Faculty of Engineering & Technology, SRM University, Kattankulathur – 603203
School of Mechanical Engineering
Department of Mechanical Engineering

Course plan
Course code: ME1010  
Course title: Mechanics of Solids  
Semester: IV  
Academic year: 2015 - 2016 / Even  
Semester: (Feb 2016 – May 2016)  
Date: 24/01/2016  
Course Coordinator: Ravi Krishnamoorthy S

Faculty details:

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<tr>
<th>Section</th>
<th>Class room No</th>
<th>Name</th>
<th>Room No.</th>
<th>Cell Phone No.</th>
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<td>Mr. Ravi Krishnamoorthy S</td>
<td>MEM 12/D</td>
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<td>Mr. Raja D</td>
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<td>Ramesh K</td>
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Direct assessment details:

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<tr>
<td>Cycle test - I</td>
<td>10</td>
<td>Concept of Stress and Strain, Shear force and Bending moment diagrams.</td>
<td>Feb 24, 2016</td>
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<td>Surprise test</td>
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<td>Bending stresses, Shear stresses</td>
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<td>Cycle test - II</td>
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<td>Bending stresses, Shear stresses, Torsion of shafts, deflection of beams - cantilevers</td>
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ME1010

MECHANICS OF SOLIDS

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<td>Total contact hours - 60</td>
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PURPOSE

To familiarize the students with the fundamentals of deformation, stresses, strains in structural elements.

INSTRUCTIONAL OBJECTIVES

1. Know the concepts of stress and strain.
2. Analyze the beam of different cross sections for shear force, bending moment, slope and deflection.
3. Understand the concepts necessary to design the structural elements and pressure vessels.

UNIT I - CONCEPT OF STRESSES AND STRAINS

(12 hours)

Concept of stress and strain, Hooke’s law - Tension, Compression, and Shear, stress-strain diagram - Poisson’s ratio, elastic constants and their relationship - Deformation of simple and compound bars. Thermal stresses – simple and Composite bars. Principal plane, principal stress, maximum shearing stress - Uniaxial, biaxial state of stress - Mohr's circle for plane stresses.

UNIT II - ANALYSIS OF BEAMS

(12 hours)

Types of beams and loads - shear force and bending moment diagrams for cantilevers, simply supported and over hanging beams. Theory of pure bending - Bending stresses in simple and composite beams. Shear stress distribution in beams of different sections.

UNIT III - TORSION OF SHAFTS

(12 hours)

Theory of pure torsion, torsion of circular shafts and composite shafts.

UNIT IV - DEFLECTION OF BEAMS

(12 hours)

Slope and deflection of cantilever, simply supported beam by double integration method - Macaulay’s method - Moment area method - Castigliano’s theorem.

UNIT V - COLUMNS AND CYLINDERS

(12 hours)

Columns and struts: Member subjected to combined bending and axial loads, Euler’s theory, Crippling load, Rankine’s theory. Cylinders And Shells: Thin cylinder, thin spherical shells under internal pressure - Thick cylinders - Lame’s equation - Shrink fit and compound cylinders.

TOTAL : 60 hours
TEXT BOOKS


REFERENCES


<table>
<thead>
<tr>
<th>Course Designed by</th>
<th>Department of Mechanical Engineering</th>
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## SESSION PLAN

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<tr>
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<td>Concept of stress and strain, Hooke’s law - Tension, compression and shear, stress – strain diagram.</td>
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<td>Analysis of bars of uniform and varying sections subjected to single load and varying loads.</td>
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<td>Mohr’s circle – direct stress in two mutually perpendicular directions.</td>
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<td><strong>ANALYSIS OF BEAMS</strong></td>
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<td>13</td>
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<td>Shear force and bending moment diagrams for simply supported beam - problems. (pure point load, pure UDL, pure UVL)</td>
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<td>Shear stress distribution in beams of different sections– derivation.</td>
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<td>Tutorial on Shear stress distribution in beams of different sections.</td>
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**TORSION OF SHAFTS**

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**DEFLECTION OF BEAMS**

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| 50 | Expression for crippling load with different end conditions. | T3, Ch-16  
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| 51 | Rankine’s theory –problems. | T3, Ch-16  
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| 53 | Thin cylindrical vessel subjected to internal pressure. | T3, Ch-10  
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| 54 | Change in dimensions due to internal pressure- problems. | T3, Ch-10  
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| 55 | Thin spherical shells subjected internal pressure- problems. | T3, Ch-10  
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| 56 | Tutorial – Thin cylinders. | T3, Ch-10  
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| 57 | Stresses in Thick cylinders –Lame’s theory. | T3, Ch-11  
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| 58 | Stresses in compound thick cylinder. | T3, Ch-11  
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| 59 | Tutorial - Thick cylinders. | T3, Ch-11  
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TEXT BOOKS


REFERENCES


### Name and Signature Faculty:

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(Ravi Krishnamoorthy S)  

Officers Co-ordinator

HOD (Mechanical)