B. Tech.
Semester – 2
030050XXX / 030130XXX / 030040XXX
FUNDAMENTALS OF MECHANICAL SYSTEMS
EFFECTIVE FROM July-2015
Syllabus version: 1.02
Objective of the course:
Introduction of basic mechanical machines to all the students. To understand working principles of different machines and basic science involved behind their operating. To acquire general skills about specifications and standards of basic mechanical machines.

Student learning outcomes/objectives:
At the closing stage of the course, the students will be able to understand the fundamentals of mechanical engineering which are important to know the actual mechanisms behind the instruments.

Instructional methods and pedagogy:
Faculty members shall explain in a class room using black board and multimedia projector through PowerPoint presentation.

Outline of the course:

<table>
<thead>
<tr>
<th>No.</th>
<th>Unit</th>
<th>Minimum no. of contact hours</th>
<th>Approx. weightage %</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Energy sources</td>
<td>5</td>
<td>10</td>
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<tr>
<td>2</td>
<td>Power plants</td>
<td>10</td>
<td>20</td>
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<tr>
<td>3</td>
<td>Steam boilers</td>
<td>11</td>
<td>20</td>
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<tr>
<td>4</td>
<td>Internal combustion engines</td>
<td>10</td>
<td>20</td>
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<tr>
<td>5</td>
<td>Refrigeration and Air conditioning</td>
<td>8</td>
<td>15</td>
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<tr>
<td>6</td>
<td>Machine tools and Welding</td>
<td>8</td>
<td>15</td>
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<td><strong>Total</strong></td>
<td><strong>52</strong></td>
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<tr>
<td>Sr. No.</td>
<td>Topic</td>
<td>Hours</td>
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<tr>
<td><strong>Unit – I</strong></td>
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<tr>
<td>1</td>
<td>Energy sources: Conventional and non-conventional energy sources, Types of fuels, Calorific value of fuels and calculation of minimum air required for complete combustion of fuel.</td>
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<td><strong>Unit – II</strong></td>
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<td>2</td>
<td>Power plants: Layout of different types of power plants – Thermal power plant, Nuclear power plant, Hydro power plant.</td>
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<td><strong>Unit – III</strong></td>
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<td>3</td>
<td>Steam boilers: Steam generators – Definition, Classification, General study of Cochran, Babcock Wilcox, Lancashire and Locomotive boilers, Boilers mountings and accessories, Draught classification, Calculation of chimney height, Boiler efficiency and numerical.</td>
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<tr>
<td><strong>Unit – IV</strong></td>
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<td><strong>Unit – V</strong></td>
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<td>5</td>
<td>Refrigeration and Air conditioning: Definition, Vapour compressor system, Domestic refrigerator, Ice plant, Window air conditioner.</td>
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<td><strong>Unit – VI</strong></td>
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<td>6</td>
<td>Machine tools and Welding: Introduction to different types of machine tools such as Lathe, Drilling, Shaper machines and its various operations, Types of welding, Welding terminology, Types of welds.</td>
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</table>
Practical
(030050XXX / 030130XXX / 030040XXX)
Fundamentals of Mechanical Systems

Credit: 1 (Practical)  Contact hours per week: 2 (Practical)

Objective of the course:
· To provide the knowledge related to working principles of different machines and basic science involved behind their operating.

Student learning outcomes / objectives:
· At the closing stage of the course, the students will be able to understand the fundamental concepts of actual mechanisms behind the instruments.

Instructional method and pedagogy:
· Experiments are to be performed in laboratory.

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<thead>
<tr>
<th>Sr. No.</th>
<th>Fundamentals of Mechanical Systems (Practical)</th>
<th>Hours</th>
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<tbody>
<tr>
<td>1</td>
<td>To calculate calorific value of given fuel using bomb calorimeter</td>
<td>2</td>
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<td>2</td>
<td>Study of working principles of Cochran boiler and Lancashire boiler</td>
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<tr>
<td>3</td>
<td>Study of working principles of Locomotive boiler and Babcock and Wilcox boiler</td>
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<td>4</td>
<td>Study of working principles of high pressure boilers</td>
<td>2</td>
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<tr>
<td>5</td>
<td>Study of working principles of boiler mountings</td>
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<td>6</td>
<td>Study of working principles of boiler accessories</td>
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<td>7</td>
<td>Study of working principles of four-stroke petrol and diesel engine</td>
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<td>8</td>
<td>Study of working principles of two-stroke petrol and diesel engine</td>
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<td>9</td>
<td>Study of working principle of vapour compression cycle</td>
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<td>10</td>
<td>Study of lathe cutting tools and its operations</td>
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<tr>
<td>11</td>
<td>Study of drilling tools and its operations</td>
<td>2</td>
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<tr>
<td>12</td>
<td>Study of shaper machine and its operations</td>
<td>2</td>
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<tr>
<td>13</td>
<td>Study of welding processes</td>
<td>2</td>
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</tbody>
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Text books:

Reference books: