

Subject Code: 1ET1060301	Subject Title: STRUCTURAL ANALYSIS-I
Pre-requisite Subject	Basic Knowledge of Mechanics of Solids

Course Objective:

1. The students will learn fundamental basics of Mechanics of solids.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Theory (T+P)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
4	2	0	6	70	30	--	--	100

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
01	Fundamentals of Statically Determinate Structures: 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 plane truss, plane frame, grids.	06	10	
02	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.	06	15	
03	Displacement of Determinate Beams and Plane Truss: Differential equation of elastic curve, relation between moment, slope and deflection, Macaulay's method, Moment Area Method, Conjugate Beam Method applied to beams. Joint and methods of sections displacement of determinate plane truss using unit load method.	14	25	
04	Strain Energy Resilience, strain energy due to axial loads & flexure, proof resilience, modulus of resilience, impact loads, and sudden loads.	06	10	
05	Columns and Struts: Buckling of columns, different end conditions, effective length, least radius of gyration, Euler's and Rankine's formulae, columns with initial curvature, eccentrically loaded columns, columns with lateral loading.	06	10	
06	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.	06	15	
07	Thin cylinder: Analysis of thin cylinder and spherical vessels under pressure.	04	05	
08	Principal stresses and strains: Compound stresses, analysis of principal planes and principal stresses, principal strains, angle of obliquity of resultant stress, principal stresses in beams.	08	10	

Term Work:

This will consist of graphical and analytical solutions of at least 30 problems based on the above course.

List of References:

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.