மற்றும் இந்திய ற ுொ ஈட்டிற்குத் தமிழ்களின் ங்களி ுபு	3
இந்திய விடுதமலம்மதபொரில் தமிழர்களின் பங்கு, இந்தியொவின் பிறப்பகுதிகளில் தமிழ்ப் பண்தபொட்டின் ததொக்கம ு, சுயமரிதயொமத இயக்கம ு, இந்திய மருத்Fவத்தில், சித்த மருத்Fவத்தின் பங்கு, கல்மவட்டுகள், மகமயழத்Fப்படிகள், தமிழ்ப் புத்தகங்களின் தஅச வரதலொறு.	
TOTAL: 15 PERIODS	
Textbooks: 1. தமிழக வரதலொறு, மக்களும பண்தபொடும ு, மக.மக. பிள்மள (மவளியீடு: தமிழ்தநொடு தபொடநூல் மற்றும் ு கல்வியியல் பணிகள் கழகம ு). 2. கணினித் தமிழ், முமனவர் இல. சுந்தரம ு. (விகடன் பிரசுரம ு).	
References: 1. கீழடி, மவமக நதிக்கமரயில் த ங்கதகொல நகர தநொகரிகம (மததொல்லியல் Fமற மவளியீடு). 2. மதபொருமந, ஆற்றங்கமர தநொகரிகம ு. (மததொல்லியல் Fமற மவளியீடு)	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	1	-	-	-	-	1	-	-	2	-	1	-	-	-
2	-	-	-	-	-	2	-	-	1	-	1	-	-	-
3	-	-	-	-	-	2	-	1	2	-	1	-	-	-
4	-	-	-	-	-	2	2	-	1	-	1	-	-	-
5	-	-	-	-	2	3	2	-	1	-	1	-	-	-
Avg.	1	-	-	-	2	2	2	1	1.4	-	1	-	-	-

UC25H01	HERITAGE OF TAMILS	L	T	P	C
		1	0	0	1
Course Objectives:	To enable students to understand the heritage of the Tamil civilization.				
Course Outcomes				Knowledge Level	
The students will be able to					
CO1	Understand the language families of India.				K2
CO2	Understand the artistic and cultural heritage of Tamils				K2
CO3	Describe traditional folk arts, performing arts, martial arts, and cultural practices of Tamils.				K2
CO4	Explain the Thinaï concept, Aham–Puram concepts, and Aram philosophy.				K2
CO5	Understand the contribution of Tamils to the Indian freedom struggle, cultural influence across India.				K2

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 and jainism in tamil land, Bakthi literature azhwars and nayanmars - Forms of minor poetry - Development of modern literature in tamil, Contribution of bharathiyar and bharathidhasan.	
Unit II - Heritage - Rock art Paintings to Modern Art – Sculpture:	3
Hero stone to modern sculpture, Bronze icons, Tribes and their handicrafts - Art of temple car making, Massive terracotta sculptures, Village deities, Thiruvalluvar statue at Kanyakumari, Making of musical instruments, Mridhangam, Parai, Veenai, Yazh and Nadhaswaram, Role of temples in social and economic life of tamils.	
Unit III - Folk and Martial Arts:	3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and games of tamils.	
Unit IV - Thinaï Concept of Tamils:	3
Flora and fauna of tamils and 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 and manuscripts, Print history of tamil books.	
Textbooks: 1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB and ESC and RMRL – (in print) 2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.	
References: 1. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by:International Institute of Tamil Studies). 2. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.) 3. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology and Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) 4. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	1	-	-	-	-	1	-	-	2	-	1	-	-	-
2	-	-	-	-	-	2	-	-	1	-	1	-	-	-
3	-	-	-	-	-	2	-	1	2	-	1	-	-	-
4	-	-	-	-	-	2	2	-	1	-	1	-	-	-
5	-	-	-	-	2	3	2	-	1	-	1	-	-	-
Avg.	1	-	-	-	2	2	2	1	1.4	-	1	-	-	-

EN25C01	ENGLISH ESSENTIALS-I	L	T	P	C
		2	0	0	2
Course Objectives:	- Enhance learners' listening and speaking skills to understand and deliver speeches effectively - Equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes. - Strengthen the ability to comprehend, interpret, and analyse written - English across diverse contexts.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Apply vocabulary and grammar appropriately to communicate in written and spoken forms.				K3
C02	Listen and comprehend spoken English, take and draft notes.				K2
C03	Analyze texts in different contexts using appropriate reading strategies.				K4
C04	Communicate thoughts and ideas in real life situations				K3
C05	Develop communication skills relevant to engineering and technology				K3

Unit I - Basic Grammar for Effective Communication	6
Tenses, Adjectives, Subject- Verb Agreement	
Unit II - Speaking Skills	6
Self-Introduction, Expressing opinions, Participating in conversations (Speech Acts - agreeing andamp; disagreeing – synonyms and antonyms).	
Unit III - Listening Skills	6
Listening to simple conversations (understanding tone and intent), Short speeches / stories, Extracting information, Pronunciation, Listening to various accents, Note-taking.	
Unit IV - Reading Skills	6
Reading strategies – (Skimming, scanning, predicting) intensive reading - short passages and long passages on suggested themes (Sentence patterns, Prefixes and suffixes, Idioms and phrases), Cloze, Reading comprehension, note making and summarizing.	
Unit V- Writing Skills	6
Word substitution, Sentence formation, Hints development (Guided Writing), Writing different types of paragraphs - (Sentence structure) – Letter writing / Emails (informal), Picture and poster description.	
TOTAL: 30 PERIODS	
Textbooks: Miller, K. Q., and Wahl, S. T. "Business and Professional Communication: KEYS for Workplace Excellence", 5th Edition, SAGE Publications, 2023.	
References: Kumar, Sanjay and Pushpalatha, "English Language and Communication Skills for	

Engineers", India: Oxford University Press, 2018.

2. Sharma, S., and Mishra, B. "Communication Skills for Engineers and Scientists" (2nd Edition, PHI Learning, 2024.

E-resources:

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

Mapping of COs with POs / PSOs

POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	-	-	-	-	-	-	-	-	1	-	-	-
2	3	3	1	-	-	-	-	-	-	-	1	-	-	-
3	3	2	1	-	-	-	-	-	-	-	1	-	-	-
4	3	3	1	-	-	-	-	-	-	-	1	-	-	-
5	3	2	1	-	-	-	-	-	-	-	1	-	-	-
Avg.	3	2.4	1	-	-	-	-	-	-	-	1	-	-	-

CS25C02	COMPUTER PROGRAMMING: PYTHON	L	T	P	C
		2	0	2	3
Course Objectives :	- To equip engineering students with the foundational knowledge and practical skills in Python programming to analyse and solve computational problems effectively. - To foster problem-solving, critical thinking, and modular programming skills essential for engineering domains. - To master the manipulation of strings and built-in collections (Lists, Tuples, Dictionaries, and Sets) for efficient data storage and retrieval. - To equip students with the skills to interact with the file system, enabling them to process, format, and store engineering data in various formats like CSV and text. - To introduce the use of industry-standard libraries such as NumPy, Pandas, and SciPy for performing high-level mathematical computations and data analysis.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Implement basic python program and design an algorithmic solution for programs				K3
C02	Develop and apply control statements for functional python code.				K3
C03	Understand and compare various data types and their functionality and also implement them in python code.				K3
C04	Understand the lifecycle of files and process structured data files in python.				K2
C05	Understand modules and data science libraries in python.				K2

Unit I - Introduction to Python	6
Problem solving, Problem analysis chart, Developing an algorithm, Flowchart and Pseudocode, Interactive and script mode, Indentation, Comments, Error messages, Variables, Reserved words, Data types, Arithmetic operators and expressions, Built-in functions, Importing from packages.	
Unit II - Control Structures and Functions	6
if, if-else, nested if, multi-way if-elif statements, while loop, for loop, nested loops, pass statements. Hiding redundancy, complexity; Parameters, arguments and return values; formal vs actual arguments, named arguments, Recursive and Lambda Functions.	
Unit III - Strings and Collections	6
String Comparison, Formatting, Slicing, Splitting, Stripping, Lists, tuples, and dictionaries, basic list operators, searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values.	
Unit IV - File Operations	6
Create, Open, Read, Write, Append and Close files. Manipulating directories, OS and Sys modules, reading/writing text and numbers, from/to a file; creating and	

reading a formatted file (csv, tab-separated, etc.).	
Unit V- Packages	6
Built-in modules, User-Defined modules, Numpy, SciPy, Pandas, Scikit- learn.	
TOTAL: 30 PERIODS	
List of Experiments: 1. Problem Analysis Chart, Flowchart and Pseudocode Practices. (Minimum three) 2. Usage of conditional logics in programs. (Minimum three) 3. Usage of functions in programs. (Minimum three) 4. String manipulations and operations on lists, tuples, sets, and dictionaries. (Minimum three) 5. Opening, closing, reading and writing in formatted file format and sort data. (Minimum three) 6. Usage of modules and packages to solve problems. (Minimum three), Project (Minimum Two)	
TOTAL: 30 PERIODS	
Textbooks: 1. Matthes, E. "Python crash course: A hands-on, project-based introduction to programming", No Starch Press, 2019. 2. Brown, M. C. "Python: The complete reference", McGraw Hill Publishers, 2018.	
References: 1. Guttag, J. V. "Introduction to computation and programming using Python: With applications to understanding data", MIT Press, 2016. 2. McKinney, W. "Python for data analysis: Data wrangling with pandas, NumPy, and IPython", Shroff/O'Reilly, 2017.	
E-resources: 1. Official Python Documentation – https://docs.python.org/3/ 2. Python Tutorials – https://www.w3schools.com/python/	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	3	1	-	2	-	-	-	-	-	2	1	2	2
2	1	3	2	1	2	-	-	-	-	-	2	1	2	2
3	2	3	1	1	2	-	-	-	-	-	2	1	2	2
4	2	2	1	2	2	-	-	-	1	-	2	1	2	2
5	3	2	2	3	3	-	-	-	1	-	3	2	3	2
Avg.	2.0	2.6	1.4	1.4	2.2	-	-	-	1	-	2.2	2.8	2.2	2

UC25A01	LIFE SKILLS FOR ENGINEERS – I	L	T	P	C
		1	0	2	1
Course Objectives:	• To equip engineering students with essential life skills encompassing personal and emotional development, effective management of time and stress, financial literacy, digital safety, and civic responsibility. • To enhance self-awareness, interpersonal skills, and resilience to prepare students for the professional and personal challenges of engineering careers and life beyond academics.				
Course Outcomes			Knowledge Level		
The students will be able to					
CO1	Explain the importance of self-awareness, emotional intelligence, and personal development for improving individual effectiveness and well-being.			K2	
CO2	Apply time management and stress management techniques to balance academic, professional, and personal responsibilities.			K3	
CO3	Describe the principles of financial literacy, digital safety, and responsible citizenship in modern society.			K2	
CO4	Apply interpersonal communication and teamwork skills to interact effectively in professional and social environments.			K3	
CO5	Demonstrate resilience, ethical behavior, and problem-solving abilities to handle real-life and workplace challenges.			K3	

Unit I - Personal and Emotional Development	10
Self-awareness and personality, Emotional intelligence and empathy, Positive thinking, Right attitude, Stress and anger management, Goal-setting and Time management, Growth mindset and resilience.	
Unit II - Management Skills	5
Financial literacy: Budgeting and saving, Nutrition, Health, and Hygiene, Digital literacy and Online safety, Civic responsibility and ethics.	
TOTAL: 15 PERIODS	

Textbooks:

1. Khera, S. "You can win", Macmillan, 2003
2. Levesque, H. (n.d.). Life skills 101: A practical guide to leaving home and living on your own.

References:

1. Mitra, B. K. "Personality development and soft skills", 3rd impression, Oxford University Press, 2017.
2. ICT Academy of Kerala. "Life skills for engineers", McGraw Hill Education (India) Private Ltd, 2016.

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	-	-	-	-	-	2	2	-	1	-	2	-	-	-
2	-	1	-	-	-	2	2	-	1	-	2	-	-	-
3	-	-	-	-	-	2	2	-	1	-	2	-	-	-
4	-	-	-	-	-	1	1	3	3	-	2	-	-	-
5	-	-	-	-	-	2	3	2	2	-	2	-	-	-
Avg.	-	1	-	-	-	1.8	2	2.5	1.6	-	2	-	-	-

UC25A02	PHYSICAL EDUCATION - I	L	T	P	C
		0	0	4	1
Course Objectives:	- To impart the fundamentals of physical education for development of students' physical, mental, and social well-being. - To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.				
Course Outcomes The students will be able to				Knowledge Level	
CO1	Understand and analyze personal development evaluate their impact on overall well-being.				K4
CO2	Explain, apply, and assess the rules, regulations, and techniques of major athletic events.				K3
CO3	Demonstrate and analyze skills in selected outdoor games (basketball, volleyball, football, kabaddi, cricket, hockey, handball, ball badminton, kho-kho, tennis), evaluate performance, and create strategies for team success.				K3/K4/ K5
CO4	Demonstrate and analyze skills in selected indoor games, evaluate techniques, and develop strategies to improve performance.				K3/K4/ K5
CO5	Exhibit and evaluate teamwork, leadership, discipline, and sportsmanship during participation, and create a personal or team development plan for long-term physical fitness and professional conduct.				K5/K6

Unit I - Introduction to Physical Education	4
Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid Practices.	
Unit II - Participation of Athletic Events	4
Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.	

Unit III - Skill Development in any one of the Following Outdoor Games	4
Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.	
Unit IV - Skill Development in any one of the Following Indoor Games	3
Shuttle Badminton, Chess and Table Tennis.	
TOTAL: 15 PERIODS	
References: 1. Singh, A. (2008). Essentials of physical education. Kalyani Publishers. 2. Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co. 3. Mangal, S. K. (2009). Psychology of sports performance. Sports Publication.	
E-Resources: 1. https://www.who.int/health-topics/physical-activity	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	-	-	-	-	-	2	2	-	1	-	2	-	-	-
2	-	1	-	-	-	2	2	-	1	-	2	-	-	-
3	-	-	-	-	-	2	2	-	1	-	2	-	-	-
4	-	-	-	-	-	1	1	3	3	-	2	-	-	-
5	-	-	-	-	-	2	3	2	2	-	2	-	-	-
Avg.	-	1	-	-	-	1.8	2	2.5	1.6	-	2	-	-	-

ME25C04	MAKERSPACE	L	T	P	C
		0	0	4	2
Course Objectives:	- To impart practical skills in the assembly, disassembly, and welding of components using appropriate tools and techniques. - To provide hands-on training in electrical wiring practices, and the use of electronic components, sensors, and actuators.				
Course Outcomes The students will be able to				Knowledge Level	
CO1	Safely handle tools and perform dis-assembly and assembly of home appliances, air-conditioners, refrigerators, and bicycles.				K3
CO2	Prepare base materials, select appropriate welding techniques, and perform MAW, GMAW, and GTAW on carbon steel and stainless steel for simple fabrication.				K3
CO3	Safely use electrical installation tools and perform wiring for distribution boards, lighting, fans, motors, and UPS systems.				K3
CO4	Identify, assemble, and solder electronic components, integrate sensors and actuators with microcontrollers, and demonstrate basic PLC circuits.				K3/K4
CO5	Create solid and assembly models of components, fabricate parts using 3D printers, and perform precise cutting of wood and metal using laser cutting technology.				K3/K6

LIST OF EXPERIMENTS:
1. Dis-assembly & Assembly Practices i. Tools and its handling techniques. ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine. iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators. iv. Dis-assembly and assembly of a Bicycle. 2. Welding Practices i. Welding Procedure, Selection & Safety Measures.

- ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
 - iii. Hands-on session of preparing base material & Joint groove for welding.
 - iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Steel plates / pipes, for fabrication of a simple part.
- 3. Electrical Wiring Practices
 - i. Electrical Installation tools, equipment & safety measures.
 - ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
 - iii. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
 - iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.
- 4. Electronics Components / Equipment Practices
 - i. Electronic components, equipment & safety measures.
 - ii. Dis-assembly and assembly of Computers.
 - iii. Hands-on session of Soldering Practices in a Printed Circuit Board.
 - iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
 - v. Hands-on session of integration of sensors and actuators with a Microcontroller.
 - vi. Demonstration of Programmable Logic Control Circuit.
- 5. Contemporary Systems
 - i. Demonstration of Solid Modelling of components.
 - ii. Demonstration of Assembly Modelling of components.
 - iii. Fabrication of simple components / parts using 3D Printers.
 - iv. Demonstration of cutting of wood / metal in different complex shapes using Laser Cutting Machine.

TOTAL: 60 PERIODS

References:

- 1. Stephen Christena, "Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics", Crestline Books, 2014.
- 2. H. Lipson, "Fabricated - The New World of 3D Printing", Wiley, 1st Edition, 2013.
- 3. Code of Practice for Electrical Wiring Installations (IS 732:2019).

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	-	-	-	-	-	1	-	-	1	1	2	-	-
2	2	3	2	2	-	-	1	-	3	2	2	2	-	-
3	1	1	2	-	1	-	3	-	-	1	2	3	3	2
4	1	3	2	3	-	3	1	-	3	3	2	1	3	2
5	-	-	1	-	-	-	-	-	-	3	2	1	3	2
Avg.	1.5	2.33	1.75	2.5	1	3	1.5	-	3	2	1.8	1.8	3	2

II SEMESTER

MA25C02	LINEAR ALGEBRA	L	T	P	C
		3	1	0	4
Course Objectives:	- To impart foundational knowledge in linear algebra essential for analysing and solving problems in engineering applications. - To provide the knowledge on computation using software and interpret key linear algebra concepts using software				
Course Outcomes The students will be able to				Knowledge Level	
C01	Understand the fundamental concepts of matrices, systems of linear equations, and matrix operations.	K2			
C02	Apply methods such as Gaussian elimination and matrix inversion to solve systems of linear equations.	K3			
C03	Compute eigenvalues and eigenvectors and apply them in solving engineering and mathematical problems.	K3			
C04	Analyze vector spaces, linear independence, basis, and dimension of vector spaces.	K4			
C05	Apply inner product concepts and orthogonalization techniques such as Gram–Schmidt process.	K3			

Unit I - Vector Spaces	9+3
Introduction to vector spaces examples, Subspaces, Linear combinations span, Generating sets	
Unit II - Linear Bases and Dimensions	9+3
Linear dependence and independence, Basis and dimension, Dimension of subspaces.	
Unit III - Linear Transformations and Diagonalization	9+3
Null space, Range, Dimension theorem (statement only), Matrix representation of a linear transformation, Eigenvalues and eigenvectors, Diagonalizability.	
Unit IV - Inner Product Spaces	9+3
Inner product, Norms, Cauchy, Schwarz inequality, Gram, Schmidt orthogonalization, Simple problems (up to R^3).	
Unit V - Matrix Decomposition	9+3
Orthogonal transformation of a symmetric matrix to diagonal form - Positive definite matrices, QR decomposition, Singular value decomposition (SVD), Least squares solutions- simple problems (up to 3×3 matrices).	
TOTAL (L:45, T:15): 60 PERIODS	
Textbooks: - Friedberg, S. H., Insel, A. J., and Spence, L. E. "Linear algebra", Pearson, 2022. - Lay, D. C., Lay, S. R., and McDonald, J. J. "Linear algebra and its applications with MATLAB". Pearson, 2020.	

References:

1. Bronson, R. "Schaum's outline of matrix operations", McGraw-Hill Education, 2011.
2. Strang, G., and Thomson, R. "Linear algebra and its applications" Brooks/Cole, 2005.
3. Lipschutz, S., and Lipson, M. "Schaum's outline of linear algebra" McGraw-Hill, 2009.
4. Kreyszig, E. "Advanced engineering mathematics". Wiley India, 2018.

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	-	-	-	-	-	-	-	-	1	2	-	-
2	3	3	1	-	-	-	-	-	-	-	1	2	-	-
3	3	2	1	-	-	-	-	-	-	-	1	2	1	-
4	3	3	1	-	-	-	-	-	-	-	1	2	1	-
5	3	2	1	-	-	-	-	-	-	-	1	2	1	-
Avg.	3	3	1	-	-	-	-	-	-	-	1	2	1	-

ME25C02	ENGINEERING MECHANICS	L	T	P	C
		3	1	0	4
Course Objectives:	• To introduce the fundamental concepts and principles of statics related to forces acting on particles and rigid bodies. • To develop the ability to formulate and apply equilibrium equations for particles and rigid bodies in two and three dimensions. • To enable students to analyse force systems through vector resolution and calculation of moments and couples.				
Course Outcomes			Knowledge Level		
The students will be able to					
CO1	Apply statics principles to find resultant forces and equilibrium in 2D and 3D particle systems.		K3		
CO2	Apply rigid body statics to determine moments, and force–couple systems.		K3		
CO3	Apply the concept of first moments of area to determine centroids and centers of gravity		K3		
CO4	Apply moments of inertia principles to find inertia and principal axes of plane areas and thin plates.		K3		
CO5	Apply laws of friction to analyze wedges, ladders and belt friction systems.		K3		

Unit I - Statics of Particles	9+3
Resultant of forces in a plane, Equilibrium of a particle in a plane, Addition of concurrent forces in space, Equilibrium of a particle in space.	
Unit II - Statics of Rigid Bodies	9+3
Statics of Rigid Bodies Concept of Free Body Diagram, Equivalent systems of forces, Transmissibility, Moment of a force about a point and an axis, Couples and force-couple systems, Equilibrium of rigid bodies in two and three dimensions, Principle of virtual work.	
Unit III - Center of Gravity	9+3
First moments of areas and lines, Centroids of composite areas and lines, Theorems of Pappus - Guldinus.	
Unit IV - Moments of Inertia	9+3
Second moment of area, Parallel axis theorem, Rectangular and polar moments of inertia of composite areas, Radius of gyration, Product of Inertia, Principal axes and Principal moments of Inertia, Mass moments of inertia of thin plates.	
Unit V- Friction	9+3
Laws of friction, Coefficients of Friction, Angles of Friction, Types of Friction Problems, Wedges and Ladder friction, Belt friction.	
TOTAL (L:45, T:15): 60 PERIODS	
Textbooks: 1. R.S. Khurmi, N. Khurmi. "A Textbook of Engineering Mechanics", 22nd Edition, S. Chand & Company Ltd.	
References: 1. Ferdinand Beer, E. Russell Johnston Jr., David Mazurek - Vector Mechanics for Engineers_ STATICS - Instructor Solutions Manual (2012, McGraw-Hill) 2. Meriam, J. L., & Kraige, L. G. "Engineering Mechanics: Statics and Dynamics",	

Wiley, 2018.

3. Pytel, A., & Kiusalaas, J. "Engineering Mechanics", (Indian Edition). Cengage Learning India, 2014.

E-resources:

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

Mapping of COs with POs / PSOs

POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	2	1	-	1	2	3	2	2	-	1	2	3	2
2	2	2	2	-	2	2	3	2	2	-	1	2	3	2
3	2	2	1	-	2	2	3	2	2	-	1	2	3	2
4	2	2	2	1	3	2	3	2	2	-	2	2	3	2
5	1	2	2	1	3	2	3	2	2	1	2	2	3	2
Avg.	1.8	2	1	1	2.2	2	3	2	2	1	1.4	2	3	2

PH25C02	APPLIED PHYSICS (CE) – II	L	T	P	C
		2	1	0	3
Course Objectives:	To provide a comprehensive understanding of physics concepts in Civil engineering applications.				
Course Outcomes The students will be able to				Knowledge Level	
CO1	The students will be able to understand the principles of equilibrium, and force analysis in rigid bodies.				K2
CO2	The students will be able to apply Sabine's formula in sound reverberation.				K3
CO3	The students will be able to apply lighting principles for basic daylight and artificial lighting design.				K2
CO4	The students will be able to understand the properties and applications of composites and shape memory alloys.				K3
CO5	The students will be able to explain the properties and applications of engineering ceramics.				K2

Unit I - Mechanics	7+2
Elasticity – Types of supports and loads – free body diagrams - Equilibrium of rigid bodies – Types of structures: Beams, frames, trusses – Analysis of trusses – internal forces in members – Moment of inertia and bending- cantilever	
Unit II – Acoustics	7+2
Reverberation – Loudness – Focusing – Echelon – Noise – Echo - Resonance – Interference – Sabine's formula (Derivation) – Absorption coefficient – Sonometer - Sound insulation.	
Unit III- Lighting	7+2
Visual field glare, colour – day light calculations – day light design of windows, measurement of day light and use of models and artificial skies - artificial lighting – LED characteristics.	
Unit IV - Engineering Materials	7+2
Composites – Fibre Reinforced Plastics (FRP) – Fiber Reinforced Metals (FRM) – Fiber Reinforced Bricks (FRB) - Shape memory alloys.	
Unit V - Ceramics	7+2
Thermal, Mechanical, Electrical and Chemical properties –3D printed construction materials - Nano materials.	
TOTAL (L:35, T:10): 45 PERIODS	
Textbooks: - Balasubramaniam, R. "Callister's materials science and engineering", Wiley India Pvt. Ltd., 2014. - Hibbeler, R. C. "Engineering mechanics", Pearson, 2017.	

References:

1. Hibbeler, R. C. "Structural analysis", Pearson, 2023.
2. Medved, S. "Building physics", Springer, 2021.

E-resources:

1. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science>
2. <https://www.khanacademy.org/science/electrical-engineering>

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	3	3	2	2	3	-	1	-	-	2	-	-	-
2	3	2	3	2	2	3	-	1	-	-	2	-	-	-
3	3	2	3	2	2	3	-	1	-	-	3	-	-	-
4	3	3	3	3	-	3	-	1	-	-	3	-	-	-
5	3	3	3	3	2	3	-	1	-	-	3	-	-	-
Avg.	3	2.6	3	2.4	2	3	-	1	-	-	2.6	-	-	-

EE25C01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3
Course Objectives:	• To impart foundational knowledge in principles and applications of electrical and electronics engineering.				
Course Outcomes The students will be able to			Knowledge Level		
CO1	Analyze basic DC circuits using sources, R, L, and C components with fundamental circuit laws.			K4	
CO2	Apply AC and three-phase system concepts with electrical safety practices.			K3	
CO3	Apply core principles of electrical machines and transformers in practical engineering applications.			K3	
CO4	Explain and apply the working and applications			K3	
CO5	Analyze and design digital circuits using Boolean algebra and logic gates and explain microcontroller architecture and applications.			K4	

Unit I - DC Fundamentals	9
Current and Voltage sources, Resistance, Inductance and Capacitance; Ohm's law, Kirchhoff's law, Series parallel combination of R, L and C components, Voltage divider and Current divider rules.	
Unit II – AC Fundamentals	9
Faraday's Laws of Electro-magnetic Induction, Definition of self and mutual inductances, Generation of sinusoidal voltage, Instantaneous & RMS values of sinusoidal signals, Introduction to 3-phase systems, Electrical safety, Fuses and Earthing.	
Unit III- Electric Machines	9
DC Machines, Transformers, Star and delta connections, Three phase induction motors, Synchronous generators, Single phase induction motors, Stepper motor, Universal motor and BLDC motor.	
Unit IV - Semiconductor Devices	9
PN junction diodes, Zener diode, Voltage regulator, BJT & FET transistors, Timers, Operational amplifiers.	
Unit V - Digital Electronics And Microcontrollers	9
Boolean algebra, Basic and Universal gates, Adders, Multiplexers, Demultiplexers and Flip-flops, Microcontrollers: Introduction, Architecture, Potential Applications.	
TOTAL: 45 PERIODS	

Textbooks:

1. Mehta, V. K., & Mehta, R. "Principles of electrical engineering and electronics", S. Chand Publishing, 2006.

References:

1. Del Toro, V. "Electrical engineering fundamentals", Pearson Education, 2022.
2. Hambley, A. R. "Electrical engineering: Principles and applications", 7th Edition, Pearson Publisher, 2019.

E-resources:

1. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science>
2. <https://www.khanacademy.org/science/electrical-engineering>

Mapping of COs with POs / PSOs

POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	3	1	-	2	-	-	-	-	-	1	1	3	1
2	3	2	1	-	2	3	2	-	-	-	1	1	3	1
3	3	2	2	-	2	2	-	-	-	-	1	2	3	1
4	3	2	2	-	2	-	-	-	-	-	1	2	3	2
5	3	3	3	1	3	-	-	1	1	1	2	2	3	2
Avg.	3	2.4	1.8	1	2.2	2.5	2	1	1	1	1.2	1.6	3	1.4

CY25C22	APPLIED CHEMISTRY (CE) – II	L	T	P	C
		2	0	0	2
Course Objectives:	To impart knowledge and expose to applications of chemistry in civil engineering stream.				
Course Outcomes The students will be able to				Knowledge Level	
CO1	Explain the properties, manufacturing process and applications of conventional building materials.				K2
CO2	Understand the types, properties and advantages of reinforcement.				K2
CO3	Classify the composite materials and properties of composites.				K2
CO4	Identify sustainable bio-based building materials and their environmental impact of carbon footprint.				K2
CO5	Apply sustainability concepts and analytical skills to calculate and compare carbon footprints of conventional and sustainable buildings.				K3

UNIT – I Building Materials	6
Introduction, Bricks, Glass, Cement, Special Cement, Concrete.	
Unit – II Reinforcement	6
Reinforcement, types of reinforcement, PMC, MMC, Fiber reinforcement.	
UNIT – III Composites	6
Types, Matrix materials, Hybrids, Characteristics, CM Applications.	
UNIT – IV Sustainable Materials	6
Bio-based materials, Product and Technology development, Admixtures, Environmental aspects, energy efficiency.	
UNIT – V Analytical Methods	6
Thermal conductivity, porosity, absorption and emission characteristics of building materials.	
TOTAL (L:30): 30 PERIODS	
Textbooks:	
1. Jain, P. C., and Jain, M., "Engineering chemistry", Dhanpat Rai Publishing Company (P) Ltd., 2022. 2. Eckold, G., "Design and manufacture of composite structures", Woodhead Publishing Ltd., 1994.	
References:	
1. Skoog, D. A., West, D. M., Holler, F. J., and Crouch, S. R., "Fundamentals of analytical chemistry", (10 th edition). Cengage Learning India Pvt. Ltd., 2022. 2. Spitzer, W. G., and Simonson, K., "Green building materials: A guide to product selection and specification", Wiley, 2011.	

E-resources:

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

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	2	1	-	2	2	-	3	3	3	2	-	-	-
2	2	1	1	-	2	2	-	2	3	3	2	-	-	-
3	2	1	1	-	2	2	-	3	3	3	2	-	-	-
4	2	1	1	-	-	2	-	3	3	3	2	-	-	-
5	2	1	1	-	2	2	-	2	3	3	2	-	-	-
Avg.	2	1.2	1.0	-	2	2	-	2.6	3	3	2	-	-	-

UC25H02	தமிழர்களும் தொதாழில்நுட் ழும்	L	T	P	C
		1	0	0	1
Course Objectives:	To enable students to understand the technological developments of the Tamil civilization.				
Course Outcomes				Knowledge Level	
The students will be able to					
CO1	Understand and explain the technological knowledge of weaving and ceramic technology of the Sangam Age.			K2	
CO2	Describe ancient Tamil design and construction technologies.			K2	
CO3	Explain the manufacturing and industrial technologies of ancient Tamil society.			K2	
CO4	Explain agricultural and irrigation technologies of ancient Tamils.			K2	
CO5	Describe the development of Scientific Tamil and Tamil Computing.			K2	

அலகு I - ாநசவு மற்றும் றறனத் நதாழில்நுட் ழ்	3
சங்க காலத்தில் தநசவுத் நதொழில், பொனனத் நதொழில்நுட்பம், கருப்பு சிவப்பு பொண்டங்கள், பொண்டங்களில் கீறல் குறியீடுகள்	
அலகு II - வடிவனம ஁பு மற்றும் கட்டிடத் நதாழில்நுட் ழ்	3
சங்க காலத்தில் வடிவனமப்பு மற்றும் கட்டுனமங்கள் & சங்க காலத்தில் வீட்டுப் நபொருட்களில் வடிவனமப்பு, சங்க காலத்தில் கட்டுமொன நபொருட்களும் த டுகல்லும் - சிலப்பதிகொரத்தில் மமனட அனமப்பு பற்றிய விவரங்கள், மொமல்லபுரச் சிற்பங்களும், மகொவில்களும், மசொழர் காலத்஁ நபருங்மகொயில்கள் மற்றும் பிற வழிபொட்டுத் தலங்கள் - த ாயக்கர் காலக் மகொயில்கள், மொதிரி கட்டனமப்புகள் பற்றி அறிதல், ம஁னர மீன ாட்சி அம்னம் ஆலயம் மற்றும் திருமனல த ாயக்கர்மஹால் - நசட்டித ாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் நனன்னயில் தஇமதொ, சொமரொநனசிக் கட்டிடக் கனல.	
அலகு III - உற் த்தித் நதாழில் நுட் ழ்	3
கப்பல் கட்டும் கனல, உமலொகவியல், இரும்புத் நதொழிற்சொனல, இரும்பு உருக்குதல், ஂ஁கு, வரலொற்றுச் சொன ஁றுகளொக நசம்பு மற்றும் தங்க த ாணயங்கள், த ாணயங்கள் அச்சடித்தல், மணி உருவொக்கும் நதொழிற்சொனலகள், கல்மணிகள், கண்ணொடி மணிகள், சுடுமண் மணிகள், சங்கு மணிகள், ஂலும்புத்஁ண்டுகள், நதொல்லியல் சொன ஁றுகள், சிலப்பதிகொரத்தில் மணிகளின வனககள்	
அலகு IV வவளாண்னம மற்றும் ார் ாறசத் நதாழில் நுட் ழ்	3

அனண, ஏரி, குளங்கள், மதகு, மசொழர்கொலக் குழுழித் தூம்பின ி முக்கியத்Fவம், கொல்த னட பரொமரிப்பு, கொல்த னடகளுக்கொக வடிவனமக்கப்பட்ட கிணறுகள், மவளொண்ணம மற்றும் மவளொண்ணமச் சொர்த ்த நசயல்பொடுகள், கடல்சொர் அறிவு, மீன ்வளம், முத்F மற்றும் முத்Fக்குளித்தல், நபருங்கடல் குறித்த பண்ணடய	
அறிவு, அறிவுசொர் சமுகம்	
அலகு V அறிவியல் தமிழ் மற்றும் கணின ித்தமிழ்	3
அறிவியல் தமிழின ி வளர்ச்சி, கணின ித்தமிழ் வளர்ச்சி, தமிழ் நூல்களள மின ெபதிப்பு நசய்தல், தமிழ் நனம்நபொருட்கள் உருநவொக்கம், தமிழ் இனணயக் கல்விக்கழகம், தமிழ் மின ி நூலகம், இனணயத்தில் தமிழ் அகரொதிகள், நசொற்குனவத் திட்டம்.	
TOTAL: 15 PERIODS	
Textbooks: 1. தமிழக வரலொறு, மக்களும் பண்பொடும், மக.மக. பிள்ளள (நவளியீடு: தமிழ்த ெொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்). 2. கணின ித் தமிழ், முனனவர் இல. சுத ெ்தரம். (விகனட் பிரசுரம்).	
References: 1. கீழடி, னவனக த திக்கனரயில் சங்ககொல த கர த ெொகரிகம் (நதொல்லியல் Fனற நவளியீடு). 2. நபொருதன, ஆற்றங்கனர த ெொகரிகம். (நதொல்லியல் Fனற நவளியீடு)	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	1	-	-	-	1	-	-	-	-	1	-	-	-
2	2	1	1	-	-	2	-	-	-	-	1	-	-	-
3	2	2	1	-	-	2	-	-	-	-	1	-	-	-
4	2	2	1	-	-	3	-	-	-	-	1	-	-	-
5	2	1	-	-	2	1	-	-	1	-	2	-	-	-
Avg.	2	1.4	1	-	2	1.8	-	-	1	-	1.2	-	-	-

UC25H02	TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1
Course Objectives:	To enable students to understand the technological developments of the Tamil civilization.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Understand and explain the technological knowledge of weaving and ceramic technology of the Sangam Age.				K2
C02	Describe ancient Tamil design and construction technologies.				K2
C03	Explain the manufacturing and industrial technologies of ancient Tamil society.				K2
C04	Explain agricultural and irrigation technologies of ancient Tamils.				K2
C05	Describe the development of Scientific Tamil and Tamil Computing.				K2

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 Stonebeads, Glass beads, Terracotta beads -Shell beads/ bone beats, Archeological evidences - Gem stone types described in Silappathikaram.	
Unit IV - Agriculture and Irrigation Technology:	3
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing Knowledge of Sea, Fisheries, Pearl, Conche diving - Ancient Knowledge of Ocean -Knowledge Specific Society.	
Unit V- Scientific Tamil & Tamil Computing:	3
Development of Scientific Tamil, Tamil computing, Digitalization of Tamil Books,	

Development of Tamil Software, Tamil Virtual Academy, Tamil Digital Library, Online Tamil Dictionaries, Sorkuvai Project.
TOTAL: 15 PERIODS
Textbooks: 1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print) 2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
References: 1. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by:International Institute of Tamil Studies). 2. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.) 3. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) 4. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	1	-	-	-	1	-	-	-	-	1	-	-	-
2	2	1	1	-	-	2	-	-	-	-	1	-	-	-
3	2	2	1	-	-	2	-	-	-	-	1	-	-	-
4	2	2	1	-	-	3	-	-	-	-	1	-	-	-
5	2	1	-	-	2	1	-	-	1	-	2	-	-	-
Avg.	2	1.4	1	-	2	1.8	-	-	1	-	1.2	-	-	-

CE25201	CONSTRUCTION MATERIALS AND TECHNOLOGY	L	T	P	C
		3	0	0	3
Course Objectives:	- To impart fundamental knowledge of traditional and modern building materials used in construction. - To introduce methods of construction such as masonry, formwork, scaffolding, plastering, and joints.				
Course Outcomes The students will be able to			Knowledge Level		
CO1	Classify the good quality materials used in construction.			K2	
CO2	Illustrate the practices and material properties based on strength tests.			K2	
CO3	Identify appropriate construction and service practices for building components.			K2	
CO4	Select the construction equipment for various building works and conditioning.			K2	
CO5	Explain the scheduling techniques with modern construction materials.			K2	

Unit I - Stones, Bricks and Concrete Blocks	9
Stone as building material, Criteria for selection, Tests on stones, Deterioration and preservation of stonework. Bricks, Classification, Manufacturing of clay bricks, Tests on bricks, Compressive strength, Water absorption, Efflorescence, Bricks for special uses, Refractory bricks. Concrete blocks, Types, Hollow and solid blocks, Lightweight concrete blocks, Applications.	
Unit II - Lime, Cement, Aggregates and Mortar	9
Types, Preparation of lime mortar, applications. Cement, Ingredients, Manufacturing process, Types and grades, Properties: hydration, compressive and tensile strength, soundness, consistency, setting time. Fine aggregates, River sand, crushed stone sand (M and P-Sand), Properties. Coarse aggregates, Crushing strength, impact strength, flakiness and elongation index, abrasion resistance, Grading. Mortar, Cement and lime mortars, Uses and proportions.	
Unit III - Timber, Metals and Other Materials	9
Timber, Market forms, Industrial timber, Plywood, Laminated panels. Metals, Steel, Aluminum, Composition, properties, Market forms, Mechanical treatment, Aluminum composite panels. Surface finishes, Paints, Varnishes, Distempers, Bituminous products. Sealants for joints, Insulating materials, Acoustic and thermal insulation, Fire protection, Damp proofing, Ventilation, Air conditioning.	

Unit IV - Construction Technology and Construction Practices	9
Masonry construction, Brick and stone masonry. Formwork, Centering, shuttering, Scaffolding, Shoring, Underpinning. Construction joints, Contraction, construction and expansion joints. Plastering, Pointing, Cavity and diaphragm walls.	
Unit V- Advanced Materials, Construction Equipment and Planning	9
Advanced materials, Glass, Solar panels - Ceramics, Clay products, Refractories, Fibre reinforced plastics, Fibre textiles, Geomembranes, Geotextiles. Composite materials, Types, Laminar composites, Applications in construction, Construction equipment, Selection for earthwork, concreting, material handling, dewatering and pumping, Construction planning.	
TOTAL (L:45): 45 PERIODS	
Textbooks: 1. Varghese, P. C. "Building materials", PHI Learning Pvt. Ltd., 2015. 2. Punmia, B. C. "Building construction", Laxmi Publications Pvt. Ltd, 2008.	
References: 1. Rangwala, S. C. "Building materials", Charotar Publishing House Pvt. Ltd., 2017. 2. Arora, S. P., & Bindra, S. P. "Building construction", Dhanpat Rai Publications, 2013.	

Mapping of COs with POs / PSOs														
COs	POs											PSOs		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	3	3	1	2	2	1	3	3	2	3	3	2	3
2	3	3	2	2	3	2	2	2	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3	3	3	3	2	3
4	3	3	2	-	-	3	3	1	2	-	3	3	2	2
5	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Avg.	3	3	2.6	2.2	2.7	2.6	2.4	2.4	2.8	2.7	3	3	2	2.8

EN25C02	ENGLISH ESSENTIALS-II	L	T	P	C
		1	0	2	2
Course Objectives:	• Enable learners to improve fluency and accuracy in spoken and written communication. • Develop learners' ability to articulate ideas clearly and effectively in formal and informal spoken interactions. • Help learners construct well-organised written documents relevant to academic and workplace contexts.				
Course Outcomes The students will be able to				Knowledge Level	
CO1	Identify and explain the types of oral communication (verbal and non-verbal) and their appropriate use in conversation.				K2
CO2	Apply effective oral communication strategies in different situations.				K3
CO3	Prepare clear, concise, and professional emails and formal letters for academic and workplace communication.				K3
CO4	Prepare well-structured academic texts by paraphrasing, summarizing, and writing different types of essays.				K3
CO5	Produce effective teamwork by assuming roles such as team leader or team player during collaborative task				K4

Unit I - Oral Communication – Fundamentals	3
Types of Oral Communication: Verbal and Non-verbal, Interpersonal Communication, Group Communication.	
Unit II - Oral Communication – Applied Skills	3
Telephonic Conversation, Formal Speeches (Welcome, Vote of Thanks, Introducing Guests), Listening and responding to short podcasts.	
Unit III - Business Correspondence	3
Email Communication, Formal Letters (Types), Business Meetings (Agenda and Minutes of the Meeting).	
Unit IV - Academic Writing	3
Paraphrasing, Summarizing, Essay Writing, Instructions and Recommendations.	
Unit V- Team Work	3
Leadership Skills (Team building, Team leader, Team player), Negotiation and Problem-solving Skills.	
TOTAL: 30 PERIODS	
List of Experiments: 1. Short presentations, Debates 2. Formal speeches, Listening tasks and responses 3. Agenda and Minutes of the Meeting	

4. Email writing, Letter writing (Complaint, Request, Permission) 5. Essay writing (Cause and Effect, Argumentative, Persuasive) 6. Summarizing and Paraphrasing 7. User guides / manuals / policy documents 8. SWOT Analysis, Brainstorming and Group discussions
TOTAL (L:15, P: 15): 30 PERIODS
Textbooks: 1. Taylor, Shirley and Chandra. V. "Communication for Business A Practical Approach. India: Pearson Longman", 2010. 2. Koneru Aruna. "English Language Skills for Engineers. McGraw Hill Education", 2020.
References: 1. Ian Badger, et al., "Listening: B2 (Collins English for Life: Skills), Collins", 2014. 2. Raymond Murphy, "Grammar in Use, Cambridge University Press", 2019.
E-Resources: 1. Communication for Business Success https://open.umn.edu/opentextbooks/textbooks/8 2. TED Talks – https://www.ted.com/

Mapping of COs with POs / PSOs														
COs	POs											PSOs		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	-	-	-	-	-	-	3	2	3	-	2	-	-	-
2	2	2	-	3	2	3	-	3	3	2	3	-	-	-
3	2	-	-	2	-	3	3	3	3	2	3	-	-	-
4	3	3	-	2	-	3	3	2	3	2	2	-	-	-
5	2	2	-	1	2	3	3	3	3	2	2	-	-	-
Avg.	2.25	2.33	-	2	2	3	3	2.6	3	2	2.4	-	-	-

UC25A03	LIFE SKILLS FOR ENGINEERS-II	L	T	P	C
		1	0	2	1
Course Objectives:	To impart and cultivate analytical reasoning, innovative thinking, effective collaboration, and ethical leadership to prepare students for complex challenges in professional and personal environments.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Apply the importance of leadership in professional and personal life.				K3
C02	Apply creatively problem-solving techniques for innovative solutions.				K3
C03	Demonstrate management skills in teamwork situations effectively.				K3
C04	Analyze problems scientifically in engineering & real-world contexts.				K4
C05	Analyze leadership decisions for goal-oriented solutions ethically.				K4

Unit I - Foundations of Creativity & Critical Thinking	3
Creativity: Meaning and Importance - Critical Thinking: Meaning and Need - Creativity vs Critical Thinking, Sources of creativity, Myths of creativity, Imagination, Intuition, and Experience, Multiple Intelligence.	
Unit II - Thinking Processes & Reasoning Skills	3
Convergent and Divergent Thinking, Lateral Thinking, Analytical Thinking, Numeric Reasoning, Symbolic, Graphic Reasoning - Scientific Temperament and Logical thinking.	
Unit III - Problem Solving & Decision Making	3
Problem-solving techniques, Decision-making process, Six Thinking Hats - Mind Mapping - Forced Connections.	
Unit IV - Collaboration & Leadership Skills	3
Collaboration - Leadership Styles and Self-Assessment - Communication and Active listening - Teamwork and Delegation.	
Unit V - Ethical & Situational Leadership Practices	3
Empathy in Leadership, Integrity and Conflict management, Crisis Leadership Simulation, Vision, Motivation & Goal Setting, Responsibility in Decision Making.	
TOTAL (L:15): 15 PERIODS	
Textbooks: 1. Sobana, S., Mahalakshmi, A. Life Skills For Engineering – II. VK Publications, 2025.	
References: 1. DeBono,E., "Six thinking hats", Little, Brown Book Group, 2017. 2. Facione,P.A. "Critical thinking: What it is and why it counts", Insight Assessment", 2015.	

3. Kahneman,D., "Thinking, fast and slow. Farrar, Straus and Giroux", 2011.
4. Whetten, D.A., & Cameron,K.S., "Developing management skills", Pearson, 2016.

E-resources:

1. https://www.mindtools.com/pages/main/newMN_TMC.htm
2. <https://www.skillsyouneed.com/ips/problem-solving.html>
3. https://www.mindtools.com/pages/main/newMN_TED.htm
4. <https://www.skillsyouneed.com/ips/decision-making.html>
5. <https://www.mindmapping.com/>

Mapping of COs with POs / PSOs														
COs	POs											PSOs		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	2	1	1	2	2	1	2	3	1	2	-	-	-
2	2	2	2	1	2	2	2	2	3	2	2	-	-	-
3	2	3	2	2	1	3	2	2	3	2	2	-	-	-
4	1	2	2	2	2	2	1	2	3	2	2	-	-	-
5	2	2	3	2	3	2	2	3	3	2	2	-	-	-
Avg.	1.8	2.2	2	1.6	2	2.2	1.6	2.2	3	1.8	2	-	-	-

UC25A04	PHYSICAL EDUCATION - II	L	T	P	C
		0	0	4	1
Course Objectives:	To impart knowledge on gymnastic exercises and pressing needs for upskilling in a particular game				
Course Outcomes The students will be able to				Knowledge Level	
CO1	Recall the basic concepts of warming-up exercises, safety education, and suitable lead-up games in gymnastics.				K1
CO2	Explain the principles of movement education, balance walk, floor exercises, and tumbling/acrobatics in basic gymnastics.				K2
CO3	Apply the techniques of grip, release, swinging, and exercises on parallel bars and horizontal bars during gymnastics practice.				K3
CO4	Demonstrate skills in any one athletic event such as broad jump, high jump, relay sprint, javelin throw, discus throw, shot put, or running events.				K3
CO5	Analyze and perform gymnastics movements an athletic activities to improve coordination, balance, and overall physical fitness.				K4

Unit I - Basic gymnastics exercises	10
Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.	
Unit II - Upskilling in any one of the athletics	10
Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.	
TOTAL:20 PERIODS	
References: - Singh, A. "Essentials of physical education. Kalyani Publishers", 2008. - Kamlesh, M. L., "Psychology in physical education and sport", (3rd edition). Metropolitan Book Co., 2006. - Mangal, S. K., "Psychology of sports performance", Sports Publication, 2009. - Kandappan, K. "Foundations of physical education", Friends Publications, 2004.	
E-resources: https://www.who.int/health-topics/physical-activity	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	1	-	-	2	-	2	1	-	-	1	-	-	-
2	2	2	-	-	2	-	2	2	-	-	1	-	-	-
3	-	2	3	-	2	-	1	2	-	-	1	-	-	-
4	-	1	3	2	3	-	1	3	-	-	2	-	-	-
5	-	2	2	3	3	-	2	3	-	-	2	-	-	-
Avg.	2.5	1.6	2.6	2.5	2.4	-	1.6	2.2	-	-	1.4	-	-	-

FOREIGN LANGUAGE^

UC25F01		DEUTSCH – I		L	T	P	C
				1	0	2	1
Course Objectives:		• To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.					
Course Outcomes The students will be able to					Knowledge Level		
C01	Demonstrate basic proficiency in German pronunciation, greetings, introductions, numbers, and simple sentence structures.					K2	
C02	Apply fundamental German grammar, including personal pronouns, articles, and present tense verb forms, to construct simple sentences.					K3	
C03	Use essential German vocabulary related to everyday life, such as family, school, food, colors, and common objects, in simple conversations.					K3	
C04	Communicate effectively in routine situations by asking and answering questions, giving directions, telling time, ordering food, and describing daily activities in German.					K3	
C05	Demonstrate awareness of basic German culture and etiquette, including formal and informal communication, and participate appropriately in simple intercultural interactions.					K3	

Unit I - Basics and Introduction	5
German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße..., Wer bist du?), Numbers 1–100 and days of the week, Personal pronouns (ich, du, er, sie...), Sentence structure (SVO word order), Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.	
Unit II - Grammar Essentials and Everyday Vocabulary	5
Present tense of regular verbs (spielen, arbeiten, machen...), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary, Conjugate regular and irregular verbs, "Question Chain" game, Create a simple family tree.	
Unit III - Everyday Communication in German	5
Asking for and giving directions, Telling the time and talking about schedules,	

Ordering food and drinks at a café or restaurant, Talking about hobbies, weather, and daily routines, Listening to short conversations and responding appropriately, Introduction to German culture and formal/informal language use (du vs Sie), Ordering food and drinks, Give directions, Formal / Informal greetings, Do's and Don'ts.

References:

1. Funk, H., Kuhn, C., and Demme, S. Menschen A1: Deutsch als Fremdsprache Kursbuch. Hueber Verlag, 2015.

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	-	-	-	-	-	-	-	-	3	-	2	-	-	-
2	-	-	-	-	-	-	-	-	3	-	2	-	-	-
3	-	-	-	-	-	-	-	1	3	-	2	-	-	-
4	-	-	-	-	-	-	-	2	3	-	2	-	-	-
5	-	-	-	-	-	2	-	2	3	-	2	-	-	-
Avg.	-	-	-	-	-	2	-	1.6	3	-	2	-	-	-

UC25F02	JAPANESE – I	L	T	P	C
		1	0	2	1
Course Objectives:	To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation, and speaking.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Understand reading, writing, and pronunciation of basic Hiragana and Katakana characters and use common greetings, numbers, and simple expressions in Japanese.				K2
C02	Apply fundamental Japanese grammar, including particles, sentence structure, and present tense verb forms, to construct simple sentences and questions.				K3
C03	Use essential Japanese vocabulary related to family, food, colors, daily activities, and common objects in basic written and spoken communication.				K3
C04	Communicate effectively in everyday situations such as self-introduction, asking for directions, ordering food, expressing preferences, and discussing daily routines using simple Japanese expressions.				K3
C05	Demonstrate awareness of Japanese cultural practices, etiquette, and formal/informal language usage to interact appropriately in basic social contexts.				K2

Unit I - Writing Systems and Basic Communication	5
Introduction to Hiragana: vowels, basic characters, reading and writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject-Object- Verb, Numbers 1-100, days of the week, classroom expressions, Games and writing drills, Self-introduction, Numbers and datematching, Greeting expressions, Listening to audio.	
Unit II - Grammar and Everyday Vocabulary	5
Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、い, Vocabulary for family, food, colors, and basic actions, Verb conjugation drills, Guessing game, Picture description, "Shopping" with food vocab and counters.	

Unit III - Conversation and Cultural Etiquette	5
Talking about routines and schedules (daily verbs, time expressions), Asking and giving simple directions (～はどこですか?), Ordering food and making polite requests (～をください、～をおねがいします), Expressing likes and dislikes (好き・嫌い), Listening to short conversations and identifying key phrases, Introduction to formal/informal speech and Japanese etiquette, Skits and role-plays, daily schedule, beginner-level dialogue, Group discussion on etiquette.	
References: 1. Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., and Tokashiki, K. Genki I, "An integrated course in elementary Japanese", The Japan Times, 2011. 2. The Japan Foundation. Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers, 2017.	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	-	-	-	-	-	-	-	-	3	-	-	-	-	-
2	-	-	-	-	-	-	-	-	3	-	-	-	-	-
3	-	-	-	-	-	-	-	1	3	-	-	-	-	-
4	-	-	-	-	-	-	-	2	3	-	-	-	-	-
5	-	-	-	-	-	2	2	2	3	-	2	-	-	-
Avg.	-	-	-	-	-	2	2	1.6	3	-	2	-	-	-

UC25F03	KOREAN – I	L	T	P	C
		1	0	2	1
Course Objectives:	• To impart fundamentals of the Korean language, including reading, writing systems, pronunciation, and speaking.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Demonstrate the ability to read, write, and pronounce basic Hangul characters and use common Korean greetings, introductions, numbers, and simple expressions.				K2
C02	Apply fundamental Korean grammar, including particles, sentence structure, and present tense verb conjugation, to construct simple sentences and questions.				K3
C03	Use essential Korean vocabulary related to everyday life, such as family, food, shopping, time, and common activities, in basic written and spoken communication.				K3
C04	Communicate effectively in routine situations such as self-introduction, shopping, ordering food, asking for directions, and discussing daily schedules using simple Korean expressions.				K3
C05	Demonstrate awareness of Korean cultural practices, etiquette, and polite speech levels to interact appropriately in basic social and professional contexts.				K2

Unit I - Fundamentals of Korean	5
Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (SubjectObject-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요), Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.	
Unit II - Essential Grammar and Vocabulary	5
Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, Expressing possession and location,	

Asking simple questions (어디, 뭐, 누구), Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.	
Unit III - Everyday Korean Communication	5
Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication, Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.	
References: 1. King, R., Yeon, J., and Brown, A. "Elementary Korean" (2nd edition). Tuttle Publishing, 2015. 2. Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., and Sohn, S.-O., "Integrated Korean: Beginning 1", University of Hawai'i Press, 2001.	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	-	-	-	-	-	-	-	-	3	-	2	-	-	-
2	-	-	-	-	-	-	-	-	3	-	2	-	-	-
3	-	-	-	-	-	-	-	1	3	-	2	-	-	-
4	-	-	-	-	-	-	-	2	3	-	2	-	-	-
5	-	-	-	-	-	2	2	2	3	-	2	-	-	-
Avg.	-	-	-	-	-	2	2	1.6	3	-	2	-	-	-

ME25C05	RE-ENGINEERING FOR INNOVATION	L	T	P	C
		0	0	4	2
Course Objectives:	- To cultivate foundational skills in prototyping, and automation for development of prototypes with real-world applications. - To provide a comprehensive, hands-on exposure to product development through reverse engineering concepts.				
Course Outcomes The students will be able to				Knowledge Level	
CO1	Explain the concepts of product development, product life cycle, and reverse engineering through analysis of simple products.				K2
CO2	Perform disassembly of products, take basic measurements, and prepare sketches for reverse engineering and CAD modeling.				K3
CO3	Develop CAD models of disassembled components and Perform virtual assembly of parts using appropriate software tools.				K3
CO4	Interface sensors with embedded system platforms and implement simple automation applications.				K3
CO5	Design and fabricate prototype components using reverse engineering concepts and rapid prototyping techniques such as 3D printing.				K4

LIST OF EXPERIMENTS:
Boot camp 1: Introduction to Product Development, Reverse Engineering, Overview of the product lifecycle, Hands-on disassembly of simple products, Practice of basic measurements and sketching, Introduction to CAD modeling of disassembled parts, Virtual assembly of parts. Boot camp 2: Embedded System Programming (Open-source platforms), Practice of interfacing sensors, reading data, automation in home, healthcare and agriculture.
REVERSE ENGINEERING:
Reverse Engineering: Sketch and prototype alternative designs, Group brainstorming sessions, Manufacture prototype parts using 3D printing and / or workshop tools, Assemble prototype product.
TOTAL: 60 PERIODS
References: - Wang, W., "Reverse engineering: Mechanisms, structures, systems and materials", CRC Press, 2010. - Margolis, M. Arduino cookbook: Recipes to begin, expand, and enhance your projects (3rd edition). O'Reilly Media, 2020.
E-resources:

1. GrabCAD – <https://grabcad.com/>
2. GitHub – <https://github.com/>

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	2	1	–	1	–	–	1	–	–	1	1	1	–
2	2	2	2	–	2	–	–	1	–	–	1	2	2	–
3	2	2	3	1	3	–	–	1	–	–	1	2	3	1
4	2	3	2	1	3	–	–	1	–	–	1	2	3	1
5	2	2	3	1	3	–	–	2	–	–	2	3	3	2
Avg.	2.0	2.2	2.2	1	2.4	–	–	1.2	–	–	1.2	2	2.4	1.3

III SEMESTER

MA25301	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4
Course Objectives:	- To develop the skills of the students in solving different kinds of problems that occur in their engineering field. - To provide students with adequate knowledge of the theory and applications of Fourier series, Fourier transforms, partial differential equations, and Z-transforms.				
Course Outcomes The students will be able to				Knowledge Level	
CO1	Apply analytical techniques to solve standard partial differential equations.				K3
CO2	Solve differential equations using Fourier series analysis for engineering applications.				K3
CO3	Apply Fourier series techniques to solve one-dimensional wave and heat equations and two-dimensional heat conduction problems.				K3
CO4	Solve physical engineering problems using mathematical principles of transforms and partial differential equations.				K3
CO5	Apply Z-transform techniques to solve difference equations arising in discrete-time systems.				K3

Unit I – PARTIAL DIFFERENTIAL EQUATIONS	9+3
Formation of partial differential equations – Solutions of standard types of first order partial differential equations – First order partial differential equations reducible to standard types – Lagrange’s linear equation: grouping and multipliers – Linear partial differential equations of second and higher order with constant coefficients of homogeneous types – Linear partial differential equations of second and higher order with constant coefficients of non-homogeneous type.	
Unit II – APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	9+3
Dirichlet’s conditions – General Fourier series – Change of Interval – Odd and even functions – Half range sine series – Half range cosine series – Root Mean Square value – Parseval’s identity – Complex form of Fourier series – Harmonic analysis.	
Unit III – FOURIER SERIES	9+3
Solution of algebraic and transcendental equations – Fixed point iteration method – Newton Raphson method – Solution of linear system of equations – Gauss elimination method – Pivoting – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss-Seidel – Eigenvalues of a matrix by Power method – Jacobi’s method for symmetric matrices.	

CE25301	CONCRETE TECHNOLOGY	L	T	P	C
		2	0	2	3
Course Objectives:	• To understand the properties and characteristics of concrete constituent materials, admixtures, and their role in concrete production. • To familiarize with concrete mix design and the latest IS method of mix design. • To develop practical skills in concrete testing and gain knowledge of special concretes used in modern construction.				
Course Outcomes			Knowledge Level		
The students will be able to					
C01	Understand the properties, tests, and requirements of cement, aggregates, water, and other constituent materials used in concrete.		K2		
C02	Summarize the characteristics and effects of chemical and mineral admixtures on concrete properties.		K2		
C03	Prepare and assess concrete mixes following IS code guidelines.		K4		
C04	Utilize standard test methods to determine fresh and hardened properties of concrete.		K3		
C05	Explain the suitable special concretes for specific structural and functional requirements.		K2		

UNIT I CONSTITUENT MATERIALS	6
Cement-Different types-Chemical composition and Properties -Tests on cement-IS Specifications- Aggregates-Classification-Mechanical properties and tests as per BIS Grading requirements-Water- Quality of water for use in concrete.	
UNIT II CHEMICAL AND MINERAL ADMIXTURES	6
Accelerators-Retarders- Plasticizers- Super plasticizers- Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaolin -Their effects on concrete properties.	
UNIT III PROPORTIONING OF CONCRETE MIX	6
Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix-BIS Method of Mix Design - Mix Design Examples.	
UNIT IV FRESH AND HARDENED PROPERTIES OF CONCRETE	6
Workability-Tests for workability of concrete-Slump Test and Compacting factor Test Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete- Stress-strain curve for concrete-Determination of Modulus of elasticity.	
UNIT V SPECIAL CONCRETES	6
Light weight concretes - High strength concrete - Fibre reinforced concrete – ferrocement - Ready mix concrete - SIFCON - Shotcrete – Polymer concrete - High performance concrete- self compacting concrete - Geopolymer Concrete.	

PRACTICAL EXPERIMENTS**30 Hrs**

1. Determination of fineness and consistency of cement
2. Determination of initial and final setting time of cement
3. Determination of water absorption capacity of coarse aggregate
4. Determination of slump of concrete
5. Determination of compaction factor of fresh concrete
6. Determination of hardness of concrete using NDT
7. Determination of compressive strength of concrete

TOTAL (L:30 , P:30) : 60 PERIODS**TEXT BOOKS**

1. Neville, A. M., & Brooks, J. J., "Concrete Technology", 2nd Edition, Pearson Education Limited, Harlow, England, 2010.
2. Shetty, M. S., & Mokal, M., "Concrete Technology: Theory and Practice", 9th Edition, S. Chand Publishing, New Delhi, India, 2026.
3. IS 10262-2019 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi.

REFERENCES

1. Gupta, B.L. and Amit Gupta, Concrete Technology, Standard Publishers Distributors, New Delhi, 2024.
2. Neville, A.M. and Brooks, J.J., Properties of Concrete, Pearson Education, London, 5th Edition, 2011.
3. Gambhir, M.L. and Sandeep Chaudhary, Concrete Technology: Theory and Practice, McGraw Hill Education, India, 6th Edition, 2025.
4. Thomas, Job, Concrete Technology, Cengage Learning India Pvt. Ltd., New Delhi, 1st Edition, 2015.

E-RESOURCES:

1. National Programme on Technology Enhanced Learning (NPTEL). Concrete Technology Course Materials and Video Lectures. Available at: <https://nptel.ac.in>
2. Indian Institute of Technology Madras. Concrete Technology Lecture Notes and Learning Resources. Available at: <https://civil.iitm.ac.in>

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	1	2	1	1	1	1	-	-	-	-	1	2	1	2
2	1	2	1	1	1	2	-	-	-	-	1	2	2	2
3	1	3	2	2	2	1	-	-	-	1	1	2	2	3
4	1	2	1	3	2	1	-	-	-	-	1	1	3	2
5	2	2	3	1	2	3	1	-	-	-	1	2	2	3
Avg.	2.4	2.2	1.6	1.6	1.6	1.6	1.0	-	-	1.0	1.0	1.8	2.0	2.4

CE25302	FLUID MECHANICS	L	T	P	C
		3	0	0	3
Course Objectives:	• To understand the fundamental properties of fluids, fluid statics, and basic principles of fluid flow. • To apply fluid flow equations, dimensional analysis, and similitude concepts to engineering problems. • To analyse viscous flow in pipes and boundary layer behaviour relevant to hydraulic and fluid engineering applications.				
Course Outcomes The students will be able to			Knowledge Level		
CO1	Explain the basic concepts and properties of fluids and hydrostatic forces on submerged surfaces and floating bodies.			K2	
CO2	Apply principles of fluid kinematics and dynamics. Use continuity, energy and momentum equations to solve flow problems.			K3	
CO3	Apply dimensional analysis and similitude principles to formulate dimensionless parameters and solve engineering model study problems.			K3	
CO4	Apply viscous flow concepts in pipes under laminar and turbulent conditions and can determine head losses and pipe flow characteristics.			K3	
CO5	Apply boundary layer concepts to determine flow separation, drag forces, and lift forces in fluid flow systems.			K3	

UNIT I FLUIDS PROPERTIES AND FLUID STATICS	9
Scope of fluid mechanics – Definitions of a fluid – Methods of analysis – Continuum hypothesis – System and Control volume approach – Reynold’s transportation theorem– Fluid properties – Fluid statics– Manometry– Forces on plane and curved surfaces– Buoyancy and floatation– Stability of floating bodies.	
UNIT II BASIC CONCEPTS OF FLUID FLOW	9
Kinematics: Classification of flows – Streamline, streak-line and path-lines – Stream function and velocity potentials–Flow nets; Dynamics: Euler’s equation of motion along a stream line – Bernoulli’s equation – Applications to velocity and discharge measurements – Linear momentum equation – Application to pipe bends – Moment of momentum equation.	
UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES	9
Fundamental dimensions – Dimensional homogeneity – Rayleigh’s method and Buckingham Pi theorem – Dimensionless parameters – Similitude and model studies – Distorted and undistorted models.	
UNIT IV INCOMPRESSIBLE VISCOUS FLOW	9
Reynolds experiment – Laminar flow in pipes and between parallel plates – Development of laminar and turbulent flows in pipes – Darcy-Weisbach equation – Major and minor losses of flow in pipes – Total energy line – Hydraulic grade line – Siphon – Pipes in series and parallel – Equivalent pipes.	

UNIT V BOUNDARY LAYERS	9
Definition of boundary layers – Laminar and turbulent boundary layers – Displacement, momentum and energy thickness – Momentum integral equation – Applications – Separation of boundary layer – Drag and Lift forces.	
TOTAL : 45 PERIODS	
TEXT BOOKS: 1. Fox, R. W., McDonald, A. T., Pritchard, P. J., & Leylegian, J. C., "Introduction to Fluid Mechanics", 10th Edition, John Wiley & Sons, Hoboken, New Jersey, USA, 2024. 2. Bansal, R.K., A Textbook of Fluid Mechanics and Hydraulic Machines, 11th Edition, Laxmi Publications (P) Ltd., New Delhi, 2025.	
REFERENCES : 1. Modi, P.N. and Seth, S.M., Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, New Delhi, 22nd Edition, 2019. 2. Som, S.K., Biswas, G. and Chakraborty, S., Introduction to Fluid Mechanics and Fluid Machines, McGraw Hill Education, India, 3rd Edition, 2017. 3. Pani, B.S., Fluid Mechanics: A Concise Introduction, Prentice Hall of India (PHI Learning), New Delhi, 2016. 4. Streeter, V.L., Wylie, E.B. and Bedford, K.W., Fluid Mechanics, McGraw Hill Education, New Delhi, 9th Edition, 1998.	
E-RESOURCES: 1. https://www.hsit.ac.in/ELEARNING/MECHANICAL%20ENGINEERING/IV%20SEME/STER/FLUID%20MECHANICS%2015ME44/Fluid%20Mechanics-15ME44-e-notes.pdf?utm_source=chatgpt.com	

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	-	-	1	-	-	-	-	1	1	-	3
2	3	3	2	1	1	1	-	-	-	-	1	2	1	3
3	2	2	1	2	2	-	-	-	-	-	1	1	1	2
4	3	3	2	2	1	1	-	-	-	-	1	2	1	3
5	2	2	2	1	1	2	-	-	-	-	1	1	1	2
Avg.	2.6	2.4	1.6	1.5	1.0	1.0	-	-	-	-	1.0	1.4	0.8	2.6

CE25303	ENGINEERING GEOLOGY	L 3	T 0	P 0	C 3
Course Objectives:	- To understand the basic concepts of geology and Earth processes related to civil engineering. - To learn the properties of minerals, rocks, and geological structures used in engineering works. - To apply geological knowledge for site investigation, construction projects, and geohazard management.				
Course Outcomes The students will be able to				Knowledge Level	
CO1	Explain the internal structure of the Earth, geological processes, landforms, and groundwater relevant to civil engineering.			K2	
CO2	Explain the properties of common minerals and rocks and their use in construction.			K2	
CO3	Explain geological structures and geo mechanical properties of rocks affecting engineering works.			K2	
CO4	Explain geological mapping, remote sensing, geophysical methods, and subsurface investigation techniques.			K2	
CO5	Apply basic geological knowledge to civil engineering structures and geo hazard mitigation.			K3	

UNIT I PHYSICAL GEOLOGY AND GEOMORPHOLOGY	9
Internal structure of the Earth-Weathering of rocks Fluvial, Marine, Glacial and Aeolian landforms - Plate tectonics and its relevance to earthquakes-Groundwater: types of aquifers, origin, movement and role of groundwater in Civil Engineering constructions.	
UNIT II MINERALOGY AND PETROLOGY	9
Physical and Chemical properties of common rock forming minerals: Quartz family, Feldspar family, Mica (Muscovite, Biotite and Vermiculite), Calcite, Gypsum and Clay minerals and their significance. Formation of rocks and its types- Description of important rocks: Granite, Syenite, Dolerite, Basalt, Quartzite, Slate, Marble, Sandstone, Limestone, Shale and Conglomerate. Engineering properties of rocks: field and laboratory tests.	
UNIT III STRUCTURAL GEOLOGY AND ROCK MECHANICS	9
Attitudes of beds: Strike and Dip- Different types of folds, faults, joints and fractures in rocks - Rock Quality Designation (RQD)- Rock Mass Rating (RMR) - Geological Strength Index (GSI) and their importance in various civil engineering	

projects.

UNIT IV GEOPROSPECTING

9

Geological mapping techniques- Remote Sensing- Geophysical methods for subsurface investigations: Electrical, Seismic and Ground Penetrating Radar (GPR) and their importance in civil engineering projects.

UNIT V GEOLOGICAL CONSIDERATIONS AND GEOHAZARDS

9

Geological conditions necessary for designing and construction of important structures: Dams-Reservoirs - Tunnels - Coastal protection; Landslides- Earthquakes - Tsunamis: Causes and mitigation.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Bell, F. G., "Engineering Geology", 2nd Edition, Butterworth-Heinemann (Elsevier), Oxford, United Kingdom, 2007.
2. Parbin Singh., A Textbook of Engineering and General Geology, S.K. Kataria & Sons, New Delhi, 2024.

REFERENCES :

1. Kesavulu, N. Chenna, Textbook of Engineering Geology, Macmillan India Ltd., New Delhi, 4th Edition, 2018.
2. Reddy, D. Venkat, Engineering Geology, Vikas Publishing House Pvt. Ltd., New Delhi, 2nd Edition, 2021.

E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc23_ce107/preview

Mapping of COs with POs / PSOs

Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	-	-	2	-	-	-	-	1	1	-	3
2	3	2	2	1	1	2	-	-	-	-	1	2	-	3
3	2	3	2	2	1	1	-	-	-	-	1	2	1	3
4	2	2	1	3	3	1	-	-	-	-	1	1	2	2
5	2	3	3	1	1	3	1	-	-	-	1	2	1	3
Avg.	2.4	2.4	1.8	1.4	1.2	1.8	1.0	-	-	-	1.0	1.6	1.3	2.8

CE25304	STRENGTH OF MATERIALS	L	T	P	C
		3	0	0	3
Course Objectives:	• To understand the behaviour of structural members subjected to axial, bending, shear, torsional, and thermal loads. • To analyse stresses, strains, slopes, and deflections in determinate and indeterminate beams. • To apply theories of failure and advanced strength of materials concepts in engineering design and analysis.				
Course Outcomes				Knowledge Level	
The students will be able to					
CO1	Apply the concepts of simple, compound, thermal, and torsional stresses to analyse structural members under different loading conditions.			K2	
CO2	Analyse shear force, bending moment, bending stresses, and shear stresses in beams subjected to various loading conditions.			K4	
CO3	Determine the deflection and slope of beams using classical and energy methods.			K3	
CO4	Analyse statically indeterminate beams and continuous beams to determine reactions, moments, slopes, and deflections.			K4	
CO5	Apply advanced concepts such as unsymmetrical bending, thick cylinders, and theories of failure in structural engineering problems.			K3	

UNIT I – SIMPLE AND COMPOUND STRESSES	9
Stresses in simple and compound bars – Thermal stresses – Elastic constants - Thin cylindrical and spherical shells – Biaxial state of stress – Principal stresses and principal planes – Mohr’s circle of stresses - Torsion on circular shafts.	
UNIT II – BENDING OF BEAMS	9
Types of beams and transverse loadings– Shear force and bending moment for simply supported, cantilever and over-hanging beams - Theory of simple bending – Bending stress distribution – Shear stress distribution.	
UNIT III – DEFLECTION OF BEAMS	9
Double Integration method – Macaulay’s method – Area moment method – Conjugate beam method- Strain energy method for determinate beams.	
UNIT IV – INDETERMINATE BEAMS	9
Propped Cantilever and Fixed Beams – Fixed end moments reactions, slope and deflection for standard cases of loading – Continuous beams – support reactions and moments – Theorem of three moments Shear Force and Bending Moment Diagrams.	

UNIT V – ADVANCED TOPICS	9
Unsymmetrical bending of beams - shear center applied - thick cylinders - Theories of failure –Principal stress, principal strain, shear stress, strain energy and distortion energy theories –application problems.	
TOTAL : 45 PERIODS	
TEXT BOOKS :	
1. Hibbeler, R. C., "Mechanics of Materials", 11th Edition, Pearson Education, Harlow, United Kingdom, 2023. 2. Khurmi, R.S. and Khurmi, N., A Textbook of Strength of Materials (Mechanics of Solids), 26th Edition, S. Chand Publications, New Delhi, 2019. [<u>1</u>, <u>2</u>]	
REFERENCES :	
1. Rajput, R.K., Strength of Materials (Mechanics of Solids), S. Chand & Company Ltd., New Delhi, 2018. 2. Punmia, B.C., Jain, A.K. and Jain, A.K., Theory of Structures (SMTS) Vol. II, Laxmi Publications Pvt. Ltd., New Delhi, 2017. 3. Vazirani, V.N., Ratwani, M.M. and Duggal, S.K., Analysis of Structures: Analysis, Design and Detailing of Structures – Vol. 1, Khanna Publishers, New Delhi, 2014.	
E-RESOURCES:	
1. https://www.e-booksdirectory.com/listing.php?category=456	

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	1	-	-	-	-	-	-	1	2	-	3
2	3	3	2	1	1	-	-	-	-	-	1	3	-	3
3	3	3	2	2	1	-	-	-	-	-	1	3	-	3
4	3	3	2	2	1	-	-	-	-	-	1	3	-	3
5	3	3	2	2	2	-	-	-	-	-	1	2	1	3
Avg.	3.0	2.8	1.8	1.6	1.0	-	-	-	-	-	1.0	2.6	1.0	3.0

CE25305	SURVEYING AND LEVELLING	L 3	T 0	P 0	C 3
Course Objectives:	- To understand the principles, methods, and instruments used in conventional surveying and levelling. - To perform angle, distance, and elevation measurements using theodolite and control surveying techniques. - To familiarize with modern surveying instruments such as Total Station, GPS, and DGPS for engineering applications.				
Course Outcomes				Knowledge Level	
The students will be able to					
C01	Understand the basic principles and classifications of conventional surveying and the use of basic surveying instruments.			K2	
C02	Apply levelling methods and computations for determining reduced levels and contouring.			K3	
C03	Measure angles and perform theodolite and tacheometric surveying for field applications.			K3	
C04	Apply triangulation and trilateration methods to establish horizontal and vertical control networks.			K3	
C05	Explain the concepts and applications of Total Station, GPS, and DGPS.			K2	

UNIT I FUNDAMENTALS OF CONVENTIONAL SURVEYING	9
Definition – Classifications – Basic principles – Equipment and accessories for ranging and chaining – Methods of ranging – Chain traversing – Compass traversing – Types – Bearing – System and conversions – Sources of errors and Local attraction – Magnetic declination – Dip– Plane table and its accessories – Radiation – Intersection – Resection – traversing.	
UNIT II LEVELLING	9
Level line – Horizontal line – Datum – Benchmarks – Levels and staves – Temporary and permanent adjustments – Methods of levelling – Fly levelling – Check levelling – Procedure in levelling – Booking – Reduction – Curvature and refraction – Reciprocal levelling – Precise levelling - Contouring.	
UNIT III THEODOLITE SURVEYING	9
Horizontal and vertical angle measurements – Temporary and permanent adjustments – Sources of errors – Tacheometric surveying – Stadia Tacheometry – Tangential Tacheometry.	
UNIT IV CONTROL SURVEYING AND ADJUSTMENT	9
Horizontal and vertical control – Methods – Triangulation – Traversing – Gale's table – Trilateration - Least square methods – Angles, lengths and levelling network.	

UNIT V MODERN SURVEYING	9
Total Station: Digital Theodolite, EDM – Advantages – Parts and accessories – Working principle – applications. GPS and DGPS: Advantages – System components – Planning and data acquisition – Data processing – Errors– Field procedure and applications.	
TOTAL : 45 PERIODS	
TEXT BOOKS:	
1. Ghilani, C. D., & Wolf, P. R., "Elementary Surveying: An Introduction to Geomatics", 16th Edition, Pearson Education, New York, USA, 2024. 2. Punmia, B.C., Jain, A.K. and Jain, A.K., Surveying Vol. I & II, Laxmi Publications Pvt. Ltd., New Delhi, 17th Edition, 2024.	
REFERENCES:	
1. Kanetkar, T.P. and Kulkarni, S.V., Surveying and Levelling (Parts 1 & 2), Pune Vidyarthi Griha Prakashan, Pune, 2014. 2. Subramanian, R., Surveying and Levelling, Oxford University Press, 2nd Edition, 2012. 3. Arora, K.R., Surveying Vol. I & II, Standard Book House, New Delhi, 15th Edition, 2021.	
E-RESOURCES:	
1. https://nptel.ac.in/courses/105107122	

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	1	2	-	-	-	-	-	1	3	1	2
2	3	2	1	2	2	-	-	-	-	-	1	3	1	2
3	3	3	2	2	2	-	-	-	-	-	1	3	1	2
4	2	3	2	3	2	-	-	-	-	-	1	2	1	2
5	2	2	2	2	3	1	-	-	-	-	1	2	3	2
Avg.	2.6	2.4	1.6	2.0	2.2	1.0	-	-	-	-	1.0	2.6	1.4	2.0

CE25306	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
		0	0	4	2
Course Objectives:	- To understand the mechanical properties and behaviour of engineering materials under different loading conditions. - To perform standard laboratory tests on steel, brick, and wood specimens and interpret the test results. - To evaluate the strength, stiffness, hardness, impact resistance, and durability characteristics of construction materials.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Perform tensile, torsion, compression, shear, and impact tests on engineering materials using standard laboratory equipment and procedures.	K3			
C02	Determine the mechanical properties of materials such as tensile strength, shear strength, modulus of elasticity, toughness, hardness, and spring stiffness from experimental observations.	K3			
C03	Evaluate the behaviour of beams and structural elements under loading by conducting deflection tests on metal and wooden beams and comparing experimental results with theoretical concepts.	K4			
C04	Assess the engineering properties of construction materials such as bricks through compressive strength and water absorption tests and interpret their suitability for construction applications.	K4			
C05	Analyse, interpret, and present laboratory test results in the form of calculations, graphs, and technical reports in accordance with relevant standards and engineering practices.	K4			

LIST OF EXPERIMENTS:
STEEL 1. Tension test on steel rod 2. Torsion test on mild steel rod 3. Deflection test on metal beam 4. Double shear test on metal 5. Impact test on metal specimen (Izod and Charpy) 6. Hardness test on metals (Rockwell and Brinell Hardness Tests) 7. Compression test on helical spring

BRICK

1. Compressive strength test on brick
2. water absorption test on brick

WOOD

1. Deflection test on wooden beam

TOTAL: 60 PERIODS**Mapping of COs with POs / PSOs**

Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	3	2	-	-	-	-	-	1	2	1	3
2	3	3	1	3	2	-	-	-	-	-	1	2	1	3
3	3	3	2	3	2	-	-	-	-	-	1	3	1	3
4	3	2	2	3	2	-	-	-	-	-	1	2	1	3
5	2	2	1	3	2	-	-	-	-	-	1	2	1	2
Avg.	2.8	2.4	1.4	3.0	2.0	-	-	-	-	-	1.0	2.2	1.0	2.8

CE25307	SURVEYING AND LEVELLING LABORATORY	L	T	P	C
		0	0	4	2
Course Objectives:	• To understand the principles and procedures of chain, compass, levelling, and theodolite surveying. • To develop practical skills in measuring distances, angles, elevations, and preparing survey traverses. • To familiarize with modern surveying techniques using Total Station for field measurements and data collection.				
Course Outcomes The students will be able to				Knowledge Level	
C01	Apply chain and compass surveying techniques to measure distances and bearings and prepare simple survey layouts.				K3
C02	Conduct levelling operations using dumpy level and tilting level to determine reduced levels and establish benchmarks.				K3
C03	Use theodolite to measure horizontal and vertical angles and determine the elevation of objects.				K3
C04	Determine distances, elevations, and tacheometric constants for field surveying.				K4
C05	Operate Total Station to perform traversing, compute areas, and determine distances and elevation differences between inaccessible points.				K4

LIST OF EXPERIMENTS:

CHAIN SURVEY

1. Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset
2. Setting out works – Foundation marking using tapes single Room and Double Room

COMPASS SURVEY

3. Compass Traversing – Measuring Bearings and arriving included angles Levelling - Study of levels and levelling staff
4. Fly levelling using Dumpy level and Tilting level
5. Check levelling

THEODOLITE - STUDY OF THEODOLITE

6. Measurement of horizontal angles by reiteration and repetition methods and measurement of vertical angles.
7. Determination of elevation of an object using single plane method when the base is accessible/inaccessible.

TACHEOMETRY – TANGENTIAL SYSTEM – STADIA SYSTEM

8. Determination of tacheometric constants.
9. Determination of heights and distances by stadia tacheometry.
10. Determination of heights and distances by tangential tacheometry.

TOTAL STATION - STUDY OF TOTAL STATION, MEASURING HORIZONTAL AND VERTICAL ANGLES

11. Traverse using Total station and Area of Traverse.
12. Determination of distance and difference in elevation between two inaccessible points using Total station.

TOTAL: 60 PERIODS

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	3	2	-	-	-	-	-	1	3	1	2
2	3	3	1	3	2	-	-	-	-	-	1	3	1	2
3	3	3	2	3	3	-	-	-	-	-	1	3	2	2
4	2	3	2	3	3	-	-	-	-	-	1	2	3	2
5	2	2	1	2	3	1	-	-	-	-	1	2	3	2
Avg.	2.6	2.6	1.4	2.8	2.6	1.0	-	-	-	-	1.0	2.6	2.0	2.0

IV SEMESTER

CE25401	APPLIED HYDRAULICS ENGINEERING	L	T	P	C
		3	1	0	4
Course Objectives:	- To introduce the fundamental principles of hydraulics and the behavior of fluid flow in open channels and hydraulic structures. - To provide knowledge on different types of open channel flow and the analysis of uniform, gradually varied, and rapidly varied flows. - To understand the concepts of hydraulic jump, energy principles, and momentum principles used in hydraulic engineering.				
Course Outcomes The students will be able to			Knowledge Level		
C01	Understand the difference between types of flow and their properties.			K2	
C02	Apply gradually varied flow equations to determine water profiles.			K3	
C03	Analyze rapidly varied flow phenomena such as hydraulic jumps and surges, energy dissipation.			K4	
C04	Select the turbine for different applications based on the performance.			K3	
C05	Select the pumps for different applications based on the performance.			K3	

UNIT I UNIFORM FLOW	9+3
Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Sub-critical, Super-critical and Critical flow - Velocity distribution in open channel - Steady uniform flow: Chezy's equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force.	
UNIT II VARIED FLOWS	9+3
Dynamic equations of gradually varied - Water surface flow profile classifications: Hydraulic Slope, Hydraulic Curve - Profile determination by Numerical method: Direct step method and Standard step Method.	
UNIT III RAPIDLY VARIED FLOW	9+3
Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation - Positive and Negative surges.	
UNIT IV TURBINES	9+3
Turbines - Classification - Impulse turbine - Pelton wheel - Reaction turbines - Francis turbine - Kaplan turbine - Draft tube - Cavitation - Performance of turbine - Specific speed - Runaway speed.	

UNIT V PUMPS	9+3
Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitation's in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Indicator diagrams and its variations - Air vessels - Savings in work done.	
TOTAL (L:45 , T:15) : 60 PERIODS	
TEXT BOOKS: 1. Bansal, R.K., A Textbook of Fluid Mechanics and Hydraulic Machines, 11th Edition, Laxmi Publications (P) Ltd., New Delhi, 2025. 2. Subramanya, K., A Textbook of Flow in Open Channels, McGraw Hill Education (India) Pvt. Ltd., Chennai, 5th Edition, 2019.	
REFERENCES: 1. Chandramouli, P.N., Applied Hydraulic Engineering, Yes Dee Publishing Pvt. Ltd., Chennai, Revised 1st Edition, 2022. 2. Chow, V.T., Open Channel Hydraulics, McGraw Hill, New York, Indian Edition, 2009. 3. Modi, P.N. and Seth, S.M., Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, New Delhi, 22nd Edition, 2019.	
E-RESOURCES: 1. http://elearn.psgcas.ac.in/nptel/courses/video/105107157/105107157.html 2. https://nptel.ac.in/courses/105107122	

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	2	1	1	3	1	-	-	-	1	2	1	3
2	3	3	3	2	2	3	1	-	-	-	1	2	1	3
3	3	3	2	2	2	2	-	-	-	1	1	3	2	3
4	3	3	3	2	2	3	1	-	-	1	1	3	1	3
5	3	3	3	2	2	3	1	-	-	1	1	2	2	3
Avg.	3.0	2.8	2.6	1.8	1.8	2.8	1.0	-	-	1.0	1.0	2.4	1.4	3.0

CE25402	WATER SUPPLY AND WASTE WATER ENGINEERING	L	T	P	C
		3	0	0	3
Course Objectives:	- To understand the sources, quality requirements, treatment, storage, and distribution of water for public water supply systems. - To learn the planning and design principles of water supply and sewerage systems for communities. - To analyse sewage treatment processes, sludge management, and wastewater reuse for sustainable environmental engineering practices.				
Course Outcomes The students will be able to			Knowledge Level		
C01	Explain the components of water supply scheme and conveyance system for water transmission.		K2		
C02	Classify the various advanced treatment system in water supply system.		K2		
C03	Illustrate the water distribution systems and pipe networks.		K2		
C04	Apply the sewage design procedures for sewer systems and sewer appurtenances.		K3		
C05	Apply the design concepts for wastewater treatment units and sludge disposal.		K3		

UNIT I WATER SUPPLY	9
Estimation of surface and subsurface water resources - Predicting demand for water- Physical, chemical and bacteriological analysis - Standards for potable water. Intake of water: Pumping and gravity schemes.	
UNIT II WATER TREATMENT	9
Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation – Clari flocculator - sand filters - Disinfection - softening, removal of iron and manganese -Defluoridation - Softening - Desalination process - Residue Management.	
UNIT III WATER STORAGE AND DISTRIBUTION	9
Storage and balancing reservoirs - types, location and capacity. Distribution system: layout, hydraulics of pipe lines, pipe fittings, valves including check and pressure reducing valves, meters, analysis of distribution systems, leak detection, pumping stations and their operations - House service connections.	
UNIT IV PLANNING AND DESIGN OF SEWERAGE SYSTEM	9
Characteristics and composition of sewage - Population equivalent - Sanitary sewage flow estimation- Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Storm drainage-Storm runoff estimation - Sewer appurtenances - Plumbing systems for drainage.	

UNIT V SEWAGE TREATMENT AND DISPOSAL	9
Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended aeration systems - Trickling filters - Sequencing Batch Reactor (SBR) - UASB – Waste Stabilization Ponds - Reclamation and Reuse of sewage –Discharge standards-sludge treatment -Disposal of sludge.	
TOTAL : 45 PERIODS	
TEXT BOOKS: 1. Metcalf & Eddy (2014), Wastewater Engineering: Treatment and Resource Recovery, 5th Edition, McGraw-Hill Education. 2. Garg, S.K., "Environmental Engineering, Vol. I: Water Supply Engineering and Vol. II: Sewage Disposal and Air Pollution Engineering", Khanna Publishers, New Delhi, Vol. I – 35th Edition, 2024; Vol. II – 42nd Edition, 2025.	
REFERENCES: 1. Punmia, B.C., Jain, A.K. and Jain, A.K., "Environmental Engineering I & II", Laxmi Publications (P) Ltd., New Delhi, Vol. I – 2026 reprint/revision; Vol. II – 2023 edition. 2. Duggal, K.N., "Elements of Environmental Engineering", S. Chand and Company Ltd., New Delhi, Revised Edition, 2014. 3. Qasim, S.R., Motley, E.M. and Zhu, G., "Water and Wastewater Engineering: Planning, Design and Operation", Prentice Hall of India Learning Pvt. Ltd., New Delhi, 2009.	
E-RESOURCES: 1. https://onlinecourses.nptel.ac.in/noc23_ce12/preview	

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	2	1	1	3	1	-	-	-	1	2	1	3
2	3	3	3	2	2	3	1	-	-	-	1	2	1	3
3	3	3	2	2	2	2	-	-	-	1	1	3	2	3
4	3	3	3	2	2	3	1	-	-	1	1	3	1	3
5	3	3	3	2	2	3	1	-	-	1	1	2	2	3
Avg.	3.0	2.8	2.6	1.8	1.8	2.8	1.0	-	-	1.0	1.0	2.4	1.4	1.4

CE25403	SOIL MECHANICS	L	T	P	C
		3	0	0	3
Course Objectives:	- To understand the engineering properties of soils such as permeability, compaction, and consolidation. - To study the stress distribution in soils and the principles of effective stress. - To analyse the shear strength characteristics of soils and their behaviour under different loading conditions.				
Course Outcomes The students will be able to			Knowledge Level		
C01	Classify soils and evaluate properties of soils.			K3	
C02	Apply effective stress, Darcy’s law, permeability concepts, and flow net methods to solve seepage problems.			K3	
C03	Compute stress distribution and evaluate soil settlement using consolidation theory.			K3	
C04	Determine shear strength parameters of soils using Mohr-Coulomb theory and laboratory tests.			K3	
C05	Analyze slope stabilityand recommend suitable protection measures.			K4	

UNIT I SOIL CLASSIFICATION AND COMPACTION	9
Formation of Soil-Soil Description-Soil Structure-Phase Relationship-Index Properties-Soil Classification Systems-Compaction of soils – Theory, Laboratory and field tests – Field Compaction methods – Factors influencing compaction of soils.	
UNIT II EFFECTIVE STRESS AND PERMEABILITY	9
Effective stress concepts in soils – Capillary phenomena Permeability interaction – Hydraulic conductivity – Darcy's law – Determination of Hydraulic Conductivity – Laboratory Determination (Constant head and falling head methods) and field measurement pumping out in unconfined and confined aquifer – Seepage - Two dimensional flow – Laplace's equation – Introduction to flow nets.	
UNIT III STRESS DISTRIBUTION AND SETTLEMENT	9
Stress distribution in homogeneous and isotropic medium – Boussinesq theory – (Point load, Line load and udl) Use of New marks influence chart – Components of settlement – Immediate and consolidation settlement – Terzaghi's one dimensional consolidation theory – Computation of rate of settlement.	
UNIT IV SHEAR STRENGTH	9
Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – Measurement of shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Liquefaction.	

UNIT V SLOPE STABILITY	9
Stability Analysis - Infinite slopes and finite slopes – Total stress analysis for saturated clay – Friction circle method – Use of stability number – Method of slices – Fellenious and Bishop's method - Slope protection measures.	
TOTAL : 45 PERIODS	
TEXT BOOKS: 1. Gopal Ranjan and A.S.R. Rao, "Basic and Applied Soil Mechanics", New Age International Publishers, New Delhi, 5th Edition, 2025. 2. Das, B. M., & Sobhan, K., "Principles of Geotechnical Engineering", 10th Edition, Cengage Learning, Boston, Massachusetts, USA, 2022.	
REFERENCES: 1. 1. Murthy, V.N.S., "Textbook of Soil Mechanics and Foundation Engineering: Geotechnical Engineering Series", CBS Publishers & Distributors Pvt. Ltd., New Delhi, Revised Edition, 2022. 2. McCarthy, D.F., "Essentials of Soil Mechanics and Foundations: Basic Geotechnics", Prentice Hall (Pearson), 7th Edition, 2007. 3. Coduto, D.P., Kitch, W.A. and Yeung, M.R., "Geotechnical Engineering: Principles and Practices", Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition, 2011.	
E-RESOURCES: 1. https://cequcest.wordpress.com/wpcontent/uploads/2015/09/terzaghi129883967-soil-mechanics- in-engineering-practice-3rd-edition-karl-terzaghi-ralph-b-peck-gholamreza-mesri-1996.pdf 2. https://onlinecourses.nptel.ac.in/noc26_ce14/preview	

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	1	1	-	-	-	-	-	1	2	-	3
2	3	3	2	2	1	1	-	-	-	-	1	2	1	3
3	3	3	2	2	1	-	-	-	-	-	1	3	-	3
4	3	3	2	3	1	1	-	-	-	-	1	2	1	3
5	3	3	3	2	1	2	-	-	-	-	1	3	1	3
Avg.	3.0	2.8	2.0	2.0	1.0	1.3	-	-	-	-	1.0	2.4	1.0	3.0

CE25404	DESIGN OF REINFORCED CONCRETE STRUCTURAL ELEMENTS	L	T	P	C
		3	0	0	3
Course Objectives:	- To understand the principles and methods used in the analysis and design of reinforced concrete structural elements. - To design beams, slabs, staircases, and columns using the Limit State Method as per relevant IS codes. - To design reinforced concrete footings and structural components for safe and serviceable performance under different loading conditions.				
Course Outcomes The students will be able to			Knowledge Level		
C01	Design beams using working stress and limit state methods.			K3	
C02	Analyse and design flanged beams, shear, torsion, and bond requirements.			K4	
C03	Design slabs and staircases under different loading and support conditions.			K4	
C04	Design RC columns under axial and eccentric loading conditions.			K4	
C05	Design various types of RC footings as per IS code provisions.			K4	

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES	9
Concept of Elastic method, ultimate load method and limit state method – Working stress method as detailed in IS code - Design of Singly Reinforced beam by working stress method - Limit State philosophy as detailed in IS code - Advantages of Limit State Method over other methods - Analysis and design of singly and doubly reinforced rectangular beams by limit State Method.	
UNIT II LIMIT STATE METHOD – FLANGED BEAM, SHEAR AND TORSION	9
Analysis and design of flanged beams – Use of design aids for Flexure - Behavior of RC members in bond and Anchorage - Design requirements as per current code - Behavior of RC beams in shear and torsion - Design of RC members for combined bending, shear and torsion - serviceability.	
UNIT III LIMIT STATE DESIGN OF SLABS AND STAIRCASE	9
Analysis and design of cantilever, one way, two way and continuous slabs subjected to uniformly distributed load for various boundary conditions- Types of Staircases – Design of dog-legged Staircase –Introduction to Flat Slab.	
UNIT IV LIMIT STATE DESIGN OF COLUMNS	9
Types of columns – Design of short Rectangular and circular columns for axial, uniaxial and biaxial bending.	

UNIT V LIMIT STATE DESIGN OF FOOTING	9
Design of wall footing – Design of axially and eccentrically loaded rectangular pad and sloped footings – Design of combined rectangular footing for two columns only.	
TOTAL : 45 PERIODS	
TEXT BOOK:	
1. Krishnaraju, N., "Design of Reinforced Concrete Structures", CBS Publishers & Distributors Pvt. Ltd., New Delhi, 4th Edition, 2019. 2. Nilson, A. H., Darwin, D., & Dolan, C. W., "Design of Concrete Structures", 15th Edition, McGraw-Hill Education, New York, USA, 2016.	
REFERENCES :	
1. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd Edition, 2017. [1] 2. Unnikrishna Pillai, S. and Devdas Menon, "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 4th Edition, 2021. 3. Punmia, B.C., Jain, A.K. and Jain, A.K., "Limit State Design of Reinforced Concrete", Laxmi Publications Pvt. Ltd., New Delhi, 18th Edition, 2023. 4. Shah, V.L. and Karve, S.R., "Limit State Theory and Design of Reinforced Concrete", Standard Publications, Pune, 9th Edition, 2023.	
E-RESOURCES:	
1. https://nptel.ac.in/courses/105105105	

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	3	1	1	-	-	-	-	1	1	3	-	3
2	3	3	3	2	1	-	-	-	-	1	1	3	-	3
3	3	3	3	2	1	-	-	-	-	1	1	3	-	3
4	3	3	3	2	1	-	-	-	-	1	1	3	-	3
5	3	3	3	2	1	1	-	-	-	1	1	3	1	3
Avg.	3.0	2.8	3.0	1.8	1.0	1.0	-	-	-	1.0	1.0	3.0	1.0	3.0

CY25401	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY	L	T	P	C
		3	0	0	3
Course Objectives:	- To introduce the basic concepts of environment, ecosystems, and biodiversity, with emphasis on the biodiversity of India and its conservation. - To impart knowledge of the causes, effects, control, and prevention measures of environmental pollution and natural disasters. - To facilitate understanding of the global and Indian scenarios of renewable and non-renewable resources, the causes of their degradation, and measures for their conservation. - To create awareness of sustainable development goals and environmentally responsible practices for sustainable living.				
Course Outcomes The students will be able to			Knowledge Level		
CO1	Understand the structure and functions of the environmental ecosystem.			K2	
CO2	Recognize the types of biodiversity and their conservation.			K2	
CO3	Identify the causes and effects of environmental pollution and natural disasters, and contribute to preventive measures in society.			K3	
CO4	Explain major environmental issues and evaluate their impact on society and sustainable development.			K2	
CO5	Understand the Sustainable Development Goals (SDGs) and their role in promoting sustainable practices.			K2	

Unit I – ENVIRONMENTAL ECOSYSTEM	9
Environmental studies, Environmental impacts of urbanization, Ecosystem-Food chains and webs-Types, structure and functions of an ecosystem, Energy flow through an ecosystem, Ecological pyramids, Ecological Succession.	
Unit II – BIODIVERSITY	9
Types of biodiversity, Values of biodiversity, India as a mega- diversity nation, Biodiversity Hot-spots, Threats to biodiversity, Endangered and Endemic species of India, Conservation of biodiversity (In- situ and ex-situ)-Man-wild life conflicts.	
Unit III – ENVIRONMENTAL POLLUTION	9
Sources, Effects and Preventive measures of Air, water, soil and noise pollutions, Solid waste, Hazardous waste and E waste management, Pollution Control Board regulations and environmental legislation in India, Role of an individual in prevention of pollution, Pollution case studies.	

Unit IV – SOCIAL ISSUES AND THE ENVIRONMENT	9
Urban problems related to energy, Water conservation, Watershed management, Ozone layer depletion, Global warming and climate change, Green chemistry, Wasteland reclamation, Consumerism and waste generation, Resettlement and rehabilitation of people (case studies), Public awareness.	
Unit V – SUSTAINABILITY AND PRACTICES	9
From unsustainability to sustainability, Sustainability Development Goals (SDG), Life cycle assessment, Environmental impact assessment, Environmental ethics, Value education, Biogeochemical cycles (Carbon Cycle and Nitrogen Cycle).	
TOTAL: 45 PERIODS	
Text Books: 1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2016. 2. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers 2018.	
References: 1. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001. 2. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media. 38th Edition 2010.	

Mapping of COs with POs / PSOs														
POs												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	2	-	-	-	-	3	-	-	-	-	-	-	-
2	1	2	-	-	-	-	3	-	-	-	-	-	-	-
3	2	3	2	1	-	2	3	-	1	-	-	-	-	-
4	-	2	-	-	-	3	2	2	1	1	-	-	-	-
5	1	2	2	-	-	2	3	2	1	-	1	-	-	-
Avg.	1.2	2.2	1	0.2	-	1.4	2.8	0.8	0.6	0.2	0.2	-	-	-

CE25405	HYDRAULIC ENGINEERING LABORATORY	L 0	T 0	P 4	C 2
Course Objectives:	• To understand the principles of fluid flow measurement and energy relationships in hydraulic systems. • To develop practical skills in determining flow characteristics, pipe losses, and the performance of pumps and turbines. • To evaluate the hydraulic behaviour and stability of fluid systems through laboratory experiments and data analysis.				
Course Outcomes The students will be able to			Knowledge Level		
CO1	Perform flow measurement experiments using Rotameter, Venturimeter, Orificemeter, mouthpiece, and notches, and determine the discharge under different flow conditions.			K3	
CO2	Analyse energy losses in pipe networks by determining and interpreting friction factors and minor loss coefficients from laboratory experiments.			K4	
CO3	Evaluate the performance characteristics of different pumps including centrifugal, gear, submersible, and reciprocating pumps under varying operating conditions.			K4	
CO4	Evaluate the performance characteristics of hydraulic turbines including Pelton wheel and Francis turbine under varying operating conditions.			K4	
CO5	Determine and analyse the metacentric height of floating bodies to understand stability of floating structures.			K4	

LIST OF EXPERIMENTS:

A. FLOW MEASUREMENT

1. Calibration of Rotameter.
2. Determination of flow through Orifice meter / Mouthpiece, Venturi meter and Notches.
3. Verification of Bernoulli's theorem using Bernoulli's apparatus.

B. LOSSES IN PIPES

4. Determination of friction factor in pipes.
5. Determination of minor losses.

C. PUMPS

6. Determination of characteristics of Centrifugal pump.
7. Determination of characteristics of Gear pump.
8. Determination of characteristics of Submersible pump.
9. Determination of characteristics of Reciprocating pump.

D. TURBINES

10. Determination of Characteristics of Pelton wheel turbine

11. Determination of Characteristics of Francis turbine

E. DETERMINATION OF METACENTRIC HEIGHT

12. Determination of metacentric height of floating bodies.

TOTAL: 60 PERIODS

Mapping of COs with POs / PSOs

Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	3	2	-	-	-	-	-	1	2	1	3
2	3	3	1	3	2	-	-	-	-	-	1	2	1	3
3	3	3	2	3	2	-	-	-	-	-	1	2	2	3
4	2	3	2	3	3	-	-	-	-	-	1	2	3	3
5	2	2	1	2	2	1	-	-	-	-	1	1	2	2
Avg.	2.6	2.6	1.4	2.8	2.2	1.0	-	-	-	-	1.0	1.8	1.8	2.8

CE25406	WATER AND WASTEWATER ANALYSIS LABORATORY	L	T	P	C
		0	0	4	2
Course Objectives:	- To understand standard sampling, preservation, and analytical procedures for water and wastewater quality assessment. - To develop practical skills in determining the physical, chemical, and biological characteristics of water and wastewater. - To evaluate water and wastewater quality using laboratory test results for environmental monitoring and treatment applications.				
Course Outcomes The students will be able to			Knowledge Level		
CO1	Analyse the physical properties of water and wastewater samples.			K4	
CO2	Analyse the chemical characteristics of water using standard laboratory tests.			K4	
CO3	Analyse wastewater quality by determining important pollution parameters such as DO, BOD, and COD.			K4	
CO4	Evaluate the quality of wastewater based on nitrogen and bacteriological analyses.			K5	
CO5	Interpret test results to assess the suitability of water and wastewater for treatment and disposal.			K5	

LIST OF EXPERIMENTS:

Analysis of Water Sample

1. Sampling and preservation methods for water and wastewater (Demonstration only)
2. Measurement of Electrical conductivity and turbidity
3. Determination of fluoride in water by spectrophotometric method /ISE
4. Determination of iron in water (Demo)
5. Determination of Sulphate in water
6. Determination of Optimum Coagulant Dosage by Jar test apparatus
7. Determination of available Chlorine in Bleaching powder and residual chlorine in water

Analysis of Wastewater Sample

8. Estimation of suspended, volatile and fixed solids
9. Determination of Sludge Volume Index in waste water
10. Determination of Dissolved Oxygen

11. Estimation of B.O.D.

12. Estimation of C.O.D.

13. Determination of TKN and Ammonia Nitrogen in wastewater

14. Determination of total and faecal coliform (Demonstration only)

TOTAL: 60 PERIODS

Mapping of COs with POs / PSOs

Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	2	2	1	3	2	3	1	-	-	-	1	1	2	2
2	2	3	1	3	2	3	1	-	-	-	1	1	2	2
3	2	3	2	3	2	3	1	-	-	-	1	2	2	3
4	2	2	1	3	3	2	1	-	-	-	1	1	3	2
5	2	3	2	3	2	3	1	-	-	-	1	2	2	3
Avg.	2.0	2.6	1.4	3.0	2.2	2.8	1.0	-	-	-	1.0	1.4	2.2	2.4

CE25407	SOIL MECHANICS LABORATORY	L	T	P	C
		0	0	4	2
Course Objectives:	• To determine the index properties and classification characteristics of soils through standard laboratory tests. • To evaluate the compaction, permeability, consolidation, and shear strength properties of soils for engineering applications. • To develop practical skills in geotechnical testing and interpret soil behaviour for foundation and pavement design.				
Course Outcomes			Knowledge Level		
The students will be able to					
CO1	Determine the index properties and classification characteristics of soils through laboratory tests.			K3	
CO2	Evaluate the in-situ density and compaction characteristics of soils using standard field and laboratory methods.			K3	
CO3	Analyse the permeability and consolidation characteristics of soils for geotechnical applications.			K4	
CO4	Analyse the shear strength and compressive behaviour of cohesive and cohesionless soils using laboratory testing methods.			K4	
CO5	Evaluate the engineering performance of subgrade soils and geosynthetic materials for civil engineering applications.			K5	

LIST OF EXPERIMENTS:

1. INDEX PROPERTIES

- Determination of specific gravity of soil solids.
- Determination of grain size distribution by sieve (dry) analysis.
- Determination of grain size distribution by hydrometer (wet) analysis.
- Determination of liquid limit and plastic limit of soil.
- Determination of shrinkage limit and differential free swell of soil.

2. IN-SITU DENSITY AND COMPACTION CHARACTERISTICS

- Determination of Field density test (Sand replacement method and Core cutter method)
- Determination of moisture–density relationship using Standard Proctor compaction test

3. ENGINEERING PROPERTIES

- Determination of permeability of soil by constant head and falling head methods.
- Determination of coefficient of consolidation by one-dimensional consolidation test.
- Determination of shear strength of cohesionless soil by direct shear test.
- Determination of unconfined compressive strength of cohesive soil by unconfined compression test.
- Determination of shear strength of cohesive soil by laboratory vane shear test.

- f. Determination of shear strength characteristics of cohesionless soil by tri-axial compression test (Demonstration only).
- g. Determination of California Bearing Ratio (CBR) of soil.

4. TEST ON GEOSYNTHETICS (DEMONSTRATION ONLY)

- a. Determination of tensile strength and interfacial friction angle
- b. Determination of apparent opening sizes and permeability

TOTAL: 60 PERIODS

Mapping of COs with POs / PSOs														
Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	1	2	3
1	3	2	1	3	2	-	-	-	-	-	1	2	1	3
2	3	3	1	3	2	-	-	-	-	-	1	2	1	3
3	3	3	2	3	2	1	-	-	-	-	1	3	1	3
4	2	3	2	3	3	1	-	-	-	-	1	2	2	3
5	2	2	1	2	2	1	-	-	-	-	1	2	2	2
Avg.	2.6	2.6	1.4	2.8	2.2	1.0	-	-	-	-	1.0	2.2	1.4	2.8