## AFFILIATED INSTITUTIONS
### ANNA UNIVERSITY, CHENNAI
#### R-2008

### B.E. MECHATRONICS ENGINEERING
#### II - VIII SEMESTERS CURRICULA AND SYLLABI

### SEMESTER II

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>HS2161</td>
<td>Technical English – II*</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>MA2161</td>
<td>Mathematics – II*</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>PH2161</td>
<td>Engineering Physics – II*</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>CY2161</td>
<td>Engineering Chemistry – II*</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>5.a</td>
<td>ME2151</td>
<td>Engineering Mechanics (For non-circuit branches)</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5.b</td>
<td>EE2151</td>
<td>Circuit Theory (For branches under Electrical Faculty)</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5.c</td>
<td>EC2151</td>
<td>Electric Circuits and Electron Devices (For branches under I &amp; C Faculty)</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6.a</td>
<td>GE2151</td>
<td>Basic Electrical &amp; Electronics Engineering (For non-circuit branches)</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6.b</td>
<td>GE2152</td>
<td>Basic Civil &amp; Mechanical Engineering (For circuit branches)</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

### PRACTICAL

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>GE2155</td>
<td>Computer Practice Laboratory-II*</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>GS2165</td>
<td>Physics &amp; Chemistry Laboratory - II*</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9.a</td>
<td>ME2155</td>
<td>Computer Aided Drafting and Modeling Laboratory (For non-circuit branches)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9.b</td>
<td>EE2155</td>
<td>Electrical Circuits Laboratory (For branches under Electrical Faculty)</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9.c</td>
<td>EC2155</td>
<td>Circuits and Devices Laboratory (For branches under I &amp; C Faculty)</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**TOTAL : 28 CREDITS**

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td></td>
<td>English Language Laboratory *</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>

* Common to all B.E. / B.Tech. Programmes

+ Offering English Language Laboratory as an additional subject (with no marks) during 2nd semester may be decided by the respective Colleges affiliated to Anna University Chennai.
A. CIRCUIT BRANCHES

I Faculty of Electrical Engineering
1. B.E. Electrical and Electronics Engineering
2. B.E. Electronics and Instrumentation Engineering
3. B.E. Instrumentation and Control Engineering

II Faculty of Information and Communication Engineering
1. B.E. Computer Science and Engineering
2. B.E. Electronics and Communication Engineering
3. B.E. Bio Medical Engineering
4. B.Tech. Information Technology

B. NON – CIRCUIT BRANCHES

I Faculty of Civil Engineering
1. B.E. Civil Engineering

II Faculty of Mechanical Engineering
1. B.E. Aeronautical Engineering
2. B.E. Automobile Engineering
3. B.E. Marine Engineering
4. B.E. Mechanical Engineering
5. B.E. Production Engineering

III Faculty of Technology
1. B.Tech. Chemical Engineering
2. B.Tech. Biotechnology
3. B.Tech. Polymer Technology
4. B.Tech. Textile Technology
5. B.Tech. Textile Technology (Fashion Technology)
7. B.Tech. Plastics Technology
## SEMESTER III

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA 2211</td>
<td>Transforms and Partial Differential Equation</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>CE 3204</td>
<td>Strength of Materials</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 2204</td>
<td>Fluid Mechanics and Machinery</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EC 3204</td>
<td>Digital Electronics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EE 3205</td>
<td>Electrical Machines and Drives</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3203</td>
<td>Kinematics of Machinery</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td><strong>PRACTICALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE 3218</td>
<td>Fluid Mechanics And Machinery Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>MT 3208</td>
<td>Electrical Machines And Drives Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>MT 3209</td>
<td>Computer Aided Machine Drawing</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>MT 3210</td>
<td>Technical Seminar I</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>18</td>
<td>3</td>
<td>12</td>
<td>29</td>
</tr>
</tbody>
</table>

## SEMESTER IV

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA 2264</td>
<td>Numerical Methods</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>ME 3212</td>
<td>Dynamics of Machinery</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EC 3213</td>
<td>Control Systems</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>ME 3214</td>
<td>Manufacturing Technology</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>ME 3221</td>
<td>Engineering Metrology</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EC 3216</td>
<td>Microprocessors And Applications</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC 3217</td>
<td>Microprocessor Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME 3218</td>
<td>Manufacturing Technology Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>MT 3219</td>
<td>Machine Dynamics Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>18</td>
<td>4</td>
<td>9</td>
<td>28</td>
</tr>
</tbody>
</table>

## SEMESTER V

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 3301</td>
<td>Design of Machine Elements</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC 3302</td>
<td>Power Electronics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC 3303</td>
<td>Sensors and Signal Processing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC 3304</td>
<td>Modeling and Simulation</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3310</td>
<td>CNC Technology</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3306</td>
<td>Thermodynamics Principles and Applications</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC 3307</td>
<td>Power Electronics Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EC 3308</td>
<td>Sensors and Signal Processing Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME 3309</td>
<td>CNC Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>GE3318</td>
<td>Communication Skills Laboratory</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>18</td>
<td>0</td>
<td>13</td>
<td>26</td>
</tr>
</tbody>
</table>
### SEMESTER VI

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>MG 3310</td>
<td>Principles of Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3311</td>
<td>Micro controller and PLC</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 2305</td>
<td>Applied Hydraulics and Pneumatics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MT 3313</td>
<td>Design of Mechatronics system</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC 3314</td>
<td>Object Oriented Programming</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective – I</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MT 3315</td>
<td>Micro controller and PLC Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EC 3316</td>
<td>Object Oriented Programming Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME 3317</td>
<td>Applied Hydraulics and Pneumatics Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>MT 3318</td>
<td>Technical Seminar II</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td>18</td>
<td>0</td>
<td>12</td>
<td>26</td>
</tr>
</tbody>
</table>

### SEMESTER VII

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT 3401</td>
<td>Medical Mechatronics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MF 3402</td>
<td>Computer Integrated Manufacturing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3403</td>
<td>Robotics and Machine Vision System</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3404</td>
<td>Automobile Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective – II</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective - III</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 3405</td>
<td>Computer Aided Design And Computer Aided Manufacturing Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>MT 3406</td>
<td>Robotics Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>MT 3407</td>
<td>Design and Fabrication Project</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td>18</td>
<td>0</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>SEMESTER VIII</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CODE NO.</strong></td>
<td><strong>COURSE TITLE</strong></td>
<td><strong>L</strong></td>
<td><strong>T</strong></td>
<td><strong>P</strong></td>
<td><strong>C</strong></td>
</tr>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MT 3408</td>
<td>Automotive Electronics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MT 3408</td>
<td>Elective - IV</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MT 3408</td>
<td>Elective – V</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MT 3409</td>
<td>Project Work</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>9</td>
<td>0</td>
<td>12</td>
<td>15</td>
</tr>
</tbody>
</table>

**LIST OF ELECTIVES FOR MECHATRONICS ENGINEERING**

**ELECTIVE – I**

<table>
<thead>
<tr>
<th><strong>CODE NO.</strong></th>
<th><strong>COURSE TITLE</strong></th>
<th><strong>L</strong></th>
<th><strong>T</strong></th>
<th><strong>P</strong></th>
<th><strong>C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MT 3002</td>
<td>Digital Image Processing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MT 3004</td>
<td>Diagnostic Techniques</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3006</td>
<td>Operations Research</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>GE 3008</td>
<td>Professional Ethics and Human values</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**ELECTIVE – II**

<table>
<thead>
<tr>
<th><strong>CODE NO.</strong></th>
<th><strong>COURSE TITLE</strong></th>
<th><strong>L</strong></th>
<th><strong>T</strong></th>
<th><strong>P</strong></th>
<th><strong>C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 3007</td>
<td>Digital Signal Processing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3017</td>
<td>Micro Electro Mechanical Systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3018</td>
<td>Computer Aided Design</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME2035</td>
<td>Entrepreneurship Development</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**ELECTIVE – III**

<table>
<thead>
<tr>
<th><strong>CODE NO.</strong></th>
<th><strong>COURSE TITLE</strong></th>
<th><strong>L</strong></th>
<th><strong>T</strong></th>
<th><strong>P</strong></th>
<th><strong>C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 3014</td>
<td>Computer Networks</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC 3015</td>
<td>Virtual Instrumentation</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC 3016</td>
<td>Industrial Electronics and Applications</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**ELECTIVE – IV**

<table>
<thead>
<tr>
<th><strong>CODE NO.</strong></th>
<th><strong>COURSE TITLE</strong></th>
<th><strong>L</strong></th>
<th><strong>T</strong></th>
<th><strong>P</strong></th>
<th><strong>C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MT 3001</td>
<td>Advanced Manufacturing Technology</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GE2022</td>
<td>Total Quality Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MG2021</td>
<td>Marketing Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3009</td>
<td>Project Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC 3010</td>
<td>Database Management System</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**ELECTIVE – V**

<table>
<thead>
<tr>
<th><strong>CODE NO.</strong></th>
<th><strong>COURSE TITLE</strong></th>
<th><strong>L</strong></th>
<th><strong>T</strong></th>
<th><strong>P</strong></th>
<th><strong>C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 3011</td>
<td>Rapid Prototyping</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3012</td>
<td>Engineering Economics and Cost Analysis</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 3013</td>
<td>Product Design and Development</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
AIM:
To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES:
- To help students develop listening skills for academic and professional purposes.
- To help students acquire the ability to speak effectively in English in real-life situations.
- To inculcate reading habit and to develop effective reading skills.
- To help students improve their active and passive vocabulary.
- To familiarize students with different rhetorical functions of scientific English.
- To enable students write letters and reports effectively in formal and business situations.

UNIT I
Technical Vocabulary - meanings in context, sequencing words, Articles- Prepositions, intensive reading & predicting content, Reading and interpretation, extended definitions, Process description

Suggested activities:
Exercises on word formation using the prefix ‘self’ - Gap filling with preposition.
1. Exercises - Using sequence words.
2. Reading comprehension exercise with questions based on inference – Reading headings
3. and predicting the content – Reading advertisements and interpretation.

UNIT II

Suggested activities:
Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) - Reading comprehension exercises with texts including graphic communication - Exercises in interpreting non-verbal communication.
1. Listening comprehension exercises to categorise data in tables.
2. Writing formal letters, quotations, clarification, complaint – Letter seeking permission for Industrial visits– Writing analytical paragraphs on different debatable issues.

UNIT III
Cause and effect expressions – Different grammatical forms of the same word - Speaking – stress and intonation, Group Discussions - Reading – Critical reading - Listening, - Writing – using connectives, report writing – types, structure, data collection, content, form, recommendations .
Suggested activities:
Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word. (Eg: object – verb / object – noun)
1. Speaking exercises involving the use of stress and intonation – Group discussions – analysis of problems and offering solutions.
2. Reading comprehension exercises with critical questions, Multiple choice question.

UNIT IV
Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application - content, format (CV / Bio-data) - Instructions, imperative forms - Checklists, Yes/No question form – E-mail communication.

Suggested Activities:
Rewriting exercises using numerical adjectives.
1. Reading comprehension exercises with analytical questions on content – Evaluation of content.
2. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.
3. Speaking - Role play – group discussions – Activities giving oral instructions.

UNIT V
Speaking - Discussion of Problems and solutions - Creative and critical thinking – Writing an essay, Writing a proposal.

Suggested Activities:
1. Case Studies on problems and solutions
2. Brainstorming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements.

TOTAL : 60 PERIODS

TEXT BOOK

REFERENCES
EXTENSIVE READING:

NOTE:
The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA2161  MATHEMATICS – II  L T P C  3 1 0 4

UNIT I  ORDINARY DIFFERENTIAL EQUATIONS  12
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT II  VECTOR CALCULUS  12

UNIT III  ANALYTIC FUNCTIONS  12
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z, and bilinear transformation.

UNIT IV  COMPLEX INTEGRATION  12

UNIT V  LAPLACE TRANSFORM  12
Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TOTAL : 60 PERIODS

TEXT BOOKS
REFERENCES

PH2161 ENGINEERING PHYSICS – II

UNIT I CONDUCTING MATERIALS

UNIT II SEMICONDUCTING MATERIALS

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS

UNIT IV DIELECTRIC MATERIALS

UNIT V MODERN ENGINEERING MATERIALS
Metallic glasses: preparation, properties and applications.
Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA

TOTAL: 45 PERIODS
TEXT BOOKS
2. Charles P. Poole and Frank J.Ownen, 'Introduction to Nanotechnology', Wiley India(2007) (for Unit V)

REFERENCES

CY2161 ENGINEERING CHEMISTRY – II

AIM
To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

OBJECTIVES
• The student should be conversant with the principles electrochemistry, electrochemical cells, emf and applications of emf measurements.
• Principles of corrosion control
• Chemistry of Fuels and combustion
• Industrial importance of Phase rule and alloys
• Analytical techniques and their importance.

UNIT I ELECTROCHEMISTRY
Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometer titrations (redox - Fe²⁺ vs dichromate and precipitation – Ag⁺ vs Cl⁻ titrations) and conduct metric titrations (acid-base – HCl vs, NaOH) titrations,

UNIT II CORROSION AND CORROSION CONTROL
UNIT III  FUELS AND COMBUSTION  

UNIT IV  PHASE RULE AND ALLOYS  

UNIT V  ANALYTICAL TECHNIQUES  

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES
OBJECTIVE
At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I  BASICS & STATICS OF PARTICLES  12

UNIT II  EQUILIBRIUM OF RIGID BODIES  12

UNIT III  PROPERTIES OF SURFACES AND SOLIDS  12

UNIT IV  DYNAMICS OF PARTICLES  12

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  12
Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL: 60 PERIODS
TEXT BOOK

REFERENCES

EE2151 CIRCUIT THEORY (Common to EEE, EIE and ICE Branches) 3 1 0 4

UNIT I BASIC CIRCUITS ANALYSIS 12

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS: 12
Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS 12

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS 12
Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input.

UNIT V ANALYSING THREE PHASE CIRCUITS 12
Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES


EC2151 ELECTRIC CIRCUITS AND ELECTRON DEVICES L T P C
(For ECE, CSE, IT and Biomedical Engg. Branches) 3 1 0 4

UNIT I CIRCUIT ANALYSIS TECHNIQUES

UNIT II TRANSIENT RESONANCE IN RLC CIRCUITS

UNIT III SEMICONDUCTOR DIODES

UNIT IV TRANSISTORS
Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V SPECIAL SEMICONDUCTOR DEVICES
(QUALITATIVE TREATMENT ONLY)

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

GE2151 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to branches under Civil, Mechanical and Technology faculty) 4 0 0 4

UNIT I ELECTRICAL CIRCUITS & MEASUREMENTS 12

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II ELECTRICAL MECHANICS 12

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 12


UNIT IV DIGITAL ELECTRONICS 12
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 12

Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL : 60 PERIODS
TEXT BOOKS

REFERENCES

GE2152 BASIC CIVIL & MECHANICAL ENGINEERING L T P C
(Common to branches under Electrical and I & C Faculty) 4 0 0 4

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 15


UNIT II BUILDING COMPONENTS AND STRUCTURES 15

Foundations: Types, Bearing capacity – Requirement of good foundations.


TOTAL : 30 PERIODS

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10

UNIT IV I C ENGINES 10
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.
UNIT V   REFRIGERATION AND AIR CONDITIONING SYSTEM  10
Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and
absorption system – Layout of typical domestic refrigerator – Window and Split type room Air
conditioner.

TOTAL: 30 PERIODS

REFERENCES
(1999).
5. Shantha Kumar S R J., “Basic Mechanical Engineering”, Hi-tech Publications,

GE2155  COMPUTER PRACTICE LABORATORY – II  L T P C

LIST OF EXPERIMENTS  0 1 2 2

1. UNIX COMMANDS  15
Study of Unix OS - Basic Shell Commands - Unix Editor

2. SHELL PROGRAMMING  15
Simple Shell program - Conditional Statements - Testing and Loops

3. C PROGRAMMING ON UNIX  15
Dynamic Storage Allocation-Pointers-Functions-File Handling

TOTAL : 45 PERIODS

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

HARDWARE
☐ 1 UNIX Clone Server
☐ 33 Nodes (thin client or PCs)
☐ Printer – 3 Nos.

SOFTWARE
☐ OS – UNIX Clone (33 user license or License free Linux)
☐ Compiler - C
LIST OF EXPERIMENTS

1. Determination of Young’s modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
5. Spectrometer dispersive power of a prism.
6. Determination of Young’s modulus of the material – uniform bending.

• A minimum of FIVE experiments shall be offered.
• Laboratory classes on alternate weeks for Physics and Chemistry.
• The lab examinations will be held only in the second semester.

LIST OF EXPERIMENTS

1. Conduct metric titration (Simple acid base)
2. Conduct metric titration (Mixture of weak and strong acids)
3. Conduct metric titration using BaCl₂ vs Na₂SO₄
4. Potentiometric Titration (Fe²⁺ / KMnO₄ or K₂Cr₂O₇)
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper sulphate)
7. Estimation of Ferric iron by spectrophotometry.

• A minimum of FIVE experiments shall be offered.
• Laboratory classes on alternate weeks for Physics and Chemistry.
• The lab examinations will be held only in the second semester.
ME2155 COMPUTER AIDED DRAFTING AND MODELING LABORATORY  L T P C  0 1 2 2

List of Exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using B spline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building ( Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

List of Equipments for a batch of 30 students:
1. Pentium IV computer or better hardware, with suitable graphics facility - 30 No.
2. Licensed software for Drafting and Modeling. – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 No.

EE2155 ELECTRICAL CIRCUIT LABORATORY  L T P C  0 0 3 2
(Common to EEE, EIE and ICE)

LIST OF EXPERIMENTS

1. Verification of ohm’s laws and kirchoff’s laws.
2. Verification of Thevemin’s and Norton’s Theorem
3. Verification of superposition Theorem
4. Verification of maximum power transfer theorem.
5. Verification of reciprocity theorem
6. Measurement of self inductance of a coil
7. Verification of mesh and nodal analysis.
8. Transient response of RL and RC circuits for DC input.
10. Frequency response of single tuned coupled circuits.

TOTAL: 45 PERIODS
1. Verification of KVL and KCL
2. Verification of Thevenin and Norton Theorems.
3. Verification of superposition Theorem.
4. Verification of Maximum power transfer and reciprocity theorems.
5. Frequency response of series and parallel resonance circuits.
6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of UJT and SCR
10. Characteristics of JFET and MOSFET

TOTAL : 45 PERIODS

ENGLISH LANGUAGE LABORATORY (Optional)

1. LISTENING:  5
   Listening & answering questions – gap filling – Listening and Note taking - Listening to telephone conversations

2. SPEAKING:  5
   Pronouncing words & sentences correctly – word stress – Conversation practice.

CLASSROOM SESSION

2. Goal setting – interviews – stress time management – situational reasons

Evaluation

(1) Lab Session – 40 marks
   Listening – 10 marks
   Speaking – 10 marks
   Reading – 10 marks
   Writing – 10 marks

(2) Classroom Session – 60 marks
   Role play activities giving real life context – 30 marks
Presentation – 30 marks

Note on Evaluation
1. Examples for role play situations:
   a. Marketing engineer convincing a customer to buy his product.
   b. Telephone conversation – Fixing an official appointment / Enquiry on availability of flight or train tickets / placing an order. etc.
2. Presentations could be just a Minute (JAM activity) or an Extempore on simple topics or visuals could be provided and students could be asked to talk about it.

REFERENCES

LAB REQUIREMENTS
1. Teacher – Console and systems for students
2. English Language Lab Software
3. Tape Recorders.

MA2211 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATION (Common to all branches) 3 1 0 4

OBJECTIVES
The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I FOURIER SERIES 9 + 3

UNIT II FOURIER TRANSFORMS 9 + 3

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 9 + 3
Formation of partial differential equations – Lagrange’s linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.
UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9 + 3
Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V Z -TRANSFORMS AND DIFFERENCE EQUATIONS 9 + 3

LECTURES: 45 TUTORIALS : 15 TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

CE3204 STRENGTH OF MATERIALS L T P C 3 0 0 3

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 8

UNIT II TRANVERSE LOADING ON BEAMS AND STRESSES IN BEAMS 13

UNIT III TORSION 6
Stresses and deformation in circular and hollows shafts – Stepped shafts – Shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs.
UNIT IV DEFORMATION OF BEAMS  
Double Integration method – Macaulay’s method – Area moment theorems for computation of slopes and deflections in beams – Conjugate beam and energy method – Maxwell’s reciprocal theorems.

UNIT V THIN CYLINDERS, SPHERES AND THICK CYLINDERS  
Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses – deformation in thin cylinders –spherical shells subjected to internal pressure – deformations in spherical shells - Lame’s theory – application of theories of failure

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

ME2204 FLUID MECHANICS AND MACHINERY  
(Common to Aeronautical, Mechanical, Automobile & Production)  
OBJECTIVES
• The student is introduced to the mechanics of fluids through a thorough understanding of the properties of the fluids. The dynamics of fluids is introduced through the control volume approach which gives an integrated understanding of the transport of mass, momentum and energy.
• The applications of the conservation laws to flow though pipes and hydraulics machines are studied

UNIT I INTRODUCTION  
Units & Dimensions. Properties of fluids – Specific gravity, specific weight, viscosity, compressibility, vapour pressure and gas laws – capillarity and surface tension. Flow characteristics: concepts of system and control volume. Application of control volume to continuity equation, energy equation, momentum equation and moment of momentum equation.

UNIT II FLOW THROUG CIRCULAR CONDUITS  
UNIT III  DIMENSIONAL ANALYSIS  9
Dimension and units: Buckingham’s Π theorem. Discussion on dimensionless parameters.
Models and similitude. Applications of dimensionless parameters.

UNIT IV  ROTO DYNAMIC MACHINES  16
Homologous units. Specific speed. Elementary cascade theory. Theory of turbo machines.
Euler’s equation. Hydraulic efficiency. Velocity components at the entry and exit of the rotor.
Velocity triangle for single stage radial flow and axial flow machines. Centrifugal pumps,
turbines, performance curves for pumps and turbines.

UNIT V  POSITIVE DISPLACEMENT MACHINES  11
Reciprocating pumps, Indicator diagrams, Work saved by air vessels. Rotary pumps.
Classification. Working and performance curves.

TEXT BOOKS:

REFERENCES:
1. Ramamirtham. S, Fluid Mechanics, Hydraulics and Fluid Machines, Dhanpat Rai & Sons,
   Delhi, 1988.
   Delhi, 1995.

EC 3204  DIGITAL ELECTRONICS  L T P C
3 0 0 3

OBJECTIVE
To design Microprocessor / Microcontroller / PLC based Mechatronics system it is essential to
have the fundamental knowledge of digital circuits and digital systems. Hence the subject Digital
Electronics is offered in which they study the design of Arithmetic circuits, shift registers and
counters etc.

UNIT I  NUMBER SYSTEM AND BASIC LOGIC  9
Number systems – Binary, Octal, Hexadecimal, BCD, Excess 3, Complements Conversions and
Arithmetic. Boolean theorems, Boolean algebra – AND, OR, NOT, NAND & NOR operation,
Sum of Product and Product of Sum forms. Minimization – Kamaugh’s map, Tabular
Minimization Procedures.

UNIT II  COMBINATIONAL CIRCUITS  9
Design of Logic gates. Design of Adder, Subtractor, Comparators, Code Converters, Encoders,
Decoders, Multiplexers and Demultiplexers. Function realization using Gates & Combinational
circuits.
UNIT III  SYNCHRONOUS SEQUENTIAL CIRCUITS  9

UNIT IV  ASYNCHRONOUS SEQUENTIAL CIRCUIT  9
Stable Unstable states, Output Specifications, Cycles and Races, Race free assignments, Reduction of State and Flow tables, Hazards.

UNIT V  MEMORY, PROGRAMMABLE LOGIC DEVICES AND LOGIC FAMILIES  9
Memories and PLD’s: ROM, PROM, EPROM, PLA, PLD, CPLD and FPGA. Digital logic families: TTL, ECL, CMOS.

TOTAL= 45 PERIODS

TEXT BOOK

REFERENCES

EE3205  ELECTRICAL MACHINES AND DRIVES  L T P C
3 0 0 3

OBJECTIVES
• To study the basic concept of D.C. and A.C. circuits and to learn the concept of transformers and do simple problems.
• To study the performance characteristics of D.C. motors, three phase induction motor and single phase induction motor.
• To study the methods of speed control of D.C. and A.C. motors and methods of starting of D.C. and A.C. motors.
• To study the basic of selection of drive for a given application.
• To study the concept of controlling the speed of D.C. and A.C. motors using solid state devices.
UNIT I CIRCUITS AND TRANSFORMERS 6

UNIT II ELECTRICAL MOTORS 12
Constructional details, principle of operation and performance characteristics of D.C. motors, single phase induction motor, three phase induction motor, synchronous motors, universal motors, stepper motors and reluctance motor.

UNIT III SPEED CONTROL AND STARTING 9

UNIT IV ELECTRICAL DRIVES 9
Type of Electrical Drives – Selection & factors influencing the selection – heating and cooling curves – loading condition and classes of duty – determination of power rating – simple problems.

UNIT V SOLID STATE DRIVES (QUALITATIVE TREATMENT ONLY) 9

TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES
OBJECTIVES

- To understand the layout of linkages in the assembly of a system/machine.
- To understand the principles involved in assessing the displacement, velocity and acceleration at any point in a link of a mechanism.
- To understand the motion resulting from a specified set of linkages in a mechanism.

UNIT I  BASIC OF MECHANISMS  7

UNIT II  KINEMATICS  12
Displacement, velocity and acceleration and analysis in simple mechanisms – Graphical Method velocity and acceleration polygons – Kinematic analysis by Complex Algebra Methods – Vector Approach, Computer applications in the kinematic analysis of simple mechanisms – Coincident points – Coriolis Acceleration.

UNIT III  KINEMATICS OF CAM  8

UNIT IV  GEARS  10

UNIT V  FRICTION  8
Surface contacts – Sliding and Rolling friction – Friction drives – Friction in screw threads – Friction clutches – Belt and rope drives, Friction aspects in Brakes – Friction in vehicle propulsion and braking

TUTORIALS 15: TOTAL: 60 PERIODS

TEXT BOOKS


REFERENCES


CE3218 FLUIDS MECHANICS AND MACHINERY LABORATORY

AIM:
To perform experiments on various types of pumps and turbines to understand their characteristics.

OBJECTIVES:
- To understand the concepts flow through different cross sections.
- To understand and draw characteristics of various pumps.
- To understand and draw performance characteristics of different turbines.

UNIT I FLOW MEASUREMENT

UNIT II  PUMPS
Determination of performance characteristics of pumps – centrifugal pumps, submersible pumps, turbine pumps and positive displacement pumps – reciprocating and gear pumps.

UNIT III TURBINES
Determination of performance characteristics of turbines – reaction turbines and impulse turbines.

TOTAL : 45 PERIODS

REFERENCE
1. CWR, Hydraulics Laboratory Manual, 2004

MT3208 ELECTRICAL MACHINES AND DRIVES LABORATORY

OBJECTIVE
To expose the students the operation of electric drives and give them hands on experience.

LIST OF EXPERIMENTS
1. Load test on D.C. shunt motor.
2. Speed control of D.C. shunt motor.
3. Swinburne’s test.
4. Load test on three phase induction motor.
5. No load and blocked rotor tests on three – phase induction motor.
7. No load and blocked rotor tests on single phase induction motor.
8. Load test on Synchronous motors.

TOTAL: 45 PERIODS

**LIST OF EQUIPMENT**
(for a batch of 30 students)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Equipments</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shunt motor 5HP</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Single phase Induction Motor 2HP</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Three phase induction Motor 5HP</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Single phase transformer 2KVA</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Three phase quto transformer</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Single phase auto transformer</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>3 point starter</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>DPST, TPST</td>
<td>Each 2</td>
</tr>
<tr>
<td>9</td>
<td>DC source 300v, 100A</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Ammeter(0-5A),(0-10A)MC</td>
<td>Each 2</td>
</tr>
<tr>
<td>11</td>
<td>Ammeter(0-5A),(0-10A)MI</td>
<td>Each 2</td>
</tr>
<tr>
<td>12</td>
<td>Voltmeter(0-300V) MC</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>Voltmeter(0-150V),(0-300V),(0-600V)MI</td>
<td>Each 2</td>
</tr>
<tr>
<td>14</td>
<td>Wattmeter 150/300V, 5/10A UPF</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>Wattmeter 300/600V,5/10A UPF</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>Wattmeter 150/300V,5/10A LPF</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>Wattmeter 300/600V,5/10A LPF</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>Stepper motor 5Kg</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Synchronous motor 5KW</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Rheostat 360 ohm/1.2A</td>
<td>3</td>
</tr>
<tr>
<td>21</td>
<td>Rheostat 50 ohm/5A</td>
<td>3</td>
</tr>
<tr>
<td>22</td>
<td>Tachometer</td>
<td>5</td>
</tr>
</tbody>
</table>

**MT 3209**

**COMPUTER AIDED MACHINE DRAWING**

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**UNIT I**

**UNIT II**
9

UNIT III (DRAFTING WORK USING MINI DRAFTER)
Preparation of part and assembly drawings of Plummer block, screw jack, machine vice, lathe tailstock, tool head of the shaper, stuffing box, piston & connecting rod universal join)

UNIT IV
Introduction to the use of any drafting software – creation of simple geometric bodies using primitives (line, arc, circle etc.,) and editing for the drawing, Dimensioning and text writing, concept of layer creation and setting, line types.

UNIT V
Preparation of 2-D drawings using CAD software for components and assemblies of Plummer block, screw jack, machine vice, lathe tailstock, tool head of the shaper. Introduction to 3-D modeling solid and frame modeling.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

LIST OF EQUIPMENT AND SOFTWARE REQUIRED
(for a batch of 30 students)

1. Computer System
   VGA Color Monitor, Pentium IV Processor, 20 GB HDD, 256 MB RAM
2. Laser Printer
3. Plotter(A2 size)
4. Software: AutoCAD or Mechanical Desktop or Pro/E or CATIA or IDEAS 30 Licenses or solidworks
5. Drawing Boards and Tables in Drawing Hall Nos.

MT 3210       TECHNICAL SEMINAR I
L T P C
0 0 3 2

OBJECTIVE
During the seminar session each student is exposed to prepare and pressure a topic on engineering/technology, for a duration of about 8 to 10 minutes. In a session of three periods per weeks, 15 students are expected to present of the seminar. A faculty guide is to be allotted and he/she will guide and monitor the progress of the student and maintain attendance also.
Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

MA2264  NUMERICAL METHODS  

AIM  
With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically.

OBJECTIVES  
- At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:
- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
- Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.

UNIT I    SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS  

UNIT II    INTERPOLATION AND APPROXIMATION  
Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton’s forward and backward difference formulas.

UNIT III    NUMERICAL DIFFERENTIATION AND INTEGRATION  
UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS  9

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS  9
Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TEXT BOOKS

REFERENCES

ME3212 DYNAMICS OF MACHINERY  L T P C 3 1 0 4

OBJECTIVES
- To understand the force-motion relationship in components subjected to External Forces.
- To understand the force-motion analysis of standard mechanisms.
- To understand the undesirable effects of unbalances resulting from prescribed motions in mechanism.
- To understand the effect of dynamics of Undesirable Vibrations.
To understand the principles in mechanisms used for governing of machines.

UNIT I FORCE ANALYSIS 10

UNIT II BALANCING 9

UNIT III FREE VIBRATION 10

UNIT IV FORCE VIBRATION 6

UNIT V MECHANISM FOR CONTROL 10

TOTAL: 60 PERIODS

TEXT BOOK

REFERENCES
OBJECTIVE
To study the response and stability of mechanical and electrical systems so as to design for stable operation.

UNIT I BASIC CONCEPTS AND SYSTEM REPRESENTATION 12
Basic elements in control systems – Open and closed loop systems with example – Mathematical model of Translational, Rotational & Electrical systems – Transfer function – Block diagram reduction techniques – Signal flow graph.

UNIT II TIME RESPONSE ANALYSIS 12

UNIT III FREQUENCY RESPONSE ANALYSIS AND DESIGN 12
Introduction – Frequency domain specifications – Bode plots and polar plots – Constant M and N circles and Nichols chart – Correlation between frequency domain and time domain specifications.

UNIT IV STABILITY OF CONTROL SYSTEMS 12

UNIT V COMPENSATION DESIGN 12
Realization of basic compensation – Lag, Lead and Lag – lead networks – Compensator design using Bode plots.
MATLAB applications: Partial Fraction expansion, Transformation of a Mathematical models, Transient response analysis, Root locus, Bode diagrams, Nyquist plots, analysis of compensator design problems.

TOTAL= 60 PERIODS

REFERENCES
OBJECTIVE
This course aims to impart the knowledge about various production processes. It deals with Metal Casting, Metal Forming, Metal Machining and Metal joining Processes. After this course, a Mechatronics student will have a good exposure about the manufacturing processes and various operations and machinery. This also gives the recent trends in these processes also.

UNIT I  FOUNDRY TECHNOLOGY  9
Pattern and Core making – Moulding sand – Melting furnaces Cupola and Induction furnaces – Special casting processes – Shell, Investment, Die casting – Defects in casting.

UNIT II  FORMING – PROCESSES  9
Hot and Cold Working

UNIT III  MATERIAL – REMOVAL PROCESSES  9
Lathes and Lathe Operations, Drilling and Drilling Machines, Reaming and Reamers, Tapping and Tapes- Tool nomenclature, cutting speed, feed, machining Time calculations.

UNIT IV  SPECIAL MACHINES  9
Milling Machines and Operations, Planning and Sharping, Broaching, Gear Hobbing and Sharping.

UNIT V  PRINCIPLES & APPLICATIONS OF JOINING PROCESSES  9

TOTAL= 45 PERIODS

TEXT BOOK

REFERENCES
OBJECTIVE
For understanding the principle of Dimensional metrology and applying principles, techniques and devices used for quality control in modern Industrial environment.

UNIT I BASIC CONCEPTS AND COMPARATORS

UNIT II ANGULAR MEASUREMENT AND SURFACE FINISH MEASUREMENT

UNIT III SCREW THREAD AND GEAR METROLOGY

UNIT IV LASER METROLOGY

UNIT V ADVANCES IN METROLOGY
Coordinate measuring machine (CMM): Constructional features – types, applications, Applications of Image Processing in measurement – computer aided inspection.

TOTAL= 60 PERIODS

REFERENCES
OBJECTIVE
Most of the Mechatronics systems control is based on Microprocessor or Microcontroller. So it is necessary to include this subject in the syllabus so that students will be exposed to the knowledge of Microprocessor based systems and design of these systems.

UNIT I  INTRODUCTION  10

UNIT II  INTERFACING AND I/O DEVICES  9
Need for Interfacing - /Memory Interfacing: address space partitioning – address map – Address decoding – Designing decoders circuit for the given address map – Bus connection and Z – line Control – Access Time Computations. 
I/O Interfacing: Data transfer schemes – programmed Synchronous and asynchronous – Interrupt driven Transfer – Multiple devices and multiple interrupt levels – enabling disabling and masking of interrupts.
DMA transfer: Cycle stealing – Burst mode – Multiple DMA devices – DMA transfer in 8085 system – serial data transfer.

UNIT III  INTERFACING DEVICES  9
Programmable peripheral device – programmable interval timer (8253) – Programmable communication interface (USART) – Programmable interrupt controller – Programmable DMA Controller (8257)- Programmable Keyboard/display controllers.

UNIT IV  DESIGN USING PERIPHERAL DEVICES  9
Interfacing A/D and D/A converters – Matrix Keyboard design using 8255 using 8085 programs. 
Designing real time clock, detecting power failure, detecting presence of objects using 8253 - Design of Keyboard and display interfacing using 8279 – Design of digital transmission with modems and telephone lines using 8251 A.

UNIT V  MICROPROCESSOR APPLICATIONS  8
Temperature monitoring system – Automotive applications – Closed loop process control – Stepper motor control.

TOTAL= 45 PERIODS

TEXT BOOK

REFERENCES

EC3217 MICROPROCESSOR LABORATORY

LIST OF EXPERIMENTS

I. PROGRAMMING

1. Addition of two 8 – bit numbers, sum of 8 – bits and 16 bits.
2. Decimal addition of two 8 – bit numbers Sum: 16 bits.
3. 8 - bit subtraction.
4. 8 – bit decimal subtraction.
5. Additional of two 16 – bit numbers, Sum: 16 bits or more.
7. To arrange a series of numbers in Ascending order.
8. To arrange a series of numbers in Descending order.
9. 8 – bit Multiplication.
10. 8 – bit Division.
11. Decimal to hexadecimal conversion and hexadecimal number to decimal number conversion.

II. INTERFACING

1. Analog to digital conversion.
2. Digital to analog conversion.
4. Temperature controller.

TOTAL: 45 PERIODS

LIST OF EQUIPMENTS

(for a batch of 30 students)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Equipments</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8085 Microprocessor trainer kits</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>ADC interface card</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>DAC interface card</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Stepper motor interfacing card with stepper motor</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Temperature controller with sensors like</td>
<td>3</td>
</tr>
</tbody>
</table>
OBJECTIVE
Demonstration and study of the following machines. The Main emphasis will be on a complete understanding of the machine capabilities and processes.

LIST OF EXPERIMENTS

UNIT I \textbf{LATHE PRACTICE}
\begin{itemize}
  \item a. Plain Turning
  \item b. Taper Turning
  \item c. Thread Cutting
\end{itemize}
Estimation of machining time for the above turning processes.

UNIT II \textbf{DRILLING PRACTICE}
\begin{itemize}
  \item a. Drilling
  \item b. Tapping
  \item c. Reaming.
\end{itemize}

UNIT III \textbf{MILLING}
\begin{itemize}
  \item a. Surface Milling.
  \item b. Gear Cutting.
  \item c. Contour Milling.
\end{itemize}

UNIT IV \textbf{PLANNING AND SHAPING}
\begin{itemize}
  \item a. Cutting Key Ways.
  \item b. Dove tail machining.
\end{itemize}

\textbf{TOTAL: 45 PERIODS}

\textbf{LIST OF EQUIPMENT}
(for a batch of 30 students)
\begin{itemize}
  \item 1. Lathe \hspace{2cm} -15 Nos.
  \item 2. Drilling Machine \hspace{2cm} -1 Nos.
  \item 3. Milling Machine \hspace{2cm} -2 Nos.
  \item 4. Planning Machine \hspace{2cm} -1 Nos.
\end{itemize}

MT3219  MACHINE DYNAMICS LABORATORY  

**LIST OF EXPERIMENTS**

1. Governor – Determination of sensitivity, effort, etc. for watt, porter, proell, Hartnell governors.
2. Cam – Study of jump phenomenon and drawing profile of the cam.
5. Balancing of reciprocating masses.
7. Determination of Moment of inertia by oscillation method for connecting rod and flywheel.

**TOTAL: 45 PERIODS**

**LIST OF EQUIPMENT**

(for a batch of 30 students)

1. Cam analyzer - 1 Nos.
2. Motorised gyroscope - 1 Nos.
3. Governor apparatus – watt, porter, proell and hartnell governor. - 1 Nos.
4. Whirling of shaft apparatus. - 1 NoS.
5. Dynamic balancing machine. - 1 Nos.
7. Vibration test facilities apparatus. - 1 Nos.

ME3301  DESIGN OF MACHINE ELEMENTS  

(Note: Approved Design Data Book is permitted in the examination)  

3 0 0 3
UNIT I  DESIGN FUNDAMENTALS  
Design Process - Computer aided design - Optimum design - Mechanical properties of materials  
- Types of loads - Stresses - Static, varying, thermal, impact and residual - Factors of safety -  
Theories of failure – Stress concentration factors.

UNIT II  DESIGN OF SHAFTS, KEYS AND COUPLINGS  
Design of Solid and Hollow shafts – Based on strength, rigidity and deflection- Torsional rigidity –  
Lateral rigidity- Material constants - Design of Keys – Types – Keyways – Design of rigid and  
flexible couplings

UNIT III  GEARS  
Principles of gear tooth action - Gear correction - Gear tooth failure modes - Stresses and loads  
– Component design of spur, helical, bevel and worm gears. Design of speed reducers

UNIT IV  BRAKES AND CLUTCHES  
Dynamic and thermal aspects of braking – Design of brakes - Design of clutches- Single plate –  
Multi plate – Conical clutch

UNIT V  BEARINGS AND SPRINGS  
Design of Bearings – Sliding contact – Rolling contact – Design of Journal Bearings –  
Calculation of Bearing dimensions – Design of helical and leaf springs.

TOTAL = 45 PERIODS

REFERENCES
Hill, New Delhi, 2005.
UNIT I  POWER SEMI CONDUCTOR DEVICES  9
Principle of operation – Characteristics of power diodes, SCR, TRIAC, GTO, Power BJT, Power MOSFET and IGBT – Thyristor protection circuits.

UNIT II  PHASE CONTROLLED CONVERTERS  9
Uncontrolled and controlled converters – Single phase semi and full converters, 3 phase half converter and 3 phase full converter – effect of source inductance – Thyristor triggering circuits.

UNIT III  DC TO DC CHOPPERS  9

UNIT IV  INVERTERS  9

UNIT V  AC VOLTAGE CONTROLLERS AND CYCLOCONVERTERS  9
Single phase AC voltage controller – on-off control and phase control – multistage sequence control – step up and step down cycloconverters – three phase to single phase and three phase cycloconverters.

TOTAL = 45 PERIODS

REFERENCES
UNIT I SCIENCE OF MEASUREMENT
Units and Standards – Calibration techniques – Errors in Measurements – Generalized Measurement System – Static and dynamic characteristics of transducers – Generalized Performance of Zero Order and First Order Systems - Response of transducers to different time varying inputs – Classification of transducers

UNIT II MECHANICAL MEASUREMENTS

UNIT III ELECTRICAL MEASUREMENTS

UNIT IV SMART SENSORS
Radiation Sensors - Smart Sensors - Film sensor, MEMS & Nano Sensors – applications - Automobile, Aerospace, Home appliances, Manufacturing, Medical diagnostics, Environmental monitoring.

UNIT V SIGNAL CONDITIONING AND DATA ACQUISITION
Amplification – Filtering – Sample and Hold circuits –Data Acquisition: Single channel and multi channel data acquisition – Data logging.

TOTAL = 45 PERIODS

REFERENCES
OBJECTIVE
To provide an exposure on how to simulate a system or a process or an activity for detailed analysis, optimization and decision making which is essential to reduce the product design and development cost and time.

UNIT I
System and System Environment: Component of a System – Continuous and discrete systems – Types of model; Steps in Simulation study; Simulation of an event occurrence using random number table – Single server queue – two server queues – inventory system.

UNIT II

UNIT III
Random Variate Generation: Inverse transform technique for Exponential, Uniform, triangular, weibull, empirical, uniform and discrete distribution, Acceptance rejection method for Poisson and gamma distribution; Direct Transformation for normal distribution.

UNIT IV
Analysis of simulated Data – Data collection, identifying the distribution, Parameter estimation, goodness of fit tests, verification and validation of simulation models.

UNIT V
Concepts of System Identification – Identification using normal operating records (Integration method) – Identifiability conditions – System order determination

TOTAL : 45 PERIODS

TEXT BOOK

REFERENCES

WEB SITES REFERENCES
1. www.arenasimulation.com
2. www.gpss.co.uk
3. www.caciasl.com
4. Other useful sites can be found in the text book recommended for this course.
OBJECTIVE
Now a day's industries are having lot of changes because of technological developments and the same creates better environment to manufacture components. CNC machining is one of the widely accepted machining methods, which provides lessen manufacturing lead-time and accuracy to the components. Therefore studying the fundamentals, construction details and other controls are very much essential for the Mechatronics engineering students.

UNIT I  FUNDAMENTALS OF CNC MACHINES  9

UNIT II  CONSTRUCTIONAL FEATURES OF CNC MACHINES AND RETROFITTING  10

UNIT III  CONTROL SYSTEMS, FEED BACK DEVICES AND TOOLING  10

UNIT IV  CNC PART PROGRAMMING  9

UNIT V  ECONOMICS AND MAINTENANCE  7
Factors influencing selection of CNC Machines – Cost of operation of CNC Machines – Practical aspects of introducing CNC machines in industries – Maintenance features of CNC Machines – Preventive Maintenance, Other maintenance requirements.

TOTAL : 45 PERIODS

TEXT BOOK

REFERENCES:

ME3306 THERMODYNAMICS PRINCIPLES AND APPLICATIONS
(Approved Heat and Mass Transfer Data Book is Allowed) 3 0 0 3

UNIT I FIRST LAW OF THERMODYNAMICS 8
Thermodynamics – microscopic and macroscopic point of view – systems, properties, process, path, cycle. Units – pressure, temperature – Zeroth law. First law – application to closed and open systems, internal energy, specific heat capacities $C_V$ and $C_P$ – enthalpy

UNIT II SECOND LAW OF THERMODYNAMICS 8

UNIT III INTERNAL COMBUSTION ENGINES 11
Classification of IC engine - IC engine components and functions. Valve timing diagram and port timing diagram - Comparison of two stroke and four stroke engines, Comparison of petrol & diesel engine, Fuel supply systems, total fuel consumption, specific fuel consumption, mechanical efficiency, BHP, IHP, FP - Ignition Systems, Lubrication system, Cooling system, MPFI, DTSI, CRDI.

UNIT IV REFRIGERATION AND AIR-CONDITIONING 8
Principles of refrigeration, refrigerator& heat pump cycle, refrigerants, refrigerant properties, refrigerant selection, vapour compression refrigeration cycle, vapour absorption cycle, dry bulb temperature, wet bulb temperature, relative humidity, comfort air-conditioning, Psychrometric chart, humidification, de-humidification, air coolers, cooling towers.

UNIT V HEAT TRANSFER (Qualitative Treatment Only) 10

TOTAL: 45 PERIODS

REFERENCES
3. Dr. C.P. Kothandaraman, S.Domkundwar & A.V.Domkundwar, “A course in Thermal

EC 3307                  POWER ELECTRONICS LABORATORY                        L  T  P  C
                          0 0 3 2

LIST OF EXPERIMENTS

1. Study of SCR, MOSFET & IGBT characteristics
2. UJT, R, RC firing circuits for SCR
3. Voltage & current commutated chopper
4. SCR phase control circuit
5. TRIAC phase control circuit
6. Study of half controlled & fully controller converters
7. Study of three phase AC regulator
8. Speed control of DC shunt motor using three phase fully controlled converter.
9. SCR single-phase cyclo converter
10. SCR series and parallel inverters
11. IGBT Chopper
12. IGBT based PWM inverter (single phase)

TOTAL = 45 PERIODS

LIST OF EQUIPMENT
( for a batch of 30 students )

<table>
<thead>
<tr>
<th>S.No</th>
<th>Equipments</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Study of SCR, MOSFET &amp; IGBT characteristics module</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>UJT, R, RC firing circuits for SCR module</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Voltage &amp; current commutated chopper module</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>SCR phase control circuit module</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>TRIAC phase control circuit module</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Study of half controlled &amp; fully controller converters module</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Study of three phase AC regulator module</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Speed control of DC shunt motor using three phase fully controlled converter module</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>SCR single phase cyclo converter module</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>SCR series and parallel inverters module</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>IGBT chopper module</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>IGBT based PWM inverter (single phase) module</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Ammeter (0-5A) MC, (0-2A) MC, (0-2A) MI, (0-5V) MI</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Voltmeter (0-300V) MC, (0-600V) MC,</td>
<td></td>
</tr>
</tbody>
</table>
EC3308    SENSORS AND SIGNAL PROCESSING LABORATORY       L T P C
                      0 0 3 2

LIST OF EXPERIMENTS

1. Measurement of temperature using thermocouple, thermistor and RTD
2. Measurement of displacement using POT, LVDT & Capacitive transducer
3. Torque measurement using torque measuring devices
4. Strain Measurement using strain gauge
5. Servomotor position control using photo electric pickup
6. Wave Shaping circuit
7. Analog to Digital Converters
8. Digital Comparator
9. Voltage to frequency converter
10. Frequency to Voltage Converter
11. Position and velocity measurement using encoders
12. Study on the application of data acquisition system for industrial purposes

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.NO</th>
<th>EQUIPMENT</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cathode Ray Oscilloscope</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Function Generator</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Regulated power supply</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Displacement Measurement Trainer using LVDT</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Capacitive pickup trainer module</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Position and Velocity measurement using encoder kit</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Servomotor Position control kit</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Speed measurement and closed loop control of DC Motor using photo electric pickup kit</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>RTD module</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Thermistor module</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Thermocouple module</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Absolute encoder</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Potentiometer trainer pickup</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Strain gauge module</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Loadcell module</td>
<td>1</td>
</tr>
</tbody>
</table>
OBJECTIVE
To train the students in manual and computer assisted part programming, tool path generation and control, operation and control of CNC machines tools.

LIST OF EXPERIMENTS
1. Manual part programming using G and M codes for Turning, step turning, Taper turning, thread cutting and radius turning on cylindrical components.
2. Programming and Simulation of machining using the following features.
   (i) Linear and Circular interpolation
   (ii) Pocket milling, slotting, peck drilling and other fixed canned cycles.
3. Given a component drawing to write the manual part programming and execute on CNC Lathe and Milling Machine.

LIST OF FACILITIES REQUIRED
1. CNC Lathe with Fanuc control
2. CNC Milling Machine with Fanuc control
3. Master CAM software
4. Computer nodes

TOTAL = 45 PERIODS

GE3318                  COMMUNICATION SKILLS LABORATORY                 L T P C
0 0 4 2

Globalisation has brought in numerous opportunities for the teeming millions, with more focus on the students’ overall capability apart from academic competence. Many students, particularly those from non-English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre-employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the industry environment, thus rendering them as prospective assets to industries. The course will equip the students with the necessary communication skills that would go a long way in helping them in their profession.

OBJECTIVES:
- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their job.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

I. PC based session   (Weightage 40%)   24 periods
A. ENGLISH LANGUAGE LAB  
(18 Periods)

1. LISTENING COMPREHENSION:  
   (6)
   Listening and typing – Listening and sequencing of sentences – Filling in the blanks -Listening and answering questions.

2. READING COMPREHENSION:  
   (6)
   Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

3. SPEAKING:  
   (6)

   Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

B. DISCUSSION OF AUDIO-VISUAL MATERIALS  
(6 PERIODS)

   (Samples are available to learn and practice)

1. RESUME / REPORT PREPARATION / LETTER WRITING  
   (1)
   Structuring the resume / report - Letter writing / Email Communication - Samples.

2. PRESENTATION SKILLS:  
   (1)
   Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples

3. SOFT SKILLS:  
   (2)
   Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management & Poise - Video Samples

4. GROUP DISCUSSION:  
   (1)
   Why is GD part of selection process ? - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work - Body Language - Mock GD -Video samples

5. INTERVIEW SKILLS:  
   (1)
   Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews-Video samples.

<table>
<thead>
<tr>
<th>II. Practice Session</th>
<th>(Weightage – 60%)</th>
<th>24 periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Resume / Report Preparation / Letter writing: Students prepare their own resume and report.</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>2. Presentation Skills: Students make presentations on given topics.</td>
<td>(8)</td>
<td></td>
</tr>
<tr>
<td>3. Group Discussion: Students participate in group discussions.</td>
<td>(6)</td>
<td></td>
</tr>
</tbody>
</table>
4. **Interview Skills**: Students participate in Mock Interviews

**TEXT BOOKS**

**REFERENCES**

**LAB REQUIREMENT**
1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

**Requirement for a batch of 60 students**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Server</strong></td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>o PIV system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o 1 GB RAM / 40 GB HDD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o OS: Win 2000 server</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Audio card with headphones (with mike)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o JRE 1.3</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td><strong>Client Systems</strong></td>
<td>60 No.</td>
</tr>
<tr>
<td></td>
<td>o PIII or above</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o 256 or 512 MB RAM / 40 GB HDD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o OS: Win 2000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Audio card with headphones (with mike)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o JRE 1.3</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td><strong>Handicam Video Camera (with video lights and mic input)</strong></td>
<td>1 No.</td>
</tr>
</tbody>
</table>
4. Television - 29”  1 No.
5. Collar mike  1 No.
6. Cordless mikes  1 No.
7. Audio Mixer  1 No.
8. DVD Recorder / Player  1 No.

MG3310  PRINCIPLES OF MANAGEMENT  L T P C
UNIT I  BASICS OF GLOBAL MANAGEMENT  9

UNIT II  PLANNING  9

UNIT III  ORGANISING  9

UNIT IV  LEADING  9

UNIT V  CONTROLLING  9

REFERENCES
ME3311  
MICRO CONTROLLER AND PLC  

UNIT I  

UNIT II  

UNIT III  

UNIT IV  

UNIT V  
Timer instructions ON DELAY, OFF DELAY and RETENTIVE Timers, UP COUNTER, DOWN COUNTER and UP DOWN COUNTERS, control instructions – Data manipulating instructions, math instructions; Applications of PLC – Simple materials handling applications, Automatic control of warehouse door, Automatic lubrication of supplier Conveyor belt, motor control, Automatic car washing machine, Bottle label detection and process control application.

TOTAL : 45 PERIODS

TEXT BOOKS  

REFERENCES
ME2305  APPLIED HYDRAULICS AND PNEUMATICS  L T P C  3 0 0 3

OBJECTIVES:
• To know the advantages and applications of Fluid Power Engineering and Power Transmission System.
• To learn the Applications of Fluid Power System in automation of Machine Tools and others Equipments.

UNIT I  FLUID POWER SYSTEMS AND FUNDAMENTALS  9

UNIT II  HYDRAULIC SYSTEM & COMPONENTS  9

UNIT III  DESIGN OF HYDRAULIC CIRCUITS  9

UNIT IV  PNEUMATIC SYSTEMS AND COMPONENTS  9

UNIT V  DESIGN OF PNEUMATIC CIRCUITS  9
Servo systems – Hydro Mechanical servo systems, Electro hydraulic servo systems and proportional valves. Fluidics – Introduction to fluidic devices, simple circuits, Introduction to Electro Hydraulic Pneumatic logic circuits, ladder diagrams, PLC applications in fluid power control. Fluid power circuits; failure and troubleshooting.
TEXT BOOKS:

REFERENCES:

MT3313 DESIGN OF MECHATRONICS SYSTEM

UNIT I FUNDAMENTALS

UNIT II SYSTEM MODELLING
Introduction-model categories-fields of application-model development-model verification-model validation-model simulation-design of mixed systems-electro mechanics design-model transformation-domain-independent description forms-simulator coupling.

UNIT III SYSTEM INTERFACING

UNIT IV CASE STUDIES ON MECHATRONIC SYSTEM
Introduction –Fuzzy based Washing machine – pH control system – Autofocus Camera, exposure control– Motion control using D.C.Motor & Solenoids – Engine management systems. – Controlling temperature of a hot/cold reservoir using PID- Control of pick and place robot – Part identification and tracking using RFID – Online surface measurement using image processing

UNIT V MICRO MECHATRONIC SYSTEM

REFERENCES

TOTAL = 45 PERIODS

EC3314 OBJECT ORIENTED PROGRAMMING L T P C

UNIT I OOP PARADIGM  9

UNIT II INTRODUCTION TO C++  10

UNIT III CLASSES AND OBJECTS  9

UNIT IV OPERATOR OVERLOADING, INHERITANCE AND POLYMORPHISM  10

UNIT V CASE STUDIES  7
Over view of typical object oriented systems – Case studies - Applications.

TOTAL : 45 PERIODS

REFERENCES

MT3315 MICRO CONTROLLER AND PLC LABORATORY

LIST OF EXPERIMENTS

1. Study of Microcontroller Kits.
2. 8051 / 8031 Programming Exercises.
5. Study of interrupt structure of 8051.
6. Interfacing high power devices to microcomputer port lines, LED relays and LCD displays.
7. Linear actuation of hydraulic cylinder with counter and speed control.
8. Hydraulic rotation with timer and speed control.
9. Sequential operation of pneumatic cylinders.
10. Traffic light controller.
11. Speed control of DC motor using PLC.
12. Testing of Relays using PLC.

TOTAL : 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No</th>
<th>Equipments</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regulated power supply</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Pulse generator</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Function generator</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Cathode ray oscilloscope</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>8051 MicroController Kit</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>stepper Motor</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>stepper motor interfacing board</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>PLC trainer kit and related software</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Hydraulic cylinder</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Pneumatic cylinder</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>LED/LCD interface units</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>SCR/Triac/Power MOSFET interface unit</td>
<td>1</td>
</tr>
</tbody>
</table>
EC3316 OBJECT ORIENTED PROGRAMMING LABORATORY

LIST OF EXPERIMENTS

1. Programs Using Functions
   - Functions with default arguments
   - Implementation of Call by Value, Call by Address and Call by Reference
2. Simple Classes for understanding objects, member functions and Constructors
   - Classes with primitive data members
   - Classes with arrays as data members
   - Classes with pointers as data members – String Class
   - Classes with constant data members
   - Classes with static member functions
3. Compile time Polymorphism
   - Operator Overloading including Unary and Binary Operators.
   - Function Overloading
4. Runtime Polymorphism
   - Inheritance
   - Virtual functions
   - Virtual Base Classes
   - Templates
5. File Handling
   - Sequential access
   - Random access

TOTAL : 45 PERIODS

ME3317 APPLIED HYDRAULICS AND PNEUMATIC LABORATORY

LIST OF EXPERIMENTS

1. Design and testing of hydraulic circuits such as
   i) Pressure control
   ii) Flow control
   iii) Direction control
   iv) Design of circuit with programmed logic sequence, using an optional PLC in hydraulic Electro hydraulic Trainer.
2. Design and testing of pneumatic circuits such as
   i) Pressure control
   ii) Flow control
iii) Direction control
iv) Circuits with logic controls
v) Circuits with timers
vi) Circuits with multiple cylinder sequences in Pneumatic Electro pneumatic Trainer.

3. Modeling and analysis of basic electrical, hydraulic, and pneumatic systems using **MATLAB/LABVIEW** software.

4. Simulation of basic hydraulic, pneumatic and electrical circuits using Automation studio software.

**TOTAL : 45 PERIODS**

**LIST OF EQUIPMENT**  
(for a batch of 30 students)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Equipments</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hydraulic equipments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pressure relief valve</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Pressure reducing valves</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Flow control valves</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Pressure switch</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Limit switches</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Linear actuator</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Rotary actuator</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Double solenoid actuated DCV</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Single solenoid actuated DCV</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Hydraulic power pack with 2 pumps &amp; 2 pressure relief valve</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>PLC</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Pneumatics equipment</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Pneumatic trainer kit with FRL Unit, Single acting cylinder, push buttons</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Pneumatic trainer kit with FRL unit, Double acting cylinder, manually actuated DCV</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Pneumatic training kit with FRL unit, Double acting cylinder, pilot actuated DCV</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Pneumatic trainer kit with FRL unit, Double acting cylinder, Double solenoid actuated DCV, DCV with sensos/ magnetic reed switches</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>PLC with Interface card</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>LABVIEW Software</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Automation studio software</td>
<td>1</td>
</tr>
</tbody>
</table>
MT3318  TECHNICAL SEMINAR II  L  T  P  C  0  0  3  2

During technical seminar hour students are encouraged to use various teaching aids like O.H.P., PPT and demonstration models. This will enable them to gain confidence in facing the placement interviews.

MT3401  MEDICAL MECHATRONICS  L  T  P  C  3  0  0  3

UNIT I  INTRODUCTION  9
Cell structure – electrode – electrolyte interface, electrode potential, resting and action potential – electrodes for their measurement, ECG, EEG, EMG – machine description – methods of measurement – three equipment failures and trouble shooting.

UNIT II  TRANSDUCERS FOR BIO-MEDICAL INSTRUMENTATION  9
Basic transducer principles Types – source of bioelectric potentials – resistive, inductive, capacitive, fiber-optic, photoelectric and chemical transducers – their description and feature applicable for biomedical instrumentation – Bio & Nano sensors & application

UNIT III  SIGNAL CONDITIONING, RECORDING AND DISPLAY  9

UNIT IV  MEDICAL SUPPORT  10

UNIT V  BIO-MEDICAL DIAGNOSTIC INSTRUMENTATION  8

TOTAL = 45 PERIODS

REFERENCES

MF3402 COMPUTER INTEGRATED MANUFACTURING

UNIT I INTRODUCTION

UNIT II GROUP TECHNOLOGY AND COMPUTER AIDED PROCESS PLANNING

UNIT III COMPUTER AIDED PLANNING AND CONTROL
Production planning and control-cost planning and control-inventory management-Material requirements planning (MRP)-shop floor control-Factory data collection system-Automatic identification system-barcode technology automated data collection system.

UNIT IV COMPUTER MONITORING
Types of production monitoring systems-structure model of manufacturing process-process control & strategies direct digital control-supervisory computer control-computer in QC - contact inspection methods-non-contact inspection method - integration of CAQC with CAD/CAM.

UNIT V INTEGRATED MANUFACTURING SYSTEM
Definition - application - features - types of manufacturing systems-machine tools-materials handling system computer control system - DNC systems manufacturing cell. Flexible manufacturing systems (FMS) - the FMS concept-transfer systems - head changing FMS-variable mission manufacturing system - CAD/CAM system-Rapid prototyping - Artificial Intelligence and Expert system in CIM.

TOTAL = 45 PERIODS

REFERENCES
ME3403 ROBOTICS AND MACHINE VISION SYSTEM

UNIT I BASICS OF ROBOTICS 9

UNIT II ROBOT END EFFECTORS 9
Robot End effectors: Introduction- types of End effectors- Mechanical gripper- types of gripper mechanism- gripper force analysis- other types of gripper- special purpose grippers.

UNIT III ROBOT MECHANICS 10

UNIT IV MACHINE VISION FUNDAMENTALS 9
Machine vision: image acquisition, digital images-sampling and quantization-levels of computation Feature extraction-windowing technique- segmentation- Thresholding- edge detection- binary morphology - grey morphology

UNIT V ROBOT PROGRAMMING 8
Robot programming: Robot Languages- Classification of robot language-Computer control and robot software-Val system and Languages- application of robots.

TOTAL = 45 PERIODS

REFERENCES
ME3404  AUTOMOBILE ENGINEERING     L  T  P  C
                                      3  0  0   3

UNIT I   INTRODUCTION  9

UNIT II   TRANSMISSION SYSTEMS  9

UNIT III   STEERING, BRAKES AND SUSPENSION  9

UNIT IV    BATTERY AND LIGHTING SYSTEM  9

UNIT V    ALTERNATE ENERGY SOURCES  9
Use of Natural Gas, LPG, Biodiesel, Gasohol and Hydrogen in Automobiles - Electric and Hybrid Vehicles, Fuel Cells.

TOTAL = 45 PERIODS

REFERENCES
LIST OF EXPERIMENTS

1. Modelling of a part using Pro-E / CATIA / UNIGRAPHICS.
2. Modelling of a component using Pro-E / CATIA / UNIGRAPHICS.
3. Modelling and assembling of the mechanical assembly using Pro-E / CATIA / UNIGRAPHICS.
4. Structural analysis using FEA software – ANSYS / SOLIDWORKS / CATIA.
5. Beam deflection analysis using FEA software – ANSYS / SOLIDWORKS / CATIA.
6. Thermal analysis using FEA software – ANSYS / SOLIDWORKS / CATIA.
7. Vibration or modal analysis using FEA software – ANSYS / SOLIDWORKS / CATIA.
8. Modelling and tool path simulation using Master CAM (MILL) or any CAM package.
9. Modelling and tool path simulation using Master CAM (Lathe) or any CAM package.
10. NC code generation for milling using Master CAM (MILL) or any CAM package.
11. NC code generation for turning using Master CAM (Lathe) or any CAM package.

TOTAL = 45 PERIODS

NOTE - Any solid modelling or suitable software packages can be used for exercise.

LIST OF EXPERIMENTS

1. Study of different types of robots based on configuration and application.
2. Study of different type of links and joints used in robots
3. Study of components of robots with drive system and end effectors.
4. Determination of maximum and minimum position of links.
5. Verification of transformation (Position and orientation) with respect to gripper and world coordinate system
7. Robot programming exercises
The objective of this project is to provide opportunity for the students to implement their skills acquired in the previous semesters to practical problems. The students in convenient groups of not more than 4 members have to take one small item for design and fabrication. Every project work shall have a guide who is the member of the faculty of the institution and if possible with an industry guide also.

The item chosen may be small machine elements (Example-screw jack, coupling, machine vice, cam and follower, governor etc), attachment to machine tools, tooling (jigs, fixtures etc), small gear box, automotive appliances, agricultural implements, simple heat exchangers, small pumps, hydraulic /pneumatic devices etc.

The students are required to design and fabricate the chosen item in the college and demonstrate its working apart from submitting the project report. The report should contain assembly drawing, parts drawings, process charts relating to fabrication.

UNIT I
INTRODUCTION

UNIT II
IGNITION AND INJECTION. SYSTEMS

UNIT III
SENSOR AND ACTUATORS
UNIT IV ENGINE CONTROL SYSTEMS 10

UNIT V CHASSIS AND SAFETY SYSTEMS 10

REFERENCES

MT 3002 DIGITAL IMAGE PROCESSING L T P C
UNIT I DIGITAL IMAGE FUNDAMENTALS 9
Introduction – Examples of fields that use Digital image processing, Fundamental steps in Digital Image Processing systems, Components of an image processing systems, Light and EM spectrum, Image sensing and acquisition, Image sampling and quantization- Concepts, image representation, Spatial and gray level resolution, Aliasing and Morie patterns, Some basic relationships between pixels

UNIT II IMAGE ENHANCEMENT IN SPATIAL DOMAIN 9
Background, Gray level transformation- Image negatives, Log transformations, Power law transformations, Piecewise-Linear transformation functions, Histogram processing- Histogram equalization, Histogram matching(Specifications), Enhancement using ALU

UNIT III IMAGE ENHANCEMENT IN FREQUENCY DOMAIN 9
Introduction to the Fourier transform and the frequency domain – 1-D Fourier transform and its inverse, 2-D Fourier transform and its inverse, Smoothing frequency domain filters- Ideal, Butterworth, Gaussian low pass filters, Sharpening frequency domain filters- Ideal, Butterworth, Gaussian high pass filters
UNIT IV  COLOR IMAGE PROCESSING AND WAVELETS  9
Color fundamentals, Color models- RGB color model, CMY and CMYK color model, HIS color model.

Wavelets- Background- Image pyramids, sub band coding, Haar transform, Wavelet transform in 1-D- Wavelet series expansion, discrete wavelet transform, Continuous wavelet transform.

UNIT V  IMAGE COMPRESSION AND SEGMENTATION  9

TOTAL = 45 PERIODS

REFERENCES

MT3004  DIAGNOSTIC TECHNIQUES  L T P C
3 0 0 3

UNIT I  DEFECTS AND FAILURE ANALYSIS  9
Maintenance Concept, Maintenance objective, Challenges in maintenance. Defect generation - Types of failures - Defect reporting and recording - Defect analysis - Failure analysis - Equipment down time analysis - Breakdown analysis - FTA - FMEA - FMECA.

UNIT II  MAINTENANCE SYSTEMS  9
Planned and unplanned maintenance - Breakdown maintenance - corrective maintenance- Opportunistic maintenance - Routine maintenance - Preventive maintenance - Predictive Maintenance - Condition based maintenance system - Design out maintenance – Maintenance by objectives – Selection of maintenance system

UNIT III  SYSTEMATIC MAINTENANCE  9
permit - job monitoring – Feedback and control – Maintenance records and documentation. Introduction to Total Productive Maintenance (TPM).

UNIT IV COMPUTER MANAGED MAINTENANCE SYSTEM 9

UNIT V CONDITION MONITORING 9

REFERENCES

TOTAL = 45 PERIODS

ME3006 OPERATIONS RESEARCH

UNIT I LINEAR MODELS 12
The phases of operations research study- Linear programming - Graphical method - Simplex algorithm – Dual Simplex - Transportation problems- Traveling salesmen problems - Assignment models - Applications to problems with discrete variables.

UNIT II NETWORK MODELS 6

UNIT III INVENTORY MODELS 6
Inventory models - Economic order quantity models - Quantity discount models - Stochastic Inventory models - Multi product models - Inventory control models in practice.

UNIT IV QUEUING THEORY 9
Queueing models - Queueing systems and structures - Notation - parameter - Single Server and multi server models - Poisson input - Exponential service - Constant rate service - Infinite population - Simulation.
UNIT V DECISION MODELS

REFERENCES

TOTAL= 60 PERIODS

GE3008 PROFESSIONAL ETHICS AND HUMAN VALUES

UNIT I HUMAN VALUES

UNIT II ENGINEERING ETHICS

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES
Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors - moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE),India, etc.

TOTAL= 45 PERIODS
REFERENCES

EC3007 DIGITAL SIGNAL PROCESSING

UNIT I SIGNALS AND SYSTEMS
Basic elements of Digital Signal Processing - Concept of frequency in Continuous time and Discrete time signals - Sampling theorem – Discrete time signals. Discrete time systems – Analysis of Linear time invariant systems – Z transform – Convolution and Correlation.

UNIT II FAST FOURIER TRANSFORMS

UNIT III IIR FILTER DESIGN
Structure of IIR – System Design of Discrete time IIR filter from continuous time filter – IIR filter design by Impulse Invariance. Bilinear transformation – Approximation derivatives

UNIT IV FIR FILTER DESIGN

UNIT V FINITE WORD LENGTH EFFECTS

TOTAL : 45 PERIODS

REFERENCES
1. John G. Proakis and Dimitris G. Manolakis, “Digital Signal Processing,

ME3017    MICRO ELECTRO MECHANICAL SYSTEMS          L   T   P   C
                   3   0   0   3

UNIT I    INTRODUCTION

UNIT II   MICRO SENSORS & ACTUATORS

UNIT III  FABRICATION PROCESS
Substrates - single crystal silicon wafer formation - Photolithography - Ion implantation - Diffusion – Oxidation - CVD - Physical vapor deposition - Deposition by epitaxy - etching process

UNIT IV   MICRO SYSTEM MANUFACTURING

UNIT V    MICRO SYSTEM DESIGN
Design considerations - process design - mask layout design - mechanical design - applications of micro system in - automotive industry - bio medical - aerospace - telecommunications.

TOTAL : 45 PERIODS

REFERENCES
UNIT I  DESIGN PROCESS  9
The design process Morphology of design - Product cycle - Sequential and concurrent engineering - Role of computers - Computer Aided Engineering - Computer Aided Design - Computer Aided Manufacturing - Benefits of CAD.

UNIT II  INTERACTIVE COMPUTER GRAPHICS  9
Creation of Graphic Primitives - Graphical input techniques - Display transformation in 2-D and 3-D – Viewing transformation - Clipping - hidden line elimination - Mathematical formulation for graphics - Curve generation techniques.

UNIT III  DATA STRUCTURE AND STORAGE  9
Model storages and Data structure - Data structure organisation - Engineering Data Management System. Hierarchical data structure - Network data structure - Relational data structure. Data storage and search methods.

UNIT IV  SOLID MODELING  9
Geometric Modeling - Wire frame, Surface and Solid models - CSG and B-REP Techniques - Features of Solid Modeling Packages - Parametric and features.

UNIT V  DESIGN ANALYSIS USING FINITE ELEMENT METHOD  9
Introduction - Procedures - Element types - Nodal approximation - Element matrices, vectors and equations - Global connectivity - Assembly - Boundary conditions - Solution techniques - Interfaces to CAD – Introduction to CAD packages.

TOTAL = 45 PERIODS

REFERENCES
OBJECTIVE:
- Study of this subject provides an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.

UNIT I ENTREPRENEURSHIP

UNIT II MOTIVATION
Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

UNIT III BUSINESS

UNIT IV FINANCING AND ACCOUNTING

UNIT V SUPPORT TO ENTREPRENEURS

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
<table>
<thead>
<tr>
<th>EC3014</th>
<th>COMPUTER NETWORKS</th>
<th>L T P C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 0 0 3</td>
<td>3 0 0 3</td>
<td></td>
</tr>
</tbody>
</table>

**UNIT I  DATA COMMUNICATION CONCEPTS**

- Computer Networks: introduction, Network topology, wired network Vs wireless network.
- Classification of computer N/w’s: LAN, MAN, WAN.

**UNIT II  N/W REFERENCE MODELS AND PROTOCOL SUITS**

- Networking Hardware: Ethernet cabling, The NIC, Repeater, Router, Bridges, Switches, Transceivers, hubs, Cable modems.

**UNIT III  SWITCHING TECHNOLOGIES AND LAN STANDARDS**

- Circuit switching, message & packet switching, Channel allocation methods – ALOHA protocols – Pure ALOHA – Slotted ALOHA, IEEE standard 802 for LANS Ethernet, CSMA/CD, Token Ring, Token Bus, & their frame format. FDDI.

**UNIT IV  DATA LINK & NW LAYER**

- Services provided by N/W layer, Framing, Data link control: Flow control, Error detection, HDLC & SDLC, Concept of Routing & congestion control. Transport layer Protocols like TCP, UDP, connection oriented transport protocol, TCP services.

**UNIT V  N/W PROTOCOLS & TRADITIONAL APPLICATION**

- The IP layers and functions – addressing and routing – Internet user services – E-Mail – w.w.w, Telnet, FTP, HTTP.
- Broad Band Networks: ISDN Evolution – structures – Limitation Broadband ISDN, Asynchronous transfer mode (ATM), SONET.

**REFERENCES**

UNIT I  REVIEW OF VIRTUAL INSTRUMENTATION  9
Historical perspectives, advantages, block diagram and architecture of a virtual instrument, data
-flow techniques, graphical programming in data flow, comparison with conventional
programming.

UNIT II  VI PROGRAMMING TECHNIQUES  9
VIS and sub-VIS loops and charts, arrays, clusters and graphs, case and sequence structures,
formula nodes, local and global variables, string and file I/O.

UNIT III  DATA ACQUISITION BASICS  9
AOC. OAC. 010. Counters & timers. PC Hardware structure, timing. Interrupts OMA, software
and hardware installation.

UNIT IV  COMMON INSTRUMENT INTERFACES  9
Current loop, RS.232C/RS.485, GPIB, System buses, interface buses: USB, PCMCIA, VXI,
SCXI, PXI, etc., networking basics for office & Industrial applications, Visa and IVI, image
acquisition and processing. Motion control.

UNIT V  USE OF ANALYSIS TOOLS  9
Fourier transforms, power spectrum correlation methods, windowing & filtering, VI application in
various fields.

TOTAL = 45 PERIODS

REFERENCES
York, 1997
3. S. Gupta, J.P: Gu.pta, PC interfacing for Data Acquisition & Process Control, Second
4. Lis K. wells & Jeffrey Travis, Labview for everyone, Prentice Hall Inc., New Jersey;
1997
UNIT I  INTRODUCTION
Industrial control classification- motion and process control- feed forward control-interfacing devices- Operational Amplifier-review of thyristor- SCR- TRIAC-Phototransistor

UNIT II  CONVERTERS AND INVERTERS
Analysis of controlled and fully controlled converters-Dual converters-Analysis of voltage source and current source- current source and series converters

UNIT III  INDUSTRIAL MOTOR CONTROL
Method of controlling speed- Basic control circuit-DC motor control- AC motor control- Servo motor control- Stepper motor control- micro controller based speed control – solid state motor control-PLL control of a DC motor control

UNIT IV  RELAYS, HEATING & WELDING CONTROL

UNIT V  PROCESS AND MOTION CONTROL
Elements of process control- temperature control- Flow control- Level control- Methods of motion control- feed back control- Direct digital control

TOTAL = 45 PERIODS

REFERENCES:
1. Terry Baltelt- Industrial electronics, devices, systems and applications- Delmar publishers-1997
UNIT I SHEET METAL WORKING OF METALS  

UNIT II NON TRADITIONAL MACHINING  

UNIT III SURFACE FINISHING AND SURFACE HARDENING PROCESS  
Grinding process, various types of grinding machine-grinding wheel-types-selection of grinding wheel for different applications-selection of cutting speed and work speed-mounting of grinding wheel-galvanizing, electroplating, anodising. Surface hardening-carburizing, carbonitriding, cyaniding, nitriding, ion nitriding, boronizing, laser hardening, thin film coating(PVD, CVD).

UNIT IV EDM AND ECM  
Electrical Discharge Machining (EDM) - Description of EDM equipment-electrical circuits -electrolyte-metal removal rate-applications-EDWC - process principles – equipments - applications.
Electro Chemical Machining (ECM) - Description of the equipment-electrolyte-metal removal rate -accuracy and surface finish obtained. Electro Chemical grinding (ECG) - Chemical machining-electro chemical grinding equipment-application-electro chemical deburring-honing-applications

UNIT V JIGS AND FIXTURES  

TOTAL = 45 PERIODS

REFERENCES
GE2022 TOTAL QUALITY MANAGEMENT

UNIT I INTRODUCTION

UNIT II TQM PRINCIPLES
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I

UNIT IV TQM TOOLS & TECHNIQUES II

UNIT V QUALITY SYSTEMS

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:
OBJECTIVES:
- To understand the various processes involved in Marketing and its Philosophy.
- To learn the Psychology of consumers.
- To formulate strategies for advertising, pricing and selling

UNIT I  MARKETING PROCESS  9
Definition, Marketing process, dynamics, needs, wants and demands, marketing concepts, environment, mix, types. Philosophies, selling versus marketing, organizations, industrial versus consumer marketing, consumer goods, industrial goods, product hierarchy

UNIT II  BUYING BEHAVIOUR AND MARKET SEGMENTATION  9
Cultural, demographic factors, motives, types, buying decisions, segmentation factors - demographic -Psychographic and geographic segmentation, process, patterns.

UNIT III  PRODUCT PRICING AND MARKETING RESEARCH  9
Objectives, pricing, decisions and pricing methods, pricing management. Introduction, uses, process of marketing research.

UNIT IV  MARKETING PLANNING AND STRATEGY FORMULATION  9
Components of marketing plan-strategy formulations and the marketing process, implementations, portfolio analysis, BCG, GEC grids.

UNIT V  ADVERTISING, SALES PROMOTION AND DISTRIBUTION  9
Characteristics, impact, goals, types, and sales promotions- point of purchase- unique selling proposition. Characteristics, wholesaling, retailing, channel design, logistics, and modern trends in retailing.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
# ME3009  PROJECT ENGINEERING

<table>
<thead>
<tr>
<th>UNIT I</th>
<th>FEASIBILITY ANALYSIS</th>
<th>9</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>UNIT II</th>
<th>PROJECT PLANNING</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project management: nature, scope, PERT, CPM techniques, principles, applications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT III</th>
<th>TIME VALUE OF MONEY</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal and time value of money: simple interest, compound interest, present worth uniform series payments, use of interest tables, nominal and effective interest rates, continuous compounding, uniform continuous payment, uniform gradient.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT IV</th>
<th>EVALUATION OF ALTERNATIVES</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods of tangible evaluation of alternatives: Equivalent annual worth comparisons, present worth comparisons rate of return comparisons.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methods of forecasting: Need for forecast – statistical method, time series analysis, method of least squares, moving average method, curvilinear trend, correlation analysis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT V</th>
<th>REPLACEMENT AND RISK ANALYSIS</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacement policy: item deteriorating with time and items that fail completely (not accounting for time value of money), accounting time value of money, replacement policy for new and old machine with infinite horizon.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk analysis: Risk in economic analysis, measuring risk investment, risk profiles, decision trees, formulation of discounted tree.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL = 45 PERIODS**

## REFERENCES
UNIT I  INTRODUCTION
Introduction to data file and database environment – Database administration – Data dictionary – Basic data modeling concepts.

UNIT II  PHYSICAL STORAGE ORGANIZATION

UNIT III  PROGRAMMING
Programming in the database environment – Programming languages – programming language interfaces – Front-end tools – Querying languages – Security and Integrity factors.

UNIT IV  RECORD BASE MODELS
Relational Model: system R architecture, data structure – external level, data manipulation – Hierarchical model: IMS architecture, data structure, external and internal levels – data manipulation – Network model: DBTG architecture, data structure, external level, data manipulation.

UNIT V  RECENT TRENDS
Introduction to distributed databases – Recent trends in database systems – case studies using existing systems – Comparative study of existing commercial systems.

TOTAL = 45 PERIODS

REFERENCES
Definitions, evolution, CAD for RPT, Product design and rapid product development, conceptual design, detail design, prototyping, Fundamentals of RP systems, 3D solid modeling software and their role in RPT, creation of STL file

UNIT II  LIQUID BASED RP PROCESSES  9
Liquid based RP systems: Stereo lithography (SLA)-principle-process parameters-process details-machine details- applications Solid Ground Curing - Principle- process parameters-process details-machine details, Applications

UNIT III  SOLID BASED RP PROCESSES  9

UNIT IV  POWDER BASED RP PROCESSES  9

UNIT V  RAPID TOOLING  10
Principles and typical process for quick batch production of plastic and metal parts through quick tooling.
Reverse Engineering – 3D scanning-3D digitizing and Data fitting

TOTAL : 45 PERIODS

REFERENCES:
UNIT I  DEMAND AND SUPPLY ANALYSIS

UNIT II  COST ANALYSIS

UNIT III  MONEY AND BANKING

UNIT IV  CAPITAL BUDGETING

UNIT V  DEPRECIATION AND COST ANALYSIS

REFERENCES:
1. Varshney R L nd Maheswari K L, Managerial Economics, S.Chand & Co, 1993

TOTAL: 45 PERIODS
UNIT I  CREATIVE THINKING AND PRODUCT INNOVATION  
The product and process design function. Locating ideas for new products. Selecting the product. Qualifications of the production design engineer, Creative thinking curiosity and imagination.

UNIT II  CRITERIA FOR PRODUCT SUCCESS  
Areas to be studies preparatory to design market research functional design. The value of appearance - Principles and laws of appearance - Incorporating quality and reliability into the design. Man Machine considerations-Designing for case of maintenance.

UNIT III  COST AND PRODUCT DEVELOPMENT  

UNIT IV  PATENTS  
Classes of exclusive rights - Patents-Combination versus aggregation - Novelty and Utility - Design patents - patent disclosure - patent application steps - Patent office prosecution - Sales of patent rights - Trade marks - Copy rights.

UNIT V  QUALITY CONTROL AND RELIABILITY  
Quality Control procedure - Inspection and test equipment - Statistical quality control - Manufacturing Reliability - Probability of tool reliability - Reliability operations - Developing a quality-control and reliability programme.

TOTAL: 45 PERIODS

REFERENCES