

5th Semester	RCI5D002	Advance Mechanics of Material	L-T-P 3-0-0	3 Credits
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Module I**(10 Classes)**

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.

Module II**(4 Classes)**

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

Module III**(10 Classes)**

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 IV**(8 Classes)**

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 V**(8 Classes)**

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.

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

Digital Learning Resources:

Course Name	Advanced Strength of Materials
Course Link	https://nptel.ac.in/courses/112/101/112101095/
Course Instructor	Prof. S.K. Maiti Department of Mechanical Engineering IIT Bombay