

PME6G001 MECHANICS OF SOLID

(MINOR SPECIALIZATION)

MODULE - I (10 LECTURES)

1. Load, Stress, Principle of St.Venant, Principle of Superposition, Strain, Hooke's law, Modulus of Elasticity, Stress-Strain Diagrams, Working Stress, Factor of safety, Strain energy in tension and compression, Resilience, Impact loads, Analysis of Axially Loaded Members : Composite bars in tension and compression - temperature stresses in composite rods, Statically indeterminate problems. Shear stress, Complimentary shear stress, Shear strain, Modulus of rigidity, Poisson's ratio, Bulk Modulus, Relationship between elastic constants.
2. Members in Biaxial State of Stress : Stresses in thin cylinders, thin spherical shells under internal pressure - wire winding of thin cylinders. Analysis of Biaxial Stress. Plane stress, Principal stress, Principal plane, Mohr's Circle for Biaxial Stress.

MODULE - II (11 Lectures)

3. Strain Deformation : Two dimensional state of strain, Mohr's circle for strain, Principal strains and principal axes of strain measurements, Calculation of principal stresses from principal strains.
4. Shear Force and Bending Moment for Simple Beams Shear force and bending moment. Types of load and Types of support. Support reactions, Relationship between bending moment and shear force, Point of inflection. Shear Force and Bending Moment diagrams.
5. Simple Bending of Beams : Theory of simple bending of initially straight beams, Bending stresses, Shear stresses in bending, Distribution of normal and shear stress, beams of two materials, Composite beams.

MODULE - III (8 LECTURES)

6. Deflection of Beams : Differential equation of the elastic line, Slope and deflection of beams by integration method and area - moment method.
7. Theory of Columns: Eccentric loading of a short strut, Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio

MODULE - IV (7 LECTURES)

8. Torsion in solid and hollow circular shafts, Twisting moment, Strain energy in shear and torsion, strength of solid and hollow circular shafts. Stresses due to combined bending and torsion, Strength of shafts in combined bending and twisting.
9. Close - Coiled helical springs.

TEXT BOOKS

1. Elements of Strength of Materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press
2. Strength of Materials by G. H. Ryder, Macmillan Press
3. Strength of Materials by James M. Gere and Barry J. Goodno, Cengage Learning

REFERENCE BOOKS

1. Mechanics of Materials by Beer and Johnston, Tata McGraw Hill
2. Mechanics of Materials by R.C.Hibbeler, Pearson Education
3. Mechanics of Materials by William F.Riley, Leroy D.Sturges and Don H.Morris, Wiley