VELAMMAL

COLLEGE OF ENGINEERING & TECHNOLOGY, MADURAI – 625 009

(Autonomous)

(Accredited by NAAC with 'A' Grade and by NBA for 6 UG Programmes)

(Approved by AICTE and affiliated to Anna University, Chennai)

DEPARTMENT OF CIVIL ENGINEERING

B.E. CIVIL ENGINEERING

REGULATIONS 2025

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM and SYLLABUS

(I - IV Semesters)

(For the students admitted in the academic year 2025 -2026)

GOLDEN GOALS OF VET

1. Regularity & Punctuality.
2. Nil Failures, High Subject Average & More Centums.
3. Research & Development.
4. Focus in General Knowledge & Depth in the Subject.
5. Communication Skills (Spoken English & Learning more Languages).
6. Extracurricular Activities & Co-Curricular Activities (All-around Development).
7. Good Health and Food Habits.
8. Human Values.

VISION AND MISSION OF THE INSTITUTE

VISION OF VCET

To emerge and sustain as a center of excellence for technical and managerial education upholding social values.

MISSION OF VCET

Our aspirants are

- Imparted with comprehensive, innovative and value – based education.
- Exposed to technical, managerial and soft skill resources with emphasis on research and professionalism.
- Inculcated with the need for a disciplined, happy, married and peaceful life.

VISION AND MISSION OF CIVIL DEPARTMENT

VISION

To inspire and mould Civil Engineering aspirants as competent and dynamic infrastructure developers.

MISSION

Integrate high quality Civil Engineering Education and Research.

Keep the students abreast with the State of the art Theory and Practice.

Create a supportive environment to meet professional challenges.

VELAMMAL COLLEGE OF ENGINEERING & TECHNOLOGY, MADURAI - 625009

(Autonomous)

REGULATIONS – 2025

B. E. CIVIL ENGINEERING (CBCS)

BATCH 2025 - 2029

CURRICULUM FOR SEMESTERS I TO VIII

SEMESTER-I

S.No.	Course Code	Course Title	Category	L	T	P	C
1.	25IP101	Induction Programme *(Common to all B.E./B.Tech. Programmes)*	MC	0	0	0	0
THEORY							
2.	EN25C01	Technical English *(Common to all B.E./B.Tech. Programmes)*	HSMC	3	0	0	3
3.	MA25C02	Applied Mathematics for Engineers *(Common to B.E. Civil, CSE, EEE &B.Tech. IT Programmes)*	BSC	3	1	0	4
4.	PH25C01	Engineering Physics *(Common to AI & DS, Civil, CSE, CSE (CS), ECE, EEE, IT and VLSI)*	BSC	3	0	0	3
5.	CH25C01	Engineering Chemistry *(Common to all B.E./B.Tech. Programmes)*	BSC	3	0	0	3
6.	CS25C01	Problem Solving using C Programming *(Common to AI & DS, Civil, CSE, CSE (CS), ECE, EEE, IT, and VLSI)*	ESC	3	0	0	3
7.	TA25C01	Heritage of Tamils *(Common to all B.E./B.Tech. Programmes)*	HSMC	1	0	0	1
PRACTICAL COURSES							
8.	CS25C02	Programming in C Laboratory *(Common to AI & DS, Civil, CSE, CSE (CS), ECE, EEE, IT and VLSI)*	ESC	0	0	4	2
9.	ME25C02	Engineering Graphics *(Common to Civil and ECE)*	ESC	0	0	4	2
10.	EM25C01	Engineering Practices Laboratory *(Common to Civil, CSE, CSE (CS), EEE, IT, Mech and VLSI)*	ESC	0	0	4	2
Total Credits							**23**

SEMESTER-II

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	MA25201	Vector Calculus and Partial Differential Equations	BSC	3	1	0	4
2.	PH25201	Physics for Civil Engineering	ESC	2	0	0	2
3.	EE25203	Basic Electrical and Electronics Engineering	ESC	3	0	0	3
4.	CE25201	Basics of Mechanics	ESC	3	0	0	3
5.	CE25202	Construction Materials, Practices and Techniques	PCC	3	0	0	3
6.	TA25C02	Tamils and Technology *(Common to all B.E./B.Tech. Programmes)*	HSMC	1	0	0	1
THEORY WITH PRACTICAL COURSE							
7.	EN25C02	English Proficiency and soft skills *(common to AI & DS, Civil, CSE(CS),EEE, IT and VLSI)*	HSMC	2	0	2	3
PRACTICAL COURSES							
8.	PC25C01	Physics and Chemistry Laboratory *(Common to all I Year B.E./B.Tech. Programmes)*	BSC	0	0	4	2
9.	CE25203	Computer Aided Drafting and Modeling Laboratory	ESC	0	0	4	2
Total Credits							**23**

SEMESTER-III

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	MA25C05	Probability and Statistical Techniques *(Common to B.E. Civil & B.E. Mechanical Engineering Programme)*	BSC	3	1	0	4
2.	CE25301	Engineering Geology	PCC	3	0	0	3
3.	CE25302	Water Supply Engineering	PCC	3	0	0	3
4.	CE25303	Mechanics of Solids	PCC	3	0	0	3
5.	CE25304	Fluid Mechanics	PCC	3	0	0	3
THEORY WITH PRACTICAL COURSE							
6.	CE25305	Surveying and Geomatics	PCC	3	0	2	4
PRACTICAL COURSES							
7.	CE25306	Computer Aided Building Drawing Laboratory	PCC	0	0	3	1.5
8.	CE25307	Strength of Materials laboratory	PCC	0	0	3	1.5
Total Credits							**23**

SEMESTER-IV

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	MA25C06	Numerical Methods *(Common to B.E. Civil & B.E. Mechanical Engineering Programme)*	BSC	3	1	0	4
2.	CH25C02	Environmental Science *(Common to all B.E./B.Tech. Programmes)*	BSC	2	0	0	2
3.	CE25401	Strength of Materials	PCC	3	0	0	3
4.	CE25402	Applied Hydraulic Engineering	PCC	3	0	0	3
5.	CE25403	Wastewater Engineering	PCC	3	0	0	3
6.	AD25P35	Artificial Intelligence and Machine Learning *(Common to B.E Civil, Electrical & Electronics and Mechanical Engineering Programmes)*	ESC	3	0	0	3
THEORY WITH PRACTICAL COURSE							
7.	CE25404	Soil Mechanics	PCC	3	0	2	4
PRACTICAL COURSES							
8.	CE25405	Hydraulic Engineering Laboratory	PCC	0	0	3	1.5
9.	CE25406	Water and Wastewater Analysis Laboratory	PCC	0	0	3	1.5
Total Credits							**25**

SEMESTER-V

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	CE25501	Structural Analysis - I	PCC	2	1	0	3
2.	CE25502	Design of Reinforced Cement Concrete Elements	PCC	2	1	0	3
3.	CE25503	Foundation Engineering	PCC	3	0	0	3
4.	CE25PXX	Professional Elective - I	PEC	3	0	0	3
5.	CE25PXX	Professional Elective - II	PEC	3	0	0	3
6.	MC2501	Constitution of India	MC	1	0	0	0
THEORY WITH PRACTICAL COURSE							
7.	CE25504	Concrete Technology	PCC	3	0	2	4
PRACTICAL COURSES							
8.	CE25505	Computer Aided Structural Design & Drawing - I	PCC	0	0	3	1.5
9.	EN25C06	Professional Skills Enhancement Laboratory *(Common to all B.E./B.Tech. Programmes)*	HSMC	0	0	2	1
10.	ICE25XX	Industry Oriented course	EEC	0	0	2	1
Total Credits							**22.5**

S.No.	Course Code	Course Title	Category	L	T	P	C
For Honors Degree							
1.	CE25PXX	Honors Elective – I		3	0	0	3
2.	CE25PXX	Honors Elective – II		3	0	0	3
For Minor Degree							
1.		Minor Elective – I		3	0	0	3
2.		Minor Elective – II		3	0	0	3

SEMESTER-VI

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	CE25601	Structural Analysis – II	PCC	2	1	0	3
2.	CE25602	Design of Steel Structural Elements	PCC	2	1	0	3
3.	CE25603	Irrigation and Water Resources Engineering	PCC	3	0	0	3
4.	CE25PXX	Professional Elective - III	PEC	3	0	0	3
5.	MG25C01	Principles of Management	HSMC	3	0	0	3
6.	SLC25XX	Self-Learning Course	EEC	1	0	0	1
7.	MC2502	Essence of Indian Traditional Knowledge	MC	1	0	0	0
THEORY WITH PRACTICAL COURSE							
8.	CE25605	Highway and Railway Engineering	PCC	3	0	2	4
PRACTICAL COURSES							
9.	CE25606	Computer Aided Structural Design & Drawing - II	PCC	0	0	3	1.5
Total Credits							**21.5**

S.No.	Course Code	Course Title	Category	L	T	P	C
For Honors Degree							
1.	CE25PXX	Honors Elective – III		3	0	0	3
2.	CE25PXX	Honors Elective – IV		3	0	0	3
For Minor Degree							
1.		Minor Elective – III		3	0	0	3
2.		Minor Elective – IV		3	0	0	3

SEMESTER-VII

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	CE25701	Estimation, Costing and Valuation Engineering	PCC	3	0	0	3
2.	CE25702	Construction Planning and Management	PCC	3	0	0	3
3.	MG25C02	Professional Ethics and Human Values	HSMC	3	0	0	3
4.	CE25PXX	Professional Elective - IV	PEC	3	0	0	3
5.	CE25PXX	Professional Elective - V	PEC	3	0	0	3
6.	CE25O01	Open Elective - I	OEC	3	0	0	3
PRACTICAL COURSES							
7.	CE25703	Project Work – I	EEC	0	0	4	2
8.	SCE2501	Internship#	EEC	0	0	0	1
Total Credits							**21**

 # will be done during summer vacation

S.No.	Course Code	Course Title	Category	L	T	P	C
For Honors Degree							
1.	CE25PXX	Honors Elective – V		3	0	0	3
2.	CE25PXX	Honors Elective – VI		3	0	0	3
For Minor Degree							
1.		Minor Elective – V		3	0	0	3
2.		Minor Elective – VI		3	0	0	3

SEMESTER-VIII

S.No.	Course Code	Course Title	Category	L	T	P	C
PRACTICAL COURSE							
1.	CE25801	Project Work – II	EEC	0	0	12	6
Total Credits							**6**
Overall Credits							**165**

PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL-I: CONSTRUCTION MANAGEMENT

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	CE25P01	Sustainable Construction	PEC	3	0	0	3
2.	CE25P02	Housing Planning and Management	PEC	3	0	0	3
3.	CE25P03	Infrastructure Planning and Management	PEC	3	0	0	3
4.	CE25P04	Energy Efficient Buildings	PEC	3	0	0	3
5.	CE25P05	Construction Automation	PEC	3	0	0	3
6.	CE25P06	Construction Safety	PEC	3	0	0	3
7.	CE25P07	Smart Materials and Measuring Techniques	PEC	3	0	0	3
8.	CE25P08	Building Information Modelling	PEC	3	0	0	3

VERTICAL-II: GEOTECHNICAL ENGINEERING

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	CE25P09	Geo Synthetics in Civil Engineering	PEC	3	0	0	3
2.	CE25P10	Ground Improvement Techniques	PEC	3	0	0	3
3.	CE25P11	Soil Dynamics and Machine Foundation	PEC	3	0	0	3
4.	CE25P12	Reinforced Earth Structures	PEC	3	0	0	3
5.	CE25P13	Rock Engineering	PEC	3	0	0	3
6.	CE25P14	Tunnelling Engineering	PEC	3	0	0	3
7.	CE25P15	Pile Foundation	PEC	3	0	0	3

VERTICAL-III: ENVIRONMENTAL ENGINEERING

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	CE25P16	Industrial Wastewater Management	PEC	3	0	0	3
2.	CE25P17	Air and Noise Pollution Control Engineering	PEC	3	0	0	3
3.	CE25P18	Solid and Hazardous Waste Management	PEC	3	0	0	3
4.	CE25P19	Environmental Impact Assessment	PEC	3	0	0	3
5.	CE25P20	Environment, Health and Safety	PEC	3	0	0	3
6.	CE25P21	Disaster Management	PEC	3	0	0	3
7.	CE25P22	Remote Sensing and Geographical Information System	PEC	3	0	0	3

VERTICAL-IV: STRUCTURAL ENGINEERING

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	CE25P23	Prestressed Concrete Structures	PEC	3	0	0	3
2.	CE25P24	Repair and Rehabilitation of Structures	PEC	3	0	0	3
3.	CE25P25	Prefabricated Structures	PEC	3	0	0	3
4.	CE25P26	Introduction to Finite Element Method	PEC	3	0	0	3
5.	CE25P27	Steel Concrete Composite Structures	PEC	3	0	0	3
6.	CE25P28	Structural Dynamics and Aseismic Design	PEC	3	0	0	3
7.	CE25P29	Design of Formwork	PEC	3	0	0	3

VERTICAL-V: WATER RESOURCES ENGINEERING

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	CE25P30	Ground Water Engineering	PEC	3	0	0	3
2.	CE25P31	Hydrology and Water Resources Engineering	PEC	3	0	0	3
3.	CE25P32	Participatory Water Resources Management	PEC	3	0	0	3
4.	CE25P33	Artificial Intelligence and Machine Learning for Water Resources Engineering	PEC	3	0	0	3
5.	CE25P34	River Engineering	PEC	3	0	0	3
6.	CE25P35	Coastal Engineering	PEC	3	0	0	3
7.	CE25P36	Watershed Conservation and Management	PEC	3	0	0	3

VERTICAL-VI: TRANSPORTATION ENGINEERING

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	CE25P37	Airports, Docks and Harbor Engineering	PEC	3	0	0	3
2.	CE25P38	Pavement Engineering	PEC	3	0	0	3
3.	CE25P39	Transportation Planning	PEC	3	0	0	3
4.	CE25P40	Urban Planning and Development	PEC	3	0	0	3
5.	CE25P41	Intelligent Transport System	PEC	3	0	0	3
6.	CE25P42	Smart Cities	PEC	3	0	0	3
7.	CE25P43	Traffic Planning and Management	PEC	3	0	0	3

INDUSTRY ORIENTED COURSES

S.No.	Course Code	Course Title	Category	L	T	P	C
THEORY							
1.	ICE2501	Advanced Surveying	EEC	0	0	2	1
2.	ICE2502	Restoration of Structures	EEC	0	0	2	1
3.	ICE2503	Design Thinking	EEC	1	0	0	1
4.	ICE2504	Life Skills for Engineers	EEC	1	0	0	1

SEMESTER WISE CREDIT DISTRIBUTION

	I	II	III	IV	V	VI	VII	VIII	Total Credits
HSMC	4	4	-	-	1	3	3	-	**15**
BSC	10	6	4	6	-	-	-	-	**26**
ESC	9	10	-	3	-	-	-	-	**22**
PCC	-	3	19	16	14.5	14.5	6	-	**73**
PEC	-	-	-	-	6	3	6	-	**15**
OEC	-	-	-	-	-	-	3	-	**3**
EEC	-	-	-	-	1	1	3	6	**11**
MC (Non Credit)	✓	-	-	-	✓	✓	-	-	**-**
TOTAL	**23**	**23**	**23**	**25**	**22.5**	**21.5**	**21**	**6**	**165**

S.No.	Topic
1	Humanities and Social Science including Management (HSMC)
2	Basic Science Courses (BSC)
3	Engineering Science Courses including Workshop, Drawing, Basics of Civil/Electrical/Mechanical/Computer etc., (ESC)
4	Professional Core Course (PCC)
5	Professional Elective Courses: Courses relevant to chosen Specialization/branch (PEC)
6	Open Elective Courses (OEC)
7	Project Work, Seminar, Internship in Industry, Industry Oriented Courses and Self-Learning Courses – Employability Enhancement Course (EEC)
8.	Mandatory Courses (MC)

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REGULATIONS – 2025

B. E. CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

SYLLABUS FOR SEMESTERS I TO VIII

SEMESTER-I

25IP101	**INDUCTION PROGRAMME** **(Common to all B.E./B.Tech. Programmes)**	**L**	**T**	**P**	**C**
		0	**0**	**0**	**0**

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfil his/her responsibility as an engineer, as a citizen and as a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity

This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc.

A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(vi) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(viii) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and **therefore there shall be no tests / assessments** during this programme.

REFERENCE:

Guide to Induction program from AICTE

EN25C01	TECHNICAL ENGLISH (Common to all B.E./B.TECH. Programmes)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

The course enables the students to:

- Recognize and interpret listening cues for enhancing comprehending skills in spoken interactions
- Develop confidence in expressing ideas clearly in speaking situations.
- Understand and apply vocabulary effectively while summarizing written content.
- Build the ability to plan and structure coherent written compositions
- Encourage articulation to support personal viewpoints in diverse formats.

UNIT I	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	9

Listening – Pronunciation, Stress, Syllable, Listening for general information and specific details **-** Listening and filling a form; **Speaking -** Self Introduction, asking for information to fill details in a form; **Reading -** Comprehension Passages - Skimming Scanning and intensive & extensive reading; **Writing -** Writing emails / letters (formal & informal - requisition, Complaint); **Grammar -** Parts of Speech (Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections), Kinds of Sentences; **Vocabulary -** Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II	NARRATION AND SUMMATION	9

Listening - Listening short talks/ podcast/ stories / event narration, documentaries and say true or false **Speaking** - Narrating personal experiences/events, summarizing of documentaries/podcasts; **Reading** - Reading biographies, travelogues & technical blogs; **Writing** -- Paragraph writing, Short Report on an event (Industrial visits etc.); **Grammar** - Question types: Framing "WH" Questions & Yes or No Questions and Tenses; **Vocabulary** - Word forms (prefixes & suffixes), Antonyms, Phrasal verbs.

UNIT III	DESCRIPTION OF A PROCESS / PRODUCT	9

Listening - Listening to advertisements about products and process descriptions and summarize them: **Speaking** - Giving instruction to use the product; Presenting a product; **Reading** - Reading advertisements, gadget reviews; user manuals; **Writing** - Writing definitions; instructions; and Product /Process description; **Grammar** - Tenses, Subject - Verb Agreement; **Vocabulary** - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words)

UNIT IV	CLASSIFICATION AND RECOMMENDATIONS	9

Listening - Listening to TED Talks; differentiate instructions and recommendations; **Speaking** – Short Talk; Mini presentations and making recommendations; **Reading** - Newspaper articles - interviews, Non Verbal Communication (infographics, tables, pie charts etc) to understand and classify information **Writing** - Writing recommendations; Transferring information from non -verbal (chart, graph etc, to verbal mode) **Grammar** - Articles, Degrees of comparison; **Vocabulary** - Collocations; Fixed / Semi fixed expressions.

UNIT V	EXPRESSIONS	9

Listening - Listening to debates/ discussions; different viewpoints on an issue; and panel discussions; **Speaking** - Group discussions, Debates, and Expressing opinions through Simulations & Role-play; **Reading** - Reading editorials; and Opinion Blogs; **Writing** - Essay Writing (Descriptive or narrative); **Grammar** -Phrases & Clauses, Simple, Compound & Complex Sentences; **Vocabulary** - Connotations-Content vs. Function words.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Identify listening cues and respond appropriately in real-time communication.

CO2: Deliver spoken messages clearly and appropriately in varied contexts.

CO3: Use new vocabulary in context and summarize main ideas from texts.
CO4: Create and organize clear written compositions.
CO5: Express and justify opinions through oral, written, and digital formats

TEXT BOOKS:

1. Shoba. K N.& Lourdes Joavani Rayen. "Communication Skills", New Delhi, Cambridge University Press, 2021
2. Board of Editors, Fluency in English-A Course book for Undergraduate Engineers and Technologists. Orient Blackswan Pvt Ltd, Hyderabad: 2018
3. Jawahar, Jewelcy & Rathna.P. Communicative English Workbook. VRB Publishers Pvt Ltd. Chennai. 2018.

REFERENCE BOOKS:

1. Department of English. Mindscapes English for Technologists and Engineers. Orient Black swan Ltd, Hyderabad: 2012
2. Verma, Shalini. Technical Communication for Engineers. Vikas Publishing House Pvt Ltd. New Delhi. 2015
3. Rizvi, Ashraf.M. Effective Technical Communication. MCGraw Hill Education Pvt Ltd. New Delhi. 2016.
4. Leech Geoffrey and Svartvik Jan. A Communicative Grammar of English. Third Edition, Routledge, New York. 2013

WEB SOURCES:

1. www.esl.org
2. elt.oup.com/learning resources
3. a4esl.org

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	1	2	-	1	-	1
CO2	-	-	-	-	-	-	-	1	2	-	1	-	1
CO3	-	-	-	-	-	-	-	1	2	-	1	-	1
CO4	-	-	-	-	-	-	-	1	2	-	1	-	1
CO5	-	-	-	-	-	-	-	1	2	-	1	-	1
Course Contribution	-	-	-	-	-	-	-	1	2	-	1	-	1

MA25C02	APPLIED MATHEMATICS FOR ENGINEERS *(Common to B.E. Civil, CSE, EEE &B.Tech. IT Programmes)*	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To establish the matrix concepts in engineering applications.
- To obtain the solution of different types of differentiation equations involved in differential calculus.
- To make use of the concept of functions of several variables and partial derivatives in various fields of Engineering.
- To prepare the student to use mathematical tools in evaluating multiple integrals and its applications.
- To obtain a solution of ordinary differential equations that model engineering problems.

UNIT I	MATRICES	12

Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem - Diagonalization of matrices by orthogonal transformation - Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications of matrices : Principal Component Analysis, Stretching of elastic membrane..

UNIT II	DIFFERENTIAL CALCULUS	12

Differentiation – Implicit differentiation – Logarithmic differentiation – Applications: Maxima and minima of functions of one variable, Radius of curvature - Centre of curvature – Circle of curvature.

UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV	INTEGRAL CALCULUS	12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Double integrals –Area enclosed by plane curves – Triple integrals – Volume of solids.

UNIT V	ORDINARY DIFFERENTIAL EQUATIONS	12

Linear equations of second order with constant and variable coefficients-Homogeneous equations of Euler type – Equations reducible to homogeneous form –Variation of parameters-Simultaneous first order differential equation with constant coefficients.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Apply the matrix algebra for Eigen value related application problems.

CO2: Apply differential calculus tools in solving various Engineering problems

CO3: Determine the solutions for functions of more than one variable.

CO4: Solve the practical problems of finding area and volume using multiple integrals.

CO5: Apply ordinary differential equations to model real world problems.

TEXT BOOKS:

1. Grewal.B.S. “Higher Engineering Mathematics”, 44th Edition, Khanna Publishers, New Delhi, 2018.
2. Bali N.P and Manish Goyal “A Text Book of Engineering Mathematics”,9th Edition Lakshmi Publications Pvt., Ltd., New Delhi, 2016
3. Kreyszig.E, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons, New Delhi, 2016.

REFERENCES:

1. James Stewart, "Calculus: Early Transcendentals", 9th Edition, Cengage Learning, 8th edition New Delhi, 2015
2. Ramana. B.V., "Higher Engineering Mathematics", 6th Edition, McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
3. Jain. R.K. and Iyengar. S.R.K., “Advanced Engineering Mathematics”, 5th Edition, Narosa Publications, New Delhi, 2016.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	1	1	-
CO2	3	2	1	1	-	-	-	-	-	-	1	1	-
CO3	3	2	1	1	-	-	-	-	-	-	1	-	-
CO4	3	2	1	1	-	-	-	-	-	-	1	1	-
CO5	3	2	1	1	-	-	-	-	-	-	1	1	-
Course Contribution	3	2	1	1	-	-	-	-	-	-	1	1	-

PH25C01	ENGINEERING PHYSICS *(Common To I Year B.E./B.Tech. AI & DS,CSE,IT, CS (Cyber),ECE,EEE, EE(VLSI), CIVIL Engineering)*	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To illustrate the effective understanding of mechanics.
- To gain knowledge on oscillations and thermal physics.
- To explain the working of laser and its applications.
- To outline the importance of quantum mechanics.
- To understand crystal structures and its applications.

UNIT I	MECHANICS OF MATERIALS	9

Rigid body – Centre of mass: 1D & 3D – Elasticity –Hooke's law - Poisson's ratio - stress-strain diagram for ductile and brittle materials(basic) – Uses - Bending of beams – Cantilever - Simply supported beams - uniform and non-uniform bending - Young's modulus determination - I shaped girders.

UNIT II	OSCILLATIONS AND THERMAL PHYSICS	9

Simple harmonic motion - Torsional pendulum –Introduction to Damped and Forced oscillations – Shock absorber – Resonance - Introduction to conduction, convection and radiation - Thermal expansion – Expansion joints – Bimetallic strip – Seebeck effect – thermocouple.

UNIT III	LASERS	9

Laser – characteristics – spontaneous and stimulated emission - population – inversion - Metastable states - CO_2 laser, Semiconductor laser - Industrial and medical applications - Optical Fibers – Total internal reflection – Numerical aperture and acceptance angle – Fiber optic communication.

UNIT IV	QUANTUM MECHANICS	9

Black body radiation (Qualitative) – Planck's hypothesis - Matter waves – de Broglie hypothesis - Electron microscope – Uncertainty Principle – The Schrodinger Wave equation (time-independent and time-dependent) – Physical significance of wave function - Degenerate energy states - Barrier penetration and quantum tunneling - Tunneling microscope.

UNIT V	CRYSTAL PHYSICS	9

Crystal Bonding – Ionic – covalent – metallic and van der Wall's molecular bonding - Introduction to Crystal systems (unit cell, Bravais lattices, Miller indices) - Crystal structures - atomic packing density of BCC, FCC and HCP structures - crystal imperfections - point defects - edge and screw dislocations – grain boundaries. X-ray diffractometer.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to:

CO1: Understand the basic properties of materials
CO2: Express the knowledge based on applications of oscillations and thermal Physics.
CO3: Know the basics of optics, lasers and its applications
CO4: Demonstrate the importance of quantum physics.
CO5: Apply the significance of crystal physics.

TEXT BOOKS:

1. Raymond A. Serway, John W. Jewett, Physics for Scientists and Engineers, Thomson Brooks/Cole, First Edition 2013.
2. D. Halliday, R. Resnick and J. Walker, Principles of Physics. John Wiley & Sons, 1 Tenth Edition, 2015.
3. N. Garcia, A. Damask and S. Schwarz, Physics for Computer Science Students, Springer- Verlag, First

Edition, 2012.
4. Alan Giambattista, Betty McCarthy Richardson and Robert C. Richardson, College Physics, McGraw-Hill Higher Education, First Edition ,2012.

REFERENCES

1. R. Wolfson, Essential University Physics. Volume 1 & 2. Pearson, First Edition, 2016.
2. D. Kleppner and R. Kolenkow. An Introduction to Mechanics, McGraw Hill Education, First Edition, 2017.
3. K. Thyagarajan and A. Ghatak. Lasers: Fundamentals and Applications. Springer, First Edition, 2012.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	1	-	-	-	-
CO2	2	1	-	-	-	-	-	-	1	-	-	1	-
CO3	2	1	-	-	-	-	-	-	1	-	-	1	-
CO4	2	1	-	-	-	-	-	-	1	-	-	-	-
CO5	2	1	-	-	-	-	-	-	1	-	-	1	-
Course Contribution	2	2	-	-	-	-	-	-	1	-	-	1	-

CH25C01	ENGINEERING CHEMISTRY *(Common to all I year B.E / B.Tech. Programmes)*	L 3	T 0	P 0	C 3

COURSE OBJECTIVES:

- To inculcate the sound understanding of water quality parameters and water treatment techniques.
- To acquire basic principles and preparatory methods of nanomaterials.
- To describe the characteristics, applications of polymeric materials and composites.
- To illustrate the operating principles in electrochemistry and working processes and applications of storage devices.
- To use appropriate synthetic fuels and fuel additives for better combustion characteristics.

UNIT I	WATER AND ITS TREATMENT	9

Water: Sources and impurities, **Water quality parameters:** Definition and significance of-colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. **Municipal water treatment:** primary treatment and disinfection (UV, Ozonation, break-point chlorination)**. Boiler troubles:** Scale and sludge, boiler corrosion, caustic embrittlement, priming & foaming. **Treatment of boiler feed water**: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and external treatment – Ion exchange demineralization and zeolite process. **Desalination of brackish water**: Reverse Osmosis (RO) method.

UNIT II	NANOCHEMISTRY	9

Basics: Distinction between molecules, nanomaterials and bulk materials; **Size-dependent properties** (optical, electrical, mechanical and magnetic). **Preparation of nanomaterials:** sol-gel, solvothermal, laser ablation, chemical vapour deposition, and electrochemical deposition. **Applications** of nanomaterials. **Sensors**: Basic components, types and applications. Chemiresistive sensors - environmental monitoring – CO_2 sensor.

UNIT III	POLYMERS AND COMPOSITES	9

Polymers: Classification, functionality of monomers, Types of polymerizations, free radical mechanism, degree of polymerization, weight and number average molecular weights (definition only). **Engineering Plastics** - Properties and types. **Composites:** Definition & need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and reinforcement (fiber, particulates, flakes and whiskers). **Properties and applications**: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites.

UNIT IV	ELECTROCHEMICAL POWER SOURCES	9

Electrochemical cells – EMF, electrode potential, dependence of emf on electrolyte concentration – Nernst equation. Electrochemical series and its applications. **Batteries:** Types of batteries, primary battery - dry cell, secondary battery - lead acid battery, Zn-Carbon, and lithium-ion-battery; **Fuel cells:** H_2-O_2 fuel cell, **Supercapacitors:** Storage principle, types and examples. **Electric vehicles -** working principles

UNIT V	FUELS AND COMBUSTION	9

Fuels: Introduction, classification of fuels; **Coal and coke**: Analysis of coal (proximate and ultimate), Carbonization, and manufacture of metallurgical coke (Otto Hoffmann method). **Petroleum and Diesel:** Manufacture of synthetic petrol (Bergius process), knocking - octane number, diesel oil - cetane number; Power alcohol and bio-diesel. **Combustion of fuels:** Introduction, calorific value - higher and lower calorific values, Theoretical calculation of calorific value; **Ignition temperature**: spontaneous ignition temperature, Explosive range; **Flue gas analysis** - ORSAT Method. CO_2 emission and carbon foot print.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.

CO2: Describe the basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.

CO3: Apply the knowledge of polymers and composites for material selection requirements.

CO4: Illustrate the basics of electrochemistry and apply them for suitable applications in energy sectors.

CO5: Utilize different fuels and predict their performance and combustion characteristics.

TEXT BOOKS:

1.P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.

2.B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.

3.S.S. Dara, "A text book of Engineering Chemistry", 12th Edition, S. Chand Publishing, 2018.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B.B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-II M Series in Metallurgy and Materials Science, 2018.
2. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", 2nd Edition, Cambridge University Press, Delhi, 2019.
3. V. R. Gowarikar, N.V. Viswanathan and Jayadev Sreedhar, "Polymer Science", New Age International (P) Ltd., 2015.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	1	-	-	-	-	-	-	-	-	1	1	-
CO2	-	1	-	-	-	-	-	-	-	-	1	1	-
CO3	2	1	-	-	-	-	-	-	-	-	1	1	-
CO4	2	1	-	-	-	-	-	-	-	-	1	1	-
CO5	2	1	-	-	-	-	-	-	-	-	1	-	-
Course Contribution	1	1	-	-	-	-	-	-	-	-	1	1	-

CS25C01	PROBLEM SOLVING USING C PROGRAMMING *(Common to B.E. Civil, CSE, ECE, EEE, CSE(CS), EE(VLSI) and B.Tech. IT, AI&DS Programmes)*	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the constructs of C Programming.
- To apply conditional and looping constructs in C Programming to manage program execution flow.
- To develop applications that effectively use arrays and strings for data storage and manipulation
- To develop modular applications using functions and pointers.
- To design and implement applications using structures and unions for efficient handling of complex data types.

UNIT-I	INTRODUCTION	7

Evolution of Programming Languages - Programming Paradigms: *Structured programming - Object Oriented programming - Functional programming* -Algorithms - Pseudo code and Flowchart - Structure of C Program - Compilation Process -Preprocessor Directives - C Tokens.

UNIT-II	CONTROL FLOW STATEMENTS	9

Expressions –I/O Statements - Operators: Precedence and Associativity -Decision Making Statements: *if -else if ladder, Nested if, Switch statements* - Iterative Statements: *For, While, Do while statements-Break, Continue Statements*

UNIT-III	ARRAYS AND STRINGS	9

Arrays: Declaration, Initialization – One Dimensional Array – Multi Dimensional Arrays - String: String Operations - Sorting: Selection Sort - Searching: Linear and Binary Search.

UNIT-IV	FUNCTIONS AND POINTERS	11

Modular Programming: Function Prototype, Function Definition, Function Call, Built-in Functions: String Functions and Math Functions - User Defined Functions – Recursion - Pointers: Pointer Operators, Pointer Arithmetic, Arrays and Pointers, Array of Pointers - Parameter Passing: Pass by Value and Pass by Reference.

UNIT-V	STRUCTURES AND UNION	9

Structure: Defining and Processing a Structure - Nested Structures - Passing Structure to Functions - Array of Structure – *Self referential Structure*- Pointer to Structure - Union - Dynamic Memory Allocation - File Processing.

TOTAL:45 PERIODS

COURSE OUTCOMES

At the end of the course, the students will be able to:

CO1: Demonstrate the constructs of C Programming (K2-Understand)
CO2: Build applications using Conditional and Looping constructs in C (K3-Apply)
CO3: Design applications using Arrays and Strings in C (K3-Apply)
CO4: Make use of Functions and Pointers and develop applications (K3-Aply)
CO5: Make use of Structure and Union to design applications (K3-Apply)

TEXTBOOKS:

1. ReemaThareja,“ Programming in C”,3rd edition, Oxford University Press,2023
2. Deitel.H.M, Deitel.P.J , "C: How to Program", Pearson, 9th Edition, New Delhi, 2022
3. PradipDey, ManasGhosh, "Programming in C", Oxford University, New Delhi, 2018

REFERENCES:

1. Gottfried B, "Programming with C", McGraw Hill, 4th Edition, Noida, 2018
2. Herbert Schildt, "C: The Complete Reference", McGraw Hill, 4th Edition, Noida, 2017
3. Kernighan, B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2015.

SUGGESTED ACTIVITIES FOR ASSIGNMENT/SELF STUDY

1. Design and develop flowchart for real time applications like ticket reservation system, Electricity Billing, Retail shop billing etc using online tools such as Smart draw, Luci, Canva etc.,	K3	CO1
2. Programming/ Code Debugging using online programming platforms like Hackerrank, Leetcode, Code Chef	K3	CO2, CO3, CO4, CO5

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	1	-	1	1	1	-	1	-	-
CO2	3	2	1	-	1	-	1	1	1	-	1	1	-
CO3	3	2	1	-	1	-	1	1	1	-	1	1	-
CO4	3	2	1	-	1	-	1	1	1	-	1	1	-
CO5	3	2	1	-	1	-	1	1	1	-	1	1	-
Course Contribution	3	2	1	-	1	-	1	1	1	-	1	1	-

TA25C01	HERITAGE OF TAMILS (Common to all B.E./B.Tech. Programmes)	L 1	T 0	P 0	C 1
UNIT I	**LANGUAGE AND LITERATURE**				**3**
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.					
UNIT II	**HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**				**3**
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.					
UNIT III	**FOLK AND MARTIAL ARTS**				**3**
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.					
UNIT IV	**THINAI CONCEPT OF TAMILS**				**3**
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.					
UNIT V	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**				**3**
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.					
					TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு மக்களும் பண்பாடும் கே. கே.பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித்தமிழ் முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.)

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

CS25C02	PROGRAMMING IN C LABORATORY *(Common to B.E. Civil, CSE, ECE, EEE, CSE (CS), EE (VLSI) and B.Tech. IT, AI&DS Programmes)*	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To describe the basics of algorithmic problem solving
- To develop programs in C using basic constructs.
- To develop programs in C using arrays and strings
- To develop applications in C using functions.
- To develop applications in C using Pointers, Structures, Union

LIST OF EXPERIMENTS

Exercise 1: Basics of C programming

a. Identification and solving of simple real life or scientific or technical problems, and developing flow charts and Pseudo code for the same (Electricity Billing, Retail shop billing)
b. Write a program to print sample strings like "hello world", "Welcome to C Programming" with different formats using escape sequences.
c. Write a Program to print different data types in 'C' and their ranges.
d. Write a Program to initialize, assignment & printing variables of different data types.

Exercise 2: Operators

a. Write a Program to demonstrate arithmetic, logical and relational operators.
b. Write a Program to demonstrate pre increment and post increment (++a, a++), pre decrement and post decrement (--a, a--)
c. Write a Program to read radius value from the keyboard and calculate the area of circle and print the result in both floating and exponential notation.
d. Write a Program to calculate simple interest.
e. Write a Program to convert temperature from Fahrenheit –Centigrade and vice-versa.

Exercise 3: Control Statements

a. Write a Program to read marks of a student in six subjects and print whether pass or Fail. (using if-else).
b. Write a Program to calculate roots of quadratic equation.
c. Write a Program to calculate electricity bill. Read starting and ending meter reading. The charges are as follows.

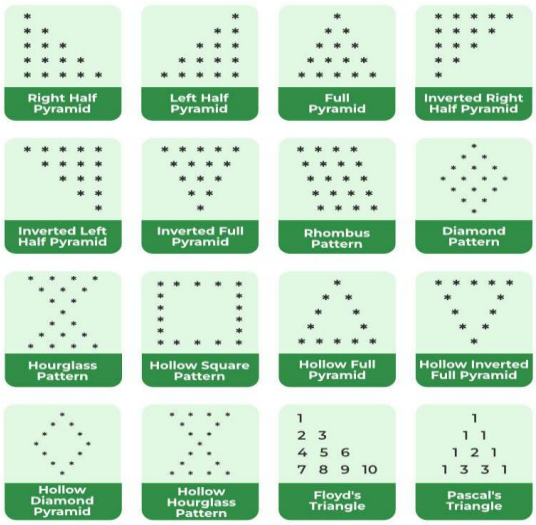
Usage Slab(in Units)	Rate per unit(Rs)
Upto 400	4.80
401-500	6.45
500-600	8.55
601-800	9.65
800-1000	10.70
>1000	11.80

d. Write a Program to perform arithmetic operations using case control statement.
e. Write a Program to display names of days in a Week using case control statement.

Exercise 4: Looping operations

a. Write a program to calculate sum of individual digits of a given number.
b. Write a program to check whether given number is palindrome or not.
c. Write a program to print prime numbers in the given range.
d. Write a program to print the Fibonacci series for given 'N' value.

e. Write a program to print the following formats.



Exercise 5: 1-D and 2-D arrays

a. Write a program to store 10 elements in a 1-D array and print sum of the array, maximum and minimum element in an array.
b. Write a program to count no. of positive numbers, negative numbers and zeros in an array.
c. Write a program to count all subsets of given array with sum equal to given sum.
d. Write a program to search an element using linear search algorithm.
e. Write a program to sort the given elements using bubble sort algorithm.
f. Write a program to perform matrix addition, subtraction and multiplication.

Exercise 6: Strings

a. Write a program to perform various string manipulations using built-in functions.
b. Write a program to verify the given string is palindrome or not.
c. Write a program to check if two strings are anagrams of each other.
d. Write a program to concatenate two strings using arrays.
e. Write a program to print the given strings in ascending order.

Exercise 7: Non recursive and recursive functions

a. Write an application to simulate basic calculator (+, -, *, /) using functions.
b. Write a program to find nth Fibonacci number using recursive and non-recursive number.
c. Write a program to find factorial of a number using recursive and non-recursive number.
d. Write a program to swap two numbers using Call by Value and Call by Reference.

Exercise 8: Pointers

a. Write a program to illustrate Pointers to array, strings, Pointers to Pointers, Array of Pointers
b. Write a program to sort an array using pointers.
c. Write a program to perform matrix multiplication using pointers.

Exercise 9: Structures and Union

a. Write a program to create structure for an account holder in a bank with following Fields: name, account number, address, balance and display the details of 'n' account holders.
b. Write a program to find total marks of individual student and average marks for 'n' students using structures.
c. Write a program to illustrate the functions of union.

Mini project

TOTAL :60 PERIODS

COURSE OUTCOMES:

At the end of the course, the learners will be able to

CO1: Develop algorithmic solutions to simple computational Problems using flow chart and Pseudo code

CO2: Develop simple applications using basic C components.

CO3: Solve applications adopting array and string concepts in C.

CO4: Construct and implement applications in C using functions and pointers.

CO5: Make use of Structures and Union concepts to prepare applications in C.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	1	-	1	1	1	-	1	-	-
CO2	3	2	1	-	1	-	1	1	1	-	1	1	-
CO3	3	2	1	-	1	-	1	1	1	-	1	1	-
CO4	3	2	1	-	1	-	1	1	1	-	1	1	-
CO5	3	2	1	-	1	-	1	1	1	-	1	1	-
Course Contribution	3	2	1	-	1	-	1	1	1	-	1	1	-

ME25C02	ENGINEERING GRAPHICS (Common to CIVIL and ECE)	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To sketch the projection of points and lines.
- To sketch the projection of simple solids
- To sketch the projection of sectioned solids and development of lateral surfaces
- To sketch the isometric, orthographic and perspective views of simple solids.
- To Develop proficiency in using a modelling software to create 3D models

INTRODUCTION **(6)**

1. Lettering practice and Dimensioning practice as per BIS conventions
2. Projection of points and lines

ORTHOGRAPHIC PROJECTION **(6)**

3. Projection of solids

SECTIONS AND DEVELOPMENT **(6)**

4. Sectional views of regular solids
5. Development of lateral surfaces of regular solids

PICTORIAL PROJECTIONS **(6)**

6. Isometric view of simple engineering components
7. Conversion of isometric views to orthographic views
8. Perspective projection using visual ray method

GEOMETRIC MODELING USING CAD SOFTWARE **(6)**

9. Modeling of simple engineering components
10. Extraction of 2D views from 3D models

TOTAL : 30 PERIODS

COURSE OUTCOMES:

At the end of the course, the learners will be able to

CO1: Construct the orthographic projections of points and straight lines.
CO2: Sketch the orthographic projections of simple solids
CO3: Sketch the orthographic projections of sectional solids and lateral surfaces of the solids.
CO4: Construct the isometric projections, orthographic and perspective projections of simple solids.
CO5: Create and modify 3D models of simple engineering components using a modelling software

TEXT BOOKS:

1. Natarajan K.V., "A text book of Engineering Graphics", 31st Edition, Dhanalakshmi Publishers, Chennai, 2018.
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", 15th Edition, New Age International (P) Limited, 2018.
3. Bhatt N.D. and Panchal V.M., "Engineering Drawing", 53rd Edition, Charotar Publishing House, 2014.

REFERENCES:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", 2nd Edition, Tata McGraw Hill Publishing Company Limited, 2013.
2. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", 2nd Edition, Oxford University, Press, New Delhi, 2015.
3. Shah M.B. and Rana B.C., "Engineering Drawing", 2nd Edition, Pearson, 2009.

CO - PO - PSO MAPPING													
CO-PO- PSO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	2	-	1	-	1	-	2	-	1	1	-
CO2	3	3	2	-	1	-	1	-	2	-	1	1	-
CO3	3	2	3	-	1	-	1	-	2	-	1	1	-
CO4	2	3	2	-	1	-	1	-	2	-	2	1	-
CO5	2	2	3	-	3	-	1	-	2	-	2	1	-
Course Contribution	2	2	2	-	1	-	1	-	2	-	1	1	-

EM25C01	ENGINEERING PRACTICES LABORATORY *(Common to CIVIL, CSE, CSE(CS) ,EEE, EE(VLSI), IT, and MECH)*	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To draw pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.
- To demonstrate the basic switch board wiring, fluorescent lamp wiring and stair case wiring using various electrical components.
- To choose various joints in steel plates using arc welding work and machining various simple processes like turning, drilling, tapping in parts
- To build a tray out of metal sheet using sheet metal work.
- To develop electronic circuit and testing for soldering and desoldering using PCB board.

LIST OF EXPERIMENTS:

GROUP – A

PART – I

PLUMBING WORK:

- Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household using Power Tools.

WOOD WORK:

- Planning and Making Dovetail joint.

CENTRIFUGAL PUMP:

- Assembly and Dismantling of Centrifugal pump.

AIR-CONDITIONER:

- Trouble shooting of AC

MODERN MANUFACTURING:

- Laser engraving and 3D printing* - Demo

ROBOTICS:

- Application of Robot In Automation* - Demo

PART – II

CYCLE I

- Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
- Staircase wiring
- Energy meter wiring and related calculations calibration
- Roof top solar panel connection and EV connection
- Study of BLDC Fan.

GROUP – B

PART - III

MECHANICAL ENGINEERING PRACTICES

WELDING WORK:

- Welding of Butt Joints using arc welding.
- Robot welding* (Demo)

BASIC MACHINING WORK:

- Facing and Turning*. (Demo)

SHEET METAL WORK:

- Making of a rectangular tray

AUTOMOBILE:

- Mantling and dismantling of Tyre's for 4 wheeler.
- Assembly and disassembly of Bearing.

PART- IV

CYCLE II

- Construction of series and parallel circuits using resistors.
- Measurement of resistance to earth of electrical equipment.
- Introduction of electronic components (Resistance, Capacitor, Diode, BJT, UJT, SCR, JFET)
- Soldering Simple electronic Circuits and Checking Continuity
- Generation of Signals (DSO, Function generator).

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Build various plumbing joints

CO2: Develop various carpentry joints.

CO3: Construct various wiring electrical joints in common household electrical wire work

CO4: Construct various welded joints, sheet metal and basic machining operations

CO5: Develop the electronic circuit for soldering

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	2	-	1	1	3	-	-	1	1
CO2	3	2	2	1	2	-	1	1	3	-	-	1	1
CO3	3	2	1	-	-	-	1	3	-	-	-	1	1
CO4	3	2	2	1	2	-	1	1	3	-	-	1	1
CO5	3	2	1	-	-	-	1	3	-	-	-	1	1
Course Contribution	3	2	2	1	2	-	1	1	3	-	-	1	1

SEMESTER-II

MA25201	VECTOR CALCULUS AND PARTIAL DIFFERENTIAL EQUATIONS *(B.E.Civil Engineering)*	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES

- To explain various methods of Laplace Transforms for solving Engineering problems
- To acquaint the student with the concepts of Vector Calculus, needed for problem solving in all Engineering discipline.
- To apply the concepts of Fourier Analysis which is essential in solving boundary condition problems.
- To solve Partial Differential Equations and get familiarize with its types.
- To make use of the methods of solving different partial differential equations that model wave and heat equations with initial boundary conditions.

UNIT I	LAPLACE TRANSFORMS	12

Laplace transform-definition, linearity, first shifting theorem, unit step function, second shifting theorem, periodic functions, inverse Laplace transform, solving ODEs with constant coefficients and initial value problems.

UNIT II	VECTOR CALCULUS	12

Gradient and directional derivative - Divergence and curl - Irrotational and solenoidal vector fields - Integration Review (simple problems only)- Line integral over a plane curve - Surface integral and volume integral - Green's, Gauss divergence and Stokes' theorems (proofs excluded) - Verification and application in evaluating line, surface and volume integrals.

UNIT III	FOURIER SERIES	12

Dirichlet's conditions, General Fourier series**,** even and odd functions, half range expansions, Harmonic Analysis

UNIT IV	PARTIAL DIFFERENTIAL EQUATION	12

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 - Linear partial differential equations of second and higher order with constant coefficients of homogeneous.

UNIT V	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	12

Classification of PDE, one dimensional wave equation, one dimensional heat equation, two- dimensional heat equation problems - solution by Fourier series

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to:

CO1: Compute Laplace transform and inverse Laplace transform of different functions.
CO2: Evaluate the line and surface integrals involving functions with several variables.
CO3: Expand the Fourier series for the given periodic function.
CO4: Solve the given Partial differential equations using suitable methods.
CO5: Solve boundary value problems using the concept of Partial Differential equation.

TEXT BOOKS:

1. Grewal.B.S. "Higher Engineering Mathematics", 44 th Edition, Khanna Publishers, New Delhi,2018.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, New Delhi, 2018.
3. Peter V.O Neil, "Advanced Engineering Mathematics", Cengage, New Delhi, 2018.

REFERENCES:

1. Dennis G. Z and Patrick D. S, "A first course in Complex Analysis with applications", Jones and Bartlett Pvt. Ltd, New Delhi,2015.
2. Wylie C. R and Barret L. C, "Advanced Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2019.
3. Dennis G. Z, "Advanced Engineering Mathematics", Jones and Bartlett Pvt. Ltd, New Delhi, 2017
4. Dean G. D, "Advanced Engineering Mathematics with MATLAB", CRC Press, USA, interrnational (P) Limited, 2018.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	1	-	-
CO2	3	2	1	1	-	-	-	-	-	-	1	-	-
CO3	3	2	1	1	-	-	-	-	-	-	1	-	-
CO4	3	2	1	1	-	-	-	-	-	-	1	-	-
CO5	3	2	1	1	-	-	-	-	-	-	1	1	-
Course Contribution	3	2	1	1	-	-	-	-	-	-	1	1	-

PH25201	PHYSICS FOR CIVIL ENGINEERING *(I Year B.E. CIVIL Engineering)*	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

- To introduce the basics of heat transfer through different materials.
- To impart knowledge on the ventilation and air conditioning of buildings.
- To illustrate the concepts of sound insulation and lighting designs.
- To summarize the processing and applications of new engineering materials.
- To create awareness on natural disasters and safety measures.

UNIT I	THERMAL APPLICATIONS	6

Principles of heat transfer - steady state of heat flow - conduction through compound media-Series and parallel- Conductivity of rubber tube.

UNIT II	VENTILATION AND REFRIGERATION	6

Requirements, principles of natural ventilation - design for natural ventilation - packaged air conditioners - Chilled water plant.

UNIT III	ACOUSTICS AND LIGHTING DESIGNS	6

Acoustics: Introduction - Reverberation - Growth and decay of sound - Sabine's formula for reverberation time - Visual field glare - artificial skies - principles of artificial lighting.

UNIT IV	NEW ENGINEERING MATERIALS	6

Composites - classification – properties - application - Metallic glasses - classification – properties - application - Shape memory alloys - classification – properties – application.

UNIT V	NATURAL DISASTERS	6

Seismology and Seismic waves - Fire hazards - fire protection - fire-proofing of materials - fire safety regulations - firefighting equipment - Prevention and safety measures.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to:

CO1: Demonstrate the heat transfer through different materials.

CO2: Extend knowledge on the ventilation and air conditioning of buildings.

CO3: Illustrate the acoustic properties of buildings.

CO4: Summarize the processing and applications of composites, metallic glasses, shape memory alloys.

CO5: Gain knowledge on natural disasters such as earth quake, fire and safety measures.

TEXT BOOKS:

1. Marko Pinteric, "Building Physics", First Edition, Springer 2017.

2. D.S.Mathur,"Elements of Properties of Matter",First Edition, S Chand & Company, 2010.

3. Hugo Hens, "Building Physics - Heat, Air and Moisture: Fundamentals and Engineering Methods with

Examples and Exercises", Third Edition,Ernst & Sohn Publishers, Wiley, 2017

REFERENCES:

1. W.R.Stevens,"Building Physics: Lighting", First Edition, Pergamon Press, 2013.
2. Hugo Hens, "Applied Building Physics: Ambient Conditions, Building Performance and Material Properties", Second Edition, John Wiley Publication, 2016
3. K.G.Budinski and M.K.Budinski, "Engineering Materials: Properties and Selection", Ninth Edition, Pearson Education, 2016.
4. Peter A. Claisse, "Civil Engineering Materials", First Edition, Elsevier, 2016.
5. Patrick L. Abbott, "Natural Disasters", Eleventh Edition, McGraw-Hill, 2017.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	1	-	-	1	-
CO2	2	1	-	-	-	-	-	-	1	-	-	1	-
CO3	2	1	-	-	-	-	-	-	1	-	-	1	-
CO4	2	1	-	-	-	-	-	-	1	-	-	1	-
CO5	2	1	-	-	-	-	-	-	1	-	-	1	-
Course Contribution	2	1	-	-	-	-	-	-	1	-	-	1	-

EE25203	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To illustrate the basics of DC electric circuits
- To explain single phase and three phase AC circuits
- To summarize the basics of working principles of electrical machines and protective devices
- To outline the lighting system and lighting control
- To infer the working of measuring instruments and estimation of power consumption

UNIT I	DC CIRCUITS	9

Electrical circuit elements (R, L and C), voltage and current sources, Resistance in series and parallel, Star Delta transformation, Kirchhoff's current and voltage laws, Mesh and Nodal Analysis.

UNIT II	AC CIRCUITS	9

Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits – Three phase loads

UNIT III	ELECTRICAL MACHINES AND PROTECTIVE DEVICES	9

Construction and working of Single phase Induction motor, Three phase Induction motor, Servo motor and BLDC motor. Switch Fuse Unit, MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Important Characteristics of Batteries.

UNIT IV	ELECTRICAL INSTALLATIONS FOR SMART BUILDINGS	9

Smart lighting systems - CCTV Circuits and applications - Centralized Air Conditioning systems - Lighting control - Lighting for special buildings - Electrical safety measures.

UNIT V	ENERGY MANAGEMENT IN BUILDINGS	9

Construction and working of Voltmeter, Ammeter, Single phase energy meter and wattmeter. Elementary calculations for energy consumption, power factor improvement. Estimation of power consumptions - Power saving Instruments and techniques.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to:

CO1: Relate the basic laws and circuit analysis in DC electric circuits
CO2: Interpret Single phase and three phase AC circuits
CO3: Demonstrate the working of CBs and Batteries.
CO4: Show the different lighting systems for smart buildings
CO5: classify the various measuring instruments used in buildings

TEXT BOOK:

1. D P Kothari and I.J Nagarath, "*Basic Electrical Engineering*", McGraw Hill Education(India) Private Limited, Fourth edition, 2019.
2. Nageswara RaoT., "Circuit Theory",5th Edition, A.R.Publication, 2017.
3. Nagrath, I.J. and Kothari.D.P., "Electric Machines", 6th Edition, McGraw-Hill Education, 2019.
4. A.K. Sawhney, PuneetSawhney 'A Coursein Electrical & Electronic Measurements & Instrumentation', DhanpatRai and Co, 2015.
5. BadriRam,B.H. Vishwakarma, "Power System Protection and Switchgear", 2nd Edition, New Age International Pvt Ltd Publishers, 2011.

REFERENCE BOOKS:

1. V.K.Mehta, Rohit Mehta, "Basic Electrical Engineering", S. Chand & Co. Ltd, Revised
2. S.K. Bhattacharya, "Electrical Machines", 4th Edition, McGraw - Hill Education, ,2018
3. Mahadevan, K., Chitra, C., "Electric Circuits Analysis", 2nd Edition, Prentice-Hall of India Pvt Ltd., New

Delhi, 2018.
4. Ravindra P.Singh, 'Switchgear and Power System Protection', 1st Edition, PHI Learning Private Ltd., New Delhi, 2009.
5. David Bell, "Electronic Instrumentation & Measurements", 3rd Edition, Oxford University Press, 2013.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	-	1	-	-	-	1	-	-	-	-	1
CO2	2	1	-	-	-	-	-	1	-	-	1	-	1
CO3	2	-	-	-	-	-	-	1	-	-	-	-	1
CO4	2	1	1	-	-	-	1	1	-	-	1	-	1
CO5	2	-	-	1	-	-	1	1	-	-	1	-	1
Course Contribution	2	1	1	1	-	-	1	1	-	-	1	-	1

CE25201	BASICS OF MECHANICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

The course enables the students to:

- Apply the principles of statics to particles subjected to forces in two and three dimensions.
- Determine equilibrium conditions of rigid bodies using free-body diagrams and equivalent force systems.
- Calculate centroids and moments of inertia for simple and composite areas and sections.
- Examine frictional behaviour in various engineering applications such as wedges, planes, and ladders.
- Solve kinematic and dynamic problems involving displacement, velocity, acceleration, and force–motion relationships.

UNIT I	STATICS OF PARTICLES	9

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

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 dimensions.

UNIT III	CENTROID AND MOMENT OF INERTIA	9

Centroids of areas, centroids of simple geometric shapes, centroids of composite areas, moment of inertia, perpendicular axis theorem, parallel axis theorem, moment of inertia of simple geometric sections and composite sections, polar axis, polar moment of inertia, radius of gyration, mass moment of inertia of simple solids (concept only).

UNIT IV	FRICTION	9

Friction, frictional force, limiting friction, laws of static friction, coefficient of friction, angle of repose, single bodies on horizontal and inclined planes, ladder friction, wedge friction.

UNIT V	DYNAMICS OF PARTICLES	9

Displacements, Velocity, acceleration and their relationship, Rectilinear motion of particles, Newton's law of motion, D' Alembert principle, Work Energy Equation of particles, Introduction to dynamics of rigid bodies, general Plane motion (Concept only).

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Determine resultant forces of particles in two and three dimensions.

CO2: Apply free-body diagrams to assess the equilibrium of rigid bodies.

CO3: Compute centroids, moments of inertia, and radii of gyration for simple and composite sections.

CO4: Determine frictional forces in problems involving planes, ladders, and wedges.

CO5: Solve particle-motion problems using kinematic relations and work–energy equations.

TEXT BOOKS:

1. Beer, F. P., Johnston Jr., E. R., Mazurek, D. F., Cornwell, P. J., & Self, B. P., Vector Mechanics for Engineers: Statics and Dynamics (SI Units), 12th Edition, McGraw-Hill Education, New York, 2019.

REFERENCE BOOKS:

1. Vela Murali, Engineering Mechanics, 3rd Edition (latest), Oxford University Press, 2022.
2. Bhavikatti, S. S., Engineering Mechanics, 8th Edition, New Age International Publishers Pvt. Ltd., New Delhi, 2023.
3. Palani Chami, Engineering Mechanics, 2nd Edition, SciTech Publications (India) Pvt. Ltd., Chennai, 2020.
4. Dr. N. Kottiswaran, Engineering Mechanics – Statics & Dynamics, 10th Edition, Sri Balaji Publications, Erode 638 003

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	1	-
CO2	3	2	2	-	-	-	-	-	-	-	-	1	-
CO3	3	2	2	-	-	-	-	-	-	-	-	1	-
CO4	3	2	2	-	-	-	-	-	-	-	-	1	-
CO5	3	2	2	-	-	-	-	-	-	-	-	1	-
Course Contribution	3	2	2	-	-	-	-	-	-	-	-	1	-

CE25202	CONSTRUCTION MATERIALS PRACTICES AND TECHNIQUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

The course enables the students to:

- Describe the characteristics, classifications, and testing methods of stones, bricks, blocks, and timber.
- Explain standard construction practices such as site preparation, masonry work, flooring, and foundation procedures.
- Discuss the behaviour of structural systems, high-rise construction techniques, seismic effects, and eco-building concepts.
- Identify various substructure methods including jacking, piling, tunnelling, cofferdams, and dewatering systems.
- Outline key superstructure construction techniques such as girder launching, offshore works, special formwork, and prestressing.

UNIT I	STONE – BRICKS - TIMBER	9

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use –Refractory bricks – Concrete blocks – Lightweight concrete blocks - Timber – Market forms – Industrial timber– Plywood – Veneer.

UNIT II	CONSTRUCTION PRACTICES	9

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – Building foundations – basements – centering and shuttering – slip forms – scaffoldings –weather and water proof – roof finishes.

UNIT III	CONSTRUCTION TECHNIQUES	9

Structural systems - Load Bearing Structure - Framed Structure - Load transfer mechanism –floor system - Development of construction techniques - High rise Building Technology – Seismic effect - Environmental impact of materials – responsible sourcing - Eco Building Green Building

UNIT IV	SUBSTRUCTURE CONSTRUCTION	9

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement - Tunnelling techniques – Piling techniques - well and caisson - sinking cofferdam – driving diaphragm walls, sheet piles - shoring for deep cutting – well points - Dewatering and stand by Plant equipment for underground open excavation.

UNIT V	SUPERSTRUCTURE CONSTRUCTION	9

Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ prestressing in high rise structures, Material handling - erecting light weight components on tall structures

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Classify stones, bricks, blocks, and timber based on their properties, manufacturing processes, and quality tests.

CO2: Compare various construction practices such as site preparation, masonry methods, flooring systems, and foundation procedures.

CO3: Illustrate different structural systems, high-rise building techniques, seismic considerations, and eco-friendly material choices.

CO4: Distinguish substructure construction methods including jacking, piling, tunnelling, cofferdams, and dewatering systems.

CO5: Summarize superstructure techniques such as girder launching, offshore construction, shell formwork, and prestressing operations.

TEXT BOOKS:

1. Varghese.P.C, "Building Materials", 2nd Edition, PHI Learning Pvt. Ltd, New Delhi, 2015.
2. Schexnayder, Clifford J.; Shapira, Aviad; Schmitt, Robert; Peurifoy, Robert, "Construction Planning, Equipment and Methods", 9th Edition, McGraw Hill, Singapore, 2021.
3. Arora S.P. and Bindra S.P., "A Textbook of Building Construction", 2nd Edition, Dhanpat Rai and Sons, 2014.
4. Varghese, P.C. "Building construction", 2nd Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2016.

REFERENCE BOOKS:

1. Jagadish.K.S, "Alternative Building Materials Technology", 2nd Edition, New Age International, 2017.
2. Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 2008.
3. Sharma S.C. "Construction Equipment and Management", 2nd Edition, Khanna Publishers New Delhi, 2019.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	-	-	1	1	1	-	-	-	1	1	1
CO2	2	1	-	-	1	1	1	-	-	-	1	1	1
CO3	2	1	-	-	1	1	1	-	-	-	1	1	1
CO4	2	1	-	-	1	1	1	-	-	-	1	1	1
CO5	2	1	-	-	1	1	1	-	-	-	1	1	1
Course Contribution	2	1	-	-	1	1	1	-	-	-	1	1	1

TA25C02	TAMILS AND TECHNOLOGY *(Common to all B.E./B.Tech. Programmes)*	L	T	P	C
		1	0	0	1

UNIT I	WEAVING AND CERAMIC TECHNOLOGY	3

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

UNIT II	DESIGN AND CONSTRUCTION TECHNOLOGY	3

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

UNIT III	MANUFACTURING TECHNOLOGY	3

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

UNIT IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	3

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

UNIT V	SCIENTIFIC TAMIL & TAMIL COMPUTING	3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு மக்களும் பண்பாடும் கே. கே.பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2. கணினித்தமிழ் முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

EN25C02	ENGLISH PROFICIENCY AND SOFT SKILLS (Common to B.E./B.Tech. AI&DS, CIVIL, CSE(CS), EEE, IT , VLSI, CSBS& AIML)	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

The course enables the students to:

- Strengthen LSRW (Listening, Speaking, Reading, Writing) competencies in English.
- Demonstrate effective communication skills in meeting academic requirements.
- Integrate and interpret graphical data in logical writing using verbal reasoning.
- Produce formal writings for effective internal and external communication.
- Present and adapt concepts according to the target audience, fostering essential soft skills.

UNIT I	INTRODUCTION TO COMMUNICATION PROFICIENCY	6

Listening: Listening to native speaker's Telephone Conversations; **Speaking:** Sharing Childhood Experiences, dialogues (Informal & Formal), Talking about Favorite Personalities; **Reading:** Technical texts from - Newspapers /websites, Job Advertisements - Telephone Phrases; **Writing:** Statements, Issue based writing essay, Graphs, Checklist; **Grammar:** Error Spotting; **Vocabulary:** Misspelt Words; **Soft Skills:** Leadership Skills

UNIT II	TECHNICAL TALKS AND TEAM DYNAMICS	6

Listening: Listening to Technical Talks, Scientific Lectures and Short Conversations; **Speaking:** Career choice, Describing recent innovations in Technology; **Reading:** Speed-reading - Identifying the various transitions in a text - Paragraphing; **Writing:** Precise writing - Letter of Enquiry, Quotation, Order, Claim Letters- Response to complaints; **Grammar:** Numerical Adjectives, Active & Passive Voice, Use of Impersonal Passive form; **Vocabulary:** Jumbled sentences. **Soft Skills:** Teamwork

UNIT III	CAREER INSIGHTS AND DECISION MAKING	6

Listening: Job Interviews, Interview Skills, FAQs - Sports Commentaries/Animated stories/Anecdotes / Event narration; **Speaking:** Interviewing Celebrities and Entrepreneurs; **Reading:** Short stories - Critical reading; **Writing:** Cover Letter & Resume, Project Proposal writing using AI tools **Grammar:** Embedded sentences; **Vocabulary:** Foreign words used in English (from other languages); **Soft Skills:** Decision Making.

UNIT IV	PROFESSIONAL WRITING AND ANALYTICAL SKILLS	6

Listening: TED Talks; **Speaking:** Presentation Skills; **Reading:** Developing analytical skills - Company profiles; **Writing:** Writing Statement of Purpose (SOP)-Emails, Memos, Notices and Circulars, Internship Application Letters; **Grammar:** Punctuation, If Conditionals; **Vocabulary:** Verbal reasoning; **Soft Skills:** Time Management

UNIT V	ART OF REPORTING AND PANEL DISCUSSIONS	6

Listening: Model debate and reviewing the performance of each participant - Panel discussion; **Speaking:**

Group communication- Discussing social issues, current affairs and debate; **Reading:** Fitting sentences in a paragraph - Cause and Effect Essays, Technical papers and case studies; **Writing:** Accident Report and Feasibility Report, Minutes of the Meeting; **Grammar:** Cause and Effect expressions , Reported speech; **Vocabulary:** Verbal Analogies; **Soft Skills:** Conflict Resolution

PRACTICAL COURSE

PRACTICAL SYLLABUS	**INTRA PERSONAL, INTERPERSONAL, ORGANIZATIONAL AND MASS COMMUNICATION**	**15**

Listening: Listening to TED Talks and Practice Exercises - Making a Critical Appreciation of Video Content - Answering Cloze Test Based on Listening.
Speaking: Self-Introduction-Introducing Resource Persons and Chief Guests - Developing Stories Using Picture Prompts - Language Etiquette in Different Situations - Expressing Agreement and Conflict Management and Seeking Information - Expressing Feelings - Affection, Anger, Regret etc. - Team Reviewing and Appraisal on any Social Event, Short Talk on Technical Topics.
Reading: Making Inference in Reading - Reading Longer Texts with Time Frame - Reading and Interpreting Data using different types of Texts, Magazines and Internet Materials - Editing/Proof reading - Reading Research Papers.
Writing: Abstract Writing - Mind Mapping and Brainstorming on any Social Event/Issue - Creating a Product Review Blog, Making PowerPoint Presentations (MS Power point & Google Slides) and Creating PPT using AI tools.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to
CO1: Demonstrate improved LSRW competencies in English.
CO2: Exhibit enhanced academic communication skills.
CO3: Integrate graphical data into logical writing.
CO4: Compose formal documents for communication.
CO5: Adapt and present concepts to diverse audiences with the usage of soft skills.

TEXT BOOKS :

1. Gangalakshmi, C, Rathika, B, Saranraj, L. Professional English for Engineers. New Delhi: Cengage, 2022.
2. Shoba K. N. and Lourdes Joavani Rayen, “Communicative English”, Cambridge University Press, Cambridge, 2021.
3. Raymond Murphy, “Intermediate English Grammar”, Cambridge University Press, New Delhi, 2020.

REFERENCE BOOKS:

1. Raman, Meenakshi and Sangeetha Sharma. Communication Skills. New Delhi: OUP, 2018.
2. R. C. Sharma Krishna Mohan - Business Correspondence and Report Writing a Practical Approach to Technical Communication - McGraw Hill India (2017).

3. Jawahar, Jewelcy & Rathna.P. Communicative English Workbook. VRB Publishers Pvt Ltd. Chennai. 2018.

WEBSITE RESOURCES:

1. Open Online Repositories from Oxford/ Cambridge/ British Council/ Voice of America
2. https://www.youtube.com/@TEDx
3. https://youtu.be/dzR4E49zNLI?si=0RL4C_vV1i1Kz2iR
4. AI tools : www.magicschool.ai, www.typeset.io, www.gamma.app, www.veed.io

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	1	2	-	1	-	1
CO2	-	-	-	-	-	-	-	1	2	-	1	-	1
CO3	-	-	-	-	-	-	-	1	2	-	1	-	1
CO4	-	-	-	-	-	-	-	1	2	-	1	-	1
CO5	-	-	-	-	-	-	-	1	2	-	1	-	1
Course Contribution	-	-	-	-	-	-	-	1	2	-	1	-	1

PC25C01	PHYSICS AND CHEMISTRY LABORATORY *(Common to I year B.E. / B.Tech. Engineering)*	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To explain the proper use of various kinds of laboratory equipment.
- To extend how data can be collected, presented and interpreted in a clear and concise manner.
- To infer problem solving skills and interpretation of experimental data.
- To summarize error in experimental measurements and techniques used to minimize such error.
- To translate the student as an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS: PHYSICS LABORATORY

1. Laser- Determination of the wavelength of the laser using grating. (Common to ALL)
2. Photoelectric effect – Determination of Planck's constant**.** (Common to ALL)
3. Hall effect – determination of Hall parameters. (Common to ALL)
4. 4 a) Optical fibre -Determination of Numerical aperture and acceptance angle.
   b) Compact disc- Determination of width of the groove using the laser. (Common to CSE,IT, AI&DS,CS(Cyber),ECE,EEE,EE(VLSI))
5. Spectrometer-Determination of the wavelength of light using grating. (Common to CSE,IT, AI&DS,CS(Cyber),ECE,EE(VLSI))
6. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects. (Common to CIVIL,EEE,MECH)
7. Determination of Young's modulus–cantilever method. (Common to CIVIL,MECH)

LIST OF EXPERIMENTS: CHEMISTRY LABORATORY (Any 7 experiments)

1. Determination of chloride content of water sample by Argentometric method.
2. Determination of total hardness of water by EDTA method.
3. Determination of strength of acids in a mixture of acids using conductivity meter.
4. Conductometric titration of strong acid against strong base.
5. Determination of DO content of water sample by Winkler's method.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Estimation of iron content of the given solution using potentiometer.
8. Conductometric titration of barium chloride against sodium sulphate. (precipitation titration)
9. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.
10. Determination of types and amount of alkalinity in water sample.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to:

CO1: Apply the knowledge, to gain hands-on experience with laboratory equipment.

CO2: Relate the graphical models to interpret the laboratory data.

CO3: Interpret quantitative reasoning and describing physical reality.

CO4: Apply the principle and process to access the scientific information.

CO5: Translate students to solve problems individually and collaboratively.

REFERENCES :

1. "Physics Laboratory Manual", Department of Physics, Velammal College of Engineering & Technology, Madurai (2021)
2. P. Mani, "Physics Laboratory", Dhanam Publications, Third Edition 2021.
3. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, "Vogel's Textbook of Quantitative Chemical Analysis" 2009.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	-	-	-	-	-	1	-	-	-	1	-
CO2	3	1	-	-	-	-	-	1	-	-	-	1	-
CO3	3	1	-	-	-	-	-	1	-	-	-	1	-
CO4	3	1	-	-	-	-	-	1	-	-	-	1	-
CO5	3	1	-	-	-	-	-	1	-	-	-	1	-
Course Contribution	3	1	-	-	-	-	-	1	-	-	-	1	-

CE25203	COMPUTER AIDED DRAFTING AND MODELING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To have the knowledge of interpretation of dimensions of different quadrant projections.
- To understand the basic principles of engineering drawing.
- To have the knowledge of generating the pictorial views.
- To understand the development of surfaces.
- To draw 3D drawings using softwares.

LIST OF EXPERIMENTS

Drafting using AutoCAD software

1. Study of capabilities of software for Drafting and Modelling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi – line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
6. Drawing of a simple steel truss.
7. Drawing isometric projection of simple objects.
8. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
9. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Ability to use the software packages for drafting of coordinate systems, title block and projection symbol.

CO2: Draw the concept of basic views related to projections of Lines, curves, solids and sections.

CO3: Sketch the different types of simple steel trusses.

CO4: Draw isometric projection of simple objects.

CO5: Draw 3D and Assembly drawing using CAD software

TEXT BOOKS:

1. Bhat N. D. and Panchal V. M., "Engineering Drawing Plane and Solid Geometry", 53rd Edition, Charotar Publishing House, 2019.
2. Bethune, J. D., "Engineering Design and Graphics with SolidWorks", 1st edition, Macromedia Press,

2019.

REFERENCES:

1. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.

2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	1	1	3	2	-	2	1	1	1	2	1
CO2	3	3	1	1	3	2	-	2	1	1	1	2	1
CO3	3	3	1	1	3	2	-	2	1	1	1	2	1
CO4	3	3	1	1	3	2	-	2	1	1	1	2	1
CO5	3	3	1	1	3	2	-	2	1	1	1	2	1
Course Contribution	3	3	1	1	3	2	-	2	1	1	1	2	1

III SEMESTER

MA25C05	PROBABILITY AND STATISTICAL TECHNIQUES *(Common to B.E. Civil & B.E. Mechanical Engineering Programmes)*	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES

- To introduce the basic concepts of probability and random variables.
- To acquaint the knowledge of discrete and continuous distributions
- To compute different measures of central tendency, dispersion and to interpret the data
- To enhance the knowledge of testing of hypothesis for small and large samples
- To familiarize with the basic concepts of classification of design of experiments.

UNIT I	PROBABILITY AND RANDOM VARIABLES	12

Probability - axiomatic approach to probability - Conditional Probability - Baye's theorem - Random Variables - Discrete random variable- Continuous random variable- mean– variance-moments and moment generating functions.

UNIT II	PROBABILITY DISTRIBUTIONS	12

Discrete Distributions - Binomial, Poisson and geometric distributions -Continuous Distributions - uniform, exponential, and normal distributions

UNIT III	STATISTICS	12

Measures of central tendency - Arithmetic mean - Geometric mean - Harmonic mean - Median - Mode - Measures of dispersion - Range - Standard deviation - Coefficient of variation - Correlation - Coefficient of correlation - Lines of regression.

UNIT IV	TESTING OF HYPOTHESIS	12

Testing of hypotheses for large samples-Z-test, small samples-student's t-test, for singe and difference of means, chi square test for goodness of fit and independence of attributes, F-test

UNIT V	DESIGN OF EXPERIMENTS	12

Analysis of variance - completely randomized design, randomized block design, Latin square design.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Illustrate the basic concepts of Probability and Random variables
CO2: Infer the basic concepts of Discrete and Continuous distributions
CO3: Predict the Various measures of central tendency and measures of dispersion.
CO4: Explain the test of hypothesis for small and large samples by using various tests
CO5: Apply the basic concepts of classifications of design of experiments.

TEXT BOOKS:

1. Veerarajan.T " Probability , Statistics and Random Processes" , 3rd edition , Tata McGraw Hill Publication Ltd., New Delhi 2007
2. B.S. Grewal "Higher Engineering Mathematics " 45th edition , Khanna Publications 2024

REFERENCE BOOKS:

1. Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", 7th edition Wiley India, New Delhi, 2018.
2. Richard A. Johnson , "Miller & Freund's, Probability and Statistics for Engineers", 9th edition, Prentice Hall ,New Delhi, 2017
3. Jay L. Devore, "Probability and Statistics for Engineering and the Sciences", 9th edition Brooks/Cole, USA, 2015.

CO - PO - PSO MAPPING													
CO-PO- PSO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	1	1	-	-	-	-	-	-	1	1	-
CO2	3	2	1	1	-	-	-	-	-	-	1	1	-
CO3	3	2	1	1	-	-	-	-	-	-	1	1	-
CO4	3	2	1	1	-	-	-	-	-	-	1	1	-
CO5	3	2	1	1	-	-	-	-	-	-	1	1	-
Course Contribution	3	2	1	1	-	-	-	-	-	-	1	1	-

CE25301	ENGINEERING GEOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

The course enables the students to:

- Explain the fundamental geological processes of the Earth and relate their significance to civil engineering practice.
- Identify the physical properties of important rock-forming minerals used in engineering works.
- Classify major rock types and their engineering relevance.
- Explore geological structures and examine basic geophysical investigation techniques.
- Assess geological requirements essential for planning and designing civil engineering projects.

UNIT I	PHYSICAL GEOLOGY	9

Geology in civil engineering – branches of geology – structure of earth and its composition – weathering of rocks – scale of weathering – soils - landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.

UNIT II	MINERALS OF THE EARTH'S CRUST	9

Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.

UNIT III	ROCKS OF THE EARTH'S CRUST	9

Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

UNIT IV	STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD	9

Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.

UNIT V	GEOLOGY FOR ENGINEERING PROJECTS	9

Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings - Hydrogeological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Explain weathering, landforms, plate tectonics, and seismicity in relation to engineering.

CO2: Describe the characteristics of quartz, feldspar, pyroxene, amphibole, mica, calcite, gypsum, and clay minerals.

CO3: Differentiate igneous, sedimentary, and metamorphic rocks based on properties and uses.

CO4: Interpret folds, faults, joints, and basic geophysical methods for engineering studies.

CO5: Summarize geological considerations for dams, reservoirs, tunnels, roads, and landslide mitigation.

TEXT BOOKS:

1. Varghese, P.C., “Engineering Geology for Civil Engineers”, 3rd Edition, Prentice Hall of India Learning Private Limited, New Delhi, 2012.
2. Venkat Reddy. D “Engineering Geology”, 1st Edition, Techno Series, 2024.

REFERENCE BOOKS:

1. Bangar K.M, "Principles of Engineering Geology", 1st Edition, McGraw Hill Education, 2021.
2. Parbin Singh., “Engineering and General Geology”, 1st Edition, S.K.Kataria & Sons, 2013

CO - PO - PSO MAPPING													
CO-PO- PSO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	2	1	-	-	-	1	1	-	-	-	1	1	-
CO2	2	1	-	-	-	1	1	-	-	-	1	1	-
CO3	2	1	-	-	-	1	1	-	-	-	1	1	-
CO4	2	1	-	1	-	1	1	-	-	-	1	1	-
CO5	2	1	-	1	-	1	1	-	-	-	1	1	-
Course Contribution	2	1	-	1	-	1	1	-	-	-	1	1	-

CE25302	WATER SUPPLY ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

The course enables the students to:

- Identify various water sources and factors governing water demand and population forecasting.
- Examine intake structures, conveyance systems, pump types, and water quality parameters.
- Interpret the principles of sedimentation, filtration, coagulation, and disinfection processes.
- Explore advanced treatment processes such as RO, ion exchange, adsorption, MBR, and rural water treatment practices.
- Investigate distribution systems, storage requirements, leak detection, and plumbing arrangements.

UNIT I	SOURCES OF WATER AND WATER DEMAND ESTIMATION	9

Sources of water - Surface sources - ponds, lakes, streams, rivers - Ground water sources - occurrence, aquifers and their types – Wells - open wells, Tube wells - springs and their types - Infiltration galleries - Infiltration wells - Importance and need for planned water supplies - water demand – types and factors affecting per capita demand - variation in demand – Design periods - population forecasting – different methods.

UNIT II	INTAKES STRUCTURES, TRANSPORT OF WATER AND WATER QUALITY ASSESSMENT	9

Intakes and their types. Transport of water - hydraulic design of pressure pipe - Pipe materials - pipe joints - pipe appurtenances, testing of pipe line - Pumps for lifting water – types - Quality of water – Physical quality, chemical quality and biological quality – significance - water borne diseases -Water quality standards – Case Studies

UNIT III	WATER TREATMENT	9

Screening - Sedimentation – theory, types of settling, Stokes law - Coagulation - flocculation - Jar test – design of sedimentation tank - Filtration – removal mechanisms, filter media, types, slow sand, rapid sand and pressure filters, filter design. Disinfection – methods. Chlorination – action, factors influencing, free chlorination, combined chlorination – Ozonation, UV radiation.

UNIT IV	ADVANCED WATER TREATMENT	9

water softening – Desalination – Reverse Osmosis - demineralization – Adsorption - Ion exchange – Membrane Systems - RO Reject Management - Iron and Manganese removal - Defluoridation - Construction and Operation & Maintenance aspects – Recent advances - MBR process - water treatment practices in rural areas.

UNIT V	WATER DISTRIBUTION AND SUPPLY	9

Distribution systems – requirements, layouts and methods - Distribution reservoirs – storage capacity, mass curve method - Leak detection - Analysis of distribution network - Hardy Cross method - Water supply system in buildings – house service connection, pipe fittings & fixtures, storage tanks, piping systems – Systems of plumbing.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Determine water demand and forecast the population using standard methods.

CO2: Calculate pipeline design requirements and water quality parameters.

CO3: Develop size of sedimentation tanks and filtration units.

CO4: Apply advanced treatment methods for softening, desalination, metal removal, and defluoridation.

CO5: Solve distribution network problems using the Hardy Cross method and principles of plumbing system design.

TEXT BOOKS:

1. Garg, S.K. "Environmental Engineering, Vol I", 35th Edition, Khanna Publishers, New Delhi, 2021.
2. Punmia, B.C., Ashok Jain and Arun Jain, "Water Supply Engineering", 2nd Edition, Laxmi Publications (P) Ltd., New Delhi, 2016.

REFERENCE BOOKS:

1. Modi, P.N., "Water Supply Engineering, Vol.I", 7th Edition, Standard Book House, New Delhi, 2021.
2. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
3. IS10500:2012, "Water Quality Standards", New Delhi 2012.
4. IS SP 35, "Handbook on water supply and drainage (with special emphasis on plumbing)", 1987
5. Peavy, Rowe, Tchobanoglous, "Environmental Engineering", 1st Edition, McGraw Hill Publishers, New Delhi, 2017.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	1	2	-	-	-	-	1	-	2
CO2	3	2	2	-	1	2	-	-	-	-	1	-	2
CO3	3	2	2	-	1	2	-	-	-	-	1	-	2
CO4	3	2	2	-	1	2	-	-	-	-	1	-	2
CO5	3	2	2	-	1	2	-	-	-	-	1	-	2
Course Contribution	3	2	2	-	1	2	-	-	-	-	1	-	2

CE25303	MECHANICS OF SOLIDS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

The course enables the students to:

- Predict the behavior of materials under stress, strain, and thermal effects.
- Determine shear force, bending moment, loading types, and beam behavior under bending.
- Interpret torsional behavior of solid and hollow shafts, springs.
- Examine the governing principles for beam deflection using analytical methods.
- Compute forces in plane and space trusses using fundamental force methods.

UNIT I	STRESS, STRAIN AND DEFORMATION OF SOLIDS	9

Simple Stresses and strains, Elastic constants, Relationship between elastic constants, Stress Strain Diagram, Ultimate Stress, Yield Stress – Deformation of axially loaded member - Composite Bars - Thermal Stresses.

UNIT II	BENDING OF BEAMS	9

Types of loads, supports, beams, concept of shearing force and bending moment, Relationship between intensity of load, Shear Force and Bending moment, Shear Force and Bending Moment Diagrams for Cantilever, simply supported and overhanging beams with concentrated load, uniformly distributed load, uniformly varying load and concentrated moment. Theory of Simple Bending, Stress Distribution due to bending moment and shearing force.

UNIT III	TORSION	9

Theory of Torsion – Stresses and Deformations in Solid and Hollow Circular Shafts – combined bending moment and torsion of shafts - Power transmitted to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs – springs in series and parallel.

UNIT IV	DEFLECTION OF BEAMS	9

Elastic curve – Governing differential equation - Double integration method - Macaulay's method – Area moment method - conjugate beam method for computation of slope and deflection of determinant beams.

UNIT V	ANALYSIS OF TRUSS	9

Determinate trusses - Analysis of pin jointed plane determinate trusses by method of joints, method of sections and tension coefficient – Analysis of Space trusses by tension coefficient method.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Apply stress–strain relations to determine deformation in axially loaded and composite members.

CO2: Compute shear force and bending moment for various beams.

CO3: Determine stresses, power transmission, and deformation in shafts and springs using torsion equations.

CO4: Calculate slope and deflection of beams by standard methods.

CO5: Solve forces in truss members using the method of joints, method of sections, and tension coefficient method.

TEXT BOOKS:

1. Rajput.R.K. “Strength of Materials (Mechanics of Solids)”, 8th edition, S.Chand and Co, New Delhi, 2025.
2. Bansal R.K. “Strength of materials”, 7th edition, Laxmi Publications, New Delhi, 2024.

REFERENCE BOOKS:

1. Subramanian R. “Strength of materials”, Oxford University Press, New Delhi, 2016.
2. Bhavikatti. S., "Solid Mechanics", Techno Series, 2024.
3. Srinath L.S,” Advanced Mechanics of Solids”, Tata McGraw-Hill Publishing Co., New Delhi, 2017.
4. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.

CO - PO - PSO MAPPING													
CO-PO- PSO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	3	1	-	1	1	-	-	-	-	1	1	-
CO2	3	3	1	-	1	1	-	-	-	-	1	1	-
CO3	3	3	1	-	1	1	-	-	-	-	1	1	-
CO4	3	3	1	-	1	1	-	-	-	-	1	1	-
CO5	3	3	1	-	1	1	-	-	-	-	1	1	-
Course Contribution	3	3	1	-	1	1	-	-	-	-	1	1	-

CE25304	FLUID MECHANICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

The course enables the students to:

- Develop knowledge on fluids in static, kinematic and dynamic equilibrium.
- Examine the kinematics of fluid flow and problems related to equation of motion.
- Perform dimensional and model analysis.
- Classify types of flow and losses of flow in pipes.
- Solve the boundary layer problems.

UNIT I	FLUID PROPERTIES AND FLUID STATICS	9

Fluid – definition - Properties of fluids - density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillarity and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers-forces on planes – centre of pressure – buoyancy and floatation.

UNIT II	FLUID KINEMATICS AND DYNAMICS	9

Fluid Kinematics – Classification and types of flow - velocity field and acceleration – continuity equation (one and three dimensional differential forms) - stream line-streak line-path line- stream function - velocity potential function - flow net. Fluid dynamics - equations of motion -Euler's equation along a streamline - Bernoulli's equation – applications – venturi meter, orifice meter and Pitot tube- linear momentum equation and its application to pipe bend.

UNIT III	DIMENSIONAL ANALYSIS AND MODEL STUDIES	9

Fundamental dimensions - dimensional homogeneity - Rayleigh's method and Buckingham Pi theorem-dimensionless parameters - similitudes and model studies - distorted models.

UNIT IV	FLOW THROUGH PIPES	9

Reynold's experiment - laminar flow through circular pipe (Hagen poiseulle's) - hydraulic and energy gradient – flow through pipes - Darcy - Weisbach's equation - pipe roughness -friction factor- Moody's diagram- major and minor losses of flow in pipes - pipes in series and in parallel.

UNIT V	BOUNDARY LAYER	9

Boundary layer – definition- boundary layer on a flat plate – laminar and turbulent boundary layer displacement, energy and momentum thickness – Momentum integral equation-Boundary layer separation and control – drag on flat plate.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Apply the basic knowledge of fluids in static, kinematic and dynamic equilibrium.
CO2: Solve problems related to kinematics of fluid flow and equation of motion.
CO3: Solve dimensional and model analysis on fluid flow problems.
CO4: Examine the types of flow and losses of flow in pipes.
CO5: Use the boundary layer problems in fluid flow.

TEXT BOOKS:

1. Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", 22nd Edition, Standard Book House New Delhi, 2019.
2. Rajput.R.K. "Fluid Mechanics", 6th Edition, S.Chand and Co, New Delhi, 2019.

REFERENCE BOOKS:

1. Subramanya.K, "Fluid Mechanics and Hydraulic Machines", 2nd Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2019.
2. Fox W.R. and McDonald A.T. Mitchell W.J., Introduction to Fluid Mechanics", 10th Edition, Wiley, America, 2021.
3. White, F.M., "Fluid Mechanics", Tata McGraw Hill, 5th Edition, New Delhi, 2017.

4. Bansal.R.K., "Fluid Mechanics and Hydraulic Machines", 11th Edition, Laxmi Publications Pvt. Ltd., New Delhi, 2023.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	1	1	-	-	-	-	1	1	-
CO2	3	2	2	-	1	1	-	-	-	-	1	1	-
CO3	3	2	2	-	1	1	-	-	-	-	1	1	-
CO4	3	2	2	-	1	1	-	-	-	-	1	1	-
CO5	3	2	2	-	1	1	-	-	-	-	1	1	-
Course Contribution	3	2	2	-	1	1	-	-	-	-	1	1	-

CE25305	SURVEYING AND GEOMATICS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES

The course enables the students to:

- Apply the basic principles, instruments, and procedures used in chaining, ranging, compass surveying, and plane table methods.
- Interpret levelling concepts, contouring methods, and area/volume computation procedures.
- Explore the use of theodolite and tacheometer for angle, height, and distance measurements.
- Examine horizontal and vertical control, triangulation concepts, and error adjustment principles.
- Express the applications of Total Station, GPS, GIS, and drone-based surveying technologies.

UNIT I	FUNDAMENTALS OF CONVENTIONAL SURVEYING	9

Classifications and basic principles of surveying - Equipment and accessories for ranging and chaining - Methods of ranging-Obstacles in chaining and errors in chaining - Compass - Types of Compass - Basic Principles- Bearing – Types - True Bearing - Magnetic Bearing - Local attraction and magnetic declination - Computation of compass traverse. Basic concepts of plane table surveying.

UNIT II	LEVELLING AND ITS APPLICATIONS	9

Levelling- Principles and theory of Levelling – Datum- - Bench Marks – Temporary and Permanent Adjustments- Methods of Levelling- Booking – Reduction - Sources of errors in Levelling - Curvature and refraction-Longitudinal and cross sectioning-Contour – Contouring – Characteristics of contours – Methods of contouring -Drawing contours and uses of contour maps-Calculation of areas and volumes by mid-ordinate, average ordinate trapezoidal and Simpson's methods.

UNIT III	THEODOLITE AND TACHEOMETRIC SURVEYING	9

Components of transit theodolite and its adjustments- Horizontal and vertical angle measurements - Heights and distances by trigonometry-Tacheometer - Stadia Constants - Analytic Lens -Tangential and Stadia Tacheometry –Tacheometric contouring.

UNIT IV	CONTROL SURVEYING AND ADJUSTMENTS	9

Horizontal and vertical control – Methods – specifications – triangulation- baseline – satellite stations – reduction to centre- trigonometrical levelling – single and reciprocal observations – traversing – Gale's table. Errors Sources- precautions and corrections – classification of errors – true and most probable values - weighed observations – method of equal shifts – principle of least squares - normal equation – correlates-level nets- adjustment of simple triangulation networks.

UNIT V	GEOMATICS	9

Total Station: Advantages - Fundamental quantities measured - Parts and accessories - working principle - On board calculations - Field procedure - Errors and Good practices in using Total Station. GPS Surveying: Different segments - space, control and user segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability. Introduction to GIS - Introduction to Drone Surveying.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Apply survey principles to compute bearings, correct traverse data, and manage field obstacles.

CO2: Compute reduced levels, contour maps, and earthwork quantities using levelling and numerical methods.

CO3: Use theodolite and tacheometric formulas to determine heights, distances, and tacheometric contours.

CO4: Calculate most probable values for triangulation and levelling networks using adjustment procedures.

CO5: Solve field surveying tasks using modern geomatics tools such as Total Station and GPS.

PRACTICAL COURSE	30

List of Experiments

S.No.	Experiment	Conventional method	Modern Method

1	Determination of area of an enclosed boundary	Chain offset and Compass surveying	Total Station
2	Determination of elevation of points on the ground	Dumpy level	Total Station
3	Determination of elevation of tower	Theodolite –Single lane method	Total Station
4	Determination of gradient between two points	Stadia and Tangential tacheometry	Total Station

TEXT BOOKS:

1. Punmia.B.C., Ashok K.Jain and Arun K Jain , "Surveying Vol. I & II", 18th edition, Lakshmi Publication Pvt Ltd, New Delhi, 2024.

REFERENCE BOOKS:

1. Kanetkar.T.P and Kulkarni.S.V, "Surveying and Levelling", Parts 1, 24th Edition, Pune Vidyarthi Griha Prakashan, Pune, 2024.
2. Satheesh Gopi, Ra.Sathishkumar and N. Madhu, "Advanced Surveying: Total Station, GPS, GIS & Remote Sensing", 3rd Edition, Pearson education, 2021.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	1	1	1	1	1	-	1	1	-
CO2	3	2	2	2	1	1	1	1	1	-	1	1	-
CO3	3	2	2	2	1	1	1	1	1	-	1	1	-
CO4	3	2	2	2	1	1	-	-	-	-	1	1	-
CO5	3	2	2	2	1	1	1	1	1	-	1	1	-
Course Contribution	3	2	2	2	1	1	1	1	1	-	1	1	-

CE25306	COMPUTER AIDED BUILDING DRAWING LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- Construct digital models of load-bearing residential buildings, including plans, elevations, and sections for single-storey structures.
- Develop accurate architectural drawings of residential and multi-storey buildings, covering plans, elevations, and sections.
- Organize and manage 3D views of multiple building elements to create coordinated and integrated drawing sets.
- Correlate appropriate CAD tools and commands to design structural components such as doors, windows, and staircases.
- Ensure the accuracy and compliance of drawings through dimensional checks and design standards for roof truss members.

LIST OF EXPERIMENTS

Drafting using AutoCAD software

1. Single storey residential building (load bearing wall structure and framed structure) - Plan, Elevation and Section.
2. Multi-storey residential building (load bearing wall structure and framed structure) - Plan, Elevation and Section.
3. 3D view of a residential building.
4. Fully panelled door / partly glazed and wooden panelled door – Elevation and cross section.
5. Fully panelled window / fully glazed window – Elevation and cross section.
6. Dog legged staircase – Plan and Elevation.
7. Elevation of different types of roof truss members (King post and Queen post).
8. Residential building with roof truss member - Plan, Elevation and Section.
9. Multi-storey building with roof truss member - Plan, Elevation and Section.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Analyze digital models of load-bearing structures to identify the accuracy of plans, elevations, and sections for single-storey residential buildings.

CO2: Inspect architectural drawings of residential and multi-storey buildings to ensure conformance with design and construction standards.

CO3: Correlate 3D building components to evaluate the integration and consistency within coordinated drawing sets.

CO4: Test the effectiveness of CAD tools and commands used in designing structural components such as doors, windows, and staircases.

CO5: Conclude the structural adequacy and precision of roof truss detailing through dimensional and design verification.

TEXT BOOKS:

1. Nishant A. Upadhye and Vikram V. Bagade. “Building Planning and Drawing with CAD”, Tech Knowledge Publications, Pune, 2024.
2. S. S. Bhavikatti. “Building Planning and Drawing”, New Age International Publishers, New Delhi, 2023.

REFERENCES:

1. IS 962:1989 – Code of Practice for Architectural and Building Drawings.
2. IS 7973:1976 – Code of Practice for Architectural and Building Working Drawings.
3. NBC 2016 – National Building Code of India.
4. N. D. Bhatt and V. M. Panchal. “Engineering Drawing: Plane and Solid Geometry”, Charotar Publishing House, Anand, 2023.
5. P. J. Shah. “Engineering Drawing and Computer Graphics”, S. Chand & Company Ltd., New Delhi, 2023.

6. K. Venugopal and V. Prabhu Raja. “Engineering Drawing + AutoCAD”, New Age International Publishers, New Delhi, 2022.
7. S. Rajasekaran and G. Sankarasubramanian. “Computer Aided Design and Drafting”, PHI Learning Pvt. Ltd., New Delhi, 2023.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	-	3	-	1	1	1	-	1	1	-
CO2	2	2	3	-	3	-	1	1	1	-	1	1	-
CO3	2	2	3	-	3	-	1	1	1	-	1	1	-
CO4	2	2	3	-	3	-	1	1	1	-	1	1	-
CO5	2	2	3	-	3	-	1	1	1	-	1	1	-
Course Contribution	2	2	3	-	3	-	1	1	1	-	1	1	-

CE25307	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- Analyse the mechanical behavior of materials through tensile, compression, shear, torsion, impact, and hardness tests.
- Inspect the deformation characteristics of structural members under bending and torsion.
- Correlate the experimental procedures to study failure modes in metals, wood, bricks, and springs.
- Ensure the mechanical testing using standard laboratory instruments and test setups.
- Organize test data for evaluating material properties and comparing experimental results.

LIST OF EXPERIMENTS

1. Tension test on steel rod
2. Compression test on wood, bricks
3. Double shear test on metal
4. Torsion test on mild steel rod
5. Impact test on metal specimen (Izod and Charpy)
6. Hardness test on metals (Rockwell and Brinell Hardness Tests)
7. Deflection test on metal beam
8. Compression test on helical spring
9. Deflection test on carriage spring

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Analyze material responses under tension, compression, shear, torsion, impact, and hardness loading conditions.

CO2: Inspect deformation patterns and failure modes of metals, wood, bricks, and springs during testing.

CO3: Categorize materials based on measured mechanical properties such as strength, ductility, toughness, and stiffness.

CO4: Correlate experimental observations with theoretical equations to determine key mechanical parameters.

CO5: Conclude the engineering suitability of tested materials from interpreted laboratory data.

TEXT BOOKS:

1. Rajput R.K., "Strength of Materials (Mechanics of Solids)", 8th edition, S.Chand & company Ltd., New Delhi, 2025.

REFERENCES:

1. Rattan.S.S., "Strength of Materials", 3rd edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2018.
2. Anand Jayakumar., “Strength of Materials Lab Manual, Notion Press., 2020.

CO - PO - PSO MAPPING													
CO-PO- PSO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	1	-	2	1	1	1	1	-	2	1	-
CO2	3	2	1	-	2	1	1	1	1	-	2	1	-
CO3	3	2	1	-	2	1	1	1	1	-	2	1	-
CO4	3	2	1	-	2	1	1	1	1	-	2	1	-
CO5	3	2	1	-	2	1	1	1	1	-	2	1	-
Course Contribution	3	2	1	-	2	1	1	1	1	-	2	1	-

IV SEMESTER

MA25C06	NUMERICAL METHODS *(Common to B.E. Civil & B.E. Mechanical Engineering Programmes)*	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES

- To outline the basic concepts of solving system of linear equations ans eigen value problems using numerical techniques
- To explain the numerical techniques of interpolation in various intervals
- To develop the knowledge of numerical techniques in differentiation and integration problems.
- To describe various techniques and methods of solving ordinary differential equations.
- To use various techniques and methods of solving partial differential equations.

UNIT I	SOLUTIONS OF LINEAR EQUATIONS AND EIGENVALUE PROBLEMS	12

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.

UNIT II	INTERPOLATION AND APPROXIMATION	12

Interpolation with unequal intervals — Lagranges interpolation — Newton's divided difference interpolation —Difference operators and relations — Interpolation with equal intervals — Newton's forward and backward difference formulae.

UNIT III	NUMERICAL DIFFERENTIATION AND INTEGRATION	12

Approximation of derivatives using interpolation polynomials — Numerical integration using Trapezoidal, Simpson's 1/3 rule— Two point and three point Gaussian quadrature formulae — Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules

UNIT IV	NUMERICAL SOLUTION TO ORDINARY DIFFERENTIAL EQUATIONS	12

Single step methods — Taylor's series method — Euler's method — Modified Euler's method — Fourth order Runge — Kutta method for solving first order equations — Multi step methods — Milne's and Adams — Bash forth predictor corrector methods for solving first order equations.

UNIT V	NUMERICAL SOLUTION TO PARTIAL DIFFERENTIAL EQUATIONS	12

Finite difference: Elliptic equations - Laplace equation, Poisson equation – Leibmann's method, parabolic equations – heat conduction equation- explicit and implicit methods, hyperbolic equations – vibrating string.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Solve the system of equations and Eigen value problems using iterative procedure.

CO2: Apply the numerical techniques of interpolation and error approximations in various intervals

CO3: Make use of a suitable numerical techniques to evaluate the approximation of derivatives and integrals

CO4: Obtain the solutions of ordinary differential equations with initial conditions

CO5: Determine the solutions of partial differential equations with initial and boundary conditions

TEXT BOOKS:

1. Veerarajan.T and Ramachandran T, "Numerical Methods with Programming in C", 2nd edition Tata McGraw Hill Publication Ltd, New Delhi 2007.
2. B.S. Grewal's "Higher Engineering Mathematics "45th edition, Khanna Publications 2024.

REFRENCE BOOKS:

1. Richard L Burden and Douglas J Faires, "Numerical Analysis", 10th edition , Thomas Learning, New York, 2017.
2. Steven C Chapra and Raymond P Canale, "Numerical Methods for Engineers", 7th edition, Tata McGraw Hill ,New Delhi, 2017.
3. Curtis F Gerald and Patrick O Wheatly, "Applied Numerical Analysis", 7th edition , Pearson, New Delhi, 2017

CO - PO - PSO MAPPING													
CO-PO- PSO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	1	1	-	-	-	-	-	-	1	1	-
CO2	3	2	1	1	-	-	-	-	-	-	1	1	-
CO3	3	2	1	1	-	-	-	-	-	-	1	-	-
CO4	3	2	1	1	-	-	-	-	-	-	1	1	-
CO5	3	2	1	1	-	-	-	-	-	-	1	1	-
Course Contribution	3	2	1	1	-	-	-	-	-	-	1	1	-

CH25C02	ENVIRONMENTAL SCIENCE (Common to all B.E / B.Tech. Programmes)	L	T	P	C
		2	0	0	2

COURSE OBJECTIVE:

The course enables the students to:

- To appreciate the structure and function of an ecosystem and biodiversity
- To realize the environmental impacts of natural resources.
- To recognize causes, effects and control measures of different types of pollution.
- To comprehend the importance of disaster management, environmental ethics and values.
- To appreciate the relevance of the environment by evaluating its impact on the surrounding environment and its functions.

UNIT-I	ENVIRONMENT, ECOSYSTEM AND BIODIVERSITY	6

Definition, scope and importance of environment – need for public awareness - ecosystem- general structure and function of an ecosystem- ecological succession-biodiversity-types-values of biodiversity-endangered and endemic species-red data book- hot spots of biodiversity-criteria- hot spots in India-threats to biodiversity(man-animal conflicts, habitat loss, poaching) - case studies - conservation of biodiversity- in-situ and ex-situ conservation – case studies for conservation of biodiversity in Mudumalai.

UNIT-II	NATURAL RESOURCES AND ITS ENVIRONMENTAL IMPACTS	6

Natural resources-forest resource-ecological functions – causes, effects and control measures of deforestation-water resource-sources-conflict over water-dams benefits and problems-food resource-overgrazing- impacts of over grazing- impacts of modern agriculture-**Energy Resources**: Growing energy needs, renewable and nonrenewable energy sources, use of alternative energy sources, - wind mills and solar panels- case studies.

UNIT-III	ENVIRONMENTAL POLLUTION AND CONTROL	6

Air pollution-causes, effects and control methods - water pollution- causes, effects-waste water treatment-soil pollution-causes, effects-solid waste management - causes, effects and management **- E- waste**: composition and generation of E-waste pollutants, hazardous properties, Effects of pollutant on human health and environment, domestic E- waste disposal, Basic principles of E waste management, Component of E-waste management. Pollution control acts - air, water- wildlife - E- waste management rules - case studies - role of an individual in control of pollution.

UNIT-IV	DISASTER MANAGEMENT AND ENVIRONMENTAL ETHICS	6

Disaster management-causes, effects and management of- flood, landslide, earthquake and tsunami-case studies- environmental ethics - value education-traditional value systems in India-water conservation-rain water harvesting-watershed management.

UNIT-V	SUSTAINABLE MANAGEMENT AND PRACTICES	6

Social issues - climate change - causes, effects and control measures - global warming - causes, effects and control measures - Acid rain - causes, effects and control measures - ozone layer depletion - causes, effects and control measures - nuclear accident and holocausts – Sustainability - concept, needs and challenges - economic, social and aspects of sustainability - from unsustainability to sustainability - EIA - Sustainable development – goals, target - green buildings - ISO 14000 series.

TOTAL : 30 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Explain the concept of an ecosystem and biodiversity.
CO2: Demonstrate the environmental impressions of natural resources.
CO3: Illustrate the suitable method for pollution control.
CO4: Relate the proper way for disaster management.
CO5: Apply social issues and adopt sustainable practices.

TEXT BOOKS:

1. A. Kaushik, and C. P. Kaushik. “Environmental Science and Engineering”, 6th Edition, New Age International, 2018.
2. S. K. Garg and K. Garg, Ecological and Environmental studies, Khanna Publishers, 2015.

3. Wright and Nebel, Environmental science towards a sustainable future, 12th Editon, Prentice Hall of India Ltd, 2015.

REFERENCE BOOKS:

1. Erach Bharucha, "Text book of Environmental studies for Undergraduate courses", 3rd Edition, UGC, 2021.
2. P. Ravi, and Agrahari, Environmental ecology, Biodiversity, climatic change & Disaster management, 1st Edition, McGraw Hill, 2020
3. Benney Joseph, "Environmental Science and Engineering", 1st Edition, McGraw Hill Education (India) Pvt Ltd, New Delhi, 2017.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	-	-	-	2	1	-	-	1	1	1	-
CO2	1	1	-	-	-	2	1	-	-	-	1	1	-
CO3	-	1	-	-	-	2	-	-	-	-	-	1	-
CO4	-	1	1	-	-	2	2	-	-	1	1	1	-
CO5	-	1	1	-	-	2	2	-	-	1	1	1	-
Course Contribution	1	1	1	-	-	2	2	-	-	1	1	1	-

CE25401	STRENGTH OF MATERIALS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

The course enables the students to:

- Apply energy methods to evaluate strain energy and deflections in determinate structures.
- Examine indeterminate beams using fixed-end moments, three-moment theorem, and continuity principles.
- Determine critical loads for columns and assess the behavior of cylinders under pressure.
- Interpret stresses, principal planes, Mohr's circle, and failure theories for structural analysis.
- Use unsymmetrical bending and curved beam concepts to evaluate stresses and shear centre locations.

UNIT I	ENERGY PRINCIPLES	9

Strain energy and strain energy density, strain energy due to axial load (gradual, sudden and impact loadings), shear, flexure and torsion – Castigliano's theorems – Maxwell's reciprocal theorem - Principle of virtual work – unit load method - Application of energy theorems for computing deflections in determinate beams.

UNIT II	INDETERMINATE BEAMS	9

Propped cantilever and fixed beams - fixed end moments and reactions, Theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams.

UNIT III	COLUMNS AND CYLINDERS	9

Euler's column theory – critical load for prismatic columns with different end conditions – Effective length – limitations – Rankine Gordon formula - Eccentrically loaded columns – middle third rule - core of a section, thick and thin cylinders.

UNIT IV	STATE OF STRESS AND THEORIES OF FAILURE	9

State of Stress in two dimensions – Stresses on inclined planes – Principal Stresses and Principal Planes – Maximum shear stress - Mohr's circle method. Theories of failure: Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Total Strain energy theory – Maximum distortion energy theory – Application problems.

UNIT V	BENDING OF CURVED BEAMS AND UNSYMMETRICAL BENDING	9

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – Shear Centre - curved beams – Winkler Bach formula **–** stresses in hooks.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Calculate strain energy, apply energy theorems, and determine deflections using Castigliano's and virtual work methods.

CO2: Solve propped cantilever, fixed, and continuous beams using fixed-end moments and the three-moment theorem.

CO3: Determine critical loads for various column end conditions and evaluate stresses in thin and thick cylinders.

CO4: Interpret principal stresses, Mohr's circle, and different failure theories for 2D stress systems.

CO5: Examine stresses in unsymmetrical and curved beams using shear centre and Winkler–Bach concepts.

TEXT BOOKS:

1. Rajput R.K., "Strength of Materials (Mechanics of Solids)", 8th edition, S.Chand & company Ltd., New Delhi, 2025.
2. Rattan.S.S., "Strength of Materials", 3rd edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2018.

REFERENCE BOOKS:

1. Basavarajiah and Mahadevapa, Strength of Materials, University press, Hyderabad, 2016.
2. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, Tata McGraw Hill Publishing company, 2017.

3. Singh. D.K., " Strength of Materials", Ane Books Pvt. Ltd., New Delhi, 2021
4. Egor. P.Popov, Engineering Mechanics of Solids, Prentice Hall of India, Second Edition New Delhi 2015.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	1	2	-
CO2	3	2	1	-	-	-	-	-	-	-	1	2	-
CO3	3	2	1	-	-	-	-	-	-	-	1	2	-
CO4	3	2	1	-	-	-	-	-	-	-	1	2	-
CO5	3	2	1	-	-	-	-	-	-	-	1	2	-
Course Contribution	3	2	1	-	-	-	-	-	-	-	1	2	-

CE25402	APPLIED HYDRAULIC ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

The course enables the students to:

- Examine the principles governing uniform flow, specific energy, and critical flow in open channels.
- Apply gradually varied flow equations to classify profiles and compute backwater and drawdown curves.
- Interpret rapidly varied flow phenomena such as hydraulic jumps, energy dissipation, and surges.
- Explore the working principles, classifications, and performance characteristics of hydraulic turbines.
- Investigate the operating principles, performance parameters, and characteristic curves of pumps.

UNIT I	UNIFORM FLOW	9

Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow – Wide open channel - Specific energy and specific force – Critical flow .

UNIT II	GRADUALLY VARIED FLOW	9

Dynamic equations of gradually varied flows – Types of flow profiles - Classifications: Computation by Direct step method and Standard step method – Control section – Break in Grade – Computation.

UNIT III	RAPIDLY VARIED FLOW	9

Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation – Celerity – Rapidly varied unsteady flows (positive and negative surges)

UNIT IV	TURBINES	9

Impact of Jet on flat, curved plates, Stationary and Moving –Classification of Turbines – Pelton wheel – Francis turbine – Kaplan turbine - Specific speed – Characteristic Curves of Turbines- Draft tube and cavitation.

UNIT V	PUMPS	9

Classification of Pumps - Centrifugal pumps – Work done - Minimum speed to start the pump - NPSH - Multistage pumps – Characteristics curve - Reciprocating pumps - Negative slip - Indicator diagrams and its variations – Air vessels - Savings in work done.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Determine uniform flow parameters using Chezy and Manning equations and identify best hydraulic sections.

CO2: Compute gradually varied flow profiles using direct step and standard step methods.

CO3: Apply momentum principles to evaluate hydraulic jump characteristics and RVF behavior.

CO4: Use turbine performance equations to study Pelton, Francis, and Kaplan turbines and their characteristic curves.

CO5: Solve pump performance problems involving work done, NPSH, negative slip, indicator diagrams, and air vessels.

TEXT BOOKS:

1. Subramanya.K, “Flow in open channels”, 5th Edition, Tata McGraw Hill, New Delhi, 2019.
2. Chandramouli P.N, “Applied Hydraulic Engineering”, Yes Dee Publishing Pvt. Ltd., 2022.

REFERENCE BOOKS:

1. Modi P.N and Seth.S.M, “Hydraulics and Fluid Mechanics including Hydraulic Machines”, 22nd Edition, Standard Book House New Delhi, 2018.
2. VenTe Chow, “Open Channel Hydraulics”, McGraw Hill, New York, 2009.

3. Hanif Chaudhry.M, "Open Channel Flow", 2nd Edition, Springer, 2007.
4. Jain.A.K. "Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers, 12th Edition, 2024.

CO - PO - PSO MAPPING												
CO-PO- PSO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	2	-	-	-	-	-	-	-	1	2	-
CO2	3	2	2	-	-	-	-	-	-	-	1	2	-
CO3	3	2	2	-	-	-	-	-	-	-	1	2	-
CO4	3	2	2	-	-	-	-	-	-	-	1	2	-
CO5	3	2	2	-	-	-	-	-	-	-	1	2	-
Course Contribution	3	2	2	-	-	-	-	-	-	-	1	2	-

CE25403	WASTEWATER ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

The course enables the students to:

- Examine the physical, chemical, and biological characteristics of sewage and their relevance to treatment.
- Determine sewage quantity, storm runoff, and design needs for collection, conveyance, and sewer appurtenances.
- Apply primary treatment principles to design screening, grit removal, sedimentation units, and onsite sanitation systems.
- Interpret secondary biological treatment processes including ASP, trickling filters, SBR, MBR, MBBR, ponds, and anaerobic systems.
- Investigate sludge treatment processes and assess environmental impacts of treated sewage disposal on rivers, lakes, seas, and land.

UNIT I	CHARACTERIZATION OF SEWAGE	9

Characteristics of sewage, decomposition – aerobic and anaerobic decomposition- physical and chemical quality of sewage – BOD and their testing– BOD equation – problems – population equivalent – Biological quality of sewage.

UNIT II	COLLECTION AND TRANSPORATION OF SEWAGE	9

Systems of sanitation– Estimating quantity of sewage – dry weather flow – estimating storm run-off by rational formula – Sewerage – separate, combined and partially separate system – hydraulic design of sewers. Sewer materials - laying and testing of sewer - sewer appurtenances, cleaning and ventilation of sewers- pumping of sewage.

UNIT III	PRIMARY TREATMENT OF SEWAGE	9

Objective – selection of treatment processes – principles, functions, design and drawing of units - onsite sanitation - septic tank with dispersion - grey water harvesting – primary treatment – principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – construction, operation and maintenance aspects.

UNIT IV	SECONDARY TREATMENT OF SEWAGE	9

Biological treatment of sewage – aerobic treatment - activated sludge process – process mechanism, design parameters, design – modifications in ASP - Trickling filters – process mechanism, types, design parameters and design. Hybrid system – SBR, MBR, MBBR (basics only) - Natural systems - Ponds and Lagoons - Anaerobic systems – UASB, anaerobic filters and natural systems.

UNIT V	SLUDGE TREATMENT AND IMPACT OF DISPOSAL OF SEWAGE	9

Sludge digestion – characteristics- digestion tanks, design - disposal of digested sludge - advances in sludge treatment and disposal - Impact of disposal of treated sewage – Impact on river – self-purification – oxygen sag curve – Streeter Phelps equation – Impact on lakes – Eutrophication – Impact on sea - Land irrigation – sewage farming, sewage sickness - Recycling of treated sewage. Disposal of sewage in isolated buildings, plumbing system – types; Sanitary practices in rural areas. ECOSAN, Introduction to DEWATS.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Examine the physical, chemical, and biological characteristics of sewage and BOD using standard equations.

CO2: Compute sewage flow, storm runoff, and design parameters for sewers, pumping stations, and sewer appurtenances.

CO3: Develop primary treatment units including screens, grit chambers, and sedimentation tanks based on functional principles.

CO4: Apply process mechanisms to evaluate and compare secondary biological treatment systems and natural treatment options.

CO5: Determine sludge digestion requirements, disposal methods, and environmental impacts using concepts such as oxygen sag and eutrophication.

TEXT BOOKS:

1. Garg, S.K., Environmental Engineering Vol. II, 41st Edition, Khanna Publishers, New Delhi, 2021.
2. Duggal K.N., "Elements of Environmental Engineering", 3rd Edition, S.Chand and Co. Ltd., New Delhi, 2014.

REFERENCE BOOKS:

1. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, 2nd Edition, Laxmi Publications, 2016.
2. Manual on Sewerage and Sewage Treatment Systems Part A, B and C, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
3. Metcalf and Eddy, "Wastewater Engineering–Treatment and Reuse", 4th Edition, Tata McGraw-Hill Company, New Delhi, 2012.
4. Syed R. Qasim, "Wastewater Treatment Plants", 2nd Edition, CRC Press, Washington D.C., 2017.
5. Peavy, Rowe, Tchobanoglous, "Environmental Engineering", 1st Edition, McGraw Hill Publishers, New Delhi, 2017.
6. Mark J. Hammer, Mark J. Hammer, Jr, "Water and Wastewater Technology", 7th Edition, Prentice Hall of India Pvt. Ltd. New Delhi, 2011.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	-	2	2	-	-	-	1	1	2
CO2	3	2	2	-	-	2	2	-	-	-	1	1	2
CO3	3	2	2	-	-	2	2	-	-	-	1	1	2
CO4	3	2	2	-	-	2	2	-	-	-	1	1	2
CO5	3	2	2	-	-	2	2	-	-	-	1	1	2
Course Contribution	3	2	2	-	-	2	2	-	-	-	1	1	2

AD25P35	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING *(Common to B.E Civil, Electrical and Electronics and Mechanical Engineering programmes)*	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To infer knowledge of various search algorithms for problem solving.
- To understand Understand fundamental concepts of Artificial Intelligence, including agents, environments, and various problem-solving strategies.
- To gain knowledge about basics of Machine Learning concepts.
- To contrast the knowledge in supervised Machine learning algorithms
- To demonstrate unsupervised Machine learning algorithms

UNIT-I	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	9

Introduction to Artificial intelligence - Agents and Environments - Problem Solving and examples - Search Algorithms - Uninformed Search Strategies - Informed Search Strategies.

UNIT-II	PROBLEM SOLVING METHODOLOGY	9

Heuristic search strategies - heuristic functions - Local search and optimization problems - local search in continuous space - search with non-deterministic actions - search in partially observable environments online search agents and unknown environments.

UNIT-III	MACHINE LEARNING BASICS	9

Introduction to Machine Learning (ML) - Essential concepts of ML - Types of learning - Machine learning methods based on Time - Dimensionality - Linearity and Non linearity - Early trends in Machine learning - Data Understanding Representation and visualization.

UNIT-IV	SUPERVISED MACHINE LEARNING	9

Types of supervised Machine learning Algorithms - Regression -Classification -Perceptron and Neural networks - Decision trees - Support vector machines - Probabilistic models -Case Study: Spam Email detection.

UNIT-V	UNSUPERVISED MACHINE LEARNING	9

Working of Unsupervised Learning - Clustering- Association - K-Means Clustering-Component Analysis-Self Organizing Maps- Featurization- Adult Salary Predictor.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Apply appropriate search algorithms for AI based problems.

CO2: Demonstrate foundational knowledge in artificial intelligence concepts, including agents, environments, and diverse problem-solving techniques.

CO3: Summarize various problem domains and prepare data accordingly for model building.

CO4: Apply Supervised Learning algorithms to solve real world problems.

CO5: Construct classifier models using unsupervised learning algorithms for unstructured data.

TEXTBOOKS

1. Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, 4th Edition, Pearson Education,2021
2. Ethem Alpaydin,“Introduction to MachineLearning”,4th Edition,MIT Press,2020.
3. Saikat Dull, S. Chjandramouli, Das, “Machine Learning “,1st Edition, Pearson,2018

REFERENCES

1. Kevin Night,Elaine Rich,andNairB., “Artificial Intelligence”,3rd Edition, McGraw Hill,2017
2. Mehryar Mohri, Afshin Rostamizadeh and Ameet Talwalkar, “Foundations of Machine Learning”, 2nd Edition, MIT Press, 2018.
3. Deepak Khemani, “Artificial Intelligence”, 2nd Edition, Tata McGraw Hill Education,2013

CO - PO - PSO MAPPING													
CO-PO- PSO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	1	1	1	1	-	-	-	1	3	1	-
CO2	3	2	1	1	1	1	-	-	-	1	3	1	-
CO3	3	2	1	1	1	1	-	-	-	1	3	1	-
CO4	3	2	1	1	1	1	-	-	-	1	3	1	-
CO5	3	2	1	1	1	1	-	-	-	1	3	1	-
Course Contribution	3	2	1	1	1	1	-	-	-	1	3	1	-

CE25404	SOIL MECHANICS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE:

The course enables the students to:

- Examine soil formation, classification principles, and compaction characteristics.
- Interpret effective stress concepts, permeability behaviour, and seepage mechanisms in soils.
- Determine stress distribution patterns and settlement behaviour using theoretical and empirical methods.
- Use shear strength theories and laboratory test results to evaluate soil resistance.
- Explore slope stability concepts, critical slip surfaces, and stabilization measures.

UNIT I	SOIL CLASSIFICATION AND COMPACTION	9

Formation and types of soil- Phase relations - Index properties – Particle size distribution – Atterberg limits - BIS soil Classification — Compaction – Factors influencing compaction.

UNIT II	EFFECTIVE STRESS AND PERMEABILITY	9

Soil – Water – Static pressure in water - Effective Stress concept in soil – Capillary phenomena -Quick Sand- Permeability – Darcy's law – Factors influencing permeability of soils – 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's theory (point load, line load and UDL)–Use of Newmark's influence chart – Settlement and its Components – Factors influencing settlement – Terzaghi's one dimensional consolidation theory – Computation of rate of settlement. – √t and log t methods – e log p relationship consolidation settlement, Stress Path

UNIT IV	SHEAR STRENGTH	9

Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Factors influences shear strength of soil.

UNIT V	STABILITY OF SLOPES	9

Infinite slopes and finite slopes — Friction circle method – Use of stability number –Guidelines for location of critical slope surface in cohesive and c - soil – Slope protection measures – case studies on slope stability failures.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

CO1: Classify soils using index properties, grain size distribution, Atterberg limits, and BIS classification procedures.

CO2: Determine effective stress, pore pressure variation, and permeability characteristics for different soil conditions.

CO3: Compute stress distribution, consolidation settlement, and rate of settlement using Boussinesq's theory, Newmark charts, and Terzaghi's consolidation theory.

CO4: Examine the shear strength parameters using Mohr–Coulomb theory and laboratory shear tests.

CO5: Solve slope stability problems for infinite and finite slopes using stability numbers, friction circle method, and critical slip surface guidelines.

PRACTICAL COURSE **TOTAL : 30 PERIODS**

List of Experiments

A. Determination of Index Properties:

1. Special gravity of soil solids
2. Grain size distribution – Sieve analysis
3. Grain size distribution Hydrometer analysis
4. Liquid limit test
5. Plastic limit test
6. Shrinkage limit

7. Field density Test (Sand replacement method)
8. Determination of moisture – density relationship using standard Proctor compaction test.
9. Core cutter method
10. Relative density

B. Determination of Engineering Properties:

11. Permeability determination (constant head and falling head methods)
12. Direct shear test in cohesion-less soil
13. Unconfined compression test in cohesive soil

TEXT BOOKS:

1. Murthy, V.N.S., "Text book of Soil Mechanics and Foundation engineering", 2nd Edition, CBS Publishers Distribution Ltd., New Delhi. 2018.
2. Punmia, B.C., "Soil Mechanics and Foundations", 18th Edition, Laxmi Publications Pvt. Ltd. New Delhi, 2024.

REFERENCE BOOKS:

1. Gopal Ranjan, A S R Rao, "Basic and Applied Soil Mechanics", 3rd Edition, New Age International Publication, 2016.
2. Arora, K.R., "Soil Mechanics and Foundation Engineering", 7th Edition, Standard Publishers and Distributors, New Delhi, 2020 (Reprint).
3. Coduto, D.P., "Geotechnical Engineering – Principles and Practices", 2nd Edition, Prentice Hall of India Pvt. Ltd. New Delhi, 2010.
4. Purushothama Raj. P., "Soil Mechanics and Foundations Engineering", 2nd Edition, Pearson Education, 2018.
5. Venkatramaiah.C., "Geotechnical Engineering", 6th Edition, New Age International Pvt. Ltd., New Delhi, 2018.

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	2	1	1	1	1	1	1	2	1
CO2	3	2	2	2	2	1	1	1	1	1	1	2	1
CO3	3	2	2	2	2	1	1	1	1	1	1	2	1
CO4	3	2	2	2	2	1	1	1	1	1	1	2	1
CO5	3	2	2	2	2	1	1	1	1	1	1	2	1
Course Contribution	3	2	2	2	2	1	1	1	1	1	1	2	1

CE25405	HYDRAULIC ENGINEERING LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES

- Analyze flow measurement principles using Venturimeter, orificemeter, Pitot tube, and notches.
- Categorize frictional and minor losses in pipe systems under various flow conditions.
- Correlate the concept of metacentric height to study stability characteristics of floating bodies.
- Test the performance of centrifugal and reciprocating pumps to obtain characteristic curves.
- Inspect performance characteristics of Pelton and Kaplan turbines.

LIST OF EXPERIMENTS

A. Flow Measurement

1. Calibration of Venturimeter / Orifice meter
2. Bernoulli's Experiment
3. Calibration of Pitot Tube
4. Determination of Coefficient of discharge of the triangular notch.

B. Losses in Pipes

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

C. Determination of Metacentric height

7. Determination of Metacentric height of floating bodies

D. Pumps

8. Characteristics of Centrifugal pumps
9. Characteristics of Reciprocating pump

E. Turbines

10. Characteristics of Pelton wheel turbine
11. Characteristics of Kaplan turbine

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Test the performance of flow measuring device by comparing theoretical and experimental discharge values.

CO2: Inspect energy losses in pipe systems to understand frictional and minor loss behavior.

CO3: Appraise the stability of floating bodies using metacentric height observations.

CO4: Correlate pump performance parameters with operational conditions using characteristic curves.

CO5: Conclude turbine performance characteristics by interpreting efficiency, discharge, and power variations.

TEXT BOOKS:

1. Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", 22nd Edition, Standard Book House New Delhi, 2018.
2. Subramanya.K, "Fluid Mechanics and Hydraulic Machines", 2nd Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2019.
3. Subramanya.K, "Flow in open channels", 5th Edition, Tata McGraw Hill, New Delhi, 2019.
4. Chandramouli P.N, "Applied Hydraulic Engineering", Yes Dee Publishing Pvt. Ltd., 2022

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CO-PO- PSO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	1	2	-	1	1	1	1	1	1	2	1
CO2	3	2	1	2	-	1	1	1	1	1	1	2	1
CO3	3	2	1	2	-	1	1	1	1	1	1	2	1
CO4	3	2	1	2	-	1	1	1	1	1	1	2	1
CO5	3	2	1	2	-	1	1	1	1	1	1	2	1
Course Contribution	3	2	1	2	-	1	1	1	1	1	1	2	1

CE25406	WATER AND WASTEWATER ANALYSIS LABORATORY	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

- Analyze basic physical and chemical water quality parameters such as pH, turbidity, conductivity, and solids.
- Ensure hardness, alkalinity, acidity, chlorides, and nutrients using standard titration and analytical methods.
- Test for dissolved oxygen, BOD, COD, and chlorine to assess organic and disinfectant characteristics.
- Optimize coagulant dosage and microbiological analyses including MPN and microscopic examinations.
- Inspect wastewater characteristics through nutrient analysis (N,P) , sludge indices, and grease/oil determination.

LIST OF EXPERIMENTS

1. Determination of pH, Turbidity and conductivity
2. Determination of Hardness
3. Determination of Alkalinity and Acidity
4. Determination of Chlorides
5. Determination of Phosphates and Sulphates
6. Determination of iron and fluoride
7. Determination of Optimum Coagulant dosage
8. Determination of residual chlorine and available chlorine in bleaching powder
9. Determination of Oil, and Grease
10. Determination of suspended, settleable, volatile and fixed solids
11. Determination Dissolved Oxygen and BOD for the given sample
12. Determination of COD for given sample
13. Determination of SVI of Biological sludge and microscopic examination
14. Determination of MPN index of given water sample
15. Determination of Ammonia nitrogen in wastewater samples.
16. Determination of Nitrates in water and wastewater

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course, learners will be able to

CO1: Ensure physical and chemical characteristics of water and wastewater using standard laboratory methods.

CO2: Test for hardness, alkalinity, acidity, chlorides, and nutrient concentrations.

CO3: Inspect organic pollution levels by interpreting DO, BOD, COD, and chlorine test outcomes.

CO4: Categorize sludge and solids characteristics using SVI, microscopic examination, and solids fractionation.

CO5: Correlate nutrient levels, pathogens, and chemical indicators to assess overall water and wastewater quality.

TEXT BOOKS:

1. Eaton, A.D., Clesceri, L.S., Rice, E.W., Greenberg, A.E., Franson, "Standard methods for the examination of water & wastewater", 22nd Edition, American Public Health Association (APHA) M.A.H. APHA, Washington, 2012.

REFERENCES:

1. IS 3025 : Part 21 : 2009 Methods of sampling and test (Physical and Chemical) for water and wastewater : Hardness
2. IS 3025 : Part 23 : 1986 Methods of sampling and test (Physical and Chemical) for water and wastewater : Alkalinity
3. IS 3025 : Part 32 : 1988 Methods of sampling and test (Physical and Chemical) for water and wastewater : Chloride

4. IS 3025 : Part 34 : 1988 Methods of sampling and test (Physical and Chemical) for water and wastewater : Nitrate
5. IS 3025 : Part 24 : 1986 Methods of sampling and test (Physical and Chemical) for water and wastewater : Sulphate
6. IS 3025 : Part 60 : 2008 Methods of sampling and test (Physical and Chemical) for water and wastewater : Fluoride
7. IS 3025 : Part 10 : 1984 Methods of sampling and test (Physical and Chemical) for water and wastewater : Turbidity
8. IS 3025 : Part 16 : 1984 Methods of sampling and test (Physical and Chemical) for water and wastewater : FILTERABLE RESIDUE (TOTAL DISSOLVED SOLIDS)
9. IS 3025 : Part 11 : 1983 Methods of sampling and test (Physical and Chemical) for water and wastewater : pH VALUE
10. IS 3025 : Part 44 : 1993 Methods of sampling and test (Physical and Chemical) for water and wastewater : BIOCHEMICAL OXYGEN DEMAND (BOD)
11. IS 3025 : Part 39 : 1989 Methods of sampling and test (Physical and Chemical) for water and wastewater : Oil and Grease
12. IS 3025 : Part 58 : 2006 Methods of sampling and test (Physical and Chemical) for water and wastewater : CHEMICAL OXYGEN DEMAND (COD)
13. IS 3025 : Part 31 : 1988 Methods of sampling and test (Physical and Chemical) for water and wastewater : Phosphorous

CO - PO - PSO MAPPING

CO-PO- PSO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	2	2	1	2	-	-	1	1	2
CO2	3	2	2	2	2	2	1	2	-	-	1	1	2
CO3	3	2	2	2	2	2	1	2	-	-	1	1	2
CO4	3	2	2	2	2	2	1	2	-	-	1	1	2
CO5	3	2	2	2	2	2	1	2	-	-	1	1	2
Course Contribution	3	2	2	2	2	2	1	2	-	-	1	1	2