15ACE08-STRENGTH OF MATERIALS – II

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Objective: Study of the subject provides the understanding of principal stress, strains, springs, columns and structures.

UNIT – I

Principal Stresses And Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

Theories Of Failures: Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT – II

Thin Cylinders & Thick 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.

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.

UNIT – III

Torsion Of Circular Shafts – Theory of pure torsion – Derivation of Torsion equations: – Assumptions made in the theory 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 – IV

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.

UNIT – V

Unsymetrical 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.

Beams Curved In Plan : Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semicircular beam simply-supported on three equally spaced supports.

Text Books:

(1) A Text book of Strength of materials by R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.
(2) Strength of Materials by S.S. Bhavikatti – Vikas publishers
(3) Strength of Materials by R.Subramanian, Oxford University Press.
(4) Strength of Materials by D.S. Prakasa rao, University press.

References :

(1) Mechanics of Structures, by Ghosh& Datta, New Age Pubilishers
(2) Strength of Materials by B.C.Punmia.- Laxmi publications
(3) Strength of Materials by Schaum's out line series – Mc.Graw hill International Editions.
(4) Strength of Materials by S.Ramkrishna and R.Narayan – Dhanpat Rai Publications.
(5) Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Dew Delhi.
(6) Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd