PSG INSTITUTE OF TECHNOLOGY AND APPLIED RESEARCH

COIMBATORE – 641 062

(Autonomous college affiliated to Anna University)

R2025

Courses of Study, Scheme of Assessment and Syllabi for First, Second, Third and Fourth Semesters

for

B.E. Civil Engineering

B.E. CIVIL ENGINEERING
(Minimum No. of credits to be earned: 168)

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER I										
THEORY										
1	25MA101	Calculus and its Applications	3	1	0	4	40	60	100	BS
2	25PH101	Physics for Civil Engineering	3	0	0	3	40	60	100	BS
3	25CY101	Chemistry of Building Materials I	3	0	0	3	40	60	100	BS
4	25CE101	Engineering Geology	3	0	0	3	40	60	100	ES
5	25HS101	English Language Proficiency	3	1	0	4	40	60	100	HS
6	25HS102	தமிழர் மரபு / Heritage of Tamils	1	0	0	1	40	60	100	HS
PRACTICALS										
7	25BS111	Basic Sciences Laboratory I	0	0	4	2	60	40	100	BS
8	25CE111	Engineering Drawing	0	0	4	2	60	40	100	ES
9	25GE111	Design Thinking for Innovation	0	0	2	1	100	0	100	ES
MANDATORY COURSES										
10	25GEM01	Induction Programme**	-	-	-	Grade	-	-	-	MC
Total 28 periods			**16**	**2**	**10**	**23**	**460**	**440**	**900**	

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER II										
THEORY										
1	25MA201	Complex Variables and Transforms	3	1	0	4	40	60	100	BS
2	25CE201	Engineering Statics and Dynamics	3	1	0	4	40	60	100	ES
3	25PH201	Applied Physics	3	0	0	3	40	60	100	BS
4	25CY201	Chemistry of Building Materials II	3	0	0	3	40	60	100	BS
5	25HS201	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	40	60	100	HS
PRACTICALS										
6	25HS21_	Language Elective	0	0	4	2	60	40	100	HS
7	25BS211	Basic Sciences Laboratory II	0	0	4	2	60	40	100	BS
8	25CE211	Engineering Practices Laboratory	0	0	2	1	60	40	100	ES
9	25CE212	Problem Solving using Python Programming Laboratory	0	0	4	2	60	40	100	ES
10	25EEC01	Workplace Communication Skills	0	0	2	Grade	100	0	100	EEC
MANDATORY COURSES										
11	25GEM02	Activity Point Programme I*	-	-	-	Grade	-	-	-	MC
Total 31 periods			**13**	**2**	**16**	**22**	**540**	**460**	**1000**	

****As per AICTE Norms**

*** As per AICTE Norms; Total: 60 hrs.; Grade: Non-credit Course**

CAT – Category; BS – Basic Science; HS – Humanities and Social Sciences; ES – Engineering Sciences; PC – Professional Core; PE – Professional Elective; OE – Open Elective; EEC – Employability Enhancement Course; MC – Mandatory Course; CA – Continuous Assessment; ESE – End Semester Examination

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER III										
THEORY										
1	25MA304	Matrix Theory and Numerical Methods	3	1	0	4	40	60	100	BS
2	25CE301	Mechanics of Solids I	3	1	0	4	40	60	100	ES
3	25CE302	Construction Materials and Practices	3	0	0	3	40	60	100	PC
4	25CE303	Surveying	3	1	0	4	40	60	100	PC
5	25HS301	Project and Finance Management	3	0	0	3	40	60	100	HS
PRACTICALS										
6	25CE311	Strength of Materials Laboratory	0	0	2	1	60	40	100	ES
7	25CE312	Survey Practice	0	0	4	2	60	40	100	PC
8	25EEC02	Foundations of Problem Solving	0	0	2	1	100	0	100	EEC
MANDATORY COURSES										
9	25MC0__	Mandatory Course I	2	0	0	Grade	100	0	100	MC
10	25GEM03	Activity Point Programme II*	-	-	-	Grade	-	-	-	MC
Total 28 periods			**17**	**3**	**8**	**22**	**520**	**380**	**900**	

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER IV										
THEORY										
1	25CE401	Mechanics of Solids II	3	1	0	4	40	60	100	ES
2	25CE402	Hydraulic Engineering	3	1	0	4	40	60	100	ES
3	25CE403	Basic Structural Steel Design	3	1	0	4	40	60	100	PC
4	25CE404	Highway and Railway Engineering	3	0	0	3	40	60	100	PC
5	25 __O__	Open Elective I	3	0	0	3	40	60	100	OE
PRACTICALS										
6	25CE411	Concrete Technology and Highway Laboratory	0	0	4	2	60	40	100	PC
7	25CEE01	Mini Project I	0	0	2	1	100	0	100	EEC
8	25EEC03	Problem Solving	0	0	2	1	100	0	100	EEC
MANDATORY COURSES										
9	25MC0__	Mandatory Course II	2	0	0	Grade	100	0	100	MC
10	25GEM04	Activity Point Programme III*	-	-	-	Grade	-	-	-	MC
Total 28 periods			**17**	**3**	**8**	**22**	**560**	**340**	**900**	

*** As per AICTE Norms; Total: 60 hrs.; Grade: Non-credit Course**

CAT – Category; BS – Basic Science; HS – Humanities and Social Sciences; ES – Engineering Sciences; PC – Professional Core; PE – Professional Elective; OE – Open Elective; EEC – Employability Enhancement Course; MC – Mandatory Course; CA – Continuous Assessment; ESE – End Semester Examination

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER V										
THEORY										
1	25CE501	Structural Analysis I	3	1	0	4	40	60	100	PC
2	25CE502	Design of RC Elements	3	1	0	4	40	60	100	PC
3	25CE503	Mechanics of Soil	3	1	0	4	40	60	100	PC
4	25CE504	Water Supply Engineering	3	0	0	3	40	60	100	PC
5	25 __O__	Open Elective II	3	0	0	3	40	60	100	OE
PRACTICALS										
6	25CE511	Soil Mechanics Laboratory	0	0	2	1	60	40	100	PC
7	25CE512	Hydraulics and Hydraulic Machinery Laboratory	0	0	2	1	60	40	100	ES
8	25CEE02/ 25CEE03	Internship I / Community Project	0	0	0	1	100	0	100	EEC
9	25EEC04	Aptitude Skills	0	0	2	1	100	0	100	EEC
MANDATORY COURSES										
10	25GEM05	Activity Point Programme IV*	-	-	-	Grade	-	-	-	MC
Total 24 periods			**15**	**3**	**6**	**22**	**520**	**380**	**900**	

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER VI										
THEORY										
1	25CE601	Structural Analysis II	3	1	0	4	40	60	100	PC
2	25CE602	Construction Project Management	3	0	0	3	40	60	100	PC
3	25CE603	Waste Water Engineering	3	1	0	4	40	60	100	PC
4	25CE604	Foundation Engineering	3	0	0	3	40	60	100	PC
5	25CE605	Design of Steel Structures	3	1	0	4	40	60	100	PC
PRACTICALS										
6	25CE611	Environmental Engineering Laboratory	0	0	4	2	60	40	100	PC
7	25CE612	Building Planning and Drafting Laboratory	0	0	2	1	60	40	100	PC
8	25CEE04	Mini Project II	0	0	2	1	100	0	100	EEC
9	25EEC05	Enhancing Problem Solving Ability with Code	0	0	2	1	100	0	100	EEC
MANDATORY COURSES										
10	25GEM06	Activity Point Programme V*	-	-	-	Grade	-	-	-	MC
Total 28 periods			**15**	**3**	**10**	**23**	**520**	**380**	**900**	

*** As per AICTE Norms; Total: 60 hrs.; Grade: Non-credit Course**

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S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER VII										
THEORY										
1	25CE701	Estimation and Costing	3	1	0	4	40	60	100	PC
2	25CEP__	Professional Elective I	3	0	0	3	40	60	100	PE
3	25CEP__	Professional Elective II	3	0	0	3	40	60	100	PE
4	25CEP__	Professional Elective III	3	0	0	3	40	60	100	PE
5	25CEP__	Professional Elective IV	3	0	0	3	40	60	100	PE
PRACTICALS										
6	25CE711	Design and Detailing of Structures	1	0	4	3	50	50	100	PC
7	25CE712	Computer Analysis and Design Laboratory	0	0	4	2	60	40	100	PC
8	25CEE05	Project Work I	0	0	4	2	100	0	100	EEC
9	25CEE06	Internship II	0	0	0	1	100	0	100	EEC
Total 29 periods			**16**	**1**	**12**	**24**	**510**	**390**	**900**	

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER VIII										
THEORY										
1	25CEP__	Professional Elective V	3	0	0	3	40	60	100	PE
2	25CEP__	Professional Elective VI	3	0	0	3	40	60	100	PE
PRACTICALS										
3	25CEE07	Project Work II	0	0	8	4	60	40	100	EEC
Total 14 periods			**6**	**0**	**8**	**10**	**140**	**160**	**300**	

CAT – Category; BS – Basic Science; HS – Humanities and Social Sciences; ES – Engineering Sciences; PC – Professional Core; PE – Professional Elective; OE – Open Elective; EEC – Employability Enhancement Course; MC – Mandatory Course; CA – Continuous Assessment; ESE – End Semester Examination

SUMMARY OF CREDIT DISTRIBUTION

B.E. CIVIL ENGINEERING										
S. No.	Course Category	Credits Per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HS	5	3	3	0	0	0	0	0	11
2	BS	12	12	4	0	0	0	0	0	28
3	ES	6	7	5	8	1	0	0	0	27
4	PC	0	0	9	9	16	21	9	0	64
5	PE	0	0	0	0	0	0	12	6	18
6	OE	0	0	0	3	3	0	0	0	6
7	EEC	0	0	1	2	2	2	3	4	14
8	MC	-	-	-	-	-	-	-	-	-
TOTAL		**23**	**22**	**22**	**22**	**22**	**23**	**24**	**10**	**168**

CAT – Category; BS – Basic Science; HS – Humanities and Social Sciences; ES – Engineering Sciences; PC – Professional Core; PE – Professional Elective; OE – Open Elective; EEC – Employability Enhancement Course; MC – Mandatory Course

LIST OF PROFESSIONAL ELECTIVE COURSES: VERTICALS

S. No.	Vertical – I (Structural Engineering and Construction Practices)	Vertical – II (Environmental and Water Resources Engineering)	Vertical – III (Geo-informatics and Geo-technical Engineering)	Vertical – IV (Diversified)
1	25CEP01 Prefabricated Structures	25CEP09 Air Pollution and Control Engineering	25CEP17 Ground Improvement Techniques	25CEP25 Airport Docks and Harbour Engineering
2	25CEP02 Finite Element Analysis	25CEP10 Environmental Impact Assessment	25CEP18 Total Station and GPS Surveying	25CEP26 Housing Planning and Management
3	25CEP03 Structural Dynamics and Earthquake Resistant Design	25CEP11 Industrial Waste Management	25CEP19 Geographic Information Systems	25CEP27 Traffic Engineering, Safety and Management
4	25CEP04 Prestressed Concrete Structures	25CEP12 Hydrology and Water Resources Engineering	25CEP20 Remote Sensing Techniques and Applications	25CEP28 Smart City Planning and Development
5	25CEP05 Repair and Rehabilitation of Structures	25CEP13 Solid Waste Management	25CEP21 Geosynthetics in Civil Engineering	25CEP29 Design of Energy Efficient Buildings
6	25CEP06 Sustainable and Lean Construction	25CEP14 Irrigation Engineering	25CEP22 Pavement Engineering	25CEP30 Digital Construction Techniques
7	25CEP07 Advanced Reinforced Concrete Design	25CEP15 Watershed Conservation and Management	25CEP23 Disaster Management and Mitigation	25CEP31 Architecture for Civil Engineering
8	25CEP08 Advanced Concrete Technology	25CEP16 Groundwater Engineering	25CEP24 Cartography	25CEP32 Environment, Health and Safety

LIST OF PROFESSIONAL ELECTIVE COURSES FOR MINOR DEGREE PROGRAMME

S. No.	Course Code	Course Title
1	25CEM01	Construction Engineering Practices
2	25CEM02	Estimation, Costing and Valuation
3	25CEM03	Geotechnical Engineering
4	25CEM04	Surveying Techniques
5	25CEM05	Transportation Engineering
6	25CEM06	Water and Wastewater Engineering
7	25CEM07	Pollution Control and Management
8	25CEM08	Waste Management for Circular Economy
9	25CEM09	Structural Analysis and Design

SEMESTER I

25MA101 CALCULUS AND ITS APPLICATIONS
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

3 1 0 4

DIFFERENTIAL CALCULUS: Functions of two variables, limits and continuity, partial derivatives, chain rule, extreme values and saddle points, Lagrange multipliers, Taylor's formula for two variables. **(9+3)**

INTEGRAL CALCULUS: Double and iterated integrals over rectangles, double integrals over general regions, Fubini's theorem, area and volume by double integration, reversing the order of integration, double integrals in polar form. **(9+3)**

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS: Basic concepts, separable differential equations, exact differential equations, integrating factors, linear differential equations, modeling - mixing problems, Newton's law of cooling, decay and growth problems. **(9+3)**

SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS: Homogeneous linear equations of second order, homogeneous linear ODEs with constant coefficients, Euler–Cauchy equations, solution by variation of parameters, free oscillations mass spring systems, electric circuits. **(9+3)**

VECTOR CALCULUS: Gradient and directional derivative of a scalar field, divergence and curl of a vector field. Integration in vector field – line integrals, path independence of line integrals, Green's theorem in the plane, divergence theorem of Gauss and Stokes' theorem. **(9+3)**

Total L: 45 + T: 15 = 60 periods

TEXT BOOKS

1. J. Hass, C. Heil, and D. W. Maurice, '*Thomas' Calculus'*. Pearson Education, New Delhi, 2018.
2. Erwin Kreyszig, '*Advanced Engineering Mathematics*'. Wiley India, New Delhi, 2018.

REFERENCES

1. H. Anton, I. Bivens, and S. Davis, '*Calculus*'. John Wiley and Sons, USA, 2016.
2. C. R. Wylie, and L.C. Barrett, '*Advanced Engineering Mathematics*'. Tata McGraw-Hill, New Delhi, 2019.
3. D. G. Michael, '*Foundations of Applied Mathematics*'. Dover Publications, New York, 2013.
4. Gilbert Strang, '*Calculus*'. Wellesley Cambridge Press, USA, 2017.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the concepts related to Calculus, Differential Equations and Vector Calculus.	**K2**
CO2	Apply the techniques of Calculus, Differential Equations and Vector Calculus to solve engineering problems.	**K3**
CO3	Analyze the solutions of engineering problems employing Calculus, Differential Equations and Vector Calculus.	**K4**
CO4	Use modern tools to solve engineering problems with the help of Calculus, Differential Equations and Vector Calculus.	-

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3												
CO3		1											
CO4					1								
@	**3**	**1**			**1**								

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25PH101 PHYSICS FOR CIVIL ENGINEERING

3 0 0 3

PROPAGATION OF ELASTIC WAVES: Simple harmonic motion. Velocity damping. Damping coefficient. Differential equation of SHM. Velocity and acceleration. Restoring force. Vibration of a spring and mass system. Frequency response, phase response and resonance. Definition of a plane progressive wave. Attenuation of waves. Differential equation of a plane progressive wave. Phase velocity. Phase and phase difference. Solution of the differential equation of a plane progressive wave. **(9)**

TESTING OF MATERIALS BY ELASTIC WAVE PROPAGATION: Impact echo method-determination of thickness of concrete and flaw detection. S, P and R waves and their dependence on elastic moduli. Ultrasonic flaw detection-Frequency and power. Pulse echo method of flaw detection. Single and phase-array transducers-waveform synthesis and scanning-A, B, C and S Scan. **(9)**

LASERS: Properties of laser radiation and their significance-wavelength, power, monochromaticity, coherence. Types of lasers-working media and their radiation characteristics-Power, wavelength and operational modes of He-Ne, Nd-YAG, Carbon-dioxide, diode lasers. Physical principles of Laser beam delivery systems. Applications-Ranging and survey, cutting and welding. **(9)**

FLUID PROPERTIES & DIMENSIONAL ANALYSIS: Dimensions and units - Fluid properties - Types of fluids - Hydrostatic law; Pascal's law - Atmospheric, Absolute, Gauge and Vacuum pressures - Measurement of pressure by various types of manometers and mechanical gauges. Methods of Dimensional Analysis - Rayleigh's method - Buckingham's theorem. **(9)**

THERMAL PROPERTIES: Specific heat capacity, thermal capacity. Coefficient of linear thermal expansion. Methods of measurement of thermal expansion. Thermal stresses in composite structures due to non-homogeneous thermal expansion. Applications -The bimetallic strip. Expansion gaps and rollers in engineering structures. **(9)**

Total L: 45 periods

TEXT BOOKS

1. M. N. Avadhanulu, and P. G. Kshirsagar, '*A Text Book of Engineering Physics'.* S. Chand and Company, New Delhi, 2018.
2. Ronald L Panton, '*Incompressible Flow'.* Wiley, 2024.
3. R. K. Bansal, '*A Textbook of Fluid Mechanics and Hydraulic Machines'.* Laxmi Publications, New Delhi, 2023.

REFERENCES

1. F. S. Crawford, Jr., '*Waves – Berkeley Physics Course'.* Tata McGraw-Hill, 2008.
2. James F. Shackelford, '*Introduction to Material Science for Engineers'.* Prentice Hall, 2019.
3. Raymond A. Serway, and John W. Jewett, '*Physics for Scientists and Engineers'.* Cengage Learning, 2019.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the basic principles of elastic wave propagation, laser properties, fluid dynamics, and thermal expansion in engineering systems.	**K2**
CO2	Apply mathematical and physical principles to calculate wave velocity, pressure, and thermal expansion, and interpret measurement techniques in material testing and laser-based engineering applications.	**K3**
CO3	Examine the effects of elastic wave propagation, fluid pressure, thermal expansion and laser-material interactions on material integrity using experimental data and analytical techniques.	**K4**
CO4	Prepare a report or presentation on the practical applications of wave testing, laser systems, thermal stress analysis, and fluid pressure measurement techniques in engineering materials	**-**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3												
CO3		1											
CO4						1			1		1		
@	**3**	**1**				**1**			**1**		**1**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CY101 CHEMISTRY OF BUILDING MATERIALS I

3 0 0 3

MATERIALS FOR MAKING CONCRETE – I: Water - Hardness, Determination by EDTA method – Ion Exchange method of water softening. Water quality standards for construction. CEMENT: Chemical composition, manufacturing of Portland cement – dry and wet processes – reactions in rotary kiln. Setting and hardening of cement - hydration of cement- microstructure of cement paste. Types of Portland cements – rapid hardening cement, low heat cement, sulphate resisting cement, Super sulphated Portland cement, Pozzolana cement, Portland Slag cement. **(9)**

MATERIALS FOR MAKING CONCRETE – II: AGGREGATES **-** Classification and characteristics of aggregates – Strength, Stiffness, bond strength, specific gravity, bulk density, voids and porosity. Fine aggregate, Coarse aggregate, Cinder aggregate, alkali aggregate reaction – mechanism and factors affecting and control measures on alkali-aggregate reaction. Admixtures and Mineral Additives. **(9)**

POLYMERS: Classification, degree of polymerization, weight and number average molecular weights (Definition only). Polymerization reactions, step and chain mechanism. Compounding of plastics, polymer processing by injection, extrusion, compression and blow moulding techniques. Polymers in civil engineering- Reinforced Plastics – Glass Fibre Reinforced plastics, coating, polymer concretes. Thermal insulating foams. Plastic products – Floor tiles, floor finishes, PVA floor finish, Roofing – PVC and Glass fibre reinforced plastic corrugated roofing sheets. **(9)**

CORROSION AND ITS PREVENTION: Electrode potential – emf and galvanic series, corrosion rate expression, E/ pH diagram of iron, electrode polarization – passivation, polarization curves. Oxidation – mechanism, Pilling – Bedworth rule. Galvanic corrosion, differential aeration corrosion, atmospheric corrosion, pitting corrosion, waterline corrosion and soil corrosion. Factors influencing corrosion, corrosion of rebars in concrete. Corrosion control -cathodic protection, anodic protection, selection of materials and proper designing. **(9)**

PAINTS AND VARNISHES: PAINTS – Paints – constituents and their functions, types – Water paint, Aluminum paint, Bituminous paint, Cellulose paint, Cement paint, Graphite paint, Silicate paint. Defects in Painting. Varnishes – Characteristics and ingredients of a Varnish, types of varnish – Oil varnish, turpentine varnish, Sprit varnish. Coatings –Electroplating of metals – Cu, Ni, Cr and applications. **(9)**

Total L: 45 periods

TEXT BOOKS:

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

REFERENCES:

1. N. Jackson, and R. K. Dhir, '*Civil Engineering Materials*'. Brijbasi Art press Ltd., Noida, 2007.
2. S. Shan, '*Civil Engineering Materials*'. Pearson Education. Inc – Prentice Hall, New Delhi, 2012.
3. S. K. Duggal, '*Building Materials*'. New Age International Publishers, New Delhi, 5th Edition, 2019.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Understand the basic properties of materials for making concrete.	**K2**
CO2	Apply the suitable materials for developing civil engineering products.	**K3**
CO3	Analyze the strength of materials for building construction.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3										3		
CO3								1	1				
@	**3**							**1**	**1**		**3**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE101 ENGINEERING GEOLOGY

3 0 0 3

GENERAL GEOLOGY: Geology in Civil Engineering– Branches of geology–Earth Structures and composition– Elementary knowledge on continental drift and plate tectonics-Geological Time scale--Earth processes Weathering Types of soils – Work of rivers and wind and their engineering importance. Engineering Seismology –causes of earthquakes; seismic waves; magnitude, intensity and energy release, seismic zones of India-Earthquake belts in world. **(9)**

MINERALOGY: Elementary knowledge on symmetry elements of important crystallographic systems – physical properties of minerals – study of the following rock forming minerals – Quartz family. Feldspar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Gypsum, Garnet – Identification of minerals - Properties, behaviour and engineering significance of clay minerals – Fundamentals of process of formation of ore minerals – Coal and petroleum – Their origin and occurrence in India. **(9)**

PETROLOGY: Classification of rocks – distinction between igneous, sedimentary and metamorphic rocks. Description, occurrence, engineering properties sand distribution of following rocks. Igneous rocks – Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt. Sedimentary rocks - Sandstone, Limestone, Shale, Conglomerate and Breccia. Metamorphic rocks - Quartzite, Marble, Slate, Charnockite, Phyllite, Gneiss and Schist–Identification of rocks and commercial granites and marbles - Testing on rock as a construction material. **(9)**

STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD: Attitude of beds–Outcrops-Introduction to Geological maps– Study of structures – Folds, faults and joints – Their bearing on engineering construction. Seismic and Electrical methods for Civil Engineering investigations – Clinometer - Brunton Compass - Geology of India-Types and occurrence of rock formation. **(9)**

GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING: Remote sensing techniques - Applications in Civil Engineering - Groundwater-occurrence–investigation, quality, recharge – importance in civil engineering. Geological conditions necessary for construction of Dams, Tunnels, Buildings, Road Cuttings-Landslides–Causes and prevention. Sea erosion and coastal protection. **(9)**

TOTAL L: 45 periods

TEXT BOOKS:

1. Parbin Singh, '*Engineering and General Geology*'. Katson Books, New Delhi, 2013.
2. Tony Waltham, '*Foundations of Engineering Geology*'. Spon Press, New York, 2009.

REFERENCES:

1. F. G. H. Blyth, and M. H. de Freitas, '*A Geology for Engineers*'. Edward Arnold, London, 2017.
2. Gokhale, '*Principles of Engineering Geology*'. BS Publications, Hyderabad, 2019.
3. F. G. Bell, '*Fundamentals of Engineering Geology*'. BS Publications, Hyderabad, 2020.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Elaborate the geological phenomenon in the earth and differentiate the various types of minerals, rocks and their sub groups based on the physiochemical properties.	**K2**
CO2	Interpret and Select the appropriate geophysical methods and modern techniques for surface and sub-surface explorations for mapping and construction of various civil engineering projects.	**K3**
CO3	Demonstrate the necessary geological conditions for investigating & executing different Civil Engineering applications through case study presentation.	**-**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3	2											
CO3								3	3				
@	**3**	**2**						**3**	**3**				

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25HS101 ENGLISH LANGUAGE PROFICIENCY
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

3 1 0 4

VOCABULARY: Etymology-Prefixes and suffixes–Synonyms–Antonyms–Guessing meanings from context–Word formation- Single-word substitutes- Different forms of a word–Phrasal verbs–Collocations. **(9+3)**

LISTENING AND SPEAKING: Understanding listening – Listening techniques - Introducing oneself and others –Seeking and sharing information– Description-Conversation skills– Extempore speaking– Speech practice in varied formal contexts. **(9+3)**

GRAMMAR: Wh-questions – Yes/no questions– Parts of speech – Articles– Prepositions–Gerunds–Conjunctions-Degrees of comparison– Tenses– Modal verbs – Adverbs - Direct and indirect questions. **(9+3)**

READING: Reading strategies: Skimming and scanning, predicting– Reading comprehension: techniques – Practice reading. **(9+3)**

WRITING: Discourse markers – Dialogue writing - Completing sentences – Jumbled sentences – Paragraph writing –Writing compare & contrast paragraphs – Letter writing. **(9+3)**

Total L: 45 + T: 15 = 60 periods

TEXTBOOKS:

1. K. N. Shoba, and Lourdes Joavani Rayen, '*Communicative English*'. Cambridge University Press, Cambridge, 2021.
2. Raymond Murphy, '*Intermediate English Grammar*'. Cambridge University Press, New Delhi, 2020.
3. Dr. M. Sambaiah, '*Technical English an integrated text book*'. Wiley India Pvt. Ltd., 2025.

REFERENCES:

1. Raymond Murphy, '*English Grammar in Use*'. Cambridge University Press, New Delhi 2020.
2. N. P. Sudharshana, and C. Savitha, '*English for Engineers*'. Cambridge University Press, New York, 2018.
3. Helen Naylor with Raymond Murphy, '*Essential English Grammar*'. Cambridge University Press, New Delhi, 2019.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Demonstrate the ability to recognize and use a wide range of vocabulary and key grammatical structures accurately, while developing inferential reading skills to comprehend, interpret, and analyze written texts across diverse contexts.	**K2**
CO2	Organize their ideas logically in essay writing, develop paragraphs with clear topic sentences and adapt their letter-writing skills to various real-world scenarios.	**K3**
CO3	Develop and demonstrate clear and confident speaking skills in formal and informal contexts.	**-**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1										3			
CO2										3			
CO3										1			
@										**3**			

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25HS102 *தமிழர் மரபு*

(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

1 0 0 1

மொழி மற்றும் இலக்கியம்: *இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச்சார் பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.* **(3)**

மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக்கலை: *நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரி முனையில் திருவள்ளுவர் சிலை – இசைக்கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வியல் கோவில்களின் பங்கு.* **(3)**

நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள்: *தெருக்கூத்து, கரகாட்டம், வில்லுப் பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.* **(3)**

தமிழர்களின் திணைக்கோட்பாடுகள்: *தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்க கால நகரங்களும் துறைமுகங்களும் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.* **(3)**

இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: *இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப் பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப் படிகள் – தமிழ் புத்தகங்களின் அச்சு வரலாறு.* **(3)**

Total L: 15 periods

25HS102 HERITAGE OF TAMILS
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

1 0 0 1

LANGUAGE AND LITERATURE: Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in 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. **(3)**

HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE: Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils. **(3)**

FOLK AND MARTIAL ARTS: Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils. **(3)**

THINAI CONCEPT OF TAMILS: 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. **(3)**

CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE: 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. **(3)**

Total L: 15 periods

TEXT BOOK

1. V. Priyadharshini, '*தமிழர் மரபு (Heritage of Tamils)'.* VK publications, Sivakasi.

REFERENCE BOOKS

1. *கே .கே .பிள்ளை 'தமிழக வரலாறு'.- மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம் .*
2. *முனைவர் இல.சுந்தரம் 'கணினித்தமிழ்'. விகடன் பிரசுரம்.*
3. *கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு.*
4. *பொருநை – 'ஆற்றங்கரை நாகரிகம்'. தொல்லியல் துறை வெளியீடு.*
5. Dr. K. K. Pillay, '*Social Life of Tamils*'. A joint publication of TNTB, ESC and RMRL.
6. Dr. S. Singaravelu, '*Social Life of the Tamils – The Classical Period*'. International Institute of Tamil Studies.
7. Dr. S. V. Subaramanian, and Dr. K. D. Thirunavukkarasu, '*Historical Heritage of the Tamils*'. International Institute of Tamil Studies.
8. Dr. M. Valarmathi, '*The Contributions of the Tamils to Indian Culture*'. International Institute of Tamil Studies.
9. Department of Archaeology, '*Keeladi - Sangam City Civilization on the banks of river Vaigai*'. Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
10. Dr. K. K. Pillay, '*Studies in the History of India with Special Reference to Tamil Nadu'.*
11. Department of Archaeology, *'Porunai Civilization*'. Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
12. R. Balakrishnan, '*Journey of Civilization Indus to Vaigai RMRL*'. Tamil Nadu.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Describe the Dravidian language family, outline the features of Tamil classical literature, and explain the development of Tamil art, sculpture, and temple-related traditions in a historical context.	**K2**
CO2	Demonstrate the cultural relevance of Tamil folk and martial arts, apply the concepts of Sangam landscape classification to social contexts, and relate Tamil contributions to India's freedom struggle, cultural legacy, and Siddha medicine.	**K3**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1								2					
CO2								2					
@								**2**					

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25BS111 BASIC SCIENCES LABORATORY I

0 0 4 2

Physics (Any eight experiments)

1. Determination of rigidity modulus of a wire and moment of inertia of irregular objects – Torsional Pendulum.
2. Determination of Young's modulus of the material - Non-Uniform Bending.
3. Measurement of hall coefficient of a semiconductor using Hall Effect setup.
4. Determination of electrical resistivity of a given material using four probe setups.
5. Determination of wavelength of laser using diffraction grating -LASER.
6. Determination of Thickness of a thin wire – Air wedge method.
7. Study of I-V characteristics of solar cells and determination of its efficiency.
8. Determination of velocity of sound and compressibility of liquid - Ultrasonic Interferometer.
9. Determination of Planck's constant and work function of a metal - Photoelectric Effect.
10. Determination of bandgap of a semiconductor – Post office box.
11. Determination of specific heat capacity of a metal object.
12. Verification of Hooke's Law and calculating Spring Potential Energy.

Demonstration:

1. Determination of Numerical Aperture and Acceptance angle - Optical Fiber.
2. Determination of vibration frequency by Melde's Apparatus.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Relate the scientific principles, compare the experimental results with theoretical calculations, and apply graphical analysis to visualise the importance of precise measurements.	**K3**
CO2	Analyse the experimental result outcomes using analytical and experimental skills for various engineering materials and applications.	**K4**

Chemistry (Any seven experiments)

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of strength of acids in a mixture of acids using conductivity meter.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Electroplating of nickel /copper and determination of coulombic efficiency.
6. Estimation of combined ferric oxide and alumina in Portland cement.
7. Determination of Chloride in Hardened Portland Cement Concrete.
8. Photo-colorimetric estimation of Ferric ion in a water sample.

Total P: 60 periods

REFERENCES:

1. Department of Physics, '*Physics Laboratory Observation*'. 2025.
2. Jerry D Wilson, A. Cecilia, and Hernandez Hall, '*Physics Laboratory Experiments*'. Boston, MA: Cengage Learning, 2016.
3. J Mendham, Vogel's, '*Textbook of Quantitative Chemical Analysis 6th Ed*'. Pearson Education 2009.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO3	Demonstrate the measurement of water quality parameters in the given water sample.	**K3**
CO4	Analyze the properties of materials for Engineering applications.	**K4**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		2											
CO3	3								3		3		
CO4				3				3					
@	**3**	**2**		**3**				**3**	**3**		**3**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE111 ENGINEERING DRAWING

0 0 4 2

INTRODUCTION TO ENGINEERING GRAPHICS (2)

1. Introduction to Engineering Graphics.
2. Lettering and Dimensioning as per BIS.

SCALES (4)

1. Construction of Diagonal and Vernier scales.

ORTHOGRAPHIC PROJECTIONS (30)

1. Introduction to Orthographic Projections.
2. Drawing multiple views from pictorial views of objects.
3. Projection of points.
4. Projection of straight lines (only First angle projections) inclined to both the principal planes.
5. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.
6. Projection of simple solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.

SECTION OF SOLIDS (8)

1. Section of simple solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other and obtaining true shape of section.

ISOMETRIC PROJECTIONS (8)

1. Isometric projection of simple solids in simple vertical positions.

BUILDING DRAWING USING AUTOCAD (8)

1. Introduction to AutoCAD basic commands.
2. Plan and Elevation of Residential building using AutoCAD.

Total P: 60 periods

TEXT BOOKS:

1. N. D. Bhatt, '*Engineering Drawing*'. Charotar Publishing House Pvt. Ltd., 55th Edition, 2025.
2. K. C. John, '*Engineering Graphics for Degree*'. Prentice Hall India Publishers, 2009.
3. K. V. Natarajan, '*A Text book of Engineering Graphics*'. Dhanalakshmi Publications, 34th Refined Edition, 2021.

REFERENCES:

1. K. Venugopal, and V. Prabhu Raja, '*Engineering Drawing + AutoCAD and Building Drawing*'. New Age International Publishers, 7th Edition, 2026.
2. Bureau of Indian Standards, '*Engineering Drawing Practices for Schools and Colleges SP 46-2003*'. BIS, New Delhi, 2003

COURSE OUTCOMES

At the end of the course, students will be able to:		Bloom's Level
CO1	Use the BIS standards and specifications for drawing the engineering components and structures.	**K2**
CO2	Apply orthographic and pictorial projection principles to draw projections of points, lines, planes, solids, sectioned solids, development of lateral surfaces of regular and truncated solids, and isometric views engineering components and 3D objects.	**K3**
CO3	Develop models of typical engineering components and 3D objects manually and using software.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3												
CO3					1								
@	**3**				**1**								

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25GE111 DESIGN THINKING FOR INNOVATION

(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 2 1

Foundations of Design Thinking: History & Origins: Roots in Creative Problem Solving: Traces back to mid-20th century practices in architecture, engineering, and psychology. Herbert Simon's "Sciences of the Artificial" (1969): Introduced design as a way of thinking distinct from scientific inquiry. IDEO and the Rise of Human-Centered Design: Popularized design thinking as a repeatable, user-focused innovation process. Stanford school's Influence: Helped institutionalize design thinking in education and entrepreneurship.

Variations of Design Thinking Phases: IDEO's 3-Phase Model: Inspiration, Ideation, Implementation A flexible, non-linear approach emphasizing creativity and action. Stanford school's 5-Phase Model: Empathize, Define, Ideate, Prototype, Test A structured yet iterative framework centered on user empathy. Double Diamond Model (Design Council UK): Divides the process into Discover, Define, Develop, and Deliver—highlighting divergent and convergent thinking.

Related Concepts & Frameworks: Human-Centered Design (HCD): Focuses on designing solutions that deeply resonate with users' needs and contexts. Systems Thinking: Encourages understanding the broader ecosystem and interdependencies within a problem space. Agile & Lean UX: Integrates design thinking with iterative development and minimal viable experimentation. Service Design: Applies design thinking to orchestrate holistic user experiences across touchpoints. Participatory Design: Involves stakeholders directly in the design process to ensure relevance and inclusivity.

EMPATHIZE: Apply Human-Centric Design Principles: Focus on designing solutions that prioritize user needs, experiences, and values throughout the process. Consult Experts: Engage with subject matter experts to gain foundational knowledge about the problem space. Competitive Analysis: Identify & studying similar products or services to identify gaps and opportunities. Stakeholder Interviews: Engaging with people who influence or are affected by the product or service. Conduct Observations: Observe users in their natural environment to understand behaviors, challenges, and interactions. Engage with Users: Use interviews, conversations, and other methods to connect with users and hear their stories. Immerse Yourself: Step into the users' context to experience their environment and challenges firsthand. Create Empathy Maps: Visualize what users say, think, feel, and do to synthesize insights. Identify User Needs and Pain Points: Extract meaningful patterns and needs from user interactions and observations. Set Aside Assumptions: Approach the research with an open mind, suspending personal biases and preconceptions. Document Insights: Capture quotes, observations, and emotional cues to inform the next stage (Define). **(6)**

DEFINE: Organize Research Findings: Review and structure the data collected during the Empathize stage. Analyze Observations: Identify patterns, themes, and insights from user interactions and behaviors. Craft a Human-Centered Problem Statement: Frame the problem from the user's perspective, focusing on their needs—not business goals. Avoid Business-Centric Framing: Refrain from defining problems based on company objectives alone (e.g., market share). Persona Development: Synthesizing research into user personas to guide design decisions. Use Empathy to Guide Definition: Ensure the problem statement reflects real user challenges and motivations. Develop Point-of-View Statements: Create concise summaries that capture who the user is, what they need, and why. Prepare for Ideation: Formulate "How Might We" questions to spark creative thinking in the next phase. **(6)**

IDEATE: Review the Problem Statement: Revisit the user-centric problem defined in the previous stage to guide ideation. Explore Multiple Perspectives: Encourage diverse viewpoints to broaden the range of potential solutions. Use Ideation Techniques: Apply methods like Brainstorming, Brain writing, SCAMPER, and Worst Possible Idea to spark creativity. Encourage Free Thinking: Create a judgment-free space to generate as many ideas as possible without filtering. Expand the Problem Space Push boundaries and explore unconventional or extreme ideas to uncover hidden opportunities. Refine and Select Ideas: Use evaluation techniques to identify promising concepts that address user needs effectively. Prepare for Prototyping: Choose ideas that are feasible and impactful to develop into tangible prototypes in the next stage. **(6)**

PROTOTYPE: Build Low-Cost Prototypes: Create simple, scaled-down versions of the product or its features to explore ideas. Experiment with Solutions: Implement different solutions from the Ideate stage into prototypes for testing. Test Internally and Externally: Share prototypes with team members, other departments, or a small group of users. Observe User Interactions: Watch how users engage with the prototypes to uncover usability issues and insights. Evaluate and Iterate: Accept, refine, or discard prototypes based on user feedback and performance. Identify Limitations: Discover constraints and challenges in the proposed solutions through hands-on testing. Gain Deeper User Understanding: Learn how users think, feel, and behave when interacting with the product. **(6)**

TEST: Conduct Rigorous Testing: Evaluate the complete product using the most promising prototypes. Observe Real User Interactions: Study how users behave, think, and feel while using the product. Gather Feedback and Insights: Collect qualitative and quantitative data to assess usability and effectiveness. Identify Remaining Issues: Detect limitations, pain points, and areas for improvement. Refine and Iterate: Use test results to improve the product and revisit earlier stages if needed. Redefine Problems if Necessary: Reframe or adjust problem statements based on new insights. Enhance Understanding of Users: Deepen empathy and knowledge of user needs through real-world testing. **(6)**

Design Thinking & Customer Centricity: A human-centered approach that blends empathy and innovation to create solutions that truly resonate with customer needs. Practical Examples of Customer Challenges: Real-world scenarios where customers face friction, unmet needs, or emotional disconnects in their product or service journey. Use of Design Thinking to Enhance Customer Experience: Applying iterative problem-solving and user insights to craft experiences that are intuitive, delightful, and deeply relevant. Parameters of Product Experience: Key dimensions like usability, accessibility, emotional impact, and consistency that shape how customers perceive and interact with a product. Alignment of Customer Expectations with Product Design: Ensuring that every design decision reflects what customers value, expect, and aspire to achieve through the product.

Total P: 30 periods

TEXT BOOKS

1. T. Brown, '*Change by Design'*. Harper Business, 2009.
2. J. Liedtka, and T. Ogilvie, '*Designing for Growth'*. Columbia Business School Publishing, 2011.

REFERENCES

1. T. Kelley, and D. Kelley, '*Creative Confidence'*. Crown Business, 2013.
2. Stanford d. School resources: https://dschool.stanford.edu/
3. https://apphaus.sap.com/toolkit/methods#design-thinking

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Apply empathy-driven research to understand user needs.	**K3**
CO2	Frame actionable problem statements and generate creative ideas.	**K5**
CO3	Develop and test prototypes to refine innovative solutions to the real-world problems.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3					3	3	3	3		3		
CO2		2				2	2	2	2		2		
CO3			1			1	1	1	1		1		
@	**3**	**2**	**1**			**3**	**3**	**3**	**3**		**3**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25GEM01 INDUCTION PROGRAMME
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

All students shall undergo an induction programme at the beginning of the first semester for a duration of three weeks as per the guidelines of All India Council for Technical Education (AICTE). A student completing the induction programme will be awarded a completed grade in the grade sheet, and only the students who complete the induction programme shall be considered as eligible for award of degree subject to satisfying other conditions. A student who does not complete the induction programme in the first semester shall redo the same in the subsequent semester.

SEMESTER II

25MA201 COMPLEX VARIABLES AND TRANSFORMS
(Common to CIVIL, EEE, ECE, ICE, MECH and EE-VLSI)

3 1 0 4

COMPLEX DIFFERENTIATION: Derivative, analytic function, Cauchy-Riemann equations, Laplace's equation, linear fractional transformations. **(9+3)**

COMPLEX INTEGRATION: Cauchy's integral theorem, Cauchy's integral formula, derivatives of analytic functions, Laurent series, singularities and zeros, residue integration method (Residue integration of complex integrals only). **(9+3)**

LAPLACE TRANSFORMS: Laplace transform, linearity, first shifting theorem, transforms of derivatives and integrals, unit step function, second shifting theorem, Dirac's delta function, periodic functions, differentiation and integration of transforms, solving ODEs with constant coefficients and initial value problems. **(9+3)**

FOURIER ANALYSIS: Fourier series – arbitrary period, even and odd functions, half range expansions. Fourier transforms, Fourier cosine and sine transforms. **(9+3)**

PARTIAL DIFFERENTIAL EQUATIONS: Basic concepts of PDEs, wave equation, heat equation, steady state two-dimensional heat problems, solution by Fourier series. **(9+3)**

Total L: 45 + T: 15 = 60 periods

TEXT BOOKS

1. Erwin Kreyszig, '*Advanced Engineering Mathematics*'. Wiley India, New Delhi, 2018.
2. G. Z. Dennis, '*Advanced Engineering Mathematics*'. Jones and Bartlett Pvt Ltd, New Delhi, 2017.

REFERENCES

1. G. Z. Dennis, and D.S. Patrick, '*A first course in Complex Analysis with Applications*'. Jones and Bartlett Pvt Ltd, New Delhi, 2015.
2. C. R. Wylie, and L. C. Barret, '*Advanced Engineering Mathematics*'. Tata McGraw-Hill, New Delhi, 2019.
3. Peter V. O Neil, '*Advanced Engineering Mathematics*'. Cengage, New Delhi, 2018.
4. G. D. Dean, '*Advanced Engineering Mathematics with MATLAB'*. CRC Press, USA, 2017.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the concepts related to Complex Variables, Laplace Transforms, Fourier Analysis and Partial Differential Equations.	**K2**
CO2	Apply the techniques of Complex Variables, Laplace Transforms, Fourier Analysis and Partial Differential Equations to solve engineering problems.	**K3**
CO3	Analyze the solutions of engineering problems employing Complex Variables, Laplace Transforms, Fourier Analysis and Partial Differential Equations.	**K4**
CO4	Use modern tools to solve engineering problems with the help of Complex Variables, Laplace Transforms, Fourier Analysis and Partial Differential Equations.	**-**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3												
CO3		1											
CO4					1								
@	**3**	**1**			**1**								

1-low, 2-medium, 3-high @-Overall Contribution to the Course

Third ACM

25CE201 ENGINEERING STATICS AND DYNAMICS

3 1 0 4

STATICS OF PARTICLES & BODIES: Forces – Systems of forces – Concurrent forces in plane and space- Resultant equilibrium of a particle-free body diagram- rigid bodies under plane forces – moment of a force – moment of a couple – equivalent systems of coplanar forces – equilibrium of rigid bodies - types of supports - types of beams - support reactions. **(10+4)**

TRUSS ANALYSIS AND FRICTION: Analysis of trusses by method of joints and method of sections –Friction – frictional force – limiting friction – laws of static friction – coefficient of friction – angle of repose – single bodies on horizontal and inclined planes - connected bodies on horizontal and inclined planes - ladder friction - wedge friction. **(9+2)**

CENTROID, AND MOMENT OF INERTIA: 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 – moment of inertia of composite sections – polar axis – polar moment of inertia – radius of gyration – mass moment of inertia of simple solids. **(8+3)**

KINEMATICS OF PARTICLES: Types of motion – Motion curves – Rectilinear motion – time dependent motion – uniformly accelerated motion –projectile motion. **(8+3)**

KINETICS OF PARTICLES: Rectilinear motion – Newton's II law – D'Alembert's principle – Energy – potential energy – kinetic energy – conservation of energy – Work done by a force – work energy method – conservation of momentum – impulse momentum principle – Impact-Direct central impact-oblique central impact. **(10+3)**

Total L: 45 + T: 15 = 60 periods

TEXT BOOKS

1. F. P. Beer, and E. R. Johnson, '*Vector Mechanics for Engineers – Statics and Dynamics*'. Tata McGraw Hill, New Delhi, 2016
2. S. Rajasekaran, and G. Sankarasubramanian, '*Engineering Mechanics – Statics and Dynamics*'. Vikas Publishing House, New Delhi, 2006

REFERENCES

1. R. K. Bansal, '*Engineering Mechanics*', Laxmi Publications., New Delhi, 2008
2. S. S. Bhavikatti, '*A Text book of Engineering Mechanics*'. New Age International Pvt Ltd., New Delhi, 2008.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Elaborate the fundamental concepts and principles of the science of mechanics	**K2**
CO2	Compute the resultant of the coplanar forces, reactive forces under static & dynamic equilibrium conditions and moments of inertia of different cross sections	**K3**
CO3	Compare the geometrical and structural properties of the members under different practical conditions and propose the suitable support conditions & cross sections.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3											2	
CO3		2											
@	**3**	**2**										**2**	

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25PH201 APPLIED PHYSICS

3 0 0 3

ARCHITECTURAL ACOUSTICS: Concepts of sound waves-propagation of sound waves-intensity. Reverberation: Reverberation Time-Salient features for an acoustically good room. Absorption- Coefficient of absorption-Absorption materials. Sabine's Formula-Fourier spectrum. Structure of the building for an acoustically good auditorium, school, concert hall. Main parameters that affect experience—reverberation time (large spaces), early reflections, standing wave resonances (small spaces). Noise - Indoor and extraneous. Noise control methods — absorptivity, diffusers, low frequency traps. Principle of active noise cancellation. **(10)**

LIGHTING AND PHOTOMETRY: Concepts of illumination - Irradiance-brightness - Photometer - Intensity of illumination. Inverse square law and cosine law of illumination. Day lighting. Artificial lighting. Lighting in building. Design strategies using day light. Colour perception. **(8)**

THERMAL PROPERTIES: Concepts of heat- modes of propagation of heat-conduction of heat through compound medium, radial and cylindrical flow. Thermal Conductivity-Lee's method for bad conductors- Forbes method for good conductors. Thermal comfort factors- Design for minimal heat loss by conduction, radiation. Forced convection-Air filters- air showers- Greenhouse effect. **(10)**

ENERGY EFFICIENT BUILDINGS: Electrical energy - Principle of solar cells. Manufacture of solar panels. Economic considerations in using solar power. Principle of solar collectors. Factors affecting efficiency. Building envelope - economy of air conditioning and refrigeration. Principle of Passive solar buildings. **(9)**

MODERN BUILDING MATERIALS: Composites-Sandwich and laminar panels- Pultrusion - Self Cleaning Glass panes. Metallic Glass- Shape memory alloys. Seismic Sensor materials. Bio mimetic materials. **(8)**

Total L: 45 periods

TEXT BOOKS

1. M. N. Avadhanulu, P. G. Kshirsagar and T. V. S. Arun Murthy, '*A Textbook of Engineering Physics*'. S. Chand and Co., 2024.
2. R. K. Gaur, and S. L. Gupta, '*Engineering Physics*'. Dhanpat Rai Publications (P) Ltd., New Delhi 2022.
3. William D Callister Jr., '*Materials Science and Engineering – An Introduction'.* John Wiley and Sons, 2020.

REFERENCES

1. Krishnan Kumar Chawla, '*Composite Materials Science and Engineering*'. Springer, 2019.
2. Richard Wolfson, '*Essential University Physics*'. Pearson Education, Singapore, 2021.
3. R. O. Davis, and A. P. S. Selvadurai, '*Elasticity and Geomechanics*'. Cambridge University Press, 2014.
4. Paul M. Fishbane, Stephen, Gasiorowicz and Stephen T. Thornton, '*Physics for Scientists and Engineers*'. Extended Version 3rd Edition, 2014.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the principles of acoustics, lighting, thermal properties, energy efficiency, and modern building materials, emphasizing their role in building design and construction.	**K2**
CO2	Apply mathematical and analytical methods to calculate sound intensity, thermal conductivity, and lighting levels in building structures using standard design principles.	**K3**
CO3	Analyze the impact of building materials, lighting design, and thermal management strategies on energy consumption, indoor comfort, and acoustic quality in modern constructions.	**K4**
CO4	Prepare a report or presentation on sustainable building design, focusing on the integration of acoustic treatments, thermal management, and energy-efficient systems in contemporary architecture.	-

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3												
CO3		1											
CO4						1			1		1		
@	**3**	**1**				**1**			**1**		**1**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CY201 CHEMISTRY OF BUILDING MATERIALS II

3 0 0 3

METALLIC MATERIALS IN CONSTRUCTION: Ferrous metals: Iron ores – Manufacturing, Properties and uses of cast iron, wrought iron, pig Iron. Manufacturing, properties and uses of steel – mild steel, stainless steel – characteristics, high carbon steel. Non – ferrous: metals- Al, Cu, Zn, Alloys of Al, Cu, Mg, Ni – production, Properties and uses. Anodizing of aluminum, applications. **(9)**

GLASSES, INSULATING AND COMPOSITE MATERIALS: Glass – types, application in construction. Types of insulating materials – air spaces, aerated concrete, gypsum, expanded blast furnace slag, sprayed asbestos, vermiculate, coconut fibers, cork board, cellulose, fibre glass. Sound and electrical insulating materials. Classification and constituents of composites, fiber – reinforced composites and failure – particle reinforced composites, particulate composites, structural composites, advanced composite. **(9)**

GYPSUM, BITUMINOUS MATERIALS AND MIXTURES: Gypsum-Setting and hardening of gypsum-classification and manufacturing of gypsum-application- wall plasters. Bitumen, tar, pitches and asphalts – petroleum asphalts – asphalt cement, cut back asphalts, emulsified asphalts, air blown asphalts. Properties of asphalts – adhesion, specific gravity, durability, rate of curing, ageing and hardening and resistance to reaction with water. **(9)**

LOW-COST BUILDING MATERIALS: Industrial wastes: Fly ash, blast furnace slag, copper slag, red mud aggregate, steel making slag, ferro alloy slag, mine wastes, mica scrap, gypsum mines waste, Iron and gold tailings- coal washery waste and copper mine tailing Agricultural wastes - Rice husk, saw mill dust, jute stalk, sisal fibres, coconut wastes. **(9)**

INNOVATIVE BUILDING MATERIALS: Fly ash bricks, Soil – cement blocks, soil-lime blocks, mud blocks, calcium silicate bricks, Fal-G-cement, corrugated roofing sheets from coir waste. Red-mud, jute fibre polymer composite, expanded polystyrene composite, glass reinforced gypsum-medium fibre boards. **(9)**

Total L: 45 Periods

TEXT BOOKS

1. J. Neil, and R. K. Dhir, '*Civil Engineering Materials'.* Brijbasi Art Press Ltd., Noida, 2007.
2. U. K. Shrivastava, '*Building Materials Technology*'. Galgotia Publications Pvt Ltd, New Delhi., 2012.

REFERENCES

1. P. D. Kulkarni, R. Subramanian, P. S. Galion, A. Juneja, V. P. Puri, and S.K. Likhi '*Civil Engineering Materials*'. Tata McGraw Hill., New Delhi, 1997.
2. S. K. Duggal, '*Building Materials*'. New Age International Publishers., New Delhi, 5th Edition, 2019.
3. R. K. Rajput, '*Engineering Materials – Construction Materials*'. S Chand and Company, New Delhi, Revised 5th Ed., 2016.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Learn the chemistry of Materials for Civil Engineering	**K2**
CO2	Choose the materials for building and construction purpose	**K3**
CO3	Correlate the properties of materials for efficient construction	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3										3		
CO3								1	1				
@	**3**							**1**	**1**		**3**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25HS201 தமிழரும் தொழில்நுட்பமும்
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

1 0 0 1

நெசவு மற்றும் பானைத் தொழில்நுட்பம்: *சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.* **(3)**

வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: *சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள், சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.* **(3)**

உற்பத்தித் தொழில் நுட்பம்: *கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல்- மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத் துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.* **(3)**

வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்: *அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.* **(3)**

அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்: *அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.* **(3)**

Total L: 15 periods

25HS201 TAMILS AND TECHNOLOGY
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

1 0 0 1

WEAVING AND CERAMIC TECHNOLOGY: Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries. **(3)**

DESIGN AND CONSTRUCTION TECHNOLOGY: Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period. **(3)**

MANUFACTURING TECHNOLOGY: Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram. **(3)**

AGRICULTURE AND IRRIGATION TECHNOLOGY: 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. **(3)**

SCIENTIFIC TAMIL & TAMIL COMPUTING: Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project. **(3)**

Total L: 15 periods

TEXT BOOK

1. V. Priyadharshini, '*தமிழரும் தொழில்நுட்பமும் (Tamils and Technology)'.* VK publications, Sivakasi.

REFERENCE BOOKS

1. கே .கே .பிள்ளை '*தமிழக வரலாறு - மக்களும் பண்பாடும்*'. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம் .
2. முனைவர் இல.சுந்தரம், '*கணினித்தமிழ்*'. விகடன் பிரசுரம்.
3. '*கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம்*'.தொல்லியல் துறை வெளியீடு.
4. '*பொருநை - ஆற்றங்கரை நாகரிகம்*'. தொல்லியல் துறை வெளியீடு.
5. Dr. K. K. Pillay, '*Social Life of Tamils*'. A joint publication of TNTB, ESC and RMRL.
6. Dr. S. Singaravelu, '*Social Life of the Tamils – The Classical Period*'. International Institute of Tamil Studies.
7. Dr. S. V. Subaramanian, and Dr. K. D. Thirunavukkarasu, '*Historical Heritage of the Tamils*'. International Institute of Tamil Studies.
8. Dr. M. Valarmathi, '*The Contributions of the Tamils to Indian Culture*'. International Institute of Tamil Studies.
9. Department of Archaeology, '*Keeladi – Sangam City Civilization on the banks of river Vaigai*'. Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu
10. Dr. K. K. Pillay, '*Studies in the History of India with Special Reference to Tamil Nadu'.*
11. Department of Archaeology*, 'Porunai Civilization'*. Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu.
12. R. Balakrishnan, '*Journey of Civilization Indus to Vaigai*'. RMRL, Tamil Nadu.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Identify the significance of ancient Tamil technologies in weaving, pottery, metallurgy, and architecture, with emphasis on traditional design and construction methods across historical periods.	K2
CO2	Use insights from traditional Tamil knowledge systems in agriculture, irrigation, and marine sciences, and connect the development of Tamil language to its applications in digital platforms and computing.	K3

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1							3						
CO2							3						
@							**3**						

1-low, 2-medium, 3-high @-Overall Contribution to the Course

LANGUAGE ELECTIVE

25HS211 COMMUNICATION SKILLS FOR ENGINEERS
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 4 2

COMMUNICATION CONCEPTS: Process of Communication – Inter and Intrapersonal Communication – Essentials for effectiveness. **(9)**

ORAL COMMUNICATION: Oral presentations with visual aids and Group discussions. **(16)**

FOCUS ON SOFT SKILLS: Etiquette – Work Place etiquette – Telephone etiquette- Body Language – Critical Reasoning and Conflict Management based on Case Studies – Group Communication- Meetings -Interview Techniques. **(14)**

TECHNICAL WRITING: Technical Writing Principles - Style and Mechanics - Technical Definitions – Physical, Functional and Process Descriptions – Technical Report Writing – Preparing Instructions – Interpretation of Technical Data. **(14)**

BUSINESS CORRESPONDENCE: Writing Emails, Preparing Resumes. **(7)**

Total P: 60 periods

TEXT BOOKS

1. Course materials prepared by the Faculty, Department of English, PSG Institute of Technology and Applied Research, Neelambur, Coimbatore.

REFERENCES

1. Jeff Butterfield, '*Soft Skills for Everyone*'. Cengage Learning, New Delhi, 2020.
2. Sabina Pillai, and Agna Fernandez, '*Soft skills and Employability Skills*'. Cambridge University Press, New Delhi, 2019.
3. Prashant Sharma, '*Soft Skills Personality Development for Life Success*'. BPB Publications, New Delhi, 2021.
4. K. N. Shoba, and D. Praveen Sam, '*Technical English*'. Cambridge University Press, New York, 2020.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Produce clear and concise technical reports, compose professional and effective emails and develop well-structured and impactful resumes	**K2**
CO2	Plan, organize, and deliver engaging and informative presentations using appropriate visual aids and participate positively in group discussions	**K3**
CO3	Resolve disagreements constructively, embody professional conduct and a strong work ethic and apply critical thinking to generate effective solutions	**-**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1										2			
CO2										3			
CO3									3	3			
@									**3**	**3**			

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25HS212 BASIC GERMAN
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 4 2

Guten Tag! - Learning: To greet, learn numbers till 20, practice telephone numbers & e mail address, learn alphabet, speak about countries & languages; **Vocabulary:** related to the topic; **Grammar:** W – Questions, Verbs & Personal pronouns I.

Freunde, Kollegen und ich - Learning: To speak about hobbies, jobs, learn numbers from 20; **Vocabulary:** related to the topic; **Grammar:** Articles, Verbs & Personal pronouns II, sein & haben verbs, ja/nein Frage, singular/plural.

In der Stadt – Learning: To know places, buildings, question, know transport systems, understand international words; **Vocabulary**: related to the topic; **Grammar:** Definite & indefinite articles, Negotiation, Imperative with Sie.

Guten Appetit! – Learning: To speak about food, shop, converse; **Vocabulary:** related to the topic; **Grammar:** Sentence position, Accusative, Accusative with verbs.

Tag für Tag and Zeit mit Freunden – Learning: To learn time related expressions, speak about family, ask excuse, fix appointments on phone, birthdays, understand & write invitations, converse in the restaurant; **Vocabulary:** related to the topic; **Grammar:** Preposition – am, im, um, von…bis, Possessive articles, Modal verbs.

Total P: 60 periods

TEXT BOOK:

1. Dengler, Stefanie et al., '*Netzwerk A1.1*'. Klett-Langenscheidt Gmbh, München, 2013.

REFERENCES:

1. Dengler, Stefanie et al., '*Netzwerk A1'.* Klett-Langenscheidt Gmbh München, 2013.
2. Sandra Evans, Angela Pude, and Franz Specht, '*Menschen A1*'. Hueber Verlag, 2012.
3. Hermann Funk, Christina Kuhn, and Silke Demme, '*Studio d A1*'. Goyal Publishers & Distributors Pvt. Ltd, 2009.
4. Rosa-Maria Dallapiazza, Eduard von Jan, '*Til Schönherr*'. Tangram Aktuell 1 (Deutsch als Fremdsprache), Max Hueber Verlag, 2004.

25HS213 BASIC JAPANESE
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 4 2

Orientation Session, Geographic & Socio, economic perspective to Japan, Japanese people and culture and Basic greetings and responses.

Basic script, Method of writing hiragana and katakana, and Combination sounds and simple words.

Topic marker "wa", Desu / dewa arimasen cupolas, Interrogative particle "ka", Grammar particles "mo", "no", "Introducing someone: "Kochira wa ~" and Self introductions: Hajimemashite"

Demonstratives "Kore", "Sore", "Are", Demonstrative "Kono", "Sono", "Ano", Possessive noun particle "no" and Japanese apartments: Greeting your neighbor.

Place markers "Koko", "Soko", "Asoko", Direction markers "Kochira", "Sochira", "Achira" and Japanese department stores: Asking for and buying something.

Asking for and telling the time, Particle "ni (at)" for time, kara (from) ~ made (until), Particle "to (and)", Time periods: Days of the week, months, time of day, Verbs (Present / future and past tense) and Telephone enquiry: Asking for a phone no. And business hours.

Destination particle "e", Particles "de (mode of transportation)" and "to (with) and Japanese train station: Asking for Fare and track no. / types of trains.

Direct object particle "o", Particle "de (place of action)", Verbs ("~masen ka", "~mashou") and "Ohanami" Cherry blossom viewing.

Particle "de (by means of)", Particle "ni (to)", Aaemasu (give) and Moraimasu (receive) and Visiting a Japanese house.

Adjectives ("i" and "na" type), Adjectives (Positive and negative usage), Particle "ga (however, but), "Dore which?)" and Leaving a room, thanking someone for hospitality.

Likes and dislikes, Potential verbs (wakarimasu and dekimasu), "Kara (~ because)", Adverbs and Asking someone out over the phone.

Verbs denoting presence: "Imasu" and "arimasu", Particle "ni (in)", "Dare (who?)", Adverbs ("Chikaku ni ~ "), Particle "dare mo (negative ~ no one)" , Dare ka (anyone), dare ga (who) , Nani ka (anything) , nani ga (what) - ~ya (and) ~ nado (etc.) and Asking for directions.

Counters and Counting suffixes.

Introduction to Adjectives (na and ii type), Different usages of adjectives, Comparison, Likes and dislikes and Going to a trip.

Need and desire (ga hoshii), Wanting to … (Tabeti desu), Going for a certain purpose (mi –ni ikimasu) and Choosing from a menu.
Verb groups, I, II and III and Exercises to group verbs.

Please do (te kudasai), Present continuous tenses (te imasu), Shall I? (~ mashou ka) and Describing a natural phenomenon (It is raining).

To grant permission (~te mo ii desu), Asking for permission (~ te mo ii desu ka) and Should not do (~ te waikemasen) Describing a continuing state and Describing a habitual action.

Roleplays in Japanese.

A demonstration on usage of chopsticks and Japanese tea party.

Total P: 60 periods

TEXT BOOK

1. '*Minna no nohongo'* – Romaji ban (first 10 lessons of this book).

REFERENCE

1. '*Minna no Nihongo I Honsatsu Roma – ji ban (Main Textbook Romanized Version)'.* International publisher – 3A Corporation,Tokyo, Indian distributor – Goyal Publishers & Distributors, New Delhi.

25BS211 BASIC SCIENCES LABORATORY II

0 0 4 2

Physics (Any eight experiments)

1. Determination of velocity of sound in liquid – Acoustic grating.
2. Determination of Young's modulus of the material- Uniform Bending.
3. Determination of Young's modulus of the material – Simple harmonic Oscillations of a cantilever.
4. Determination of thermal conductivity of a bad conductor using Lee's Disc.
5. Determination of particle size of a microparticle film using LASER.
6. Determination of coefficient of viscosity of a liquid – Poiseuille's method.
7. Study the dispersion relation and determination of cut off frequency using lattice dynamics kit.
8. Determination of wavelength of mercury spectrum using spectrometer and grating.
9. Determination of specific resistance of a given wire – Carey foster's bridge.
10. Determination of thermal conductivity of a metallic material – Wiedemann – Franz Law.
11. Determination of force in members of Truss Bridge.
12. Validation of Newton's laws of motion.

Demonstration:

1. Study the energy loss of a ferrite magnetic material specimen by B-H curve.
2. Determination of resolving power of a prism using spectrometer.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Relate the scientific principles, compare the experimental results with theoretical calculations and apply graphical analysis to visualise the importance of precise measurements.	**K3**
CO2	Analyse the experimental result outcomes using analytical and experimental skills for various engineering materials and applications	**K4**

Chemistry (Any eight experiments)

1. Estimation of Ca^{2+} and Mg^{2+} hardness of water by EDTA method.
2. Determination of DO content of water sample by Winkler's method.
3. Estimation of iron content of the given solution using potentiometer.
4. Corrosion experiment-weight loss method.
5. Estimation of percentage of calcium oxide present in Portland cement.
6. Anodizing of aluminium and determination of thickness of anodised film.
7. Determination of kinematic viscosity of lubricating oil using Redwood viscometer.
8. Construction of phase diagram of a simple eutectic system.

Total P: 60 periods

REFERENCES:

1. Department of Physics, '*Physics Laboratory Observation*'. 2025.
2. Jerry D Wilson, A. Cecilia, and Hernandez Hall, '*Physics Laboratory Experiments*'. Boston, MA, Cengage Learning, 2016.
3. J Mendham, '*Vogel's Textbook of Quantitative Chemical Analysis, 6th Ed*.,'. Pearsons Education 2009.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO3	Demonstrate the measurement of water quality parameters in the given water sample.	**K3**
CO4	Analyze the properties of materials for Engineering applications.	**K4**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2		2											
CO3	3								3		3		
CO4				3				3					
@	**3**	**2**		**3**				**3**	**3**		**3**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

Third ACM

25CE211 ENGINEERING PRACTICES LABORATORY

0 0 2 1

ENGINEERING PRACTICES:

1. Carpentry: Study of wood working tools. Exercises: Preparation of "L" and "V" Joints.
2. Plumbing: Study of tools and operations; Exercises: External thread cutting and preparation of PVC pipe joints.
3. Welding: Study of arc welding tools and equipment; Exercises: Preparation of joints using arc and TIG welding.
4. Sheet metal work and Soldering: Study of tools and operations; Exercise: Preparation of a rectangular tray.
5. Basic Machining: Study of tools and operations, Study of types of connections; Exercise: Simple turning and taper turning, Drilling - bolted connections.

Total P: 30 periods

REFERENCES

1. Department of Civil Engineering, '*Engineering Practices Laboratory Manual*'. PSG Institute of Technology and Applied Research, Coimbatore, 2025.
2. W. A. J. Chapman, '*Workshop Technology - Part I, 4th Edition*'. CBS Publications, New Delhi, 2007.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Apply basic manufacturing and fabrication techniques such as welding, carpentry, plumbing, turning, drilling and sheet metal work using appropriate tools and procedures to prepare simple joints and components.	**K3**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	2		2		3							2	2
@	**2**		**2**		**3**							**2**	**2**

1-low, 2-medium, 3-high @-Overall Contribution to the Course

Third ACM

25CE212 PROBLEM SOLVING USING PYTHON PROGRAMMING LABORATORY

0 0 4 2

List of Experiments:

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)
11. Exploring Pygame tool
12. Developing a game activity using Pygame like bouncing ball, car race etc.

Total P: 60 periods

TEXT BOOKS

1. Allen B. Downey, '*Think Python: How to Think like a Computer Scientist'.* O'Reilly Publishers, 2016.
2. Karl Beecher, '*Computational Thinking: A Beginner's Guide to Problem Solving and Programming'.* BCS Learning and Development Limited, 2017.

REFERENCES

1. Paul Deitel, and Harvey Deitel, '*Python for Programmers*'. Pearson Education, 2021.
2. G. Venkatesh, and Madhavan Mukund, '*Computational Thinking: A Primer for Programmers and Data Scientists'*. Notion Press, 2021.
3. John V Guttag, '*Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data*'. Third Edition, MIT Press, 2021
4. Eric Matthes, '*Python Crash Course, A Hands - on Project Based Introduction to Programming*'. No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, '*Python: The Complete Reference'.* Mc-Graw Hill, 2018.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Develop algorithmic solutions to simple computational problems	**K2**
CO2	Develop and execute simple Python program for real time problems	**K3**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3				3							3	
@	**3**				**3**							**3**	

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25EEC01 WORKPLACE COMMUNICATION SKILLS
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 2 0

BUILDING COMMUNICATION SKILLS:

1. Introduction to Workplace Communication
2. Profile Building for Internships
3. English in the Workplace (Grammar & Vocabulary)
4. Professional Communication (Speaking & Writing)
5. Workplace Communication Tools
6. Career Exploration
7. Resume Update

Total P: 30 periods

REFERENCES:

1. P. C. Wren, and H. Martin, '*High school English Grammar and Composition*'. S Chand Publishing, New Delhi, 2017.
2. Norman Lewis, '*Word Power Made Easy*'. Goyal Publisher, New Delhi, 2011.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Present with clarity and coherence while speaking in formal contexts	**K2**
CO2	Understand the importance of soft skills for employability and fine tune their writing skills – Resume writing	**K3**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1									3		3		
CO2									3		3		
@									**3**		**3**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

SEMESTER III

25MA304 MATRIX THEORY AND NUMERICAL METHODS

3 1 0 4

EIGENVALUES AND EIGENVECTORS: Eigenvalues and eigenvectors of a real matrix – characteristic equation, properties - diagonalization - quadratic forms, reduction to canonical form by orthogonal reduction - Errors and approximations in numerical methods, power method for dominant eigenvalue. **(10+3)**

LINEAR ALGEBRAIC SYSTEM OF EQUATIONS AND NONLINEAR EQUATIONS: System of linear equations – Gauss elimination method, Crouts method, Gauss Seidal iterative method, Roots of equations - false-position method, Newton-Raphson method, Graeffe's root squaring method. **(8+3)**

INTERPOLATION, DIFFERENTIATION AND INTEGRATION: Newton's forward and backward interpolating polynomials, Lagrange and Newton's divided difference interpolating polynomials. Numerical differentiation, numerical integration - Newton-Cotes formulae, Trapezoidal rule, Simpson's 1/3 rule. **(12+4)**

ORDINARY DIFFERENTIAL EQUATIONS: Taylor-series method, Euler method, 4^{th} order Runge-Kutta method, multi-step method – Milne's method. **(6+2)**

PARTIAL DIFFERENTIAL EQUATIONS: Finite difference: elliptic equations – Laplace equation, Poisson equation – Liebmann method, parabolic equations – heat conduction equation – Crank Nicolson's method, hyperbolic equations – vibrating string. **(9+3)**

Total L: 45 + T: 15 = 60 periods

TEXTBOOKS

1. David C Lay, Judi J McDonald, and Steven R Lay, '*Linear Algebra and its Applications'*. Pearson Education, New Delhi, 2021.
2. Steven C Chapra, and Raymond P Canale, '*Numerical Methods for Engineers*'. Tata McGraw Hill, New Delhi, 2021.

REFERENCES

1. Curtis F Gerald, and Patrick O Wheatly, '*Applied Numerical Analysis*'. Pearson Education, New Delhi, 2017.
2. Rizwan B, '*Introduction to Numerical Analysis Using MATLAB*'. Infinity Science Press, Hingham, 2010.
3. Richard L. B, and Douglas J. F, '*Numerical Analysis*'. Thomas Learning, New York, 2017.
4. Howard Anton, Chris Rorres and Anton Haul, '*Elementary Linear Algebra*'. Wiley India, New Delhi, 2019.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the concepts related to Matrix Theory and Numerical Methods.	**K2**
CO2	Apply the techniques of Matrix Theory and Numerical Methods to solve engineering problems.	**K3**
CO3	Analyze the solutions of engineering problems employing Matrix Theory and Numerical Methods.	**K4**
CO4	Use modern tools to solve engineering problems with the help of Matrix Theory and Numerical Methods.	**-**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3												
CO3		1											
CO4					1								
@	**3**	**1**			**1**								

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE301 MECHANICS OF SOLIDS I

3 1 0 4

STRESSES AND STRAINS: Stress and strain due to axial force – Elastic limit – Hooke's law – Factor of safety – Stepped bars – uniformly varying sections – composite bar – stresses due to temperature. **(8+3)**

DIMENSIONAL CHANGES AND STRAIN ENERGY: Lateral strain – Poisson's ratio – Volumetric strain – changes in dimensions and volume – shear stress – shear strain – Relationship between elastic constants – Hoop and Longitudinal stresses in thin cylindrical and spherical shells under internal pressure – changes in dimensions and volume. – Strain Energy due to axial force – proof resilience and modulus of resilience – stresses due to gradual load, sudden load and impact load. **(9+3)**

BENDING OF BEAMS: Shear force and bending moment at a section – Relationship between load intensity, shear force and bending moment – Shear force and bending moment diagrams for cantilever, simply supported and over hanging beams under point loads, uniformly distributed load, uniformly varying loads and concentrated moment – maximum bending moment and point of contra flexure. – Theory of simple bending and assumptions –flexural formula – section modulus – normal stress due to bending – shear stress distribution. **(12+4)**

TORSION: Theory of torsion and assumptions – Derivation of torsion formula – Polar modulus – stresses in solid and hollow circular shafts – Power transmitted by a shaft – Strain Energy due to torsion – close coiled helical spring under axial load. **(8+2)**

PRINCIPAL STRESSES AND STRAINS (TWO DIMENSIONAL ONLY): State of stress at a point – Normal and tangential stresses and their planes – Principal Stress and their planes – Plane of maximum shear stress – Analytical method – Mohr's circle method – Principal strains – Analytical and graphical methods. **(8+3)**

Total L: 45 + T: 15 = 60 periods

TEXTBOOKS

1. R. K. Rajput, 'A Textbook of Strength of Materials: Mechanics of Solids'. S Chand and Company Limited, Noida, 2025.
2. R. K. Bansal, '*Strength of Materials*'. Laxmi Publications, New Delhi, 2024.

REFERENCES

1. B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, '*Strength of Materials*'. Laxmi Publications, New Delhi, 2025.
2. Egor P Popov, '*Mechanics of Materials*'. Pearson Education India, 2015.
3. Ferdinand P. Beer, E. Russell Johnston, John T. DeWolf, David F. Mazurek, and Sanjeev Sanghi, '*Mechanics of Materials*'. Tata McGraw Hill, Noida, 2020.
4. S. S. Rattan, '*Strength of Materials*'. Tata McGraw Hill, Noida, 2016.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the fundamental concepts of stress, strain, axial deformation, and strain energy under various loading conditions.	**K2**
CO2	Apply analytical methods to determine internal forces (shear force, bending moment), stresses, and deformations in beams, shafts, and shells.	**K3**
CO3	Analyze the behavior of members under axial, bending, and torsional loads by evaluating stress, strain, deformation, and failure criteria.	**K4**
CO4	Demonstrate teamwork and communication skills through group problem-solving and presentation of structural behavior using diagrams and graphical methods such as Mohr's circle.	**-**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3	2										3	
CO3		3										3	
CO4								1	1				1
@	3	3						1	1			3	1

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE302 CONSTRUCTION MATERIALS AND PRACTICES

3 0 0 3

STONES - BRICKS - CONCRETE BLOCKS - LIME: Stone as building material - criteria for selection - Tests on stones - Bricks - Classification - Manufacturing of clay bricks - Tests on bricks - Compressive strength - Water Absorption - Efflorescence - Bricks for special use - Lime - Preparation of lime mortar - Concrete hollow blocks - Lightweight concrete blocks. **(9)**

MORTAR AND CONCRETE: Cement – Ingredients – Tests on cement – Mortar – classification – Characteristics – Functions - Types of Mortar – Selection – Testing – Aggregate – Classification – Characteristics - Tests on aggregates – Concrete – Ingredients – Batching - Mixing – Transportation – Placing – Compaction – Finishing - Curing. **(9)**

PROPERTIES OF CONCRETE & OTHER MATERIALS: Fresh concrete - Hardened concrete - Non-destructive Testing - Special concretes – Admixtures - Timber - Market forms - Plywood - Veneer - False ceiling materials - Laminates - Steel - Mechanical treatment - Aluminum - Uses - Market forms - Glass - Refractories - Composite Materials – FRP. **(9)**

BUILDING REGULATIONS AND CONSTRUCTION PRACTICES: Functional planning of buildings - Site selection - site plan - Planning regulations and by-laws – principles of planning – orientation of buildings - National Building Code – types of buildings – building components and their requirements – fire safety rules – fire safety construction – fire resisting properties of materials – Foundations – need – bearing capacity – settlement – types of foundation - Brick Masonry – Plastering – Pointing - Cavity walls - Diaphragm walls. **(9)**

BUILDING FINISHES AND SERVICES: Plastering – types – cement mortar plastering - construction practice. Painting – materials and practice for walls – wood and steel. Joineries: Doors and windows – types – fixtures and fastener - water supply – sewage disposal – plumbing – electrical wiring – basic needs of building services for housing – materials – construction practice – safety and maintenance rules. **(9)**

Total L: 45 periods

TEXTBOOKS

1. S. P. Arora, and S. P. Bindra, '*The Text Book of Building Construction*'. Dhanpat Rai Publications, New Delhi, 2025.
2. G. S. Birdie, J. S. Birdie, and T. D. Ahuja, '*A Text Book of Building Construction & Construction Materials*'. Dhanpat Rai Publications, New Delhi, 2026
3. M. S. Shetty, and A. K. Jain, '*Concrete Technology: Theory and Practice*'. S Chand And Company Limited, Noida, 2019.

REFERENCES

1. S. C. Rangwala, and K. S. Rangwala, '*Building Construction*'. 10th Edition, Charotar Publishing House Pvt. Ltd., Gujarat, 2010.
2. P. C. Varghese, '*Building Construction*'. PHI Learning Private limited, New Delhi, 2010.
3. A. R. Santhakumar, '*Concrete Technology*'. Oxford University Press, New Delhi, 2018.
4. B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, '*Building Construction*'. Laxmi Publications, New Delhi, 2025.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Demonstrate knowledge of traditional and modern construction materials and the ability to apply construction practices, regulations, planning principles, and building services requirements to achieve safe, durable, and compliant buildings.	**K2**
CO2	Apply the principles of building materials, construction practices, and building regulations to select suitable materials and execute basic building construction and services.	**K3**
CO3	Exhibit effective team work, communication and collaborative skills to present seminars and submit reports related to building construction materials and practices.	**-**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3	1										1	
CO3								1	1				1
@	3	1						1	1			1	1

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE303 SURVEYING

3 1 0 4

CHAIN AND COMPASS SURVEYING: Definition - Principles - Classification – Field work and office work - Types of chain – Instruments used for Chain Surveying - methods of ranging a line - Chain survey of an area – Compass- Types - Magnetic and true north - magnetic declination and its variation - Bearings - Compass survey - local attraction and its elimination -Traversing - sources, limits of error and their corrections. **(10+3)**

LEVELLING: Principles and theory of levelling - Datum - bench mark and reduced level - level surface and horizontal plane- mean sea level - Types of levels - levelling staff and their types - effect of curvature and refraction- Balancing backsight and foresight distance – Types of levelling - Reducing levels by rise and fall and height of collimation methods and check. **(8+3)**

THEODOLITE AND TACHEOMETRIC SURVEYING: Components of theodolite and its Functions – Measurement of horizontal angles and vertical angles using Theodolite - Heights and distances of Inaccessible Stations - Methods of traversing - Tacheometric surveying - Instrument Constants – anallactic lens - Tangential, stadia and subtense bar methods. **(10+3)**

CONTOURING AND CURVES: Definition - Contour interval and horizontal equivalent -characteristics – interpolation - contouring by grid and radial methods - Drawing contour lines - uses of contour maps - Definitions - Designation of a curve - Elements of simple curve - Location of tangent points - setting out of simple curve by offset and Rankines methods - obstructions and elimination in curve ranging - compound curve - problems. **(8+3)**

ADVANCED AND ENGINEERING SURVEYING: Total Station - Parts and accessories- working Principle - Advantages - field Procedure and applications - Geographic Information System - Global Positioning System - data acquisition – Data Processing- field Procedure and applications - Electronic Theodolite - Laser alignment instrument. Engineering Surveys for Alignment of Highway and Railway track - Construction Survey. **(9+3)**

Total L: 45 + T: 15 = 60 periods

TEXTBOOKS

1. B. C. Punmia, Ashok K. Jain, and Arun K. Jain, '*Surveying Vol. I, II & III'*. Laxmi Publications, New Delhi, 2025.
2. S. K. Duggal, '*Surveying Vol. I & II'*. McGraw Hill, Noida, 2019.

REFERENCES

1. R. Agor, '*A Textbook of Surveying and Levelling'*. Khanna Publishers, New Delhi, 2024.
2. C. Venkatramaiah, '*Textbook of Surveying*'. Universities Press, Hyderabad, 2011.
3. K. R. Arora, '*Surveying Vol. I, II & III'*. Standard Book House, New Delhi, 2019.
4. T. P. Kanetkar, and S. V. Kulkarni, '*Surveying and Levelling*'. Pune Vidyarthi Griha, Pune, 2011.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the fundamental principles, procedures and applications of chain, compass, levelling, theodolite and tachometric surveying, contouring, curve setting and advanced surveying techniques in Civil Engineering.	**K2**
CO2	Apply engineering principles to solve problems related to chain, compass, levelling, theodolite and tachometric surveying, contouring and curve setting.	**K3**
CO3	Analyze data from chain, compass, levelling, theodolite, and advanced surveying techniques to evaluate measurement accuracy, identify errors, and interpret results for mapping and engineering works.	**K4**
CO4	Exhibit effective team work, communication and collaborative skills to present seminars and submit reports related to surveying techniques.	**-**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3	2										3	1
CO3		3										3	1
CO4					1			1	1				1
@	3	3			1			1	1			3	1

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25HS301 PROJECT AND FINANCE MANAGEMENT

3 0 0 3

INTRODUCTION TO PROJECT MANAGEMENT: Project: Trends in project management, project management versus general management, agile project management, the three goals of a project, life cycle of projects, project selection methods, project portfolio process, case study – friendly assisted living facility. **(9)**

ROLE OF PROJECT MANAGER AND ORGANISATION: Project manager's roles and responsibilities, selection of a project manager, project management as a profession, fitting projects into the parent organization, the project team and agile team roles, case study – the company with traditional functional organizational structure setting up teams for the new initiatives. **(9)**

PROJECT ACTIVITIES: The planning process, work-breakdown structure and other aids, risk management, methods of budgeting, cost estimation, scheduling the project with PERT and CPM networks, allocating resources, resource loading and leveling, Goldratt's Critical Chain, application – using Projectible for project management, case study – success of Chandrayan-3. **(9)**

INTRODUCTION TO FINANCE MANAGEMENT: Overview - finance and related disciplines, scope and objectives of financial management, time value of money, and risk and return and calculations with spreadsheet, analysis using cash flow statement and other statements. **(9)**

PERSONAL FINANCE: Compounding, debt, equity and financial markets and investments- debt and bonds. Equity, mutual funds, hedge funds, real estate, and commodities, Personal financial plan to enhance wealth and job marketability, components of a financial plan, tools for planning – financial statements, applying time value concept of money and tax planning. **(9)**

Total L: 45 periods

TEXTBOOKS

1. Jack R. Meredith, and Scott M. Shafer, '*Project Management in Practice*'. Wiley, 2021.
2. M. Y. Khan, and P. K. Jain, '*Basic Financial Management*', Tata McGraw Hill, 2012.
3. Michael Fisher, '*Saving and Investing*'. Author House, 2005.
4. Jeff Madura, '*Personal Finance*'. Pearson, 2020.

REFERENCES

1. National Finance Olympiad, '*Personal Finance Handbook*'. Pockvue Solutions, 2024.
2. Glen Arnold, '*Investing*'. Financial Times Guides, 2020.
3. Rachel Siegel, and Carol Yacht, '*Personal Finance*'. Open Textbook Library, Saylor Foundation, 2009.
4. Google, '*Google Project Management: Professional Certificate*'. Google Project Management: Professional Certificate, Coursera.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Identify various budgeting and cost estimation techniques suited to different project scenarios and the uses of project scheduling methods.	**K1**
CO2	Understand the basic concepts of project management, phases of project life cycle, the roles and responsibilities of project manager and how projects are integrated into different types of organizational structures.	**K2**
CO3	Apply theoretical knowledge and practical tools to support sound financial decision-making in real-world scenarios.	**K3**
CO4	Differentiate between various financial instruments and application of financial planning to enhance personal wealth.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1										2			
CO2										3			
CO3										2	2		
CO4										3	3		
@										3	3		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE311 STRENGTH OF MATERIALS LABORATORY

0 0 2 1

1. Tension Test on Metals – Studying the stress strain characteristics – determining the characteristics ductility – resilience – toughness.
2. Hardness Tests on Metals - Determination of Brinell and Rockwell Hardness numbers.
3. Impact Test on Metals - Determination of impact strength of metal rods by conducting the Charpy and Izod Impact tests.
4. Tests on Compression and Tension Helical Springs - Plotting the Load - deformation characteristics curve, determining the stiffness, shear stress, modulus of rigidity, strain energy.
5. Compression, Bending and Tension Tests on Wood - Determination of tensile and compressive strengths - Plotting of Load - Deflection Characteristics curve of wooden beam – Determination of Young's Modulus, Modulus of Rupture.
6. Torsion Test on shafts - Plotting of Torque and angle of twist characteristics curve, determination of shear stress, modulus of rigidity, energy stored.
7. Deflection Test on Beams - Plotting of Load deflection characteristics curve, determination of Young's Modulus - Verification of Maxwell's Reciprocal law.
8. Shear Test on Metal rods – Determination of Shear Strength for Single Shear and Double Shear conditions.
9. Compression Test - Determination of Compressive Strength of Concrete cube and Brick.

Total P: 30 periods

REFERENCES

1. Department of Civil Engineering, *'Strength of Materials Laboratory Manual'.* PSG Institute of Technology and Applied Research, Coimbatore, 2025.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Exhibit effective team work, communication and collaborative skills to submit reports by conducting experiments using modern tools related to strength tests on metals, springs, wood, and concrete to determine their mechanical properties and to analyze and interpret experimental data such as stress-strain behaviour, hardness, impact resistance, and deflection.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	3	1	1	3	3			3	3
@	3	2	2	2	3	1	1	3	3			3	3

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE312 SURVEY PRATICE

0 0 4 2

CHAIN SURVEYING, COMPASS SURVEYING AND LEVELLING:

1. Study of Instruments
2. Chain Surveying - Cross staff surveying
3. Compass traversing
4. Simple & Fly leveling **(24)**

THEODOLITE SURVEYING, TACHEOMETRIC SURVEYING AND SETTING OUT WORKS:

1. Measurement of horizontal angles by method of repetition and method of reiteration
2. Trigonometrical levelling - Single plane method
3. Stadia & Tangential tacheometry
4. Setting out works - Simple circular curve, Foundation marking
5. Traverse using Total station and Area of Traverse
6. Demonstration of GPS and DGPS **(36)**

Total P: 60 periods

REFERENCES

1. Department of Civil Engineering, *'Survey Practice Laboratory Manual'.* PSG Institute of Technology and Applied Research, Coimbatore, 2025.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Exhibit effective team work, communication and collaborative skills to submit reports by conducting experiments using modern tools related to field applications of chain, compass, levelling, theodolite, tachometry, contouring, curve setting, Total Station and GPS surveying techniques.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	3	1	1	3	3			3	3
@	3	2	2	2	3	1	1	3	3			3	3

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25EEC02 FOUNDATIONS OF PROBLEM SOLVING

0 0 2 1

PROBLEM SOLVING:

1. Speed Mathematics (SAW, Oz, Mirror methods)
2. Speed Mathematics (High5, Minion, Butterfly methods)
3. Speed Mathematics (Inception, Goldeneye methods)
4. Thinking with Numbers
5. Problem Solving with Visual information
6. Words Puzzles
7. Resume Writing Essentials

Total P: 30 periods

REFERENCES

1. R. S. Aggarwal, '*Quantitative Aptitude for Competitive Examination*'. S Chand Publishing, New Delhi, 2017.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Solve problems related to speed mathematics, numbers and word puzzles.	**K3**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1										1		
@	1										1		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

SEMESTER IV

25CE401 MECHANICS OF SOLIDS II

3 1 0 4

THICK CYLINDERS: Thick cylinders – Lame's equation – Hoop stress and radial stress distribution Simple cylinder – problems – compound cylinders – shrink fit – problems. **(8+2)**

BENDING OF CURVED BEAMS AND UNSYMMETRICAL BENDING OF STRAIGHT BEAMS: Curved beams – stresses due to bending by Winkler Bach theory – rectangular, trapezoidal, circular solid sections – crane hook problem. Symmetrical and unsymmetrical bending – bending stresses in beams subjected to unsymmetrical bending – principal axes and principal moments of inertia - change in direction of neutral axis – Simple problems. **(10+3)**

COLUMNS AND STRUTS: Columns – Behaviour of axially loaded short, medium and long column members – Buckling load – Euler 's theory – Different end conditions – Rankine's formula – columns subjected to eccentric loading - problems. **(7+2)**

THEORIES OF ELASTIC FAILURE AND TORSION OF THIN WALLED SECTIONS: Maximum principal stress theory – Maximum principal strain theory – Maximum shear stress theory - Maximum strain energy theory – Maximum shear strain energy theory – Mohr 's theory - simple problems - Shear centre of mono - symmetric open sections. Hollow thin walled open and closed torsion members, single and multi-connected cross – sections. **(10+4)**

DEFLECTION OF DETERMINATE BEAMS: Governing differential equation – Macaulay's method – Moment area method – conjugate beam method – Determinate beams – indeterminate beams - problems. **(10+4)**

Total L: 45 + T: 15 = 60 periods

TEXTBOOKS

1. R. K. Rajput, 'A Textbook of Strength of Materials: Mechanics of Solids'. S Chand and Company Limited, Noida, 2025.
2. R. K. Bansal, '*Strength of Materials*'. Laxmi Publications, New Delhi, 2024.

REFERENCES

1. B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, '*Strength of Materials*'. Laxmi Publications, New Delhi, 2025.
2. Egor P Popov, '*Mechanics of Materials*'. Pearson Education India, 2015.
3. Ferdinand P. Beer, E. Russell Johnston, John T. DeWolf, David F. Mazurek, and Sanjeev Sanghi, '*Mechanics of Materials*'. Tata McGraw Hill, Noida, 2020.
4. A. P. Boresi, and R. J. Schmidt, '*Advanced Mechanics of Materials*'. John Wiley & Sons, 2018.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain stress distribution in thick and compound cylinders, and analyze buckling behavior of columns under axial and eccentric loading.	**K2**
CO2	Apply analytical methods and classical theories to solve problems involving curved beams, unsymmetrical bending, elastic failure, and torsion in thin-walled sections.	**K3**
CO3	Analyze the behavior of structural elements under complex loading conditions by evaluating stress distribution, stability, deflection, and failure using advanced theories and analytical methods.	**K4**
CO4	Demonstrate collaborative and communication skills by effectively presenting the analysis and deflection of determinate beams using various classical methods.	**-**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3	2										3	
CO3		3										3	
CO4								1	1				3
@	3	3						1	1			3	3

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE402 HYDRAULIC ENGINEERING

3 1 0 4

FLUID STATICS, BUOYANCYAND FLOATATION: Total pressure on plane and curved surfaces - Centre of pressure for vertical and inclined plane surfaces - Buoyancy and Meta-centre - Determination of Meta-centric height – Analytical and experimental methods - Conditions of equilibrium of submerged and floating bodies.**(8+3)**

FLUID KINEMATICS AND DYNAMICS: Classification of fluid flow - Stream line - Streak line and Path lines - Continuity equation - Velocity potential function and Stream function - Flow net properties and its uses - Energy possessed by a fluid body in motion - Euler's equation of motion - Bernoulli's equation and its applications – Manometer - Velocity measurement - Pitot tube - Current meter - Discharge measurement, Venturimeter, Orifice meter – Orifices mouthpieces - notches and weirs - Rectangular - triangular - Cippoletti weir - submerged weir. **(12+3)**

FLOW THROUGH PIPES: Energy losses in pipes - Darcy Weisbach's formula - flow through pipes in series - flow through parallel pipes - flow through branched pipes - equivalent pipe - water hammer in pipes - Laminar flow through circular pipes – Hagen Poiseuille's equation - Velocity distribution. Flow through high viscous fluid. **(7+3)**

FLOW IN OPEN CHANNELS: Types of flow in channels - velocity distribution – Chezy's formula – Manning's formula; most economical channel section; Computation of specific energy and critical depth; hydraulic jump and backwater curve. **(9+3)**

PUMPS AND HYDRAULIC DEVICES: Classification of pumps - Centrifugal pumps - multistage pumps - specific speed and characteristic curves - reciprocating pumps - negative slip – Indicator diagram - functions of air vessels. Introductions to turbines. Pressure booster pumps - Hydraulic press - hydraulic accumulator - hydraulic intensifier and hydraulic ram –hydraulic jacks. **(9+3)**

Total L: 45 + T: 15 = 60 periods

TEXTBOOKS

1. P. K. Rajput, '*Textbook of Fluid Mechanics and Hydraulic Machines*'. S Chand and Company Ltd., New Delhi, 2018.
2. P. N. Modi, and S. M. Seth, '*Hydraulics & Fluid Mechanics Including Hydraulics Machines*'. Standard Book House, New Delhi, 2017.

REFERENCES

1. R. K. Bansal, '*A Textbook of Fluid Mechanics and Hydraulic Machines*'. Laxmi Publications, New Delhi, 2018.
2. C. S. P. Ojha, P. N. Chandramouli, and R. Berndtsson, '*Fluid Mechanics and Machinery*'. Oxford, New Delhi, 2010.
3. Yunus A. Cengel, John. M. Cimbala, '*Fluid Mechanics; Fundamentals and Applications*'. Fourth edition, Tata McGraw Hill, 2019.
4. K. Subramanya K, '*Flow in Open Channels*'. Tata McGraw Hill, Fifth edition, 2019.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the fundamental principles of fluid statics, fluid kinematics, fluid dynamics, pipe flow, open channel flow, pumps and hydraulic devices used in fluid mechanics.	**K2**
CO2	Estimate the stability of floating bodies, determine discharge and energy losses in pipe and open-channel flows, and assess the performance of pumps and hydraulic systems in practical engineering situations.	**K3**
CO3	Analyze fluid behavior in static and dynamic conditions by evaluating flow characteristics, energy relationships, losses, and performance of hydraulic systems and devices.	**K4**
CO4	Engage in team-based problem-solving tutorial and assignment activities related to fluid mechanics, using appropriate engineering tools, effective communication and embrace continuous learning.	-

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3	2										3	
CO3		3										3	
CO4					1			1	1				3
@	3	3			1			1	1			3	3

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE403 BASIC STRUCTURAL STEEL DESIGN

3 1 0 4

BASIC CONCEPTS OF STRUCTURES: Structural form: Classification of structures based on function - material and shape, different structural systems and basic structural requirements: stability strength and stiffness - STRUCTURAL LOADS: Dead load - live load - wind load - dynamic and seismic load - thermal load - DESIGN CONCEPTS: Design Process: Codes of practice - Working Stress Method - Limit State Method of Design. Probabilistic approach to design - Limit state design concepts - structural steel sections - Loads on Structures – Load combinations. **(11+4)**

DESIGN OF CONNECTIONS: Need for connections - Bolted Connection: bearing type and slip critical - axially loaded - eccentrically loaded in plane and perpendicular to the plane - Welded Connection: Types of welded connections - axially loaded - eccentrically loaded in plane and perpendicular to the plan. **(8+3)**

DESIGN OF TENSION MEMBERS: Behavior and Types of sections - strength based on gross and net area basis - net area calculation for bolts – shear lag and block shear - Design of Tension Members. **(8+2)**

DESIGN OF COMPRESSION MEMBERS: Behavior - Euler's equation - basis of IS Code formula - corrections for residual stresses - effective length calculation - selection and design of simple members - Built-up members - simple back to back – toe to toe sections - laced members - battened member - column splices. **(10+4)**

COLUMN BASES: Simple base - gusseted base - column bases subjected to moment and axial loads - design of anchor bolts. **(8+2)**

Total L: 45 + T: 15 = 60 periods

TEXTBOOKS

1. L. S. Jayagopal, and D. Tensing, '*Design of Steel Structures*'. Vikas Publishing House Pvt. Ltd., 2016.
2. N. Subramanian, '*Design of Steel Structures'.* Oxford University Press, 2018.

REFERENCES

1. S. K. Duggal, '*Limit State Design of Steel Structures'.* Tata McGraw Hill, 2019.

COURSE OUTCOMES

At the end of the course, students will be able to:		Bloom's Level
CO1	Explain the different type of structural systems, loads and basic design methods available for design of steel structures.	**K2**
CO2	Apply engineering and structural design principles and relevant codes to design steel members, connections, and column bases for various loading conditions ensuring strength, stability, and serviceability.	**K3**
CO3	Analyze the performance of structural steel members and connections under diverse loading conditions by assessing strength, stability, failure modes, and compliance with design codes.	**K4**
CO4	Solve a given design problem individually and in a team, exhibiting effective team work, communication and collaborative skills.	-

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3	2	2									3	1
CO3		3	2	1								3	1
CO4								1	1				3
@	3	3	2	1				1	1			3	3

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CE404 HIGHWAY AND RAILWAY ENGINEERING

3 0 0 3

HIGHWAY ENGINEERING INTRODUCTION, PLANNING AND DEVELOPMENT: History of Road Development - Highway Development in India – Jayakar Committee Recommendations and Realisations - Twenty-year Road Development Plan - On-going Highway Development Programmes at National Level - Institutions for Highway Development at National level - Principles of Highway Economics and financing – Requirements of Ideal Alignment Factors Controlling Highway Alignment. **(8)**

HIGHWAY GEOMETRY AND DESIGN: Classification and Cross Section of Urban and Rural Roads (IRC) - Highway Cross Sectional Elements [IRC Standards]- Horizontal Alignment – Horizontal Curves- Super elevation – Widening of Pavements on Horizontal Curves and Transition Curves - Vertical Alignments - Gradients, Summit and Valley Curves - Sight Distances and factors affecting Sight Distances - Geometric Design of Hill Roads [IRC Standards Only]. **(10)**

HIGHWAY MATERIALS, CONSTRUCTION AND MAINTANENCE: Highway Construction Materials - Desirable Properties and Testing - Construction of flexible and rigid pavements including modern materials and methods - Special consideration for hilly roads - Highway Drainage - road side development and Arboriculture. **(8)**

RAILWAY ENGINEERING INTRODUCTION, PLANNING AND DESIGN: Railroad history - transportation in India today and its significance - Railroad organizations – modern rail transportation - Railway track (Permanent way) its components and their functions - Gauge, tilting of rails - coning of wheels and theory of coning - Rails, Rail fastenings, Creep of rails - Sleepers - Ballasts and Ballast less tracks - Track alignment - Geometric design of Railway Tracks: Gradient, Horizontal curve, super elevation, Transition curves, Summit Curves. **(10)**

RAILWAY TRACK CONSTRUCTION AND MAINTENANCE: Points and crossing – Signalling and interlocking - Stations and Equipment – Yards and equipments - Track maintenance. **(9)**

Total L: 45 periods

TEXTBOOKS

1. S. K. Khanna, C. E. G. Justo, and A. Veeraragavan, '*Highway Engineering'*. Nem Chand & Bros, Roorkee, 2024.
2. S. C. Saxena, and S. P. Arora, '*A Textbook of Railway Engineering'*. Dhanpat Rai Publications, New Delhi, 2017.

REFERENCES

1. L. R. Kadiyali, and N. B. Lal, '*Principles and Practices of Highway Engineering'*. Khanna Publishers, New Delhi, 2023.
2. Satish Chandra, and M. M. Agarwal, '*Railway Engineering*'. Oxford University Press, Noida, 2013.
3. R. Srinivasa Kumar, '*Textbook of Highway Engineering'*. Universities Press, Hyderabad, 2015.
4. R. Srinivasa Kumar, '*Transportation Engineering: Railways, Airports, Docks and Harbours'*. Universities Press, Hyderabad, 2014.
5. Martin Rogers, and Bernard Enright, *'Highway Engineering'*. Wiley, 2016.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Summarize the concepts of highway planning and development, materials, construction and maintenance, railway planning, construction and maintenance.	**K2**
CO2	Apply engineering principles to solve problems related to geometric design of highways and railway tracks.	**K3**
CO3	Exhibit effective team work, communication and collaborative skills to present seminars and submit reports related to highways and railway track planning and design.	**-**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3	1										3	1
CO3								1	1				3
@	3	1						1	1			3	3

1-low, 2-medium, 3-high @-Overall Contribution to the Course

Third ACM

25CE411 CONCRETE TECHNOLOGY AND HIGHWAY LABORATORY

0 0 4 2

PHYSICAL PROPERTY TESTS ON CONCRETE AND HIGHWAY MATERIALS:

1. Tests on Cement: Standard consistency – Soundness – Initial & Final setting times – Fineness – Compressive strength.
2. Tests on Fine aggregate: Specific gravity - Bulk density - Sieve Analysis, Grading zone, Fineness modulus – Bulking - Water absorption.
3. Tests on Coarse Aggregate: Specific Gravity - Bulk density – Sieve analysis, Size of aggregate, Fineness modulus – Water Absorption - Abrasion value – Shape tests - Crushing and Impact test.
4. Tests on Bitumen: Specific gravity – Penetration – Ductility – Viscosity – Softening point – Flash and Fire point test.
5. Test on Bituminous Mix: Determination of Binder Content using Bitumen extraction test

TESTS ON FRESH AND HARDENED CONCRETE PROPERTIES:

6. Method of Designing and Proportioning of Normal Concrete Mixes by IS method.
7. Workability Tests: Slump test – Compaction factor – Vee bee consistometer - Flow table - Testing Methods of Self compacting concrete – Demo only.
8. Hardened concrete properties: Cube Compressive Strength – Flexural strength - Splitting tensile strength.
9. NDT: Rebound Hammer - Ultrasonic pulse velocity.

Total P: 60 periods

REFERENCES

1. Department of Civil Engineering, *'Concrete Technology and Highway Laboratory Manual'.* PSG Institute of Technology and Applied Research, Coimbatore, 2025.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Exhibit effective team work, communication and collaborative skills to submit reports by conducting experiments using modern tools related to the mechanical properties of cement, aggregates, bitumen and concrete as per relevant IS codes and interpret their suitability for concrete and highway applications.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	3	1	1	3	3			3	3
@	3	2	2	2	3	1	1	3	3			3	3

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25CEE01 MINI PROJECT I

0 0 2 1

The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a project report after completing the work to the satisfaction. The student will be evaluated based on the report and the viva voce examination by a team of internal examiners.

Total P: 30 periods

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Engage in independent study to research and consolidate literature in the identified area and formulate an engineering problem.	**K4**
CO2	Apply knowledge of mathematics, natural science, computing and engineering concepts to design / develop solutions for the identified problem through appropriate engineering tolls and validate the solutions using research-based knowledge.	**K6**
CO3	Contribute in project teams and present solutions for the identified in the form of poster, presentation and project report considering project management, economic, sustainability and ethical principles.	-

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1		3									3	3	
CO2	3		3	3	3							3	
CO3						3	3	3	3	3			3
@	3	3	3	3	3	3	3	3	3	3	3	3	3

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25EEC03 PROBLEM SOLVING

0 0 2 1

PROBLEM SOLVING:

1. Algorithmic Thinking, Branching & Repetition Problems
2. Logical Reasoning - Data Arrangements & Relations
3. Solving problems based on Coding & decoding, Series, Analogy, Odd man out and Visual reasoning
4. Problems based on Ages, Logical Connectives, Syllogisms, Data Interpretation & Data Sufficiency
5. Solving problems on Clocks Calendars, Direction Sense & Cubes
6. Problems based on Number system, Percentages, Simple & Compound Interest
7. Resume update

Total P: 30 periods

REFERENCES

1. R. S. Aggarwal, '*Quantitative Aptitude for Competitive Examination*'. S Chand Publishing, New Delhi, 2017.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Solve problems related to coding, logical reasoning and prepare resumes.	**K3**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1										1		
@	1										1		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

MANDATORY COURSES

25MC001 ENVIRONMENTAL SCIENCES
(Common to Civil, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

2 0 0 0

INTRODUCTION TO ENVIRONMENT: Environment - Definition, scope and importance. Types and composition of atmosphere – particles, ions and radicals. Ozone layer- significance, formation and depletion. Ecosystems- Structure and functions, components, energy flow, food chains, food web, Biodiversity-levels, values and threats – India as a mega-diversity nation, hotspots of biodiversity, endangered and endemic species of India, conservation of biodiversity. **(6)**

ENERGY RESOURCES: Introduction – National and International status- exploitation - sustainable strategies- Fossil fuels-classification, composition, physico-chemical characteristics and energy content of coal, petroleum and natural gas; solar energy - introduction, harnessing strategies. Wind energy - availability, wind power plants, wind energy conversion systems, site characteristics, and types of wind turbines. Supporting renewable energy resources -tidal, geothermal, hydroelectric. **(6)**

ENVIRONMENTAL POLLUTION: Definition, Sources, causes, impacts and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards, RF hazards, Role of an individual in prevention of pollution. Disaster Management: Floods, earthquake, cyclone and landslides – Case studies, consequences and rescue measures. **(6)**

WASTE MANAGEMENT: Waste water - Characteristics of domestic and industrial wastewater - COD and BOD, Various stages of treatment – primary, secondary, tertiary treatment- Biological and advanced oxidation processes. Solid waste management – Characteristics of municipal solid waste (MSW), biomedical, automobile and e-wastes and their management, landfills, incineration, pyrolysis, gasification and composting**.** **(6)**

SOCIAL ISSUES AND THE ENVIRONMENT: Environmentally Sustainable work practices- Rain water harvesting, Role of non-governmental organizations. Human ethics and rights- impact on environment and human health, role of information technology on environment and human kind. Green IT policies, Process of EIA - ISO 14000. Legislation- Environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act. **(6)**

Total L: 30 periods

TEXT BOOKS:

1. Gilbert M. Masters, '*Introduction to Environmental Engineering and Science*'. Pearson Education, New Delhi, 2004.
2. Deswal S and Deswal A, '*A Basic Course in Environmental Studies*'. Dhanpat Rai and Co, New Delhi, 2004.

REFERENCES:

1. Benny Joseph, '*Environmental Science and Engineering*'. Tata McGraw - Hill, New Delhi, 2006.
2. Koteswara Rao M V R, '*Energy Resources: Conventional & Non – Conventional*'. BSP Publications, New Delhi, 2006.
3. Botkin and Keller, '*Environmental Science*'. Wiley India Private Limited, New Delhi, 2013.

COURSE OUTCOMES:

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the basic concepts of environment, energy sources and waste management	**K2**
CO2	Use different renewable energy resources and environment protection measures for sustainable development	**K3**
CO3	Conduct a case study and real-time environmental issues and present as a team	**-**

COs-POs & PSOs MAPPING:

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	1												
CO3						2	2	2			2		
@	**1**					**2**	**2**	**2**			**2**		

1-low, 2-medium, 3-high @-OVERALL CONTRIBUTION TO THE COURSE

25MC002 INDIAN CONSTITUTION
(Common to Civil, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

2 0 0 0

INTRODUCTION: Evolution of Indian Constitution; significance of constitution; Composition; Preamble and its Philosophy. **(4)**

RIGHTS, DUTIES AND DIRECTIVE PRINCIPLES: Fundamental Rights- Writs and Duties, Directive Principles of State Policy. **(5)**

UNION GOVERNMENT: Union Government, President and Vice President, Houses of the Parliament and their functions; Types of Bills, Stages of passing of Bill into an Act, Veto Power, Constitution Amendment Procedure, Various Amendments made and their significance for India. **(6)**

STATE GOVERNMENT AND FEDERALISM: Composition of State Legislature; Powers, Functions and Position of Governor, Function of Chief Ministers, Council of Ministers; The Indian Federal System, Administrative Relationship between Union and States. **(8)**

JUDICIARY: Supreme Court, High Court; District Court and Lower Courts - Functions and Powers – Judges – Qualifications and Powers - Judicial Review. **(7)**

Total L: 30 periods

TEXT BOOKS:

1. Subash C Kashyap, '*Our Political System*'. National Book Trust, 2011.
2. Praveenkumar Mellalli E, '*Constitution of India, Professional Ethics and Human Rights*'. Sage Publications India Pvt. Ltd., 2015.

REFERENCES:

1. Briji Kishore Sharma, '*Introduction to the Constitution of India*'. Prentice Hall of India, 2010.
2. Basu D D, '*Introduction to the Constitution of India*'. Prentice Hall of India, 2016.
3. Jain. M C, '*The Constitution of India*'. Law House, New Delhi, 2001.
4. Shukla V N, '*Constitution of India*'. Eastern Book Company Ltd., New Delhi, 2011.

COURSE OUTCOMES:

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the evolution, significance, and philosophy of the Indian Constitution, including its Preamble, composition, and core principles.	**K2**
CO2	Analyze the structure, powers, and functions of the Union and State Governments, including the roles of the President, Parliament, Governor, and Council of Ministers, as well as the legislative process, types of bills, and constitutional amendments.	**K3**
CO3	Conduct a case study on the Indian Constitution, demonstrating understanding of its evolution, fundamental rights and duties, structure of Union and State governments, federal system, and the role of the judiciary in governance.	**-**

COs-POs & PSOs MAPPING:

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	2												
CO3								2	2		2		
@	**2**							**2**	**2**		**2**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25MC003 INDUSTRIAL SAFETY

(Common to Civil, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

2 0 0 0

SAFETY TERMINOLOGIES: Hazard-Types of Hazard- Risk-Hierarchy of Hazards Control Measures-Lead indicators- lag Indicators-Flammability- Toxicity Time-weighted Average (TWA) - Threshold Limit Value (TLV) -Short Term Exposure Limit (STEL)- Immediately dangerous to life or health (IDLH)- acute and chronic Effects-Routes of Chemical Entry-Personnel Protective Equipment- Health and Safety Policy-Material Safety Data Sheet MSDS. **(6)**

STANDARDS AND REGULATIONS: Indian Factories Act-1948- Health- Safety- Hazardous materials and Welfare- ISO 45001:2018 occupational health and safety (OH&S) - Occupational Safety and Health Audit IS14489:1998- Hazard Identification and Risk Analysis- code of practice IS 15656:2006. **(6)**

SAFETY ACTIVITIES: Toolbox Talk- Role of safety Committee- Responsibilities of Safety Officers and Safety Representatives- Safety Training and Safety Incentives- Mock Drills- On-site Emergency Action Plan- Off-site Emergency Action Plan- Safety poster and Display- Human Error Assessment. **(6)**

WORKPLACE HEALTH AND SAFETY: Noise hazard- Particulate matter- musculoskeletal disorder improper sitting poster and lifting Ergonomics RULE & REBA- Unsafe act & Unsafe Condition- Electrical Hazards- Crane Safety- Toxic gas Release. **(6)**

HAZARD IDENTIFICATION TECHNIQUES: Job Safety Analysis-Preliminary Hazard Analysis-Failure mode and Effects Analysis- Hazard and Operability- Fault Tree Analysis- Event Tree Analysis Qualitative and Quantitative Risk Assessment- Checklist Analysis- Root cause analysis- What-If Analysis- and Hazard Identification and Risk Assessment. **(6)**

Total L: 30 periods

TEXTBOOKS

1. Jain R. K. and Sunil S. Rao, '*Industrial Safety, Health and Environment Management Systems*'. Khanna Publisher, 4th Edition, 2000.
2. Deshmukh L. M., *'Industrial Safety Management: Hazard Identification and Risk Control'.* McGraw-Hill Education, 2007.

REFERENCES

1. John Ridley, John Channing, '*Safety at Work*'. Routledge, 7th Edition, 2008.
2. Dan Petersen, '*Techniques of Safety Management*: *A System Approach*'. Amer Society of Safety Engineers, 4th Edition, 2003.

COURSE OUTCOMES

At the end of the course, students will be able to		**Bloom's Level**
CO1	Describe the safety protocols and standard operating procedures in industrial settings to ensure compliance with safety regulations and minimize hazards in the workplace.	**K2**
CO2	Implement and test emergency response plans tailored to the industrial environments, ensuring effective action during emergencies such as fires, chemical spills or equipment malfunctions.	**K3**
CO3	Review and present on risk assessments and hazards using industry-specific tools to identify potential safety risks and choose appropriate corrective actions to prevent accidents and injuries.	-

CO - PO & PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	2					2	2						
CO3						1	1	1	1		1		1
@	**2**					**2**	**2**	**1**	**1**		**1**		**1**

1 - low, 2- medium, 3 – high @-Overall Contribution to the Course

25MC004 DISASTER RISK REDUCTION AND MANAGEMENT
(Common to CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

2 0 0 0

HAZRADS, VULNERABILITY AND DISASTER RISKS: Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Types of Disasters: Natural, Human induced, Climate change induced – Earthquake, Landslide, Flood, Drought, Fire, etc. – Technological disasters - Structural collapse, Industrial accidents, oil spills - Causes, Impacts including social, Economic, political, environmental, health, psychosocial, etc.- Disaster vulnerability profile of India and Tamil Nadu - Global trends in disasters: urban disasters, pandemics, Complex emergencies, Inter relations between Disasters and Sustainable development Goals. **(6)**

DISASTER RISK REDUCTION (DRR): Sendai Framework for Disaster Risk Reduction, Disaster cycle - Community Based DRR, Structural – Non-structural measures, Roles and responsibilities of - community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders - Early Warning System – Relevance of indigenous Knowledge, appropriate technology and Local resources. **(6)**

DISASTER MANAGEMENT: Components of Disaster Management – Preparedness of rescue and relief, mitigation, rehabilitation and reconstruction - Disaster Risk Management and post disaster management – Compensation and Insurance- Disaster Management Act (2005) and Policy - Institutional Processes and Framework at State and Central Level - (NDMA – SDMA – DDMA – NRDF - Civic Volunteers). **(6)**

TOOLS AND TECHNOLOGY FOR DISASTER MANAGEMENT: Early warning systems - Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness) – Role of GIS and Information Technology in Disaster Management – Disaster Damage Assessment - Elements of Climate Resilient Development – Standard operation Procedure for disaster response – Financial planning for disaster Management. **(6)**

DISASTER MANAGEMENT: CASE STUDIES: Case studies in the context of disasters - Landslide Hazard Zonation, Earthquake Vulnerability Assessment of Buildings and Infrastructure, Drought Assessment, Coastal Flooding, Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding, Forest Fire, Man Made disasters. **(6)**

Total L: 30 periods

TEXTBOOKS

1. Thomas D. Schneid, and Larry Collins, '*Disaster Management and Preparedness*'. CRC Publications, 2016.
2. R. Singh, '*Disaster Management Guidelines: Earthquakes, Landslides, Avalanches and Tsunami'*. Horizon Press Publications, 2017.
3. J. P. Singhal, '*Disaster Management'*. Laxmi Publications, 2024.
4. T. Bhattacharya, '*Disaster Science and Management'*. McGraw Hill India Education Pvt. Ltd., 2012.

REFERENCES

1. Government of India, '*Disaster Management Act'*. New Delhi, 2005.
2. Government of India, '*National Disaster Management Policy'*. New Delhi, 2009.
3. R. Shaw, '*Community based Disaster risk reduction*'. Natural Hazard Science, Oxford Research Encyclopedias, 2016.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Summarize the concepts, tools, technologies and strategies for disaster risk reduction and management.	**K2**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1					1	1	1	1	1		1		
@					**1**	**1**	**1**	**1**	**1**		**1**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course