Session: 2023-24

(As per NEP 2020, CBCS & OBE)

Scheme & Syllabus of B. Tech. (Civil Engineering)
3rd & 4th Sem (2nd Year)

Nomenclature	
EA	Ancient Science/Management/Psychology
DC	Department Core
DE	Department Elective
IC	Institute core/ Open Elective
LB	Lab work
MP	Mini Project

Scheme of B.Tech. III Semester Civil Engineering (As per NEP 2020, CBCS & OBE)
W.E.F 2023-24 (Even Semester)

S. No	Course Code	Subjects	Periods			Evaluation Scheme				Credits
		Theory	L	T	P	TA	IA	ESE	Total	
1	AMUCTB1	Engineering Mathematics-III	3	0	0	10	30	60	100	3
2	CEUCTT1	Strength of Materials	3	1	0	10	30	60	100	4
3	CEUCTT2	Fluid Mechanics-I	3	0	0	10	30	60	100	3
4	CEUCTT3	Surveying & Geomatics	3	0	0	10	30	60	100	3
5	CEUCTP1	Building Materials & Construction	3	0	0	10	30	60	100	3
	CEUCTP2	Engineering Geology								
	CEUCTP3	Ancient Philosophy of Civil Engineering								
6	CEUCTO1	Green Buildings	3	0	0	10	30	60	100	3
	CHUCTO1	Engineering Materials								
	CSUCTO1	Data Structure with C++								
	ITUCTO1	Computer Organization and Architecture								
	IPUCTO1	I.C. Engine								
	MEUCTO1	Introduction to Thermodynamics								
	ECUCTO1	Data Communication								
Total (A)			**18**	**1**	**0**				**600**	19
Practical's/Labs										
7	CEUCLT1	Survey Lab	0	0	2		25	25	50	1
8	CEUCLT2	Fluid Mechanics Lab	0	0	2		25	25	50	1
Total(B)			**0**	**0**	**4**				100	2
Total Credits (A+B)									**700**	**21**

L-Lecture, T-Tutorial, P-Practical, TA-Teacher Assessment, IA- Internal Assessment {Based on two class tests (CT)of marks-15 each}, ESE-End Sem Examination, NEP-National Education Policy, CBCS-Choice Based Credit System, OBE-Outcome Based Education

Scheme of B.Tech. IV Semester Civil Engineering (As per NEP 2020, CBCS & OBE)

W.E.F 2023-24 (Even Semester)

S.No	Course Code	Subjects	Periods				Evaluation Scheme			Credits
		Theory	L	T	P	TA	IA	ESE	Total	
1	CEUDTT1	Structural Analysis-I	3	1	0	10	30	60	100	4
2	CEUDTT2	Fluid Mechanics-II	3	0	0	10	30	60	100	3
3	CEUDTT3	Concrete Technology	3	0	0	10	30	60	100	3
4	CEUDTP1	Estimation and Costing	3	0	0	10	30	60	100	3
	CEUDTP2	Sustainable Construction								
	CEUDTP3	Ocean Engineering								
5	CEUDTO1	Remote Sensing & GIS	3	0	0	10	30	60	100	3
	CHUDTO1	Fluidization Engineering								
	CSUDTO1	Introduction to Information Science								
	ITUDTO1	Computer Network								
	ITUDTO1	Fundamentals of python programming								
	IPUDTO1	Automobile Engineering								
	MEUDTO1	Introduction to Fluid Mechanics								
	ECUDTO1	Introduction to Electronic Devices & Circuits								
6	CEUDTM1	Management and Organizational Behaviour	2	0	0					0
Total (A)			**17**	**1**	**0**				**500**	16
Practical's/Labs										
7	CEUDLT1	Civil Engineering Drawing with Computer Applications	0	0	2		25	25	50	1
8	CEUDLT2	Material Testing Lab	0	0	2		25	25	50	1
9	CEUDPT1	Mini Project	0	0	4		50	50	100	2
Total(B)			**0**	**0**	**8**				200	4
Total Credits(A+B)									**700**	**20**

L-Lecture, T-Tutorial-Practical, TA-Teacher Assessment, IA- Internal Assessment {Based on two class tests (CT)of marks-15 each}, ESE-End Sem Examination, NEP-National Education Policy, CBCS-Choice Based Credit System, OBE-Outcome Based Education

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
AMUCTB1	Engineering Mathematics-III	3	0	0	10	30	60	100	3

Course Objectives:

The students will be able

1. Use of the concepts of correlation, Regression and various types of distributions.
2. Get the skills, knowledge and attitudes required to determine approximate numerical solutions to mathematical problems which cannot always be solved by conventional analytical techniques.
3. Demonstrate the importance of selecting the right numerical technique for a particular application,
4. Carefully analyze and interpret the results obtained.
5. Analyze error.

Course Content:

UNIT-1 Correlation & Regression: Scatter diagram, Linear Correlation, Measures of Correlation. Karl Pearson's Coefficient of correlation, Limits for correlation coefficients, Coefficient of correlation for vicariate frequency distribution, Rank correlation, Linear Regression, Equations to the line of Regression. Regression coefficient. Angle between two lines of Regression.

UNIT–2 Theoretical Distributions: Discrete and Continuous probability distribution's Mathematical expectation, Mean and Variance, Moments, Moments generating function, probability distribution, Binomial, Poisson and Normal distribution, Test of significance based on chi-square,T,F, and Z distribution, degree of freedom , conditions for applying X2 (chi-square) test , student's test.

UNIT-3 Introduction of Errors and their Analysis, types of errors, numerical problems on error analysis, curve fitting: method of least squares; Numerical Solution of Algebraic and Transcendental Equations: Graphical method bisection Method, Secant Method, Regula-falsiMethod, Newton Raphson Method.

UNIT- 4 The Calculus of Finite Differences: Finite differences, Difference formula, operators and relation between operators. Inverse Operator, Interpolation with equal intervals: - Newton's forward and backward interpolation formula. Interpolation with Unequal intervals: - Lagrange's interpolation Newton's difference formula, inverse interpolation.

UNIT- 5 Numerical Differentiation and Integration: - Numerical Differentiation Newton's forward and Backward difference interpolation formula. Maxima and Minima of a Tabulated function, Numerical Integration:-Trapezoidol rule, simpson's (1/3) rd and (3/8) th rule, Boole's rule, weddle rule.

Text Books:

1) Prasad C "Advanced Engineering mathematics",
2) Dass H.K. "Advanced Engineering mathematics",
3) Ray M. "Mathematics statistics",
4) HigherEngg. Mathematics by Dr. B.S. Grewal– KhannaPublishers.,
5) Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons,
6) Advanced Engg.Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.,
7) Applied Mathematics by P.N.Wartikar& J.N. Wartikar. Vol- II– Pune VidyarthiGrihaPrakashan,Pune.
8) JAIN & IYNGAR Numerical Methods for Scientific and Engineering Computations.
9) RAO G.S. Numerical Anlysis.
10) Grewal B S Numerical Methods in Engineering and Science.
11) Rajaraman V., Computer Oriented Numerical Methods

12) P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
13) S. S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.

Course Outcomes-After successful completion of this course, the students will be able to

CO 1. Understand the statistical concept of correlation, regression and distribution, theory with special reforms to engineering problems.
CO 2. Analyse the errors obtained in the numerical solution of problems.
CO 3. Use appropriate numerical methods, determine the solutions to given non-linear equations.
CO 4. Use appropriate numerical methods, determine approximate solutions to ordinary differential equations.
CO 5. Use appropriate numerical methods, determine approximate solutions to ordinary differential equations.

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	2	3					2	2			
CO2	3	2	3	3	2	2					2	2			
CO3	3	2	3	3	2	2					2	2			
CO4	3	1	3	3	2	2					2	2			
CO5	3	1	3	3	2	2					2	2			

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUCTT1	Strength of Materials	3	1	0	10	30	60	100	4

Course Objective:

The objective of this Course is to:

- To understand the nature of stresses induced in material under different loads
- To plot construct the shear force and bending moments diagrams in determinate beams under gravity loads.
- To study the stress variation in beams subjected to bending and shear.
- To understand the elastic behavior of beams using conceptual theories.
- To study the theory of torsion in solid and hollow circular shafts and stresses developed in cylindrical shells.

Course Content:

Unit 1 : **Simple Stress - Strain and Compound Stresses**: Types of stress and strains, Mechanicals properties, Hooke's law, stress– strain curve for mild & cast iron, and HYSD. Relation between the elastic moduli & Poisson's ratio, Bars subjected to varying loads, Temperature stresses in composite bars, Elongation of bars of prismatic and non prismatic sections.

Plane Stresses: Stress at a point. Components of stress in rectangular coordinates, Stresses on an inclined plane, Principal stresses & Principle plane, Mohr's circle of stresses.

Unit 2 : **Shear Force - Bending Moment**: Shear Force & Bending Moment diagrams in statically determinate beams loaded with different load combination, Relationship between Load intensity-Shear Force -Bending Moment, Thrust diagram, Point of contra flexure, loading diagram & Bending moment diagram from shear force diagram, beam with internal hinge.

Unit 3 : **Bending Stress :** Theory of simple bending, Assumptions, Bending equation, Neutral axis, Determination of bending stresses – section modulus of sections, Combine Bending and Direct Stress.

Shear Stress: Derivation of Shear Stress formula, assumptions, Shear stresses in symmetrical elastic beam with different sections. Shear Centre.

Unit 4 : Slope and Deflections of simple Beams: Derivation of differential equation for deflection, Slope & Deflection of Beams by Double integration method, Macaulay's method & Moment area method for Simply supported, Cantilever beam subjected to pont load, UDL, UVL.

Unit 5 : **Torsion**: Equation of Pure Torsion, Assumptions, and Power transmitted, Stiffness of Shafts, Comparison of Solid & Hollow shaft, Strain energy in Torsion.

Cylindrical Shells: Type of Loads in pressure vessels, Stress Distribution in thin cylinder, Spherical vessels.

Text Books:

1) Strength of Materials – R.K. Rajput (S. Chand & Co.)
2) Strength of Materials – R.K. Bansal (Laxmi Publication)

3) Strength of Materials– S.S Ratnam (Tata McGrawHill)

Reference Books:

1) Strength of Materials – Timoshenko, S. & Gere (CBSPublishers)
2) Introductions to Solid Mechanics –Shames &Pitarresi (Prentice Hall of India)
3) Strength of Materials–S.Ramamurtham (DhanpatRai Publications)

Course Outcomes-

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

CO1 : Determine compound stresses and strains in material under different loads.
CO2 : Draw the shear force and bending moment diagrams for the beam subjected to different loading conditions.
CO3 : Evaluate stresses induced in different cross-sectional members subjected to bending and shear.
CO4 : Evaluate the deflections in beams subjected to different loading conditions.
CO5 : Estimate torsional stress in solid and hollow circular shaft and stresses variation in cylindrical shells.

COs	**POs**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1			1	1						3		2
CO2	3	2	2	1		1							3	1	2
CO3	3	2	2	1									3	1	2
CO4	3	2	2	1									3		
CO5	3	2	2	1									3	1	2

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUCTT2	Fluid Mechanics-I	3	0	0	10	30	60	100	3

Course Objectives:

- To introduce and give explanation of fundamentals of Fluid Mechanics and give fundamental knowledge of fluid with its properties, behaviour, forces on various surfaces and stability of submerged and floating body.
- To develop understanding about Kinematics of fluid flow.
- To imbibe basic law of energy and equation used for analysis of dynamic fluids.
- To introduce the importance of fluid Flow in Pipes and determine the losses in a flow system.
- To develop understanding about flow through mouthpieces and orifice

Course Content:

UNIT-1: **Introduction:** Fluid, physical properties of fluids ideal and real fluid, Newtonian and Non-Newtonian Fluid Statics: Pressure density height relationship, pressure measurement by Manometers, Pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, metacentric height.

UNIT-2: **Kinematics of fluid flow:** Steady and unsteady flow, uniform and non-uniform flow, laminar and turbulent flow, one, two and three dimensional flow, streamlines and path lines, rotational and irrotational flow, continuity equation, three dimensional continuity equation. Velocity potential and stream function.

UNIT-3:**Dynamics of fluid flow:** Euler's equation of motion along a streamline and its integration, Bernoulli's equation and its applications – Pitot tube, Venturimeter, orificemeter, and problems related to application of momentum equations.

UNIT-4: **Flow in Pipes:** Major and minor losses in pipe lines, loss due to sudden contraction & expansion, Pipes in series and parallel Flow in open Channel: Comparison between open channel and pipe flow, definition of uniform and non-uniform flow, Chezy's and Manning's Formula, Hydraulically efficient channel section of rectangular, trapezoidal.

UNIT -5: **Flow through mouthpieces and orifices:** Hydraulic coefficients of orifice, flow through large rectangular orifice, mouthpieces, Borda's mouthpieces. Notches and Weirs: Rectangular, triangular and trapezoidal notches and weir, cippoletti and broad crested weir.

Text Books:

1) Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
2) Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
3) Fluid Mechanics & Hydraulic Machines – Dr. P. N. Modi & S. M. Seth, (Narosa Publishing House)

Reference Books:

1) Mechanics of Fluid – Irving H. Shames (McGraw Hill)

2) Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)
3) Fluid Mechanics – R.J. Garde (New Age International Publication)
4) Fluid Mechanics – Streeter V.L. & Wylie E.B. (Tata McGraw Hills)
5) Fluid Mechanics – John F Dougles (Pearson Publication)
6) Introduction to Fluid Mechanics Fox, R.W. and McDonald, A.T., John Wiley & Sons.
7) Fluid Mechanics", Streeter, V.L. and Benjamin, W.E., "McGraw-Hill.
8) Fluid Mechanics and Fluid Mechanics Som, S.K. and Biswas, G., Tata McGraw Hill.
9) Introduction to Fluid Mechanics, Fox, R. W. and A. T. McDonald, 6th ed., John Wiley, New York, (2004)

Course Outcomes: At the end of the course students will be able to

CO1 Define fluid properties and state the Newton's law of viscosity with explain the mechanics of fluid at rest .
CO2 Describe the Kinematics of fluid flow.
CO3 Employ Bernoulli's equation for ideal and real fluid flow and deduce expressions for Venturimeter, orifice meter and pitot tube.
CO4 Explain the concept of Flow in Pipes and types of losses in pipe flow.
CO5 Describe Flow through mouthpieces & orifices and distinguish it.

Course Outcomes and their mapping with Programme Outcomes Fluid Mechanics- I (CE203TPC02)

COs	**POs**												**PSOs**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2									3	2	2
CO2	3	2	1	2	2								3	2	2
CO3	3	2	1	3									3	2	3
CO4	3	2	2	2	3								3	2	2
CO5	3	2	1	3	2								3	2	3

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUCTT3	Surveying & Geomatics	3	0	0	10	30	60	100	3

Course Objectives:

- To understand the Concepts of surveying & levelling &its application on the field.
- To learn about the concepts of theodolites, tacheometry & triangulation.
- To understand subsidiary surveying like photographic & hydrographic surveying.
- To learn to apply advanced application of surveying like Remote sensing, EDM.

Course Content:

Unit 1: Introduction to Surveying- Basic Principles, Objectives & Classification of surveying, Survey lines-ranging.
Compass Surveying: Bearing of survey lines (QB & WCB), Local attraction, Dip & Declination
Levelling: Principles of levelling- Dumpy level, booking and reducing levels, Methods- simple, differential, reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in leveling.

Unit 2: Theodolite and Tacheometry: Vernier theodolites, Temporary and permanent adjustments, Requirements of nonadjustable parts, Measurement of horizontal angle by repetition and reiteration method, Measurement of vertical angles.
Tacheometery: Definitions, Principles of stadia systems. Instrument constants, Substance and Tangential Systems. Construction and use of Reduction Tacheometers.

Unit 3: Triangulation: Triangulation figures, Triangulation stations, Inter visibility of stations, Satellite Stations and reduction to centre.
Theory of Errors – Types, theory of least squares, Weighting of observations, Most probable value, Computation of indirectly observed quantities - method of normal equations.

Unit 4: Photogrammetry: Phototheodolite, principle of the method of terrestrial photogrammetry, Aerial Surveying: scale and distortion of the vertical and tilted photograph

Unit 5: Principle of Electronic Distance Measurement: Principle, Type, Use, Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications.
Remote Sensing: Introduction– Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors, Introduction to GPS.

Text/Reference Books:

1. B.C. Punamia, A. K Jain, SurveyingVol.1&2, Laxmi Publications.
2. Madhu, N, Sathikumar, Rand Satheesh Gobi, Advanced Surveying: TotalStation, GIS and Remote Sensing, Pearson India, 2006.
3. Bhavikatti ,S. S. ,Surveying and Levelling, Vol. I and II,I.K.International,2010
4. Manoj,K.AroraandBadjatia,GeomaticsEngineering,NemChand&Bros,2011

Course Outcomes-

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

CO1: Remember& Understand the principle & classifications of surveying & Apply concepts &techniques of compass surveying & levelling.

CO2: Understand the working of theodolite & apply the concepts of tacheometery.

CO3: Apply the concepts of triangulation & Photogrammetry & Analyze the computations of surveying using theory of errors.

CO4: Employ surveying techniques using advanced surveying equipments & Techniques like EDM's & Remote sensing.

Course Outcomes and their mapping with Programme Outcomes: Surveying & Geomatics (CE23DC303)

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1		2								3	3	3
CO2	2	1	2	1					1				2	2	3
CO3	3		3	2	3							2	2	3	1
CO4	3	3	3	2								2	2	3	2
CO5															

Weightage:1-Sightly;2-Moderately;3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUCTP1	Building Materials & Construction	3	0	0	10	30	60	100	3

Course Objectives:

- To introduce the basic engineering properties of building materials like brick, stones, timber, ceramics,plastics, etc.
- To understand the elementary characteristics of construction materials like cement aggregates, concrete,steel, etc.
- To understand the types of foundations, functions, types of masonry, lintels, etc.
- To learn the structure supporting method like Shoring, Underpinning, and other advanced constructionmaterials & Techniques.

Course Content:

UNIT-1: Bricks, Tiles, Timber; Properties, Classification & application in Construction.

UNIT-2: Miscellaneous Engineering Materials; Ceramics & Glass; Polymers in construction; Plastics & Rubber; Paints & Paint admixtures, Varnishes and Distempers; Composite materials; Adhesives; Thermal, Electrical & Sound Insulators.
Other materials for construction; Cost effective materials, industrial byproducts, agricultural byproducts, Construction & demolition waste, Introduction to new materials (Survey and study), and locally available materials.

UNIT 3: Cement, Mortar, Aggregate, Admixtures, Concrete and Steel; classification, properties & uses.

UNIT-4: Foundations, Masonry, Arches & Lintels, Door & Window, Sill, Stairs case; Classification, Requirements, Uses & Construction, Joints; Construction, Contraction and Expansion Joints in buildings.

UNIT-5: Shoring, Underpinning, Formwork, Scaffolding, Slip form; Types and Construction Practice, Advanced Construction Materials & Techniques, Low Cost housing techniques, Damp Proofing, Sound Proofing, and Fire Proofing Construction Practice.
The relevant IS Codes for all the materials and NBC.

Name of Text Books:

1) Building Materials – S.K. Duggal (New Age Publication)
2) Building Materials – S. C. Rangwala (Charotar Publication)
3) Building Construction by S.G. Rangwala, Charter Publishing House, Anand, India.
4) Building Construction by Sushil Kumar, Standard Publ. and Distributors, New Delhi
5) Building Construction by Punmia B.C., Lakshmi Publications, New Delhi.
6) Advanced Building Materials and Construction by Mohan Rai and Jai Sing, CBRI Publications, Roorkee
7) Concrete Technology – A.M. Neville & J.J. Brooks (Pearson Education)

8) Concrete Technology – M.S. Shetty (S. Chand & Co.)
9) Engineering Materials – Surendra Singh (Laxmi Publication)
10) Construction Engineering and Management – S. Seetharaman (Umesh Publication)
11) Building Materials – Gurucharan Singh (Standard Publishers, Delhi

Course Outcomes:

At the end of the course the students shall be able

CO1 To compare the properties of most common and advanced building materials.
CO2 To understand the typical and potential applications of these materials
CO3 To select the appropriate building material for building construction
CO4 To identify the different components of a building and differentiate various types of foundations, masonry, arches and lintels
CO5 To select the appropriate supporting structure for strengthening of the building

Course Outcomes and their mapping with Programme Outcomes: Building Materials & Construction (CE23DE301)

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			1		1			1		1	2		
CO2	3	2			1	1	1					1	1	1	
CO3	3	1					1			1			2		
CO4	3	2				1	1						2		
CO5	2	1			1	1	1			1			1		

Weight age: 1-Sightly; 2-Moderately; 3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUCTP2	Engineering Geology	3	0	0	10	30	60	100	3

COURSE OBJECTIVES

To describe weathering process and mass movements

- To gain knowledge about various properties of minerals and their engineering significance.
- To acquire knowledge of various classification of rocks.
- To interpret the importance of different geological features and their effects.
- To apply the principles of geological investigations in civil engineering structures.

Course Content:

UNIT I: PHYSICAL GEOLOGY Geology in civil engineering – branches of geology; structure of earth and its composition; weathering of rocks – scale of weathering; soils landforms and processes associated with river, wind, groundwater and sea; relevance to civil engineering; Plate tectonics.

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

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

UNIT IV: STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD - Geological maps – attitude of beds, study of structures; folds, faults and joints – relevance to civil engineering; Geophysical methods – Seismic and electrical methods for subsurface investigations.

UNIT V: GEOLOGICAL INVESTIGATION - Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings; Coastal protection structures; Investigation of Landslides and earthquakes - causes and mitigation; seismic zonation – seismic zones of India.

TEXT BOOKS :-

1) Parbin Singh, “Engineering and General Geology”, S.K. Kataria & Sons, 2008.
2) Venkatareddy. D. Engineering Geology, Vikas Publishing House Pvt. Ltd. 2010.

REFERENCES :-

1) Muthiayya, V.D. (1969), “A Text of Geology”, Oxford IBH Publications, Calcutta.

2) Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
3) F.G. Bell. Fundamentals of Engineering Geology, B.S. Publications. Hyderabad 2011.
4) Dobrin, M.B An introduction to geophysical prospecting, McGraw-Hill, New Delhi, 1988
5) Varghese, P.C., Engineering Geology for Civil Engineering PHI Learning Private Limited, New Delhi, 2012.
6) MarlandP.Billings, "Structural Geology", PHI Learing Pvt. Ltd. New Delhi, 2012

WEB LINKS :

i. http://studentsuvidha.com/forum/Forum-Engineering-Geology-btech-Notes-study-material
ii. https://www.examrace.com/IES/IES-Free-Study-Material/Civil-Engineering/Engineering-Geology

COURSE OUTCOMES:-

The end of this course, students will be able to :

CO1- Classify the various geological agents and processes involved.
CO2- Identify the available minerals by their properties and behavior.
CO3- Classify and identify the available rock in the construction site.
CO4- Interpret the different geological features and their engineering importance.
CO5- Apply the geological concepts in civil engineering projects.

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2					2	2						2		
CO2	2			2	2				2				2		
CO3	2	2	1	2					2				2		
CO4	2	2		2	2	2	2	2			2	2	2		
CO5			2	2		2	2	2	2		2	2	2		

Weight age: 1-Sightly; 2-Moderately; 3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUCTP3	Ancient Philosophy of Civil Engineering	3	0	0	10	30	60	100	3

Course Objectives:

The objective of this Course is

- To define the fundamental concepts of heritage resources, including their need, values, types, significance, and the factors contributing to their decay.
- To analyze and compare different approaches for managing and rehabilitating heritage properties.
- To evaluate the criteria used for selecting heritage sites, considering their historical, cultural, and architectural significance
- To apply knowledge of heritage conservation principles by identifying and assessing heritage sites in India.
- To design and recommend appropriate construction materials and techniques, both traditional and modern, for the preservation and conservation of heritage sites

Course Content:

UNIT 1: Basic concepts of Heritage resources - need, values, types, significance, causes of decay, Approaches for Managing and Rehabilitating Heritage Properties, the institutions working for Heritage at the World Level (UNESCO) and India Level (INTACH, ASI), and Criteria for selecting Heritage Sites.

UNIT2: Heritage Sites of India (UNESCO, ASI, etc.), Evolution of Heritage Conservation, Construction Materials for the Conservation/ Preservation of Heritage - Traditional Materials and Modern Materials, Restoration vs. Preservation, Conservation Techniques and Modern Technology in Conservation, Case Studies.

UNIT 3: Construction Techniques for Conservation of Heritage - Traditional and Modern. Emerging trends in conservation practices specific to India and the role of interdisciplinary approaches, ASI regulations for Zoning of allowable Construction around the Heritage Site, Heritage By-laws, and case studies.

UNIT 4: Documentation of Construction Techniques and Materials through Live Indian Heritage Case Studies. (Supported with Site visits, Surveys, Photography, Drawings, etc., of Local Heritage Sites by organizing Heritage tours).

UNIT 5: New Building in Heritage Setting, Heritage Impact Assessment in Historic Settings, Adaptive Reuse, Legislative and Organizational Policies for India, Heritage Regulations & Role of Voluntary Organizations, Heritage Conservation – Issues (contemporary issues, political, economic, and social factors) & Potentials Heritage tourism, sustainability, and way forward.

Reference Books:

1) Appleyard, D. (Ed.). (1979). The Conservation of European Cities. Massachusetts: M.I.T. Press.
2) Basu, S., Mukerji A (Eds.) (2017). Integrated Urban Conservation: An Approach towards Development, ISBN: 978-93-5268-866-1, Kharagpur: Department of Architecture and Regional Planning, IIT, Kharagpur.
3) Croci, G. (1998). The Conservation and Structural Restoration of Architectural Heritage. Southampton, UK: WIT Press.
4) Fitch, J.M. (Reprint edition 1990). Historic Preservation: Curatorial Management of the Built World. Virginia: University Press of Virginia.
5) Cullinane, J. J. (2012). Maintaining and Repairing Old and Historic Buildings. Wiley-Blackwell.
6) Evans, N.L. (2014). An Introduction to Architectural Conservation: Philosophy, Legislation and Practice. London: RIBA Publishing.
7) Feilden, B. M. (2003). Conservation of Historic Buildings. London: Routledge.
8) Glendenning, M. (2013). The Conservation Movement: A History of Architectural Preservation: Antiquity to Modernity. London: Routledge.
9) Stipe, R.E. (2003). A Richer Heritage: Historic Preservation in the Twenty-first Century. North Carolina: The University of North Carolina Press.

Course Outcomes:

At the end of the course, the students shall be able

CO1: To demonstrate an understanding of critical concepts related to heritage resources, including their importance, types, and factors contributing to their decay.

CO2: To compare different heritage property management and conservation approaches, and critically assess their effectiveness.

CO3: To apply their knowledge to evaluate heritage sites based on specific criteria, making informed decisions about their preservation or restoration.

CO4: To synthesize information on construction techniques and materials used in heritage conservation and apply this knowledge to real-world scenarios.

CO5: To assess the impact of new construction in heritage settings, perform heritage impact assessments, and analyze the legislative and organizational policies governing heritage conservation in India.

Course Outcomes and their mapping with Programme Outcomes:

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	3	3				3				1	2	2
CO2	3	3	1	2	3			3					2	3	2
CO3	3	3	1	2	3			3		3			2	3	2
CO4	3	3	1	2	3			3		3			2	3	2
CO5	2	2	2	1	1			3	3				2	2	1

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUCTO1	Green Buildings	3	0	0	10	30	60	100	3

Course Learning Objectives:

- To understand the basics of Green Buildings.
- To learn the concept of site selection and water conservation.
- To study the use of efficient energies.
- To learn about maintenance of Indoor environmental quality.
- To study various green building rating systems including their mandatory requirements and credit points.

Course Content:

UNIT-I Green Buildings: Introduction, history and evolution, objectives, benefits, typical features of green buildings, sustainability and green buildings, global trends in green buildings, Examples of green buildings in India and the world (case studies to be presented by students).

UNIT-II Site selection and building planning: Criteria for site selection, preservation of landscape, soil erosion control, understanding and minimizing urban heat island effect. Water conservation and efficiency: Rainwater harvesting methods for roof & non-roof, water demand, water efficient plumbing systems, water metering, waste water disposal, recycle and reuse systems.

UNIT-III Energy Efficiency: Concepts of embodied energy, operational energy, demolition energy and life cycle energy. Methods to reduce operational energy: Energy efficient building envelopes, efficient lighting technologies, energy efficient appliances for heating and air conditioning systems in buildings, wind and solar energy harvesting, energy metering and monitoring, concept of net zero buildings.

UNIT-IV Indoor Environmental Quality for Occupant Comfort: Daylighting, air ventilation, exhaust systems, materials, adhesives, building acoustics. **Environment Quality and Occupational Health:** Air conditioning, air quality, Sick building syndrome, minimum fresh air
requirement, improved fresh air ventilation, Measure of Indoor air quality (IAQ), Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels.

UNIT- V Green Building Rating Systems: Introduction to various rating systems (LEED, GRIHA, IGBC etc.), mandatory requirements and credit points of various rating systems, study of green building rating criteria of IGBC, Understanding the green building measures in the areas of site preservation, energy efficiency, materials, water conservation and indoor air quality.

Text Books

1) IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian Green Building Council Publishers.
2) GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
3) Alternative building materials and technologies by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
4) Non-Conventional Energy Resources by G. D. Rai, Khanna Publishers.
5) Sustainable Building Design Manual, Vol.1 and 2, TERI, New Delhi 2004.
6) Mike Montoya, Green Building Fundamentals, Pearson, USA, 2010.
7) Charles J. Kibert, Sustainable Construction Green Building Design and Delivery, John Wiley & Sons, New York, 2008.
8) Regina Leffers, Sustainable Construction and Design, Pearson / Prentice Hall, USA, 2009.

Course Outcomes- At the end of the course students will be able to:

CO1: Apply the concept and knowledge of Green Building in handling any physical projects.
CO2: Conduct a site selection process and apply water conservation techniques for green buildings.
CO3: Make use of technologies with efficient energies.
CO4: Apply the knowledge in maintaining the indoor environmental quality.
CO5: Revise essential parameters of green building rating system.

Course Outcomes and their mapping with Programme Outcomes: Green Buildings (CE23IC301)

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1		3	3					2	2	1	2
CO2	3	2	1	2		3	3					1	2	2	3
CO3	3	2	1	2		3	3					2	2	2	3
CO4	3	2	2	2		3	3					2	2	2	2
CO5	3	2	1	1		2	2					1	2	1	2

Weight age: 1-Sightly; 2-Moderately; 3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUCLT1	Survey Lab	0	0	2		25	25	50	1

Course Objectives:

The Lab sessions would help in learning:

- Applications of chains & compass in surveying.
- Various Applications of levelling process.
- Use of Plane table surveying in preparing of maps of a location
- Tacheometry & its applications.
- Relative adjustment of non- accessible stations
- Principle & operation of Total Station.

Course Content:

List of experiments:

1. Linear measurement, offsetting using metric chain.
2. Determination of the area of the given field by cross staff survey &metric chain.
3. Compass Open Traversing using prismatic compass and elimination of local attraction.
4. Compass Close Traversing using prismatic compass and elimination of local attraction
5. To find the difference in elevation between the two non-invisible stations by the method of differential levelling.
6. To draw longitudinal profile of the road by the method of profile levelling.
7. To draw Cross-Sectional profile of the road by the method of profile levelling
8. Measurement of horizontal angle by repetition & reiteration method using theodolite.
9. Measurement of vertical angle by using theodolite
10. Determination of Tachometric constants (K & C).
11. Determination of elevation and height by tangential method when both angles are angles of elevation & angles of Depression.
12. Determination of elevation and distance by Stadia Hair method when line of sight inclined Upward & Downward
13. To perform the experiment for reduction to center from different positions of a satellite station when: (i) Satellite station in north position, (ii) Satellite station in left position
14. To perform the experiment for reduction to Centre from different positions of a satellite station when: (i) Satellite station in south position, (ii) Satellite station in right position
15. Traversing of the given area by radiation & intersection method using plane table survey.
16. Find the plane table instrument station using Resection method (Two-point problem & three-point problem)
17. Study of total station

Text Book:

1) Surveying and Levelling. N.N.Basak, 1st Edition, Tata McGraw Hill
2) Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
3) Surveying (Vol. I & II) – Kanetkar (Pune VidyarthiGrihaPrakashan, Pune)

Reference Books:

1) Surveying (Vol. II & III) – Agor, R (Khanna publications, Delhi, 1995)
2) Surveying (Vol. II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
3) Surveying (Vol. I & II) – S.K. Duggal (Tata McGraw Hill)

Course Outcomes-

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

CO1 Remember about conventional surveying tools such as chain/tape, compass, plane table, levels, Theodolite & Tachometer in the field of civil engineering applications such as structural plotting and highway profiling.

CO2 Understand & apply the concepts of Traversing, Plane Table Surveying & Levelling in the surveying field.

CO3 Understand & apply the concepts of Tacheometery & Triangulation in the surveying field.

Course Outcomes and their mapping with Programme Outcomes: Survey Lab (CE23LB301

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	3								3	3	1
CO2	2	1	2	3	2								2	3	2
CO3	3	2	3	3	2							2	2	1	1

Weight age: 1-Sightly; 2-Moderately; 3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUCLT2	Fluid Mechanics Lab	0	0	2		25	25	50	1

Course Objectives:

- To understand the verification of Bernoulli's equation.
- Determination of Meta centric height of ship model
- Calibration of flow measuring devices as Venturimeter
- Calibration of flow measuring devices as Orificemeter.
- Demonstrate and find out co-efficient of velocity for orifice and Mouthpiece.
- Demonstrate and find out co-efficient of discharge for various types notches.
- Determination of friction factor for pipes
- Determination of critical velocity in pipe
- Determination of the co-efficient of pitot tube.
- Determination of coefficient of impact for vanes
- To plot velocity profile across the cross section of pipe
- Determine the Reynold's Number in pipe.
- To learn the Calibration of rectangular sharp cornered weir and to study the pressure distribution on the upstream face of the weir.
- To learn the Calibration of rectangular streamlined weir and to study the pressure distribution on the upstream face of the weir.

Course Content:

List of experiments:

1) To calculate the total energy at different points and plot the graph between total energy vs. distance. (Verification of Bernoulli's equation)
2) To determine the Meta centric height with angle of ship model.
3) To determine the co-efficient of Discharge Cd for Venturimeter
4) To determine the co-efficient of Discharge Cd for Orificemeter.
5) To determine the co-efficient of discharge and the co-efficient of velocity for Orifice.
6) To determine the co-efficient of discharge and the co-efficient of velocity for Mouthpiece.
7) To determine the coefficient of discharge Cd of Rectangular Notch.
8) To determine the coefficient of discharge Cd V Notch - 45 0
9) To determine the coefficient of discharge Cd V Notch - 60 0
10) To determine the friction factor for Darcy-Weisbach equation
11) Experimental determination of critical velocity in pipe.
12) To determine the coefficient of impact for vanes
13) To find the co-efficient of pitot tube
14) To plot velocity profile across the cross section of pipe
15) To determine the Reynold's Number in pipe
16) Calibration of rectangular sharp cornered weir and to study the pressure distribution on the upstream face of the weir.
17) Calibration of rectangular streamlined weir and to study the pressure distribution on the upstream face of the weir.

Course Outcomes-At the end of the course students will be able to

CO1 Verify the basic energy principles (Bernoulli's equation).
CO2 Utilize the basic measurement techniques of fluid flow in Venturimeter.
CO3 Utilize the basic measurement techniques of fluid flow in Orificemeter.
CO4 Gain knowledge to calculate co-efficient of velocity for orifice and Mouthpiece
CO5 Gain knowledge to calculate co-efficient of discharge for various types notches
CO6 Determine the critical velocity in pipe.
CO7 Understand the pipe flow systems and its losses.
CO8 Determine the coefficient of impact for vanes.
CO9 Determine co-efficient of discharge for pitot tube
CO10 Plot velocity profile across the cross section of pipe
CO11 Determine the Reynold's Number in pipe
CO12 Calibrate the rectangular sharp cornered weir and to study the pressure distribution on the upstream face of the weir.
CO13 Calibrate the rectangular streamlined weir and to study the pressure distribution on the upstream face of the weir.

Course Outcomes and their mapping with Programme Outcomes: Fluid Mechanics Lab (CE203PPC02)

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	2	1								3	2	2
CO2	3	3	3	2	1								3	2	2
CO3	3	3	2	2	1								3	2	2
CO4	3	3	2	2	1								3	2	2
CO5	3	3	2	2	1								3	2	2
CO6	3	3	3	2	1								3	2	2
CO7	3	3	3	2	1								3	2	2
CO8	3	3	2	2	1								3	2	2
CO9	3	3	3	2	1								3	2	2
CO10	3	3	2	2	1								3	2	2
CO11	3	3	3	2	1								3	2	2
CO12	3	3	2	2	1								3	2	2
CO13	2	2	3	2	1								3	2	2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDTT1	Structural Analysis-I	3	1	0	10	30	60	100	4

Course Objectives:

To study the strain energy principles and their application tobeams and pin joint plane frames

To learn about analysis of arches &cables.

To know how to construct the influence line diagrams for determinate beams and its application to estimate the maximum shear force, bending moment at a section and absolute maximum bending moment in the beams.

To study the construction of influence lines for determinate trusses and three hinged arches and its applications.

To learn about the static indeterminacy of structures and methods of analysis, application of three momenttheorem to beams

Course Content:

UNIT 1: Principle of superposition, virtual work principle, Maxwell reciprocal theorem, deflection of beams using conjugate beam method. Deflection of beams and truss using energy method (Castiglianotheorem), Analysis of plane truss using tension coefficient method (determinate).

UNIT 2: Three-hinged Arches: Bending Moment, Shear force, axial force for three-hinged arches, Analysis ofSuspension Bridge without stiffening girders.

UNIT 3: Influence Lines: Basic concept of moving load and influence line; influence lines for reactions, Shearforce and bending moment for determinate beams; absolute maximum shearing force and bending moment.

UNIT4: Influence lines for three-hinged arches and stresses in simply supported plane determinate trusses.

UNIT 5: Static and kinematic indeterminacy of structure, Method of structural analysis, Analysis of fixed beam, continuous beam using Theorem of three moments, Effect of yielding of supports.

Reference Book:

1. Structural Analysis by Devdas Meenon
2. Fundamental of Structural Analysis by Lee.
3. Elementary structural Analysis by A.K. Jain
4. Advanced Structural Analysis by A. K. Jain
5. Structural Analysis (SI units) by R C hibbeler
6. Structural Analysis by L S nagi & R S Jangid

Course Outcomes:

At the end of the course the students will be able

CO1 To apply the concept of conjugate beam and strain energy methods to estimate the deflections ofdeterminate beams and trusses

CO2 To able to analysis three hinged arches and cables.

CO3 To construct and use the influence lines for estimation of different force functions in

determinatebeams

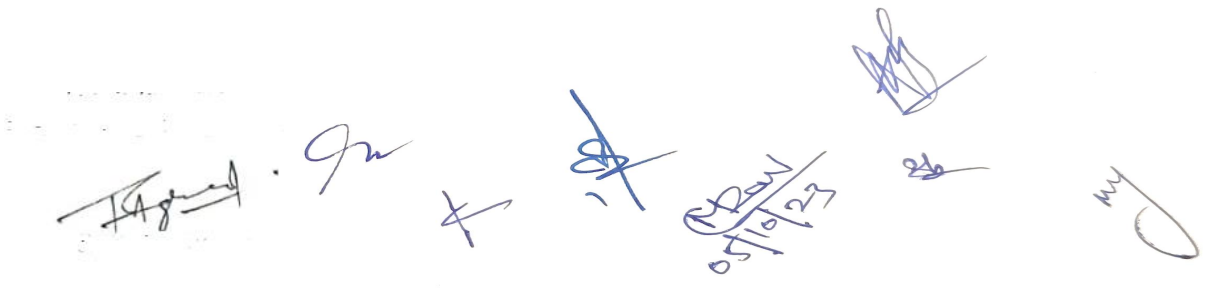
CO4 To able to draw the ILDs for reactions and internal forces in three hinged arches and determinatetrusses and find their values

CO5 To differentiate the determinate and indeterminate structures and apply the three-moment area theoremfor the analysis of continuous beams and fixed beams

Course Outcomes and their mapping with Programme Outcomes: Structural Analysis-I (CE23TDC401)

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	2	2							3	1	1	
CO 2	3	3	3	1	2							3	2	1	
CO 3	3	3	2	2	3							3	2	1	
CO 4	3	3	2	2	3							3	2	1	
CO 5	3	3	2	1	2							3	2	1	

Weightage: 1-Sightly; 2-Moderately; 3-Strongly



Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDTT2	Fluid Mechanics-II	3	0	0	10	30	60	100	3

Course Objectives:

To introduce and give explanation of fundamentals of turbulent flow in pipe.
To develop understanding about Boundary layer Analysis.
To develop understanding about non-uniform flow in open channel.
To introduce the importance of Compressibility effect in pipe flow.
To develop understanding about Hydraulic Machines.

Course Content:

UNIT 1: Non-uniform flow in open channel: Specific energy, critical flow, analysis of flow over hump and transition, equation of gradually varied flow, hydraulic jump and evaluation of its elements in rectangular channel.

UNIT 2: Boundary layer Analysis: Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, and laminar sub layer, Application of momentum equation, local and average friction coefficient. Fluid flow past submerged bodies. Drag and lift, drag on sphere and cylinder Magnus effect.

UNIT 3: Turbulent flow in pipe: Nature of turbulence, free and wall turbulence, turbulent flow in pipes, equation for velocity distribution over smooth and rough surfaces, Colebrook-White equation, Moody's diagram, Explicit equation for friction factors.

UNIT 4: Compressibility effect in pipe flow: Transmission of pressure waves in rigid and elastic pipes, water hammer Dimensional analysis and Hydraulic similitude. Dimensional analysis, Buckingham's theorem, important dimensionless numbers and their significances, geometric, kinematics and dynamicsimilarity, model study.

UNIT 5: Hydraulic Machines: Turbines: Classification of turbines, draft tube, specific speed, unit quantities, and characteristics curves of turbines, and governing of turbine. Pump: Introduction, Centrifugal pumps, efficiencies, specific speed, cavitations, slip, percentage slip.

Name of Text Books:

1. Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
2. Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
3. Fluid Mechanics – Dr. P.N. Modi (Standard Book House)
4. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
5. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India) Name of

Reference Books:

1. Fluid Machines – Dr. Jagdish Lal (Metropolitan Book Company Private Ltd.)2. Fluid Machines – John P. Douglas (Pearson Publication)

Course Outcomes: At the end of the course students will be able to

CO1 Define Turbulent flow in pipe and velocity equations for smooth and rough boundary of pipe.

CO2 Describe the Boundary layer theory and drag and lift.

CO3 Explain the concept of non-uniform flow in open channel

CO4 Explain the concept of Compressibility effect in pipe flow

CO5 Describe the concept of Hydraulic Machines.

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	2							3	3	2
CO2	3	3	2	2	2	3							3	2	2
CO3	3	3	3	2	3	2							3	2	2
CO4	3	3	2	3	2								3	2	2
CO5	3	2	2	3	3								3	2	3

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDTT3	Concrete Technology	3	0	0	10	30	60	100	3

Course Objectives:

To learn about various ingredients materials of concrete, like cement aggregates, water, etc
To understand the role of various Admixtures added to concrete mixes
To design various grades of concrete as per IS method.
To understand the various testing methods for fresh & hardened properties of concrete.
To learn about various special application concretes.

Course Content:

Unit1: Constituent Material: Cement-Types-Chemical composition and Properties-Tests on cement - IS Specifications- Aggregates-Classification-Mechanical properties and tests as per BIS grading requirements-Water- Quality of water for use in concrete.

Unit 2: Chemical and Mineral Admixtures: Accelerators-Retarders- Plasticizers- Super plasticizers-Water proofers – Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaolin-Their effects on concrete properties

Unit 3: Proportioning of Concrete Mix: Principles of Mix Proportioning-Properties of concrete related to Mix Design Physical properties of materials required for Mix Design – Design Mix and Nominal Mix-BIS Method of Mix Design – Mix Design Examples

Unit4: Fresh and Hardened Properties of Concrete: Workability-Testsforworkabilityofconcrete-SlumpTestandCompactingfactorTest-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS – Properties of Hardened Concrete-Determination of Compressive and Flexural Strength-Stress-strain curve for concrete Determination of Young's Modulus.

Unit 5: Special Concretes: Light weight concretes – High strength concrete – Fibre reinforced concrete –Ferrocement–Ready mix concrete–Slurry in filtrated fibrous concrete (IFCON)-Shotcrete–Polymer concrete – High performance concrete- Geopolymer Concrete.

Text Books:

1. Gupta. B.L., Amit Gupta, "ConcreteTechnology",JainBookAgency,2010.
2. Shetty,M.S,"ConcreteTechnology",S.ChandandCompanyLtd,NewDelhi,2003
3. Santha kumar, A.R; "Concrete Technology", Oxford University Press, New Delhi,2007

4. Neville, A.M; "Properties ofConcrete", Pitman Publishing Limited, London,1995

5. Gambir, M.L; "ConcreteTechnology",3rd Edition, Tata McGraw Hill Publishing Co Ltd, NewDelhi,2007

6. IS10262-1982Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998.

Course Outcomes:

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

CO1 Remember & understand properties and role of ingredients like cement, aggregate, admixtures etc. to produce better quality concrete.

CO2 Understand various classification & role of admixtures on properties of concrete.

CO3 Apply design concepts (as per IS method) to design various grades of concrete as per requirement.CO4 Demonstrate destructive, semi-destructive and non-destructive tests for concrete.

CO5 Understand about various special application concretes.

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2			3	2		3	2		3	2		3		2
CO2	1			3	3		3	3		3	3		3		1
CO3	2	2		3			1			3			3		2
CO4				3	2			2	2		3		2	3	2
CO5	2			1	3	3	3	1					3	2	1

Weightage:1-Sigtly;2-Moderately;3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDTP1	Estimation and Costing	3	0	0	10	30	60	100	3

Course Objectives:

The objective of this Course is

1. To able prepare detailed and abstract estimation for the building and other structure.
2. To prepare bill of quantity and schedule of rate for various item of work.
3. To able to value the existing building and property.

UNIT-I

ESTIMATION OF BUILDING

Types of estimates – Units of measurements – Methods of estimates – Advantages. Quantity estimate for load bearing and framed structures - brick work and RCC works only, Steel requirement and Bar bending schedule - Calculation of quantities of earth work excavation, brickwork, PCC, RCC, Plastering, white washing, colour washing and painting/varnishing for shops and residential building with flat roof.

UNIT-II

ESTIMATE OF OTHER STRUCTURES

Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line– estimate of bituminous and cement concrete roads

UNIT-III

ANALYSIS OF RATES AND SPECIFICATIONS

Data – Schedule of rates – Analysis of rates – Specifications – sources – General and Detailed Specifications-Material Calculations for each work. - Material cost

UNIT-IV

CONTRACTS AND TENDER

UNIT-V

REPORT WRITING OF PROJECT

Principles for report preparation – report on estimate of residential and industrial building –Roads – Water supply and sanitary installations. Introduction to Value Engineering: Cash flow and cost control. Systems of cost control based on accounting details of spends and periodicity of cost comparison

TEXTBOOKS

1. Dutta. B.N" Estimation and Costing in civil Engineering,27th Edition -2011.
2. Chackraborti .M 'Estimation and Costing Specification and valuation in civil Engineering,24th edition 2010.
3. Rangalwala S C Estimation costing and valuation, Charotar Publishing House"2008
4. Kohli D.D and Kohli. R. C" a TEXT BOOK OF Estimating and Costing,2013.
5. Estimating and Costing: Including Quantity Surveying, Tendering and Evaluation Kataria & Sons, 2010.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1 Prepare detailed estimation and find out the quantity of various works involved in the building.

CO2 Estimate the quantity of works involved in road works, water supply and sanitary works and septic tank

CO3 Carry out analysis of rates and bill preparation using spreadsheets.

CO4 Able to value the building and calculate rent from building.

CO5 Estimate the value of buildings.

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO 12	PSO 1	PSO 2	PSO 3
CO1						3				3	3		3		2
CO2						3				3	3		3		1
CO3						3				3	3		3		1
CO4						3				3	3		3		1
CO5						3				3	3		3	2	

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDTP2	Sustainable Built Environment	3	0	0	10	30	60	100	3

Course Objectives:

The objective of this Course is

- To recall key terminology and concepts related to Earth's environment and natural disasters.
- To explain the fundamental principles of Earth's structure, geological processes, and the Earth's spheres.
- To apply knowledge of natural disasters to assess their causes, impact, and methods for monitoring and mitigating them.
- To analyze the complex relationship between human civilization, natural resources, and environmental sustainability, including the environmental impacts of various human activities.
- To evaluate the concept of sustainable development, its importance, and its practical application in different sectors, considering both its benefits and limitations

Course Content:

UNIT 1: Earth and Environment Definition of the environment: origin of the earth, lithosphere, hydrosphere, atmosphere, biosphere; Earth Structure, Plate Tectonics theory, geo-morphological features; Geological structures (folds, faults, discontinuity, dike); Engineering and Genetic classification of soils, Weathering, and Soils; Rocks, rock cycle, Igneous Rocks, Sedimentary Rocks, Metamorphic Rocks, Rock Properties, Rock-water interaction.

UNIT 2: Natural disasters: Cyclones, Tornado, Volcanic Eruptions, Earthquakes– Generation mechanism, different terminologies, earthquake monitoring and measurements, seismic region of the world, Tsunami, Land Slides; Sustainability and resilience for natural disasters;

UNIT 3: Hydrosphere; water cycle, surface, and groundwater origin and its quality, oceans, ocean currents, ocean water quality; Atmosphere; components of the atmosphere; earth's energy budget; air quality, winds, cloud formation, storms; Biosphere; essential components for life; energy, carbon, water, and nutrients and their role in sustaining life; carbon and nutrients recycling; biomes and ecosystems.

UNIT 4: Natural Resource and Human Civilization; Natural Resources; natural resources for energy, food, shelter, and other human needs; Human Civilization; link between human civilization, natural resources and environment; Infrastructure: characteristics of modern human civilization and the need for infrastructure; Environmental Impacts of Human Civilization Environmental impacts of population growth, intensive agriculture, land use changes, urbanization, industrialization, mining; Consequences of fossil fuel burning; global warming and climate change; Loss of biodiversity, desertification, loss of soil fertility, reduction in water availability, land, air and water pollution.

UNIT 5: Sustainable Development; Concept of Sustainable Development: Bruntdland Report; Modifications for sustainability; reuse and recycle, demand management, innovative supply-side Engineering; Sustainable development in various sectors; energy, industry, agriculture, transportation, construction, water resources, and land management; Institutional limitations in achieving sustainable development.

TEXTBOOKS

1. Tarbuck, E. J., Lutgens, F. K., Tasa, D., & Tasa, D. (2005). Earth: an introduction to physical geology (p. 744). Upper Saddle River: Pearson/Prentice Hall.
2. Loftness, V., & Haase, D. (Eds.). (2013). Sustainable built environments (p. 431). New York: Springer.
3. Baker, S. (2015). Sustainable development. Routledge.

Course Outcomes:

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

CO1 To recall and define key terms and concepts related to Earth's environment, geological processes, and natural disasters.

CO2 To understand the Earth's structure, geological features, and the interconnectedness of its spheres, enabling them to comprehend how these factors influence natural disasters.

CO3 To apply their knowledge to analyze and solve problems related to natural disasters, including their causes and mitigation strategies.

CO4 To develop critical thinking skills by examining the intricate relationship between human civilization, natural resources, and the environment and assessing the environmental consequences of various human activities.

CO5 To understand and apply the concept of sustainable development, its significance, and its application across different sectors. They will also be able to evaluate the challenges and limitations associated with achieving sustainability in various contexts.

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO 12	PSO 1	PSO 2	PSO 3
CO1								3	3	3	3	3		2	2
CO2								3	3	3	3	2		1	1
CO3								3	3	3	2	2		1	1
CO4								3		3	1	1		1	1

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDTP3	Ocean Engineering	3	0	0	10	30	60	100	3

Course Objective:

- The objective of this Course is to:
- To introduce the students to Oceanography and Ocean Environment.
- To familiarize students with marine vehicles and offshore structures
- To study Engineering aspects in coastal oceanography.
- To provide students understanding of ports and harbor structures
- To understand application of Ocean Engineering with a few case studies.

Course Content:

UNIT I: Introduction to Oceanography – Brief introduction to ocean environment and ocean floor characteristics. Ocean Circulation, Tides, Waves, Currents, Tsunami and Storm surges – origin, generation, propagation and characteristics; Different materials for marine applications - metals, concrete, geosynthetic products and other materials for marine environment; Marine corrosion and control.

UNIT II: Different types of ocean structures and systems (fixed, floating, semi-submersibles, submersibles, pipelines, etc.,) for exploitation and production of oil and gas, minerals and energy. Brief outline of planning, design and construction, launching and installation of Platform.

UNIT III: Beach, coast and shore; Beach features - beach cycles - beach profiles – beach stability - beach erosion and sedimentation; Engineering aspects in coastal oceanography; Coastal protection structures – natural and artificial. Shore protection structures, seawalls, groins, breakwaters; Types and factors determining selection and stability of breakwaters; Sand bypassing and artificial beach nourishment - latest technologies in shore protection techniques; Environmental impacts of coastal developments.

UNIT IV: Types of ports and harbors; Harbour layout and terminal facilities - piers, break waters, wharves, jetties, quays; Spring fenders, dolphins and floating landing stage environmental issues in port planning and operations; Harbor oscillations, seiches; Inlets – siltation of inlets and harbors – remedial measures; Onshore and offshore sediment transport - Dredging.

UNIT V: Case studies: Ocean Structure Disaster

Reference Books:

1. An Introduction to Coastal Engineering, J. Paul Guyer, Amazon Asia-Pacific Holdings Private Limited, 2017.

2. Ocean Engineering – Goals, Environment, Technology: J F Brahtz, John Wiley and Sons, 1968.

3. Oceanographic Engineering: R L Weigel, Dover Publications, 2005.

Course Outcomes:

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

CO1. Describe Oceanography and its characteristics

CO2. Distinguish between different types of Onshore and Offshore structures.

CO3. Understand the link between the ocean processes and its implications in the coastal zone

CO4. Gain knowledge on ports and harbors and terminal facilities.

CO5. To raise the awareness and understanding about ocean engineering applications.

Cos	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1			3						1	3	3
CO2	3	2	2			2	3						1	3	3
CO3	3	2	2			2	3						1	3	3
CO4	3	2	2			2	3						1	3	3
CO5	3	2	2	3			3							3	3

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDTD1	Remote Sensing & GIS	3	0	0	10	30	60	100	3

Course Objectives:

- Apply the concepts of Photogrametry and its applications such as determination of heights of objects on terrain.
- Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
- Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satellite and top sheet maps.
- Understand different components of GIS and Learning about map projection and coordinate system.
- Develop knowledge on conversion of data from analogue to digital and working with GIS software.

SYLLABUS:

UNIT – I: INTRODUCTION TO PHOTOGRAMMETRY Principles and types of aerial photographs, geometry of vertical and aerial photograph, Scale and Height measurement on single and vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of Stereoscopy, fiducial points, parallax measurement using fiducial line.

UNIT – II: REMOTE SENSING Basic concepts and foundation of Remote Sensing elements, Data information, Remote sensing data collection, Remote sensing advantages and Limitations, Remote sensing process. Electromagnetic spectrum, Energy interaction with atmosphere and with earth surface features (soil, water, and vegetation) Indian Satellites and Sensors characteristics, Map and Image false color composite, introduction to digital data, elements of visual interpretations techniques.

UNIT – III: GEOGRAPHIC INFORMATION SYSTEMS Introduction to GIS, Components of GIS, Geospatial data: Spatial Data – Attribute Data- Joining Spatial and Attribute Data, GIS Operations: Spatial Data input- Attribute Data Management-Data Display-Data Exploration-Data Analysis. **COORDINATE SYSTEMS:** Geographic Coordinate system; Approximation of Earth, Datum: Map Projections; Types of Map Projections-Map Projection Parameters-Commonly used Map Projections – Projected Coordinate Systems.

UNIT – IV: VECTOR DATA MODEL Representation of simple features- Topology and its importance: coverage and its data structure, shape file: data models for composite features Object Based Vector Data Model; Classes and their Relationships: The geo-based data model: Geometric representation of Spatial feature and data structure: Topology rules.

UNIT – V: RASTER DATA MODEL Elements of Raster data model: Types of Raster data: Raster data structure: Data conversion, Integration of Raster and Vector data. Data Input: Metadata: Conversion of Existing data, Creating new data, Remote sensing data, Field data, Digitizing, Scanning, on screen digitizing, importance of source map, Data Editing.

TEXT BOOKS:

1. Bhatta B (2008), Remote sensing and GIS", Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) Remote Sensing and Image Interpretation", Wiley India Pvt. Ltd., New Delhi
3. Schowenger, R. A (2006) Remote Sensing, Elsevier publishers.

4. Parkinson, B. W., Spilker, J. J. (Jr.) (1996). Global Positioning System: Theory & Applications (Volume-I). AIAA, USA
5. Remote Sensing of the environment- An earth resource perspective- 2nd edition- by John R. Jensen, Pearson Education.
6. Introduction to geographic information system- kang – Tsung Chang, Tata McGraw- Hill Education Private Limited.
7. Concepts & Techniques of GIS by C.P. Lo Albert, K.W. Yonng, Prentice Hall (India) Publications. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001, B.S. Publications.
8. Principals of Geo physical Information System- Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004
9. Basics of Remote Sensing and GIS by S. Kumar, laxmi Publications.

REFERENCE BOOKS:

1. Fundamentals of Remote Sensing by George Joseph, Universities Press, 2013.
2. Fundamentals of Geographic Information Systems" by Demers, M.N, Wiley India Pvt. Ltd, 2013. 3. Jensen John R. Introduction to Digital Image Processing: A Remote Sensing Perspective Prentice hall, New Jersey
4. Paul Wolf, Elements of Photogrammetry, McGraw Hill.
5. Leick Alfred, 1995: GPS Satellite Surveying, Wiley Interscience
6. Burrough, P. P. &McDonnel, R. A. (1998). Principles of GIS. Oxford University Press

Course Outcomes:

After completing this course, the student will have acquired the ability on the following. 1. Understand the concepts of Photogrammetry and compute the heights of objects.

CO1 Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies.

CO2 Understand the basic concept of GIS and its applications, know different types of data representation in GIS.

CO3 Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer are.

CO4 Apply knowledge of GIS software and able to work with GIS software in various application fields.

CO5 Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems.

CO6 Apply knowledge of GIS and understand the integration of Remote Sensing and GIS.

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3											3		2
CO2	3	2											3	2	
CO3				3			2						3	2	
CO4											2		2	3	
CO5			3	2						2			2	3	2

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDTM1	Management and Organizational Behaviour	2	0	0	00	00	00	00	0

Course Objectives:

The objective of this Course is

- To describe the concept of Organizational Behavior, its significance, and its contemporary issues.
- To differentiate between various managerial roles, analyze the work of managers, and apply the framework of management perspective to real-world scenarios.
- To evaluate how diversity and individual differences impact organizational behavior, assess the role of perception in decision-making, and synthesize strategies for fostering creativity in the workplace
- To critique team effectiveness factors, assess group and organization leadership strategies, and analyze interdependence and role relationships in meso-level organizational behavior.
- To analyze the influence of power, politics, and conflict in organizations, evaluate the impact of technology and the environment on organizational behavior, and design organizational structures based on macro-level considerations

Course Content:

UNIT1: Organizational Behaviour- Definition, Contemporary Issues, Putting Organizational Behavior Knowledge to Work; Management and Managers: Define management, the work of managers, and the framework of management perspective.

UNIT 2: Micro Organizational Behavior: Managing Diversity and Individual Differences, Perception, Decision Making, Creativity, Work Motivation and Performance, Satisfaction and Stress.

UNIT 3: Meso Organizational Behavior: Efficiency, Motivation, and Quality in Work Design, Interdependence and Role Relationships, Group Dynamics and Team Effectiveness, Leadership of Groups and Organizations.

UNIT 4: Macro Organizational Behavior: Power, Politics, Conflict, Structuring the Organization, Technology, Environment, and Organization Design.

UNIT 5: International Organizational Behavior: International Dimensions, Effects on Organizational Behavior, Managing International Differences; Evidence-Based Management: Critical Thinking and Continuous Learning-Critical Thinking and the Scientific Process, Causal Inferences, Generalizing Research Results, Linking Organizational Behavior Science and Practice

TEXTBOOKS

1. John A. Wagner III and John R (2010). Hollenbeck. Organizational Behavior- Securing Competitive

Advantage, Taylor & Francis.

Course Outcomes:

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

CO1 To demonstrate comprehension of Organizational Behavior concepts, issues, and their relevance in the workplace.

CO2 To apply their knowledge of managerial roles and the framework of management to address real-world managerial challenges effectively.

CO3 To demonstrate proficiency in understanding and managing diversity, perception, decision-making, creativity, motivation, and group dynamics to enhance workplace performance and satisfaction.

CO4 To analyze and synthesize the macro-level factors influencing organizational behavior, including power dynamics, politics, conflict resolution, and the impact of technology and the environment on organizational design.

CO5 To apply principles of international organizational behavior, demonstrating an understanding of how global contexts affect organizational behavior. They will also apply critical thinking and research skills to make evidence-based decisions in management practice.

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1								3	3	3	3	3		2	2
CO2								3	3	3	3	2		1	1
CO3								3	3	3	2	2		1	1
CO4								3		3	1	1		1	1
CO5								3		3	1	1		1	1

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDLT1	Civil Engineering Drawing with Computer Applications	0	0	2		25	25	50	1

Course Objectives

1. To introduce the fundamentals of Civil Engineering drawing.
2. To practice the understanding of the principles of planning.
3. To develop capability to understand and learn drafting of building drawings.
4. To impart knowledge on drafting software such as Auto CAD Course Content:

List of Experiments:

1. To draw various symbols used in building drawings & Learn Bye-Laws of the building drawing.
2. To draw the cross section of a wall (Load bearing & Framed Structures) and its foundation.
3. To draw the line plan of a single storey residential building.
4. To draw the ground floor plan of a residential building.
5. To draw the section for the above plan showing maximum details.
6. To draw the corresponding front elevation of the above residential building.
7. To draw the plan, Elevation and section of a primary school building.
8. To draw the plan, Elevation and section of a hostel building.
9. To draw the plan, Elevation and section of a Primary Health Center building
10. To draw elevation & section of flush shutter, paneled shutter doors and windows.
11. To draw section and elevation of fully glazed, half glazed, half glazed and half paneled doors and windows.
12. To draw Bar Bending Schedule of footing, Beams , Columns & Slab.
13. To draw different stair cases (RC/Steel).
14. To draw the elevations of various types of trusses.

Refrences:

1. National Building Code of India.
2. Building drawing with a ninety grated approach to built environment by M.Shah, C.Kale, S.Patki, Tata McGraw Hill Education; 4th edition.
3. Building Planning and Drawing by M.V. Chitawadagi S.S. Bhavikatti, Dreamtech Press.
4. Civil Engineering Drawing & House Planning: A TextBook by B.P. Verma, Khanna publishers.
5. Civil Engineering Drawing by Rangwala, Charotar Publishing House Pvt.Ltd.
6. Building Planning and Drawing by Dr. N. Kumara Swamy, A. Kameswara Rao, Charotar Publishing House Pvt. Ltd.
7. NKrishna Raju, Structural Design and Drawing, Second Edition, Universities Press (India),

Private Limited, Hyderabad.

Course Outcomes:

On the completion of this course, the student will be able to:

CO1 Remember & Understand Building Bye-Law & various symbols used for drawings of structures.

CO2 Apply drawing concepts to draw Plans Sections & Elevations for Various types of buildings.

CO3 Apply drawing concepts to draw Sections & Elevations for Various types of Doors, Windows, Staircases and Trusses.

Course Outcomes and their mapping with Programme Outcomes: Computer Aided Civil Engineering Drawing (CE23PLB401)

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1		1	3	1							2	1	1
CO2	2	1								1			3	2	1
CO3	2	1				1				1			2	1	1

Weightage:1-Sightly;2-Moderately;3-Strongly

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDLT2	Material Test Lab	0	0	2		25	25	50	1

Course Objectives

- To Remember & understand various Properties of Cement & to learn testing methodology of eachproperties of cement.
- To learn to perform various experiments related to properties of Aggregates.
- To be able to examine the various properties of prefabricated bricks.
- To learn to perform various Destructive & non –destructive tests on concrete.

Course Content:

1. Normal Consistency, Fineness of Cement, Setting times of Cement
2. Specific Gravity of Cement
3. Soundness of Cement
4. Compressive strength of cement

Testing of aggregate:

5. Fineness modulus of Fine and Coarse aggregate
6. Bulk density of aggregate
7. Specific Gravity and Water Absorption of Aggregate
8. Bulking of Sand

Testing of bricks

9. Compressive strength, Water Absorption &Efflorescence of BricksTesting of concrete:
10. Workability of Concrete
11. Compressive strength
12. Modulus of Elasticity
13. Tensile Strength of Concrete
14. NDT Test of Concrete

Text Books / References:

1.Building Materials – S.K. Duggal (New Age Publication) 2. Building Materials – S. C. Rangwala (Charotar Publication)
3.Building Construction by S.G. Rangwala, Charter Publishing House, Anand, India

Course Outcomes: At the end of the course students will be able to:

CO1 Understand & demonstrate various tests on cement, Aggregates & Bricks.
CO2 Design Concrete for desired grade & test its various mechanical properties.
CO3 Demonstrate modern Non – Destructive method of concrete in-situ testing.

COs	POs												PSOs		
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	1	3	1	2	2	1							2		3
CO2	2	2	3	3	2	1							2		2
CO3	1	3	1	3	2	2		2					2	3	2

Course Code	Subjects	Periods			Evaluation Scheme				Credits
		L	T	P	TA	IA	ESE	Total	
CEUDPT1	Mini Project	0	0	4	-	50	50	100	2

Course Outcomes:

After successful completion of this course, the students will be able to

CO1: prepare plan for various types of structures.

CO2: prepare the working and approval drawings for Civil engineering structures

CO3: prepare the project reports in the prescribed formats.

CO4: present project proposals efficiently. Pre-requisites: Nil Course Assessment methods: