

DMX5302 Strength of Materials II

Level	5
Course Code	DMX5302
Course Title	Strength of Materials II
Credit value	3
Core/Optional	Core
Course Aim/s	Aim of this course is to provide the underlining theories of unsymmetrical bending of beams, stresses in thick cylinders and rotating disks, deformation of structural elements beyond elastic limit, and failure criteria along with a few practical applications.
Course Learning Outcomes (CLO):	<p>At the completion of this course student will be able to:</p> <p>CLO1: Analyze stress distributions and deformations in mechanical components with the use of Lamé's theory.</p> <p>CLO2: Analyze stresses and deformations in non-circular solid shafts, tubes and shafts having cellular sections.</p> <p>CLO3: Analyze stresses and deflections of beams due to unsymmetrical bending.</p> <p>CLO4: Describe the Airy's stress function and use it for problem solving.</p> <p>CLO5: Demonstrate the knowledge of deformations beyond elastic limit, fatigue, creep, and fracture in mechanical components and use related theories in problem solving.</p> <p>CLO6: Describe the theories of contact and residual stresses on different applications.</p> <p>CLO7: Identify the terminologies of Finite Element Analysis and its applications.</p>
Content	<p>Outline Syllabus:</p> <p>Unit 1:</p> <ul style="list-style-type: none"> Session 01: Thick Cylinders Session 02: Compound Cylinders Session 03: Rotating Rings and Discs Session 04: Torsion of Non-Circular and Thin-walled Sections Session 05: Unsymmetrical Bending Session 06: Strain beyond the Elastic Limit Session 07: Theories of Elastic Failure <p>Unit 2:</p> <ul style="list-style-type: none"> Session 08: Analysis of Stress Session 09: Analysis of Strain Session 10: Continuity Relationship Session 11: Two-dimensional Problems in Rectangular Coordinates Session 12: Application of Airy Stress Function of Rectangular Coordinates Session 13: Two dimensional Problem in Polar Coordinates Session 14: Experimental Stress and Strain Analysis Session 15: Two-dimensional Photo elasticity Session 16: Theories of Failures Session 17: Yield Surface and Bound Theorems

Unit 3:

Session 18: Basic Plasticity

Session 19: Fatigue, Creep and Fracture

Session 20: Contact Stress, Residual Stress and Stress Concentration

Session 21: Principle theories of Finite Element Analysis

Session 22: Applications of FEM

Laboratory work:

1. Stresses in thick Cylinders
2. Unsymmetrical Bending
3. Stresses in rotating discs