

PME3I101 MECHANICS OF SOLID

Theory L/T (Hours per week): 3/0, Credit: 3

MODULE - I (10 Lectures)

1. Concept of Stress:

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, Concept of Statically indeterminate problems. Shear stress, Complimentary shear stress, Shear strain, Modulus of rigidity, Poisson's ratio, Bulk Modulus, Relationship between elastic constants.

2. Biaxial State of Stress :

Analysis of Biaxial Stress.Plane stress, Principal plane, Principal stress, Mohr's Circle for Biaxial Stress. Stresses in thin cylinders and thin spherical shells under internal pressure, wire winding of thin cylinders.

MODULE - II (10 Lectures)

3. . Biaxial State of Strain:

Two dimensional state of strain, Principal strains, Mohr's circle for strain, Calculation of principal stresses from principal strains, Strain Rossette.

4. Shear Force and Bending Moment Diagrams:

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. Bending of Beams:

Theory of simple bending of initially straight beams, Bending stresses, Shear stresses in bending, Distribution of normal and shear stress, 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:

Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio, Eccentric loading of short column

MODULE - IV (8 Lectures)

8. Torsion:

Torsion in solid and hollow circular shafts, Twisting moment, Strain energy in shear and torsion, strength of solid and hollow circular shafts. Strength of shafts in combined bending and twisting, 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 R.Subramaniam, Oxford University Press

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
 - a. Student Edition
4. Mechanics of Materials by James M. Gere, Thomson Learning
5. Strength of Materials by James M. Gere and Barry J. Goodno, Cengage Learning
6. Strength of Materials by S.S.Rattan, Tata Mc Graw Hill
7. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall of India

TENTATIVE
Likely to be Modified