

B.Tech Civil Engg. III Semester

Paper code: ETCE 201

L T C

Paper: Structural Analysis – I

3 1 4

INSTRUCTIONS TO PAPER SETTERS		Maximum Marks : 75
1	Question No 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks	
2	Apart from question No 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only one question from each unit	

UNIT I

Simple stresses and strains : Definition, types of stresses and strains; Hooke's law, Modulus of elasticity, various elastic constants and their relationship, stress strain curve for ductile materials, deformation of bars under axial loads, temperature stresses, bars of varying cross sections and composite sections, Poisson's ratio, volumetric strain.

Analysis of plane stress and plane strain: General case of plane stress, Principle stresses due to combined bending and torsion, Analysis of strain, Mohr's circle for 2 dimensional stresses and strain, Elementary concepts of theories of failure.

[No. of Hours: 12]

UNIT II

Shear force and bending moment : Different types of beams and loads, shear force and bending moment diagrams for cantilever and simply supported beams with and without overhangs subjected to different kinds of loads, relation between loading, shear force and bending moments;

Bending & shear stresses in beams: Theory of simple bending, moment of resistance, modulus of section, calculation of bending stresses in beams for different loads and different types of structural sections. Shear stress and its distribution on different types of cross sections of beams.

[No. of Hours: 12]

UNIT III

Slope and deflection of beams: Relation between slope, deflection and radius of curvature. Deflection and slope of statically determinate beams: moment area method, double integration method, conjugate beam method, dummy load method etc.

Strain energy due to direct bending, shear and torsion, Maxwell's law of reciprocal deflection, Betti's law and Castigliano's theorem and their applications.

[No. of Hours: 9]

UNIT IV

Torsion: Torsion of hollow and solid circular shafts, torsion equation, torsional rigidity, modulus of rupture, power transmission by shafts, importance of angle of twist and various stresses in a shaft, comparison of solid and hollow shafts, torsional resilience.

Trusses: Analysis of trusses, method of joints, method of sections, stability and static indeterminacy of truss structures.

[No. of Hours: 9]

Suggested Reading:

1. Strength of Materials, Timoshenko & Gere.
2. Elements of Strength of Materials, S.P. Timoshenko & Young, East West Press.
3. Mechanics of Materials, Popov E.P., Prentice Hall of India.
4. Solid Mechanics, S.M.A Kazmi
5. Structures, Schodek, Pearson Education.
6. Advanced Mechanics of Solids and Structures, Raju, N.K., Narosa Publications
7. Comprehensive Structural Analysis (Vol.1), Dr.R.Vaidyanathan, Dr. P.Percumal, Luxmi Publications.
8. Strength of Materials, Nash, W.A., Tata Mc Graw Hill Publications
9. Basic Structural Analysis, Reddy, Mc Graw Hill Publications.
10. Structural Analysis, R.C. Hibbler, Pearson Publications
11. Elementary Structural Analysis, J.B. Wilbur & C.H. Norris, Mc Graw Hill

B.Tech Civil Engg. IV Semester

Paper code: ETCE 203

L T C

Paper: Building Construction, Materials & Specifications

3 1 4

INSTRUCTIONS TO PAPER SETTERS		Maximum Marks : 75
3	Question No.1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.	
4	Apart from question No.1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only one question from each unit.	

UNIT I

Building Materials : Quarrying types, dressing and polishing of stones, properties and uses of common types of stones, Manufacture, properties and uses of bricks, tiles and hollow building blocks: Pozzolonic Material, Cement, lime and mortar: Manufacture, properties and types, testing methods and uses. Properties, types and applications of other building materials like timber, protective coverings (Paints and varnishes), rubber, bitumen, tar and asphalt, glass, plastics and polymers, refractory materials etc. Plastering, Pointing, Painting, distempering, white washing, damp proofing, ventilation and air conditioning, Concept of thermal insulation, sound insulation, fire protection.

[No. of Hours: 10]

UNIT II

Concrete: Major components: Cement, Sand, aggregates and water, Batching of concrete by weight and volume, Batching plant and equipment, workability, mix proportions and grades of concrete, types of mixers, transportation, pumping, placing and compacting of concrete. Admixtures, Formwork for RCC structures, Ready mix concrete, Pre-cast concrete, Types of concrete : Special concrete, light weight concrete, high density concrete, vacuum concrete, shotcrete – steel fiber reinforced concrete, polymer concrete, Ferro cement, high performance concrete. Non destructive testing of concrete, crack control, leak proofing, guniting and jacketing techniques, self compacting concrete.

[No. of Hours: 11]

UNIT III

Building construction: Components of building, shallow and deep foundations, site investigation and sub soil exploration, Excavation in ground with sub soil water problems, Cofferdams, Caissons, Stone and brick masonry, type of bonds, load bearing walls, Earth quake resistant features of load bearing masonry building, cavity wall, partition walls, finishing/coating materials for Roofs/floors/walls, construction and expansion joints, seismic gaps between two adjacent building blocks.

[No. of Hours: 11]

UNIT IV

Stairs, lintels, trusses, arches, domes, doors and windows: Introduction, classification, types, material of construction etc.

[No. of Hours: 10]

Suggested Reading:

1. Building construction Sushil Kumar.
2. Building construction P.C.Varghese, PHI Publications.
3. Building Materials, P.C.Varghese, PHI Publications
4. Building construction B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications.
5. Building construction S.C. Rangwala, Charotar Publishing House.
6. Engineering materials S.C. Rangwala, Charotar Publishing House.
7. Civil Engg. Materials, TTTI.
8. Teaching material of IGNOU, Delhi

B.Tech Civil Engg. III Semester

Paper code: ETCE 205

L T C

Paper: Fluid Mechanics & Hydraulics-I

3 1 4

INSTRUCTIONS TO PAPER SETTERS		Maximum Marks : 75
5	Question No 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks	
6	Apart from question No 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only one question from each unit	

UNIT I

Introduction: Fluid properties, Ideal and real fluids, Concept of viscosity, surface tension and compressibility; thermodynamic properties.

Fluid statics: Fluid pressure and its measurement, types of manometers, Total pressure and centre of pressure, Evaluation of pressure force on dams, lock gates, curved surfaces, pressure distribution in liquid subjected to constant horizontal/vertical acceleration, principles of equilibrium, buoyancy, centre of buoyancy, meta centre, stability conditions of floating and submerged bodies, Experimental and analytical method of determination of metacentric height.

[No. of Hours: 9]

UNIT II

Fluid kinematics : Variation of flow parameters in space and time, Lagrangian and Eulerian concepts in fluid motion, Types of fluid flow: steady and unsteady, uniform and non uniform, rotational and irrotational, Laminar and tubular; one, two and three dimensional flow, streamline, pathline and streakline, Continuity equation in Cartesian and polar co-ordinates and its applications, Velocity potential and stream function, flownet, Types of motion: Linear translation, Linear deformation, Angular deformation, Rotation, Vorticity, Vortex flow.

[No. of Hours: 11]

UNIT III

Fluid dynamics : Reynolds's, Navier-Stokes and Euler's equations of motion, Derivation of Bernoulli's equation from Euler's equation and its limitations, Applications of Bernoulli's equations-Orifice, Venturimeter, Mouth piece, Weir & notch, Pitot's tube, Siphon, etc; hydraulic gradient and total energy lines and their Engineering significance.

[No. of Hours: 10]

UNIT IV

Momentum equation, Moment of momentum equation- Assumptions and limitations, applications, impact of jets and forces in bends..

Dimensional and Model analysis : Dimensional homogeneity, methods of dimensional analysis, Buckingham's π theorem, selection of Repeating variables, Forces acting on moving fluid, Dimensionless numbers and their Engineering significance, Model analysis, Geometric, Kinematic and Dynamic similarity, Model testing of partially submerged bodies, scale ratios for distorted models.

[No. of Hours: 10]

Suggested Reading:

1. Fluid Mechanics, Victor Streeter, International Edition, The Mc Graw Hill Publications
2. Fluid Mechanics through Problems, R.J. Garde, New Age Publications.
3. Fluid Mechanics and its Application, Vijay Gupta, Santosh K Gupta, New Age Publications
4. Fluid Mechanics, Hughes & Brighton, Tata Mc Graw Hill.
5. Mechanics of Fluids, Shames, McGraw Hill.
6. Fluid Mechanics, Neville, Pearson Education
7. Introduction to Fluid Mechanics, A. James. Fay, PHI-Publications.
8. Fluid Mechanics, R.K. Bansal
9. Fluid Mechanics, Modi and Seth
10. Fluid Mechanics, A.K. Jain.

B.Tech Civil Engg. III Semester

Paper code: ETCE 207

L T C

Paper: Geoinformatics- I

3 1 4

INSTRUCTIONS TO PAPER SETTERS		Maximum Marks : 75
7	Question No.1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks	
8	Apart from question No.1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only one question from each unit	

UNIT I

Linear Measurement: Introduction, Principles of chain survey, use and adjustment of various instruments employed in chain survey, chaining on sloping grounds, Offsets and error in offsets, Obstructions in chaining, chaining angles, Errors and sources of error, Introduction to advance linear measuring instruments, Field book:

Compass survey: Use and adjustment of prismatic and surveyor's compass, Methods of surveying with a compass, Magnetic declination, local attraction, Errors in prismatic survey, plotting of compass survey, distribution of closing error.

Leveling: Definition and working principles of a leveling instrument and its various parts with reference to the bubble tube and the telescope, Use and adjustment of dumpy and tilting levels, Establishment of Bench Marks by leveling, Longitudinal leveling, Cross section leveling, fly leveling and reciprocal leveling, Methods of booking and reduction of levels, Errors in leveling, Curvature and refraction correction, Advanced leveling instruments.

[No. of Hours: 11]

UNIT II

Theodolite survey: Study of theodolite, Temporary and permanent adjustments, Measurement of horizontal angles, methods of repetition and reiteration, Measurement of vertical angles, advanced electronic and laser theodolites.

Contouring: Definition of contours, contour interval, characteristics of contours, Direct and indirect methods of contouring, uses of contours, Estimation of volumes of the earthwork by means of contour lines and section, Grade contours, Topographic maps.

[No. of Hours: 10]

UNIT III

Tacheometric surveying: Stadia system, Fixed and movable hair methods, staff held vertical and normal, Instrument constants, Analytic lens, Tangential system, direct reading tachometer, subtense bar.

Plane table survey: Instruments employed in plane table survey, Use and adjustment of these instruments including simple alidade, Working operations like fixing, leveling, centering and orientation, Methods of orientation, various methods of plane table survey, Three point and two point problems, Errors in plane table survey, Contouring using clinometer, Advantages and disadvantages of plane tabling.

[No. of Hours: 9]

UNIT IV

Triangulation: Principal, selection of base line and stations, order of triangulation, triangulation figures, scaffold and signals, marking of stations, Intervisibility and heights of stations, satellite stations, base line measurement and corrections, Introduction to adjustment of observations.

Curves: Types of curves, Elements of a curve, Simple curves, different methods of setting out, Introduction to compound, reverse, transition and vertical curves.

Introduction to modern surveying Instruments /Techniques: like Total station, GPS etc.

[No. of Hours: 12]

Suggested Reading:

1. Plane Surveying, Dr. A. M Chandra, New Age International Publications.
2. Geodetic survey (Vol. I & II), David Clark
3. Higher surveying Norman Thomas
4. Dr. K.R. Arora, Surveying Vol. I & II Standard Book House, New Delhi.
5. Surveying-I, B.C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications
6. Fundamentals of Surveying, S.K. Roy, PHI Publications.
7. Surveying and Levelling, T. P. Kanetkar and Kulkarni, Standard Publishers.

B.Tech Civil Engg. III Semester

Paper code: ETCE 209

L T C

Paper: Engineering Geology

3 1 4

INSTRUCTIONS TO PAPER SETTERS		Maximum Marks : 75
9	Question No 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks	
10	Apart from question No 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However student may be asked to attempt only one question from each unit	

UNIT I

Introduction: Definition and scope of geology, its importance to Civil Engineers. Interior of earth, earth movement.

Rocks and minerals: Physical properties of minerals & their occurrence and uses. Classification and occurrence of rocks, Building and ornamental stones.

Geological processes: Weathering of rocks, agents of weathering, products of weathering, soil formation, soil profile, Erosion by running water, winds and glaciers. [No. of Hours: 10]

UNIT II

Structural Geology: Stratification, Altitude of formation, dip, strike, apparent dip. Faults, folds, joints and their engineering importance. [No. of Hours: 10]

UNIT III

Hydrogeology: Definition, source of ground water, ground water storage and circulation. Quality of ground water, hot water springs.

Introduction of Engineering Seismology: Earthquakes and its causes and effects, waves generated, basic terminology, Earthquakes and its measurements, Distribution of earthquakes in the World and in India, Seismic Zoning map of India. [No. of Hours: 10]

UNIT IV

Applied Geology:

- Photogeology: Aerial photographs, their importance in the field of civil engineering, stereoscope and its use.
- Dams and Reservoirs: Geological investigations for dams and reservoirs. Examples of dam failures due to geological causes, Geological study for selecting site for dam and reservoir.
- Bridges, highways and buildings: Geological investigations.
- Tunnels through rocks: Definition. Purposes for tunneling. Geological background for selecting a site for a tunnel.
- Landslides: Definition, causes and effects. Types of landslides. Preventive measures.

[No. of Hours: 10]

Suggested Reading:

- Structural geology, M.P. Billings, Prentice Hall of India.
- Principles of Engineering geology and Geotechniques, DP Kyrine and Judds, Mc Graw Hill.
- Principles of Engineering Geology, Bangar, Standard Publishers & distributors.
- Textbook of Engineering Geology, Kesavulu, Macmillan India Ltd.
- Dona, Mineralogy, Willey Eastern Limited, 1992.
- Engineering Geology, Hries and Watson.
- Geology of Engineering, Tirifethen Van, Nebard.
- Elementary Seismology by Richter, C.F. (1958), W. H. Freeman, San Francisco
- Earthquake Engineering by Bruce C. Bolt

B.Tech Civil Engg. III Semester

Paper code: ETMA 211

T T C

Paper: Applied Mathematics-III

3 1 4

INSTRUCTIONS TO PAPER SETTERS		Maximum Marks: 75
1	Question No 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.	
2	Apart from question No 1, rest of the paper shall consist of four units as per the syllabus. Every unit will have three questions. However student may be asked to attempt only one question from each unit.	

UNIT I

Numerical Computing : Theoretical Matters, Parallel and distributed computing, solving non linear equations, Colebrook's equation for friction factor, Linear interpolation methods, Newton's method, Multiple roots, Order of convergence, Solving sets of equations, Gaussian elimination and Gauss-Jordan methods, Iterative methods, Relaxation method, system of non linear equations. Applications in civil engineering for Solving linear and non linear systems using MATLAB

[No. of Hours: 10]

UNIT II

Interpolation and Curve fitting: Lagrangian polynomials, Interpolating with Cubic spline, B-spline, Polynomial approximation of surfaces, Least square approximation for polynomials, Applications in Civil Engineering using standard software like MATLAB or any other standard software.

Approximation of Functions: Chebyshev Polynomials / series, Fourier series for periodic and non periodic functions, half range expansions, Harmonic Analysis, Fourier Transforms: Sine & cosine Transforms, Application to Differential equation.

[No. of Hours: 10]

UNIT III

Numerical differentiation: Evenly spaced data, First order and higher order derivatives, backward, forward & central difference methods, Extrapolation techniques, Order of error for interpolation and extrapolation, Error terms, Applications in civil engineering.

Numerical Integration: Newton-Cotes integration formulas, Trapezoidal rule, Simpson's rules, Gaussian Quadrature, Adaptive integration, multiple integrals, Applications of cubic splines, Applications in civil engineering.

[No. of Hours: 10]

UNIT IV

Numerical solutions of Differential equations : Spring-Mass problem, Taylor series, Euler and Runge-Kutta methods, Convergence criteria, Comparison of Methods with respect to iterative steps, local error and global error, Applications in civil engineering using MATLAB or any other standard software.

Partial Differential Equations: Heat equation in one dimension, Wave equation in two dimensions, Boundary value problems, Solution techniques, Crank Nicholson method.

[No. of Hours: 12]

Suggested Reading:

1. Numerical Methods for Scientific and Engineering computation and, M.K.Jain, S.R. K. Ayengar, R.K. Jain, New Age International Publication.
2. Applied Numerical Analysis, Gerald & Wheatley, Pearson Education.
3. Computer based Numerical and Statistical techniques, Manish Goyal, Laxmi Publications
4. Numerical Methods by Steven Chapra