B. Tech
Mechanics of Solids
(030040106/030050106/030130106/030070206/
030060206/030090206/030080206)
1st year
EFFECTIVE FROM June-2012
A. **Prerequisite:** Different forces and its effect on bodies

B. **Aim and Objective:** To study about identification of different types of forces, systematic evaluation of effect of these forces, behaviour of rigid bodies subjected to various types of forces, at the state of rest or motion of the particles, as Universe exist due to force only.

C. **Subject Code:** 030040106/030050106 /030130106/030070206/030060206 /030090206/030080206  

**Subject:** Mechanics of Solids

D. **Total:** 78 Hrs.  

[Lecture: 4  Tutorial: 0  Practical: 2]

E. **Detailed Syllabus:**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Topic Name</th>
<th>Weightage (%)</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Analysis of Stresses And Strain</td>
<td>20</td>
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<tr>
<td>1.1</td>
<td>Scalar and Vector quantities laws of mechanics &amp; system of units Composition and resolution of vector fundamental concepts and idealization of mechanics</td>
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<tr>
<td>1.2</td>
<td>Force, force systems and resultant</td>
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<td>1.3</td>
<td>Composition and resolution of force</td>
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<td>1.4</td>
<td>Resultant of concurrent force systems</td>
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<td>1.5</td>
<td>Concepts of moment &amp; couple Resultant of non -concurrent force systems</td>
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<td>1.6</td>
<td>Equilibrant, equilibrium of forces</td>
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<td>1.7</td>
<td>Resultant of spatial force system</td>
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<td>1.8</td>
<td>Equilibrium of particle &amp; rigid body</td>
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<td>2.</td>
<td>Centre of Gravity and Moment of Inertia</td>
<td>10</td>
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<tr>
<td>2.1</td>
<td>Concept of centre of gravity, centre of mass &amp; centroid</td>
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<td>2.2</td>
<td>Centroid lines, plane areas of volumes and bodies</td>
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<td>2.3</td>
<td>Pappus-guldinus theorems</td>
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<td>2.4</td>
<td>Moment of inertia</td>
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<td>3.</td>
<td>Beams &amp; Principal Stresses and Strain</td>
<td>20</td>
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</tbody>
</table>
### 3. SF and BM Diagram
- Bending Stress Distribution in beams
- Shear Stress Distribution in beams
- Compound Stresses
- Analysis of principal plane and principal stresses of angle of obliquity of resultant stress
- Principal Strain
- Principal Stress in beam

### 4. Friction
- Friction, types and its applications
- Simple frictionless rigid body assemblies
- Rigid body assemblies including friction

### 5. Truss
- Classification of truss, perfect & imperfect truss
- Analysis of pin-jointed perfect truss using method of joints & method of section

### 6. Introduction to Dynamics, Vibration and Simple Stresses & Strains
- Kinematics of particle: concept of rectilinear motion, circular motion, projectile & compound motion
- Kinetics of particle: Newton's 2 law, dynamic equilibrium, energy and momentum methods
- Types of vibrations, free, forced, damping and d'Alembert's principal
- Application of single degree of freedom system
- Simple stress & strain: tensile, compressive, shear, temperature, hoop stresses
- Physical & mechanical properties metals: ductility, brittleness, harness, toughness, malleability

### F. Modes of Transaction (i.e. Delivery)
1. Lectures /discussion method shall be fruitful. It should be supplemented with various appropriate audio-visual aids.
2. Activity assignment or presentation shall be given to students.

### G. Teachers Activities/Practicum
The following activities should be carried out by the teachers:
1. Assignments based on course content will be given to the students at the end of each unit/topic.
2. Make understand various laws of mechanics
H. Student Activities/Practicum
The following activities may be carried out by the students:
1. Do experiments related to various topics.
2. Study the failure and physical properties of various materials

I. Text Books

J. Reference Books