

MECHANICS OF MATERIALS

UNIT - I STRESS STRAIN AND DEFORMATION OF SOLIDS

Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses; Tensile, Compressive and Shear – Deformation of simple and compound bars under axial load – Thermal stress – Elastic constants – Strain energy and unit strain energy – Strain energy in uniaxial loads.

UNIT - II BEAMS - LOADS AND STRESSES

Types of beams: Supports and Loads – Shear force and Bending Moment in beams – Cantilever, Simply supported and Overhanging beams – Stresses in beams – Theory of simple bending – Stress variation along the length and in the beam section – Effect of shape of beam section on stress induced – Shear stresses in beams – Shear flow

UNIT - III TORSION

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts – Fixed and simply supported shafts – Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl Factor – Deflection of helical coil springs under axial loads – Design of helical coil springs – stresses in helical coil springs under torsion loads

UNIT - IV BEAM DEFLECTION

Elastic curve of Neutral axis of the beam under normal loads – Evaluation of beam deflection and slope: Double integration method, Macaulay Method, and Moment-area Method –Columns – End conditions – Equivalent length of a column – Euler equation – Slenderness ratio – Rankine formula for columns

UNIT - V ANALYSIS OF STRESSES IN TWO DIMENSIONS

Biaxial state of stresses – Thin cylindrical and spherical shells – Deformation in thin cylindrical and spherical shells – Biaxial stresses at a point – Stresses on inclined plane – Principal planes and stresses – Mohr's circle for biaxial stresses – Maximum shear stress - Strain energy in bending and torsion.

TEXT BOOK:

1. Beer F. P. and Johnston R, "Mechanics of Materials", McGraw-Hill Book Co, Third Edition, 2002.

REFERENCES:

- 1.Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 1981.
- 2.Popov E.P, "Engineering Mechanics of Solids", Prentice-Hall of India, New Delhi, 1997

A Continuous Beam With Two Unequal Spans With Two Unequal Loads At Any Point On Each. Page Comments. Introduction. In this section we present the solutions for the stress and deflection in a built in and continuous beam due to either uniform or point loads. With each solution the following definitions apply: σ is the bending at any point. I is the section module of the beam cross-section, equal to $\frac{1}{12}bh^3$ where b is the distance from the beam centroid to the top or bottom edge of the beam. δ is the deflection at any point. w is the load on the beam. E is the modulus of elasticity. I is the moment of inertia for the cross section about the neutral axis.