Structural Analysis - II (Code: CIV- 401)	Contact Hours = 42	Total Course Credit: 4		
Mid-Term	Class Assessment	End-Term	L	T	P
30 Marks	10 Marks	60 Marks	3	1	0

Course Objective: To introduce the students to basic theory and concepts of classical methods of structural analysis.

Course Outcomes:

CO1: Identify the degree of indeterminacy of different types of structures

CO2: Determine the strain energy and compute the deflection of determinate beams, frames and trusses using energy principles.

CO3: Analyze statically indeterminate structures by force methods.

CO4: Analyze statically indeterminate structures by force methods.

CO5: Analyze building frames by approximate methods for horizontal and vertical loads.

S. No.	Contents	Contact Hours
01.	**Indeterminate Structures:** Introduction to Indeterminate Structures; Stability; Static and Kinematic Indeterminacy of Structures viz. Beams, Frames, Trusses	4
02.	**Energy Methods of Analysis of structures:** Strain energy and strain energy density – strain energy due to axial load (gradual, sudden and impact loadings) , shear, flexure and torsion – Castigliano's theorems – Maxwell's reciprocal theorem - Principle of virtual work – unit load method - Application of energy theorems for computing deflections in determinate beams , plane frames and plane trusses – lack of fit and temperature effects - Williot Mohr's Diagram.	10
03.	**Force methods of Analysis of structures:** Method of least Work; Method of consistent deformation for analysis of indeterminate beams; continuous beams; Deflection of truss joints; Analysis of two hinged arches, Clepryon's Three-Moment Equation.	10
04.	**Displacement methods of Analysis of structures:** Analysis of Indeterminate Beams & Frames (with & without Sway) by Classical Displacement Methods viz; Slope Deflection Method, Kani's Method & Moment Distribution Method.	12
05.	**Approximate Methods for Indeterminate Structural Analysis:** Portal and Cantilever methods for the analysis of frames.	6

Textbooks:

1. Hibbeler, R. C. (2002). *Structural Analysis*, Pearson Education (Singapore) Pt. Ltd., Delhi
2. Leet, K. M. and Uang, C-M. (2003). *Fundamentals of Structural Analysis*, Tata McGraw-Hill Publishing Company Limited, New Delhi.

References:

1. C. S. Reddy, 'Basic Structural Analysis', Tata McGraw Hill, New Delhi.
2. C.K. Wang, 'Intermediate Structural Analysis', Tata McGraw Hill, New Delhi.
3. Junnarkar.S.B. and Shah.H.J, "Mechanics of Structures", Vol II, Charotar Publishing House, New Delhi 2016.

Course Title: FLUID FLOW IN PIPES AND CHANNELS (Code: CIV- 402)	Syllabus for B.Tech. 4th Semester (Civil Engineering)	Total Course Credit: 3		
Midterm Examination	Class Assessment (Assignments, interaction, tutorials, viva etc.)	End-Term Examination	L	T	P
30 Marks	10 Marks	60 Marks	2	1	0

Course Objective: To develop the understanding of basic principles of fluid flow through pressure and gravity type conduit systems to ensure adequate water distribution to consumers and management of surface water resources.

Course Outcomes:

CO1: Analyze and perform calculations on open channel flows, compute water surface profiles and hydraulic jump characteristics.

CO2: Analyze and perform calculations on pipe flow problems involving turbulent flow, understand the concept of friction factor, head loss, and design of pipes and analysis of pipe-networks.

CO3: Perform calculations for determination of the drag and lift forces on submerged bodies.

CO4: Analyze water hammer phenomenon in closed conduits and design of surge tanks & Determine various hydraulic characteristics of turbines and pumps.

S. No.	Course Contents	Contact Hours
01.	**FLOW IN OPEN CHANNELS:** Uniform flow, Critical depth, Normal depth, Specific energy, Resistance formulae, Gradually varied flow equations, Classification of water surface profiles, Computation of water surface profiles, step by step method and graphical integration method. Hydraulic Jump, Momentum Principle for open channels, Evaluation of the jump elements. Venturi flumes.	14
02.	**FLOW THROUGH PIPES:** Nature of turbulent flow in pipes, Hydraulic and energy grade lines. Equation for velocity distribution over smooth and rough pipes, Resistance coefficient and its variation, Nikuradse experiments, Moody diagram, Flow in sudden expansion, Contraction, diffusers, Bends, Valves and Siphons; Concept of equivalent length, branched pipes, pipes in series and parallels, Simple networks, Transmission of power.	11
03.	**FLUID FLOW PAST SUBMERGED BODIES:** Drag and lift, Drag on a sphere, cylinder and disc: Lift, Magnus effect and Circulation.	03

04.	**WATER HAMMER AND SURGE TANKS:**	04
	Sequence of events after sudden value closure, pressure diagrams, Gradual closure or opening of the valve, Instantaneous closure of valve in a rigid pipe, Instantaneous closure of valve in an Elastic pipe and Compressible fluid, Methods of Analysis; Surge Tanks, Location of Surge Tanks, Types, Design of surge Tanks.	
05.	**HYDRAULIC MACHINES:**	06
	Types of Turbines, Description and principles of Impulse and reaction Turbines, Unit quantities and specific speed, Runaway speed, Turbine characteristics, Selection of Turbines, Cavitation; Draft Tube, Draft Tube dimensions, Types of draft tubes; Governing of Turbines; Centrifugal pumps, specific speed, power requirements, Reciprocating pumps.	

References:

1. Kumar, D.S. "Fluid Mechanics and Fluid Power Engineering". Seventh Ed. S.K. Kataria & Sons Publishers, New Delhi,2008-2009.
2. K. Subramanaya "Open channel Flow" 3rd.Tata McGraw Hill Pub. Co. New Delhi,1999.
3. RangaRaju, K.G., "Flow Through Open Channels", 2nd.Tata McGraw Hill Publishing Company Ltd., New Delhi,1986.
4. Nigam "Handbook of Hydroelectric Engg.", 2001.
5. Garde R.J "Engg. Engineering Fluid Mechanics", 1988.
6. Deshmukh,M.M, " Water Power Engineering" Danpat Rai & Sons, Nai Sarak New Delhi, 1978.
7. Asawa, GL "Fluid Flow in Pipes and Channels" CBS Publishing.

Course Title: ENGINEERING SURVEYING-II (Code: CIV- 403)	Syllabus for B.Tech. 4th Semester (Civil Engineering)	Total Course Credit: 3			
Midterm Examination	Class Assessment (Assignments, interaction, tutorials, viva etc.)	End-Term Examination	L	T	P
30 Marks	10 Marks	60 Marks	2	1	0

Course Objective: To impart basic understanding of various aspects related to system of Geometrics and other physical measurements in the field of Civil Engg.

Course Outcomes:

CO1 To understand traversing and numerical aspects of traversing.

CO2 To understand trigonometric leveling and geodetic surveying.

CO3 To understand curves and setting out works.

CO4 To understand tachometric surveying involving angular measurements.

S. No.	Course Contents	Contact Hours
01.	**a. Theodolite:** Construction, Temporary andPermanent adjustment of transit Theodolite; angle measurements and errors, Theodolite Traversing-Traverse calculations; Traverse adjustments.	06
	b. Tacheometry: Stadia and its principal, analytic lens, Heights and distances from stadia intercepts; subtense method, tangential method; Accuracy, tacheometric alidade	06
02.	**a. Trigonometrical levelling:** Curvature and refraction, Axis-signal correction, method of trigonometrical levelling.	04
	b. Curves: Elements of simple curve; design and setting out of a simple curve, compound curve, transition curve, Vertical Curves.	08
03.	**a. Setting out works:** Setting out Buildings, Culverts and bridges, Tunnels. Transfer of alignment. Fixing of horizontal and vertical controls.	06
	b. Geodetic surveying: Triangulation-principles: choice of stations, Base line measurements- electronic methods of distance measurements, Triangulation adjustments-Heights-figure	06

	adjustments; Spherical excess, Computations of sides of spherical triangles.	

References:

1. K. R. Arora., Surveying Vol. I & II, standard book; 16 edition 2018
2. Duggal, S.K., Surveying Vols. I & II, McGraw Hill Education; Fourth edition 2017
3. Basak, Surveying & Levelling, McGraw Hill Education; 2 edition 2017.
4. Kanetkar,T. P. and Kulkarni, S.V, Surveying & Levelling Vols. I & II, Pune Vidyarthi Griha Prakashan, 2014.
5. P.B. Shahani,Advance Surveying ,Vol I & II, Handbook, New Delhi Oxford and IBH
6. publication,1981.
7. Punmia, B. C., Surveying Vol. I & II, Laxmi Publications Pvt Ltd 2016.

Subject: Engineering Geology and Materials (Code: CIV: 404)	Syllabus for B.Tech 4th sem	Total Course Credit: 3			
Mid-semester Examination	Continuous Class-Assessment	End-Semester Examination	L	T	P
30 Marks	10 Marks	60 Marks	3	1	2

Course Outcomes:

CO1- Behavior of rocks at different scales, under loading conditions at ground surface and in the subsurface.

CO2- The link between rock mechanics, geology and hydrogeology.

CO3- The various engineering properties of earth's materials.

CO4- Geologically significant places to learn in-situ character of rocks in quarries/ outcrops, road cuttings, dams, tunnels and underground excavations.

Details of Course:

S. No	Contents	Lecture Hours
1.	Physical Geology; geology and its relevance to civil engineering, geological work of wind, rivers, glaciers and seas.	6
2.	Petrology; formation of rocks, types/field classification, weathering of rocks, origin of soils.	6
3.	Structural Geology; folds, faults, joints, unconformities.	4
4.	Engineering Geology; geological considerations in tunnels, dams, bridges, building sites; landslides	6
5.	Earthquakes; basic definitions, types and causes, distribution in the world, seismic zones.	6
	Part B: Materials	
1.	Stones; their engineering properties; bricks, classification and strength requirements; tiles and their uses	2
2.	Timber; properties, defects, seasoning, decay and prevention.	2
3.	Lime; types, properties and tests.	2
4.	Other materials	2
	Total	36

Books recommended:

S.No.	Name of Books/ Authors/ Publishers
1.	Bangar, K.M, Principles of Engineering Geology Standard Publishers Distributors, New Delhi.
2.	Parbin Singh Engineering Geology, Katson Publishers New Delhi.
3.	Billings, M.P., Structural Geology, Prentice-Hall

India, New Delhi.
4.   Blyth, F.G.H and de Freitas, M.H. Geology for Engineers, ELBS, London.
5.   Gokhale, KVG.K and Rao, D.M., Experiments in
        Engineering Geology, Tata- McGraw Hill, New Delhi.
6.   Kesavulu, C. Textbook of Engineering Geology, Macmillan, India Ltd. New Delhi.

7.   Geology for Civil Engineers by McLean and Gribble, Spon Press, Taylor &Francis
        Group, London.
8.   Building Materials by Parbin Singh, Katson Publishers New Delhi.

9.   Civil Engineering Material by Gurbachan Singh, Standard Publishers New Delhi.
10.   Building Material by Dutta.
11.   Building Materials by Duggal S. K., New Age
        International (P) Ltd. Publishers, New Delhi.

Course Title: CIVIL ENGINEERING DRAWING (Code: CIV- 405)	Syllabus for B.Tech. 4th Semester (Civil Engineering)	Total Course Credit: 4			
Midterm Examination	Class Assessment (Assignments, interaction, tutorials, viva etc.)	End-Term Examination	L	T	P
30 Marks	10 Marks	60 Marks	3	1	0

Course Objective: To impart understanding & knowledge of various aspects of Building Drawing and Construction.

Course Outcomes:

CO1: Identify the factors to be considered in planning and construction of buildings and execute construction activities in building projects

CO2: Knowledge about various types of foundations and their constructional aspects

CO3: Able to draw different types of drawings required for construction of buildings

CO4: Drawing of building plan, elevation and sections including slabs

S. No.	Course Contents	Contact Hours
01.	Standard Conventions in Drawing: Basic principles of planning and design in buildings.	02
02.	Foundations: Principles of foundations, types and suitability of foundations including strip, pad, raft, pile and pier foundation, timbering for excavation of foundation.	02
03.	Damp proofing: Causes, effects, parts of building likely to be affected of methods of damp-proofing , materials of damp proofing.	02
04.	Masonry: Principles and significance of brick masonry; terms used and types of brick bonds; principles and significance of stone masonry; types of stone masonry walls; building uses of common types of stones.	03
05.	Drawing of plans, elevations and sections giving construction details of important building components including foundation, plinth, DPC, lintels, slabs and roofs; full specifications for each component.	12
06.	Simple drawing exercises on layouts of building services such s electrical, water supply and plumbing, sanitation etc.	04
07.	Doors, Windows, Ventilators and Lintels; Location, size and different types including steel and aluminum: types of lintels and their construction details. Drawing of typical doors, windows and ventilators.	05
08.	Drawing of R.C.C. slabs & beams (including cantilevers), columns and footings.	05

09.	Stairs and Staircases: Various types and materials; proportioning of staircase, brief introduction of ramps, lifts and escalators. Drawing of R.C.C. stair case.	04
10.	Floors; Consideration of choice in ground and upper floors; various types of floors and their suitability; flooring materials and their construction details.	04
11.	Roofs & Roof Coverings: Classification of roofs with special reference to pitched roofs; different roof coverings and details of rain proofing at top wall. Drawings of various timber roof trusses with joint details.	05

References:

1. Shah M.G, Building Drawing, McGraw-Hill Inc.,US; 2nd Revised edition 1985.
2. Chakorobarty, Civil Engineering Drawing
3. J.B. Mc. Kay, Civil Engineering Drawing
4. Sharma and Koul, Textbook of Building Construction, S Chand & Co Ltd; 6th Revised edition, 1987.
5. Nevile, A. M., Properties of Concrete, Pearson Education India; 5 edition 2012.