



DEPARTMENT OF CIVIL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR
HAZRATBAL, SRINAGAR - 190006 (J&K)

Structural Analysis - II (Code: CIV- 301)	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: The objective of this course is elaborate on the knowledge of engineering mechanics (statics) and to teach the students the purpose of studying strength of materials with respect to civil engineering design and analysis. The course introduces the students to the concepts of engineering mechanics of materials and the behavior of the materials and structures under applied loads.

Course Outcomes:

- CO1:** Understand the concepts of stress and strain, principal stresses and principal planes.
CO2: Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
CO3: Calculate the deflection of beams by different methods and selection of method for determining slope or deflection
CO4: Apply basic equation of torsion in design of circular shafts and helical springs
CO5: To understand the buckling behavior of columns subjected to axial loads.

S. No.	Contents	Contact Hours
01.	Review of Basic Concepts of Stress and Strain: Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Modulus of elasticity; Bulk Modulus: Beam Statics: Support reactions, concepts of redundancy, axial force, shear force and bending moment diagrams for concentrated, uniformly distributed, linearly varying load, concentrated moments in simply supported beams, cantilever and overhanging beams	10
02.	Symmetric Beam Bending: Simple theory of bending, Bending and shear stress for regular sections, shear centre	6
03.	Two Dimensional Stress Problems: Principal stresses, maximum shear stresses, Mohr's circle of stresses, construction of Mohr's circle, applications.	6
04.	Deflection of statically determinate beams: Slope and deflection of beams by integration, area-moment and conjugate beam methods	8
05.	Introduction to thin cylindrical & spherical shells: Hoop stress and meridional - stress and volumetric changes. Torsion: Pure torsion, torsion of circular solid shaft and hollow shafts, torsional equation, torsional rigidity, closed coil helical; springs	7
06.	Columns: Fundamentals, column buckling theory, Euler's load for columns with different end conditions, limitations of Euler's theory – problems, eccentric load.	5

Textbooks:

- Hibbeler, R.C., "Mechanics of Materials", 6th SI edition, Prentice Hall.



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2. Junnarkar.S.B. and Shah.H.J, "Mechanics of Structures", Vol I, Charotar Publishing House, New Delhi 2016.
3. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.

References:

1. Beer, P.F. and Johnston (Jr.) E.R. "Mechanics of Materials", S.I. Version, Tata McGraw Hill, India, 2001.
1. Popov, E.P., Engineering Mechanics of Solids, Prentice-Hall, 1999.
2. Gere J.M. and Goodno, B. J., Strength of Materials, Cengage Learning.
3. Craig, R.R., "Mechanics of Materials", 2nd edition, John Wiley and Sons.



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Course Title: FLUID MECHANICS-I (Code: CIV- 302)	Syllabus for B.Tech. 3rd 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 mechanics of fluids at rest and in motion and their applications in solving the real engineering problems.

Course Outcomes:

CO1: Analyse Physical properties of fluids.

CO2: Analyse and perform calculations on Pressure Intensity pressure on plane and curved surfaces, centre of pressure;

CO3: Perform calculations for determination Steady and unsteady, uniform and non uniform, laminar and turbulent flows; one, two and three dimensional flows; Stream lines, Streak lines and path lines.

CO4: Determine Euler's equation of motion along a streamline and its integration to yield Bernoulli's equation.

S. No.	Course Contents	Contact Hours
01.	INTRODUCTION: Physical properties of fluids viz, mass density, viscosity, compressibility, vapour pressure, surface tension, capillarity, etc. Ideal Fluids and Real Fluids; Newtonian and Non-Newtonian Fluids.	03
02.	FLUID STATICS: Pressure Intensity, Pascal's law; Pressure- density- height relationships, manometers; pressure on plane and curved surfaces, centre of pressure; Buoyancy, Stability of immersed and floating bodies.	05
03.	KINEMATICS OF FLUID FLOW: Steady and unsteady, uniform and non-uniform, laminar and turbulent flows; one, two and three dimensional flows; Stream lines, and path lines; Continuity equation; Rotation and Elementary explanation of stream function and velocity Graphical and Experimental methods of drawing flow nets.	06
04.	DYNAMICS OF FLUID FLOW: Euler's equation of motion along a streamline and its integration to yield Bernoulli's equation; Flow measurement, flow through orifice meter, Venturi meter, orifices, mouth pieces, pitot and Prandtl tubes, sluice gates under free and submerged conditions, Various types of Notches and weirs under free and submerged flow conditions, Aeration of nape.	10



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05.	MOMEMENTUM EQUATION: Momentum equation and its application to stationary and moving vanes, pipe bends.	04
06.	DIMENSIONAL ANALYSIS AND HYDRAULIC SIMILITUDE: Dimensional analysis, Buckingham's theorem, Important dimensionless numbers and their significance, Geometric, Kinematic and dynamic similarity; Model analysis.	04
07.	BOUNDARY LAYER ANALYSIS: Boundary layer thicknesses, Boundary layer over a boundary layer, Application of momentum boundary layer, Laminar sub-layer, smooth and rough boundaries, local and Average friction coefficients, separation.	06

References:

1. Kumar, D.S. "Fluid Mechanics and Fluid Power Engineering". Seventh Ed. S.K. Kataria & Sons Publishers, New Delhi, 2008-2009.
2. Garde R.J "Engineering Fluid Mechanics", 1988.
3. Kumar, K.L. "Engg. Fluid Mechanics", Eurasia Publishing House (P) Ltd. New Delhi, 1984.
4. Streeter, V.L., Wylie, E.B. and Bedford, K.W. "Fluid Mechanics" McGraw Hill, New York, 2001.
5. Asawa, GL, Fluid Flow in Pipes & Cannels 2008? CBS Publishers, new Delhi, 2000.
6. Mohanty "Fluid Mechanics" Printice Hall of India second Ed.,2010.



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Course Title: SURVEYING-I (Code: CIV- 303)	Syllabus for B.Tech. 3 rd 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	3

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 the importance of Engineering Surveys especially land surveying.
- CO2:** To know about the basic principles and types of land surveying.
- CO3:** To understand the mechanics concerned with the response of the rock to the force field of its physical environments.
- CO4:** To know the theory, working principles, and numerical aspects of various surveying method viz., chain, compass, plain table and levelling

Details of Course

Unit No	Course Contents	Lecture Hours
Unit -1	a. Introduction: Importance, Principles of Surveying. Types of Surveying.	4
	b. Chain Surveying: Field Equipment, Methods of chaining, Offsets, corrections in chaining, obstacles in chain surveying; plotting; Degree of accuracy. Tape and chain corrections	7
Unit - 2	a. Prismatic compass surveying: Instruments; Principle, Procedure and precautions. Closed traverse; corrections; local attraction; plotting.	6
	b. Plane Table Surveying: Field equipments, Methods of plane tabling, Two point and Three point problem, Precautions, Accuracy	6
Unit - 3	a. Levelling: Instruments: Field book recording, Bench mark & its types, methods of reduction of levels, various types of field works; contouring; Plotting. Testing and Permanent adjustments. Sensitivity of bubble tube.	9
	b. Areas and Volumes: Methods of determining areas and volumes viz Borrow - pits.	4



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References:

1. Surveying Vols. I & II by Dr. K.R. Arora
2. Surveying Vols. I & II, by Duggal, S.K.
3. Surveying & Levelling by Basak
4. Surveying & Levelling Vols. I & II by Kanetkar, T. P. and Kulkarni, S.V
5. Surveying & Levelling by P.B. Shahni
6. Surveying Vol. I & II, by Punmia, B. C



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Course Title: GEOLOGY AND MINERALOGY (Code: CIV- 304)	Syllabus for B.Tech. 3rd 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	1

Course Objective: To impart the basic understanding of the formation of rocks and minerals and to expose the students to the basic erosional and depositional processes.

Course Outcomes:

- CO1** To impart the basic understanding of the formation of rocks and minerals.
- CO2** To understand of basic erosional, depositional processes and geological structures.
- CO3** To understand the physical attributes of minerals. Description of physical attributes is the simplest way to identify, classify, and categorize minerals.
- CO4** To summarize results of studies performed on mineral substances and have an understanding of systematic process, accurate descriptions of physical characteristics of minerals.

S. No.	Course Contents	Contact Hours
Part A Physical Geology		
01.	Introduction to the science of geology.	03
02.	Crust of earth and its composition.	03
03.	Minerals and Rocks.	03
04.	Weathering of Rocks; Erosion, transportation and deposition by wind, Water and ice.	06
05.	Introduction to geological structures.	03
Part B Mineralogy		
01.	Rock forming minerals and ore forming minerals. Processes of mineral formation. Physical properties of minerals.	04



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02.	Introduction to ore minerals. Principle ore minerals of Aluminum, Copper, Lead, Zinc, Antimony, Nickel, Tin, Chromium, Magnesium and Iron, their important properties, mode of formation, mode of occurrence, uses and distribution in India.	10
03.	Study of Refractory minerals, coal and petroleum.	04

References:

1. Bangar, K.M, Principles of Engineering Geology, Standard Publishers Distributors, New Delhi, 1995.
2. Parbin Singh Engineering Geology, Katson Publishers New Delhi, 2009.
3. Billings, M.P., Structural Geology, Prentice-Hall India, New Delhi, 1974.
4. Blyth, F.G.H and de Freitas, M.H. Geology for Engineers, ELBS, London, 1974.
5. Gokhale, KVG.K and Rao, D.M., Experiments in Engineering Geology, Tata- McGraw Hill, New Delhi, 1981.
6. Kesavulu, C. Textbook of Engineering Geology, Macmillan, India Ltd. New Delhi, 1993.
7. Geology for Civil Engineers by McLean and Gribble, Spon Press, Taylor & Francis Group, London, 1999.



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Building Materials and Construction (Code: CIV- 305)	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: At the end of this course the students should have learnt about the various materials, both conventional and modern, that are commonly used in civil engineering construction. Further the students should be able to appreciate the criteria for choice of the appropriate materials and the various tests for quality control in the use of these materials.

Course Outcomes:

After successful completion of the course, the student will be able to:

1. Develop knowledge of material science and behavior of various building materials used in construction.
2. Identify the construction materials required for the assigned work.
3. Provide procedural knowledge of the simple testing methods of cement, lime and concrete etc.
4. Adopt suitable repair and maintenance work to enhance durability of buildings.
5. Develop knowledge of various state-of-the-art materials used in construction in the modern times.

S. No.	Contents	Contact Hours
01.	Introduction: Functions of buildings and structure in general. Loads on buildings as per IS 875, IS 1893 and NBC. Functional requirements of buildings and necessity of byelaws.	2
02.	Stones - Bricks - Concrete Blocks: Stone as building material; Criteria for selection; Tests on stones; Deterioration and Preservation of stone work; Bricks, Classification, Manufacture of clay bricks, Tests on bricks, Compressive Strength, Water Absorption, Efflorescence, Bricks for special use - Refractory bricks, Cement and Concrete hollow blocks, Light weight concrete blocks - Code Practices.	6
03	Lime - Cement - Aggregates - Mortar: Lime, Preparation of lime mortar, Cement - Ingredients, Manufacturing process, Types and Grades, Properties of cement and Cement mortar, Hydration, Compressive strength, Tensile strength, Soundness and consistency, Setting time, Aggregates - Natural stone aggregates, Industrial byproducts (EAF Slag, Steel Slag), Crushing strength, Impact strength, Flakiness, Abrasion Resistance, Grading, Sand - Bulking - Code Practices	8
04.	Concrete: Concrete, Ingredients, Manufacture, Batching plants, RMC - Properties of fresh concrete - Slump Flow and compaction. Properties of hardened concrete - Compressive, Tensile and shear strength, Modulus of rupture Tests.	6



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	Mix specification - Mix proportioning: IS method. High Strength Concrete and HPC - Other types of Concrete - Code Practices	
05.	Metals: Composition and properties of ferrous and non ferrous metals used in civil engineering. Effect of various heat treatments on the properties of steel and its alloys. Corrosion and methods of corrosion control.	4
06.	Modern Materials: Glass - Ceramics, Fibre glass reinforced plastic, Clay products - Refractories, Composite materials, Applications of laminar composites, Fibre textiles - Geosynthetics for Civil Engineering applications. Thermocol - Panels of laminates, Properties and uses of asphalt, bitumen, rubber and asbestos.	8
07	Timber: Characteristics of good timber, defects in timber, seasoning of timber, tests on timber. Market forms, Industrial timber, Plywood, Veneers.	4
08.	Paints and Varnishes: Composition, preparation, properties, test and uses of paints, varnishes and distempers	4

TEXT BOOKS:

1. Building Materials and Construction - Arora & Bindra, Dhanpat Rai Publications.
2. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
3. R. K. Rajput, Engineering Materials, S. Chand & Company Ltd., 2000.

REFERENCES:

1. Building Materials by Duggal, New Age International.
2. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.
3. M. S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd., 2003.