2012-13

PVP SIDDHARTHA INSTITUTE OF TECHNOLOGY
(COURSE STRUCUTRE FOR AUTONOMOUS SCHEME)

I Year M. Tech. (Machine Design) M.E.　　　　　　　　　　**T　P　C**

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MEMD1T2 - ADVANCED MECHANICS OF SOLIDS

Unit – I

Shear center: Bending axis and shear center-shear center for axi-symmetric and unsymmetrical sections

Unit - II

Unsymmetrical bending: Bending stresses in Beams subjected to Nonsymmetrical bending, Deflection of straight beams due to nonsymmetrical bending.

Unit - III

Curved beam theory: Winkler Bach formula for circumferential stress – Limitations – Correction factors–Radial stress in curved beams – closed ring subjected to concentrated and uniform loads-stresses in chain links.

Unit - IV

Torsion : Torsion of a cylindrical bar of Circular cross Section, Saint-Venant's semi-inverse method, Linear elastic solution, Prandtl elastic membrane (Soap-Film) Analogy, Narrow rectangular cross Section, Hollow thin wall torsion members, Multiply connected Cross Section, Thin wall torsion members with restrained ends.

Unit - V

Axi-Symmetric Problems: Rotating Discs- Flat discs, Discs of uniform thickness, Discs of uniform strength, Rotating Cylinders

Unit - VI

Theory of Plates: Introduction, Stress resultants in a flat plate, Kinematics: Strain-Displacement relations for plates, Equilibrium equations for small displacement theory of flat plates, Boundary conditions for plate, Solution of rectangular plate problem, Solution of circular plate problem.

Unit - VII

Beams on Elastic Foundation: General theory, Infinite Beam subjected to concentrated load: boundary conditions, Infinite beam subjected to a distributed load segment, Semi-infinite beam subjected to a distributed load at its end, Semi-infinite beam with concentrated load near its end, Short Beams.

Unit - VIII

Introduction to Theory of Elasticity: Equilibrium and Compatibility conditions for elastic solids. 2D elasticity equations for plane stress, plane strain. Airy's stress function, bending of cantilever loaded at the end, bending of a beam by uniform load.

Textbook:

1. Advanced Mechanics of materials by Boresi & Sidebottom-Wiely International.

References:

1. Advanced strength of materials by Den Hortog J.P.
2. Theory of plates – Timoshenko.
3. Strength of materials & Theory of structures (Vol I & II) by B.C Punmia
4. Strength of materials by Sadhu singh
5. Theory of Elasticity – Timoshenko