Strength of Materials - II (Code No: A40114)

UNIT - I

Torsion of Circular Shafts: Theory of pure torsion - Derivation of Torsion equations : T/J = q/r - NΘ/L - Assumptions made in the theory of pure torsion - Torsional moment of resistance - Polar section modulus - Power transmitted by shafts - Combined bending and torsion and end thrust - Design of shafts according to theories of failure.

Springs: Introduction - Types of springs - deflection of close and open coiled helical springs under axial pull and axial couple - springs in series and parallel - Carriage or leaf springs.

UNIT - II

Columns and Struts: Introduction - Types of columns - Short, medium and long columns - Axially loaded compression members - Crushing load - Euler's theorem for long columns - assumptions - derivation of Euler's critical load formulae for various end conditions - Equivalent length of a column - slenderness ratio - Euler's critical stress - Limitations of Euler's theory - Rankine - Gordon formula - Long columns subjected to eccentric loading - Secant formula - Empirical formulae - Straight line formula - Prof. Perry's formula.

Beams Curved in Plan: Introduction - circular beams loaded uniformly and supported on symmetrically place Columns - Semi-circular beam simply-supported on three eqully spaced supports.

UNIT - III

Beam Columns: Laterally loaded struts - subjected to uniformly distributed and concentrated loads - Maximum B.M. and stress due to transverse and lateral loading.

Direct and Bending Stresses: Stresses under the combined action of direct loading and bending moment, core of a section - determination of stresses in the case of chimneys, retaining walls and dams - conditions for stability stresses due to direct loading and bending moment about both axis.

UNIT - IV

Unsymmetrical Bending: Introduction - Centroidal principal axes of section - Graphical method for locating principal axes - Moments of inertia referred to any set of rectangular axes - Stresses in beams subjected to unsymmetrical bending - Principal axes - Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis - Deflection of beams under unsymmetrical bending.

Shear Centre: Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections

UNIT - V

Thin Cylinders: Thin seamless cylindrical shells - Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and volumetric strains - changes in dia, and volume of thin cylinders -Thin spherical shells.

Thick Cylinders: Introduction Lame's theory for thick cylinders -Derivation of Lame's formulae - distribution of hoop and radial stresses across thickness - design of thick cylinders - compound cylinders - Necessary difference of radii for shrinkage - Thick spherical shells.