

PCI4I101 ADVANCED MECHANICS OF SOLIDS (3-0-1)

Module I

Theories of failure: Maximum principal stress theory, maximum shear stress theory, maximum strain theory, total strain energy theory, maximum distortion theory, octahedral shear stress theory graphical representation and comparison of theories of failure.

Thick cylinders subjected to internal and external pressures, compound cylinders, computer application in analyzing stresses in thick cylinders.

Module II

Unsymmetrical bending: Properties of beam cross section, slope of neutral axis, stresses and deflection in unsymmetrical bending, shear centre.

Curved Beam: Bending of beam with large initial curvature, Stress distribution in beam with rectangular, circular and trapezoidal cross section, stresses in crane hooks, ring and chain links.

Module III

Elementary concept of theory of elasticity, stresses in three dimensional, equations of equilibrium and compatibility, plane stress, computer analysis of two dimensional state of stress or strain at a point.

Module IV

Advanced topics in strength of materials: Repeated stresses and fatigue in metals, concept of stress Concentration, notch and stress concentration factors.

Experimental stress analysis: Resistance strain gauges, strain Rosettes, Two dimensional photoelastic methods of stress analysis, stress optic law, light and dark field in a polariscope, Isoclinic and Isochromatic fringe patterns, Computer Analysis of strain from strain rosette measurement.

Text Books:

- 1 Advanced Mechanics of Solids, L.S. Srinath, Mc Graw Hill.
2. Advanced Mechanics of Materials, Kumar & Ghai, Khanna Publisher.
3. Strength of Materials by R. Subramaniam, Oxford University Press
4. Strength of Material by S. S. Ratan, McGraw Hill

Reference Books:

1. Advanced Mechanics of Materials: Seely and Smith, John Willey, New York.
2. Mechanics of Materials by Gere & Timoshenko, CBS.