

**ADVANCED STRENGTH OF MATERIALS**

<b>Course Code</b>	19ME4501B	<b>Year</b>	III	<b>Semester</b>	I
<b>Course Category:</b>	Program Elective	<b>Branch</b>	ME	<b>Course Type</b>	Theory
<b>Credits:</b>	3	<b>L – T – P</b>	3 – 0 – 0	<b>Prerequisites:</b>	Nil
<b>Continuous Evaluation:</b>	30	<b>Semester End Evaluation:</b>	70	<b>Total Marks:</b>	100

**Course Outcomes**

Upon successful completion of the course, the student will be able to

<b>CO1</b>	Calculate deflections in fixed and continuous beams.	L3
<b>CO2</b>	Determine the stresses in thick cylinders.	L3
<b>CO3</b>	Analyse the curved beams for stresses with different cross sections.	L4
<b>CO4</b>	Calculate the stresses in rotating disks.	L3
<b>CO5</b>	Determine the Strain Energy under various loading conditions.	L3

**Course Articulation Matrix:**

	<b>Contribution of Course Outcomes towards achievement of Program Outcomes</b>													
	<b>Strength of correlations (3: High, 2: Moderate, 1: Low)</b>													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1								2	3	1
CO2	3	3	3	1								2	3	1
CO3	3	3	3	1								2	3	1
CO4	3	3	3	1								2	3	1
CO5	3	3	3	1								2	3	1

<b>Course Content</b>		<b>Mapped COs</b>
<b>UNIT-1</b>	<b>Fixed beams and continuous beams:</b> Introduction, analysis of fixed beams by Macaulay's method Clapeyron's theorem of three moments, Beams with constant moments of inertia.	<b>CO1</b>
<b>UNIT-2</b>	<b>Thick cylinders:</b> Introduction, Stresses in thick Cylindrical shell(Lame's theory), Radial Deflection, Stresses in Compound Cylinders.	<b>CO 2</b>
<b>UNIT-3</b>	<b>Curved beams:</b> Stresses in Beams of small and large initial curvature, The Winkler-Bach theory, Assumptions for stresses in the bending of curved bars, Stresses in Crane Hook and C-Clamp with Rectangular, circular and trapezoidal cross sections.	<b>CO3</b>
<b>UNIT-4</b>	<b>Centrifugal Stresses:</b> Introduction, Rotating Ring, Rotating Disc, Rotating Disc of uniform strength.	<b>CO4</b>
<b>UNIT-5</b>	<b>Strain Energy :</b> Resilience, Proof Resilience, Strain energy stored in a body when the load is applied gradually, Load is applied suddenly, Load is applied with impact, Strain energy stored in a body due to shear stress.	<b>CO5</b>

<b>Learning Resources</b>	
<b>Text Books:</b>	<ol style="list-style-type: none"><li>1. James M. Gere, "Mechanics of Materials", 7th edition, Cengage learning India, 2010.</li><li>2. S.S. Rattan, "Strength of Materials", 2nd edition, Tata Mc-Graw Hill Private Limited, New Delhi, 2012.</li></ol> S. B. Junarkar, Mechanics of Structures, Charotar Publishers, 2010
<b>Reference Books:</b>	<ol style="list-style-type: none"><li>1. Adarsh Swaroop, "Mechanics of Materials" 1<sup>st</sup> edition, New Age International Pvt. Ltd, 2012.</li><li>2. Popov, Mechanics of Solids, 2/e, New Pearson Education, 2015.</li></ol>
<b>E-Resources &amp; other digital Material:</b>	<a href="https://nptel.ac.in/courses/112/101/112101095/">https://nptel.ac.in/courses/112/101/112101095/</a>