

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 3

Civil Engineering

Subject Code 130604

Subject Name Structural Analysis-I

Sr.No	Course contents
1	Torsion: Torsion of solid and hollow circular shaft, shear stress and strain due to torsion, angle of twist, torsional moment of resistance, power transmitted by shaft, keys and coupling, combined bending and torsion, closed coiled helical springs.
2	Thin cylinder: Analysis of thin cylinder and spherical vessels under pressure
3	Fundamentals: Types of statically determinate & indeterminate structures, static and kinematic indeterminacy, stability of structures, principle of superposition, Maxwell's reciprocal theorems. Computation of internal forces in statically determinate structures such as compound truss, portals, gables, grids, beams curved in plan.
4	Displacement of determinate beams and plane truss: Differential equation of elastic curve, relation between moment, slope and deflection, Macauli's method, moment area method, conjugate beam method applied to beams including varying moment of inertia, Joint displacement of determinate plane truss using unit load method.
5	Arches, cables and suspension bridges: Three hinge arch - segmental and parabolic shapes. Forces and end actions in cables, unstiffened three hinged parabolic and cantenary type suspension bridge.
6	Strain energy: Resilience, strain energy in tension, compression, shear, bending, torsion, proof resilience, modulus of resilience, impact loads, and sudden loads.
7	Influence lines: For statically determinate beams, I.L.D for support reaction, shear and moment for u.d.l, several point loads, criteria for maximum effects, influence lines for statically determinate trusses, forces in members for u.d.l and point loads, criteria for maximum effect.
8	Direct and bending stresses: Members subjected to eccentric loads, middle third rule, kernel of section, chimney subjected to wind pressure, retaining walls, dams subjected to hydraulic pressure.

9	Columns and struts: Buckling of columns, different end conditions, effective length, least radius of gyration, product of inertia, principal axes and Mohr's circle of inertia, Euler's and Rankine's formulae, columns with initial curvature, eccentrically loaded columns, columns with lateral loading.
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Term Work:

This will consist of graphical and/or analytical solutions of at least 30 problems based on the above course. Practical examinations shall consist of oral based on term work and above course.

Reference Books:

1. Junarkar S.B. & Shah H.J.; Mechanics of Structures Vol-I; Charotar publishing house, Anand
2. Wang C. K.; Intermediate Structural Analysis; Tata McGraw Hill book Company, New Delhi
3. Popov E.P.; Engineering Mechanics of Solids; Prentice Hall of India, New Delhi
4. Ryder G.H.; Strength of Materials; Mcmillan
5. Gere & Timoshenko; Mechanics of Materials; CBS Publishers & Distributors, Delhi
6. Hibbler R C; Mechanics of Materials; Pearson Education
7. Hibbler R C; Structural Analysis; Pearson Education