

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 statical 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.RVaidyanathan, Dr, P.Perumal, 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