REGULATIONS – 2013

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM AND SYLLABI OF

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING
COLLEGE VISION

• Transforming lives through quality Education and research with human values

COLLEGE MISSION

• To maintain excellent infrastructure and highly qualified and dedicated faculty

• To provide a conducive learning environment with an ambience of humanity, wisdom, creativity and team spirit

• To promote the values of ethical behavior and commitment to the society

• To partner with academic, industrial and government entities to attain collaborative research
Department Of Electronics and Communication Engineering

VISION

- To produce communication engineers capable of generating a knowledge economy with social responsibility

MISSION

- To impart high quality education with ethical behavior.
- To equip the students compatible with recent trends in Electronic industries.
- To develop leadership qualities with humanity, wisdom, creativity and team spirit.
- To provide a passionate environment for continual learning.

Program Educational Objectives (PEO)

- Graduate will have successful technical career in core and related fields.
- Graduates will pursue higher education and work in Research and Development for solving real world problems.
- Graduates will have leadership qualities with social consciousness and ethics.
Program Outcomes (PO)

1. An ability to apply knowledge of mathematics, science, engineering and technology to solve complex Electronics and communication Engineering problems.

2. An ability to identify, formulate and analyze engineering problems using knowledge of Basic Mathematics and Engineering sciences.

3. An ability to provide solution and to design Electronics and Communication systems that meets out the social needs.

4. An ability to investigate the problems in an Electronics and Communication systems and rectifying it.

5. An ability to use latest hardware and software tools to solve complex engineering problems.

6. An ability to gain knowledge on contemporary issues which influence engineering design.

7. Awareness on society and environment to have sustainable solution for Electronics and Communication engineering problems.

8. An ability to demonstrate understanding of professional and ethical responsibilities.

9. An ability to work efficiently as an individual and in multidisciplinary teams.

10. An ability to communicate effectively and efficiently both in verbal and written form.

11. An ability to develop confidence for self education and understanding the value for life-long learning.

12. Able to implement Electronic system projects for real world applications.
REGULATIONS 2013 – CURRICULUM AND SYLLABI

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER I (Common to all B.E. / B.Tech., Degree Programmes)

<table>
<thead>
<tr>
<th>S. 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>SH100</td>
<td>Technical English – I</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>SH101</td>
<td>Matrices and Differential Calculus</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>SH102</td>
<td>Applied Physics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>SH103</td>
<td>Engineering Chemistry</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>SH104</td>
<td>Fundamentals of Computing and Programming in C</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>SH105</td>
<td>Engineering Graphics</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

PRACTICAL

<table>
<thead>
<tr>
<th>S. 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>SH106</td>
<td>C Programming Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>SH107</td>
<td>Physics and Chemistry Laboratory – I</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part A – Physics Laboratory – I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part B – Chemistry Laboratory – I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>SH108</td>
<td>Engineering Practices Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part A – Mechanical and Civil Engineering Practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part B – Electrical and Electronics Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Number of Credits : 27
## SEMESTER – II

<table>
<thead>
<tr>
<th>S. 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></td>
<td></td>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>13B20</td>
<td>Technical English – II (<em>Common to all</em>)</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>13B21</td>
<td>Integral Calculus and Transforms (<em>Common to all</em>)</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>13B22</td>
<td>Solid State Physics (<em>Common to ECE, CSE, EEE, EIE, and IT</em>)</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>13B23</td>
<td>Chemistry of Electrical and Electronic Materials (<em>Common to ECE, CSE, EEE, EIE and IT</em>)</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>13B24</td>
<td>Circuit Theory and Electron Devices (<em>ECE</em>)</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>13B25</td>
<td>Basic Civil and Mechanical Engineering (<em>Common to ECE, CSE, EEE, EIE and IT</em>)</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>13B26</td>
<td>Computer Programming Laboratory (<em>Common to all</em>)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>13B27</td>
<td>Physics and Chemistry Laboratory – II (<em>Common to all</em>)</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part A – Physics Laboratory – II (<em>Common to all</em>)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part B – Chemistry Laboratory – II (<em>Common to all</em>)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>13B28</td>
<td>Circuits and Devices Laboratory (<em>ECE</em>)</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>13B29</td>
<td>English Language Skill Laboratory (<em>Common to all</em>)</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Number of Credits:** 29
### SEMESTER – III

<table>
<thead>
<tr>
<th>S. 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>THEORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>13EC31</td>
<td>Fourier Transforms and Complex Analysis</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>13EC32</td>
<td>Environmental Science and Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>13EC33</td>
<td>Digital Electronics</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>13EC34</td>
<td>Electromagnetic Fields</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>13EC35</td>
<td>Electronic Circuits – I</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>13EC36</td>
<td>C++ and Data Structures</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>PRACTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>13EC37</td>
<td>Electronic Circuits Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>13EC38</td>
<td>C++ and Data Structures Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>18</td>
<td>4</td>
<td>6</td>
<td>26</td>
</tr>
</tbody>
</table>

### SEMESTER – IV

<table>
<thead>
<tr>
<th>S. 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>THEORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>13EC41</td>
<td>Probability and Random Processes</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>13EC42</td>
<td>Electronic Circuits – II</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>13EC43</td>
<td>Electrical Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>13EC44</td>
<td>Transmission Lines and Waveguides</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>13EC45</td>
<td>Linear Integrated Circuits</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>13EC46</td>
<td>Signals and Systems</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>PRACTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>13EC47</td>
<td>Electronic Circuits and Simulation Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>13EC48</td>
<td>Digital and Linear Integrated Circuits Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>13EC49</td>
<td>Communication Skills and Technical Seminar</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>18</td>
<td>4</td>
<td>9</td>
<td>28</td>
</tr>
</tbody>
</table>
## SEMESTER – V

<table>
<thead>
<tr>
<th>S. 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></td>
<td></td>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>13EC51</td>
<td>Communication Theory</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>13EC52</td>
<td>Digital Signal Processing</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>13EC53</td>
<td>Microprocessors and Microcontroller</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>13EC54</td>
<td>Control Systems Analysis and Design</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>13EC55</td>
<td>Professional Ethics and Human Values</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Elective – I</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>13EC57</td>
<td>Analog Communication and Signal Processing Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>13EC58</td>
<td>Microprocessor and Microcontroller Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong></td>
<td>18</td>
<td>4</td>
<td>6</td>
<td>26</td>
</tr>
</tbody>
</table>

## SEMESTER – VI

<table>
<thead>
<tr>
<th>S. 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></td>
<td></td>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>13EC61</td>
<td>Digital Communication</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>13EC62</td>
<td>Computer Architecture and Organization</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>13EC63</td>
<td>Computer Communication Networks</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>13EC64</td>
<td>Antennas and Wave Propagation</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>13EC65</td>
<td>VLSI Technology and Design</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td>Elective – II</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>13EC67</td>
<td>Digital Communication and Networks Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>13EC68</td>
<td>VLSI Design Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong></td>
<td>18</td>
<td>4</td>
<td>6</td>
<td>26</td>
</tr>
</tbody>
</table>
# LIST OF ELECTIVES

<table>
<thead>
<tr>
<th>S. 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>13ECAA</td>
<td>Fundamentals of Digital Image Processing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>13ECAB</td>
<td>VLSI Digital Signal Processing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>13ECAC</td>
<td>Digital Signal Processors</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>13ECAD</td>
<td>Wavelets and its Applications</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>13ECAE</td>
<td>Biosignal Processing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>13ECBA</td>
<td>Radar and Navigational Aids</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>13ECBB</td>
<td>Statistical Theory of Communication</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>13ECBC</td>
<td>Multimedia Compression and Communication</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>13ECBD</td>
<td>Information Theory and Coding Techniques</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>13ECBE</td>
<td>Global Navigation Satellite System</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>13ECBF</td>
<td>Electromagnetic Interference and Compatibility</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>13ECCA</td>
<td>Open Source Based Embedded System Design*</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>13ECCB</td>
<td>Advanced Microprocessors</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>13ECCC</td>
<td>Advanced VLSI Design</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>13ECCD</td>
<td>Fundamentals of Semiconductor Chip Testing*</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>13ECCE</td>
<td>ARM Processor Architecture and Programming</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>13ECCF</td>
<td>Embedded and Real Time Systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18</td>
<td>13ECDA</td>
<td>Medical Electronics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>19</td>
<td>13ECDB</td>
<td>Advanced Electronic System Design</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>13ECDC</td>
<td>Micro Electro Mechanical Systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>21</td>
<td>13ECDD</td>
<td>Electronic Instrumentation and Measurements</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>22</td>
<td>13ECEA</td>
<td>Mobile Adhoc Networks</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>23</td>
<td>13ECEB</td>
<td>Wireless Sensor Networks</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>13ECEC</td>
<td>High Speed Networks (Common to ECE, CSE &amp; IT)</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>25</td>
<td>13ECED</td>
<td>Principles of Network Security</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>13ECFA   Total Quality Management</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>13ECFB   Entrepreneurship Development</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**INTER – DISCIPLINARY COURSES**

* (Maximum of 2 Electives to be opted)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>13ECGA   Principles of Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>29</td>
<td>13ECGB   Soft Computing</td>
<td>3</td>
</tr>
<tr>
<td>30</td>
<td>13ECGC   Internet and Web Technology (Common to CSE, ECE &amp; IT)</td>
<td>3</td>
</tr>
<tr>
<td>31</td>
<td>13ECGD   Social Computing (Common to IT, ECE &amp; CSE)</td>
<td>3</td>
</tr>
<tr>
<td>32</td>
<td>13ECGE   Mobile Computing (Common to IT, ECE and EEE)</td>
<td>3</td>
</tr>
<tr>
<td>33</td>
<td>13ECGF   Analytic Computing (Common to IT, ECE &amp; CSE)</td>
<td>3</td>
</tr>
<tr>
<td>34</td>
<td>13ECGG   Cloud Computing (Common to IT, ECE, EEE &amp; CSE)</td>
<td>3</td>
</tr>
<tr>
<td>35</td>
<td>13ECGH   Business Intelligence and its Applications (Common to CSE &amp; ECE)</td>
<td>3</td>
</tr>
<tr>
<td>36</td>
<td>13ECGJ   Artificial Intelligence and Robotics (Common to CSE &amp; ECE)</td>
<td>3</td>
</tr>
</tbody>
</table>

**TRANS – DISCIPLINARY COURSES**

* (Maximum of 1 Elective to be opted)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>13ECHA   Challenges in 2030: Global Uncertainty</td>
<td>3</td>
</tr>
<tr>
<td>38</td>
<td>13ECHB   Indian Culture and Heritage</td>
<td>3</td>
</tr>
<tr>
<td>39</td>
<td>13ECHC   Indian History</td>
<td>3</td>
</tr>
<tr>
<td>40</td>
<td>13ECHD   Sustainable Development and Practices</td>
<td>3</td>
</tr>
<tr>
<td>41</td>
<td>13ECHF   Leadership Skills</td>
<td>3</td>
</tr>
</tbody>
</table>

* - Industry Oriented subject
SH100  
TECHNICAL ENGLISH – I  
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
The Student will
• apply basic grammar in Writing and Speaking.  
• prepare formal Letter Writings.  
• come out with proper pronunciation.  
• speak confidently in interactions.  
• develop interest to read any article.

UNIT I                                                                                                                             12
Language Focus: Technical Vocabulary, Word Formation, Concord, Tense (Present).  
Writing: Leave Application Letter, Paragraph writing.  
Listening: Listening to correct pronunciation of words.  

UNIT II                                                                                                                            12
Language Focus: Words often misspelled, Articles, Tense (Past)  
Writing: Permission letters (In-plant training/Seminar/Workshop), Chart description.  
Listening: Listening to the Sentences with correct stress and Intonation.  
Speaking: Situational Conversations.

UNIT III                                                                                                                         12
Language Focus: Compound nouns, Tense (Future), Preposition, Comparative Adjectives.  
Listening: Listening to the conversations.  
Speaking: One minute speech.

UNIT IV                                                                                                                         12
Language Focus: Modal verbs, Gerund, Infinitives, Voice.  
Writing: Writing Instructions, Letters to Editor.  
Listening: Listening to the different Tonal Expressions.  
Speaking: Giving Opinions.

UNIT V                                                                                                                         12
Language Focus: ‘If’ Conditionals, ‘Wh’ questions, Question Tags.  
Writing: Reading and Note - taking  
Speaking: Group Discussion.  
Reading: ERC, one word questions from the suggested book.

SUGGESTED ACTIVITIES
2. Exercises on gap filling and correction of errors on Concord (Subject – Verb Agreement).  
3. Gap filling exercises using the appropriate Tense forms.  
4. Exercises on transferring information from Graph to Text – Bar charts, Flow charts.  
5. Making sentences using Modal verbs to express probability, compulsion, etc.  
6. Exercises on Writing Instructions.  
7. Exercises on framing Questions.  
8. Other relevant classroom activities.

L: 45 T: 15 TOTAL: 60 PERIODS
BOOK SUGGESTED FOR READING

REFERENCES
SH101 MATRICES AND DIFFERENTIAL CALCULUS
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
3 1 0 4

COURSE OUTCOMES
- Ability to find inverse and integral powers of matrices and to perform transformations of matrices.
- Ability to find the evolutes of various curves.
- Ability to solve ordinary and partial differential equations.
- Ability to obtain constrained maxima and minima.

UNIT I MATRICES
12
Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties (excluding proofs); Cayley – Hamilton theorem (excluding proof) – Inverse and integral powers of a matrix using Cayley – Hamilton theorem; Diagonalisation of a matrix by orthogonal transformation; Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II DIFFERENTIAL CALCULUS
12
Curvature in cartesian, parametric and polar forms; Centre, radius and circle of curvature; Evolutes.

UNIT III FUNCTIONS OF SEVERAL VARIABLES
12
Partial derivatives; Total derivatives; Differentiation of implicit functions; Jacobians; Maxima and Minima - Method of Lagrangian multipliers.

UNIT IV 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 V PARTIAL DIFFERENTIAL EQUATIONS
12
Formation of partial differential equations; Lagrange’s linear equations; Solutions of standard types of first order partial differential equations; Linear partial differential equations of second and higher order with constant coefficients.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
SH102 **APPLIED PHYSICS**  
(Common to all B.E./B.Tech., Degree Programmes)  

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

**COURSE OUTCOMES**  
The students will be able to  
- gain knowledge on the properties of matter and hydrodynamics.  
- study and apply the ultrasonic methods for industrial and medical field.  
- understand Lasers and to identify the appropriate Laser technique for industrial and medical field.  
- understand the different types, fabrication, losses of optical fibers and the applications of fiber optics in communication and instrumentation.  
- understand the physical properties of photons and electrons and to study the different Electron Microscopes.  

**UNIT I PROPERTIES OF MATTER AND HYDRODYNAMICS**  

**Properties of Matter**  
Stress, Strain, Hooke’s law; Types of moduli of elasticity; Torsional pendulum – Determination of Rigidity modulus of a wire; Bending of beams – Expression for bending moment – Measurement of Young’s modulus by uniform and Non-uniform bending – I Shaped girders.  

**Hydrodynamics**  
Stream line flow, Turbulent flow, Poiseuille’s formula for flow of liquid through a capillary tube, Determination of coefficient of viscosity of a liquid.  

**UNIT II ULTRASONICS**  

**UNIT III LASERS**  
Principle of spontaneous emission and stimulated emission, Population inversion, Pumping, Einstein’s A and B coefficients – derivation; Types of Lasers - CO₂ Laser, Nd-YAG Laser, Semiconductor Laser (Homojunction); Determination of wavelength of Laser using grating and Particle size; Applications of Lasers: Industrial applications – Welding, Cutting and Heat treatment; Medical applications; Holography (construction and reconstruction).  

**UNIT IV FIBER OPTICS AND ITS APPLICATIONS**  
Principle and propagation of light in optical fibers; Numerical aperture and Acceptance angle; Types of optical fibers – material, refractive index and mode; Double crucible technique of fiber drawing; Splicing – fusion splicing; Loss in optical fiber – attenuation, dispersion and bending; Fiber optical communication system (Block diagram); Advantages and Applications of optical fiber; Fiber optic sensors – temperature and displacement; Endoscope.  

**UNIT V QUANTUM PHYSICS AND MICROSCOPY**  
Black body radiation – Planck’s theory (derivation) – Deduction of Wien’s displacement law and Rayleigh Jean’s Law from Planck’s theory; Photoelectric effect – Law of Photoelectric effect – Photoelectric equation; Matter Waves – De Broglie wavelength - Schrodinger’s wave equation – time independent and time dependent equations – Particle in one dimensional box; Heisenberg’s Uncertainty principle; Linear Harmonic oscillator; Electron microscope – scanning electron microscope – transmission electron microscope.  

**TOTAL: 45 PERIODS**
TEXT BOOKS

REFERENCES
SH103  ENGINEERING CHEMISTRY  
(Common to all B.E. / B.Tech., Degree Programmes)  

COURSE OUTCOMES

The students will be able to

• select suitable water treatment techniques for industrial and domestic purpose.
• acquire knowledge of electrochemistry.
• apply the contextual knowledge of adsorption techniques for industrial applications.
• synthesize polymers for domestic and industrial applications.
• understand the knowledge of nano materials for their applications in Science and Engineering.

UNIT I  WATER TREATMENT  

UNIT II  ELECTRO ANALYTICAL TECHNIQUES  
Electrode potential: definition, measurement of electrode potential, Nernst equation – problems; EMF: definition, measurement of EMF – Poggendorff’s method; reference electrode: standard hydrogen electrode, calomel electrode, glass electrode – measurement of pH using glass electrode; CO₂ sensing electrode; conductometric titrations: acid-base titration (HCl vs NaOH); potentiometric titrations: redox titration (Fe²⁺ vs K₂Cr₂O₇), precipitation titration (Ag⁺ vs NaCl).

UNIT III  CATALYSIS AND SURFACE PHENOMENA  
Types of catalysis – homogeneous catalysis – heterogeneous catalysis, mechanism of catalytic action - contact theory, catalytic promoters, catalytic poison; enzyme catalysis: Michaelis-Menton equation; adsorption: definition, types – physical adsorption – chemical adsorption – differences between physical and chemical adsorption; adsorption isotherms: definition, Freundlich and Langmuir adsorption isotherms, applications of adsorption.

UNIT IV  ENGINEERING POLYMERS  

UNIT V  NANO MATERIALS  
Nanoparticles: definition, carbon nanotubes (CNT), types of carbon nano tubes – single walled and multi walled carbon nanotubes – fullerene; synthesis of carbon nanotubes: chemical vapour deposition – laser ablation – arc-discharge method; properties of CNT: mechanical, electrical, thermal and optical properties; applications of carbon nanotubes in chemical field, medicinal field, mechanical field and current applications.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
SH104  FUNDAMENTALS OF COMPUTING AND PROGRAMMING IN C  
(Common to all B.E. / B.Tech., Degree Programmes)  

L T P C  
3 0 0 3  

COURSE OUTCOMES  
• Learn the major components of a computer system.  
• Formulate the algorithms and analyze their complexity.  
• Identify the correct and efficient ways of solving problems.  
• Acquire knowledge about dynamic memory allocation, modular programming and data organization.  
• Develop real time applications using the power of C language features.  

UNIT I  COMPUTER FUNDAMENTALS  

UNIT II  BASIC C PROGRAMMING  
Structure of C Program – Keywords, Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making – Branching and Looping.  

UNIT III  FUNCTIONS, ARRAYS AND POINTERS  

UNIT IV  STRUCTURES AND UNIONS  

UNIT V  FILE HANDLING  

TOTAL: 45 PERIODS  

TEXT BOOKS  

REFERENCES  
SH105            ENGINEERING GRAPHICS
(Common to all B.E. / B.Tech., Degree Programmes)  L T P C
2  3  0  4

COURSE OUTCOMES

• Students will be able to use the drawing instruments effectively.
• An ability to draw the basic engineering curves and problems related to projections of points, straight lines, planes and solids.
• Able to apply the knowledge acquired on practical applications of sectioning and development of solids.
• Able to draw simple solids and its sections in isometric view and projections and also to draw its perspective views.

Drawing Instruments – IS specifications on lines – drawing sheets – Printing letters and dimensioning – scales (not for examination) – First angle projection should be followed.

UNIT I    PLANE CURVES      12
Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloids – Epi and Hypo cycloids - construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

UNIT II    PROJECTION OF POINTS, LINES AND PLANE SURFACES      12
Projection of points and straight lines located in the first quadrant – Traces – Determination of true lengths and true inclinations.
Projection of regular polygonal surfaces and circular lamina inclined to any one reference plane.

UNIT III    PROJECTION OF SOLIDS      12
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV    SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES      12
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – obtaining true shape of section.
Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinder and cone – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V    ISOMETRIC AND PERSPECTIVE PROJECTIONS      12
Perspective projection of prisms, pyramids and cylinders by visual ray method and vanishing point method.

TOTAL: 60 PERIODS

Note: In end semester examination from each unit one question with either or pattern may be asked. No short questions.

TEXT BOOK
REFERENCES
C PROGRAMMING LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES

- Acquire logical thinking and problem solving skills.
- Implement the algorithms and analyze their complexity.
- Identify the correct and efficient ways of solving problems.
- Acquire hands on practice in dynamic memory allocation, modular programming and data organization.
- Implement real time applications using the power of C language features.

LIST OF EXPERIMENTS

1. Solve problems such as temperature conversion, student grading, interest calculation.
2. Finding the 2’s complement of a binary number.
3. Generation of the first ‘n’ terms of the Fibonacci sequence and prime sequence.
5. Given distance traveled by a vehicle as \( d = ut + \frac{1}{2}at^2 \), where ‘u’ and ‘a’ are the initial velocity and acceleration. Calculate the distance traveled for different time intervals.
6. Solving the roots of a quadratic equation.
7. Designing a simple arithmetic calculator. (Use switch statement)
8. Performing the following operations: (Use loop statement)
   i. Generate Pascal’s triangle.
   ii. Construct a Pyramid of numbers.
9. Performing the following operations to a string:
   i. To insert a sub-string into main string at a given position.
   ii. To delete ‘n’ characters from a given position in a string.
   iii. To replace a character of string either from beginning or ending or at a specified location.
10. Performing the following operations: (Use arrays)
    i. Matrix addition.
    ii. Transpose of a matrix.
    iii. Matrix multiplication by checking compatibility.
11. Performing the following operations: (Use recursive functions)
    i. To find the factorial of a given integer.
    ii. To find the GCD (Greatest Common Divisor) of two given integers.
    iii. To solve Towers of Hanoi problem.
12. Performing the Student Information Processing using File Handling concepts.

TOTAL: 45 PERIODS

SOFTWARE REQUIREMENTS

- Turbo C/ ANSI C Compiler
- Gcc compiler
SH107  PHYSICS AND CHEMISTRY LABORATORY – I  
(Common to all B.E. / B.Tech., Degree Programmes)  

PART A – PHYSICS LABORATORY – I

COURSE OUTCOMES
At the end of the Laboratory classes, the students are able to
• develop collaborative learning skills and to add some of their own ideas to the experiments and their explanations.
• understand the optical properties, mechanical properties and electrical properties.

LIST OF EXPERIMENTS
1. (a) Particle size determination using Diode Laser.
   (b) Determination of Laser parameters – Wavelength, and angle of divergence.
   (c) Determination of Numerical aperture and acceptance angle of an optical fiber.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of velocity of sound and compressibility of the liquid – Ultrasonic Interferometer.
5. Determination of Young’s modulus – Non-uniform bending method.
7. Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge.
   • A minimum of FIVE experiments shall be offered.

PART B - CHEMISTRY LABORATORY – I

COURSE OUTCOMES
The student
• can estimate the amount of hardness and acidity present in the water sample.
• gain knowledge about the estimation of nickel in an alloy.
• quantify the electrolyte by measuring the conductance and pH.

LIST OF EXPERIMENTS
1. Estimation of hardness of Water sample by EDTA method.
2. Estimation of acidity of Water sample.
3. Estimation of Nickel by EDTA method.
4. Conductometric titration (HCl Vs NaOH).
5. Conductometric titration (BaCl₂ Vs Na₂SO₄).
6. pH metric titration (HCl Vs NaOH).
7. Determination of molecular weight and degree of polymerization using Viscometry.
   • A minimum of FIVE experiments shall be offered.
   • Laboratory classes on alternate weeks for Physics and Chemistry.

TOTAL: 45 PERIODS
SH108                              ENGINEERING PRACTICES LABORATORY  
(Common to all B.E. / B.Tech., Degree Programmes)                      L T P C  
0 0 3 2 

COURSE OUTCOMES
• Students will be able to prepare the pipe connections and identify the various components used in plumbing.
• An ability to prepare simple wooden joints using wood working tools.
• An ability to prepare simple lap, butt and tee joints using arc welding equipments.
• An ability to prepare simple components using lathe and drilling machine.

PART A – MECHANICAL AND CIVIL ENGINEERING PRACTICES

I  PLUMBING WORKS:      5
Study of components related to plumbing.
Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

II  CARPENTRY PRACTICES:      6
Study of the joints in roofs, doors, windows and furniture.
Hands-on-exercise:
Wood work, joints by sawing, planning and cutting.

III WELDING:      5
Study of the tools used in welding Gas welding practice.
Preparation of butt joints, lap joints and tee joints using arc welding.

IV  BASIC MACHINING:      7
(a) Simple Turning and Taper turning.
(b) Drilling Practice.

REFERENCES
PART B – ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICES

COURSE OUTCOMES

• An ability to develop familiarity with rudimentary measurement equipment – signal generators, oscilloscopes, multimeters and power supplies.
• Ability to demonstrate and evaluate the parameters of basic electronic components (wires, resistors, capacitors, diodes etc.) based on their physical parameters and dimensions.
• Define, describe, and analyze fundamentals of Boolean algebra and digital logic gates.
• An ability to predict qualitatively and quantitatively compute the steady state AC responses of basic circuits using the phasor method.
• Gain experience in the documentation of measurements and procedures as well as the preparation of formal reports.

I ELECTRICAL ENGINEERING PRACTICE 10

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
5. Measurement of energy using single phase energy meter.

II ELECTRONICS ENGINEERING PRACTICE 12

1. Study of Electronic components and equipments – Resistor, colour coding, measurement of AC signal parameters (peak-peak, rms period, frequency) using CRO
2. Study of logic gates AND, OR, XOR and NOT.
4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL: 45 PERIODS

REFERENCES

COURSE OUTCOMES
The student will be able to
• apply correct form of language while Speaking and Writing.
• prepare his own Professional letter writings.
• interpret any passage after listening.
• interact at different situations fluently.

UNIT I
Language Focus: Homonyms, Different grammatical forms of the same word, correct usage of words / phrases.
Writing: Recommendation writing.
Listening: Interpreting Poetic lines.
Speaking: Telephone English.

UNIT II
Language Focus: Cause and Effect, Phrasal Verbs.
Listening: Conversations.
Speaking: Asking questions.

UNIT III
Language Focus: Idioms and Phrases with animal names.
Writing: Checklist, Process Description.
Speaking: Presentations.

UNIT IV
Language Focus: Technical Definitions, Transformation of Sentences.
Writing: Job Application Letter, Curriculum Vitae, Bio-data, Resume.
Speaking: Mock Interview.

UNIT V
Language Focus: British and American Vocabulary, Numerical Expressions.
Writing: E-mail Writing, Report Writing.
Speaking: Group Discussion.

SUGGESTED ACTIVITIES
1. Making sentences using different grammatical forms of the same word.
2. Exercises on combining sentences using Cause and Effect expressions.
4. Writing exercises on Recommendations.
5. Exercises on Idioms and Phrases.
7. Exercises on British and American English words with meanings.

TOTAL: 45 PERIODS

BOOK SUGGESTED FOR READING
REFERENCES
13B21 INTEGRAL CALCULUS AND TRANSFORMS
(Common to all B.E. / B.Tech., Degree Programmes) L T P C
3 1 0 4

COURSE OUTCOMES
• Ability to find area and volume of objects using double and triple integrals.
• Ability to analyze the concepts related to vector calculus and to apply them in engineering field.
• Ability to perform the ideas of Laplace transform and Z-transform in their respective engineering subjects.

UNIT I MULTIPLE INTEGRALS 12
Double integration – Cartesian and polar coordinates; Change of order of integration; Change of variables between cartesian and polar coordinates; Triple integration in cartesian coordinates; Area as double integral; Volume as triple integral.

UNIT II VECTOR CALCULUS 12
Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields; Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT III LAPLACE TRANSFORM 12

UNIT IV INVERSE LAPLACE TRANSFORM 12
Definition of Inverse Laplace transform – Convolution theorem – Solution of linear ordinary differential equations of second order with constant coefficients using Laplace transformation techniques and solution of simultaneous differential equations of first order with constant coefficients using Laplace transformation techniques.

UNIT V Z – TRANSFORM 12

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13B22 SOLID STATE PHYSICS
(Common to ECE, CSE, EEE, EIE and IT)

COURSE OUTCOMES
The Student will be able to
- identify the crystal lattices, their structures and how the structure influences its major properties at different levels.
- choose the major functional and structural properties required for specific applications of conducting materials.
- check the parameter that satisfies superconducting behaviour.
- relate technology to the physics of semiconductor devices.
- classify the magnetic materials and their storage applications.
- design optical materials that are able to be manufactured and measured using the state of art optical fabrication technologies.

UNIT I CRYSTAL PHYSICS
Lattice, Unit cell, Bravais lattice, Lattice planes; Miller indices – d-spacing in cubic lattice; Calculation of number of atoms per unit cell, Atomic radius, Coordination number and Packing factor for SC, BCC, FCC and HCP structures; Crystal defects – point, line and surface defects; Burger vector.

UNIT II CONDUCTING MATERIALS AND SUPERCONDUCTORS
Conductors

Superconductors
Superconductivity: Properties – Meissner effect – Isotopic effect; Types of superconductors – Type I and Type II superconductors; Applications of superconductors – Magnetic levitation.

UNIT III SEMICONDUCTORS
Intrinsic semiconductor – carrier concentration derivation – Fermi level – variation of Fermi level with temperature – electrical conductivity – bandgap determination; Extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level – with temperature and impurity concentration; Hall effect – Determination of Hall coefficient – Applications.

UNIT IV MAGNETIC MATERIALS AND STORAGE DEVICES
Origin of magnetic moment, Bohr magneton, Dia and Para magnetism, Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials; Anti-ferromagnetic materials; Ferrites – structure and applications; magnetic recording and readout – storage of magnetic data – tapes, floppy, Hard disk and CD ROM.

UNIT V OPTICAL MATERIALS
Optical properties of metals, insulators and semiconductors; Phosphorescence and fluorescence; Excitons traps and colour centre and their importance; Different phosphors used in CRO screens, liquid crystal display, LED – working of LED; Thermography and its applications; Solar cell – PN junction solar cell – Conversion efficiency and solar concentration – Hetero junction solar cell.

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
COURSE OUTCOMES
The students can

- apply the knowledge in designing new energy storing devices.
- identify the types of corrosion and to design a method to control the corrosion.
- apply the knowledge of photochemistry in designing the various electronic materials.
- choose proper analytical technique for analyzing the synthesized electronic materials.

UNIT I  ENERGY SOURCES AND STORAGE DEVICES  9

UNIT II  CORROSION AND ITS CONTROL  9

UNIT III  PHOTOCHEMICAL PROCESSES  9

UNIT IV  ELECTRONIC MATERIALS  9

UNIT V  ANALYTICAL INSTRUMENTATION  9

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of this course, students will be able to

- Analyze the circuits using various network theorems
- Compute the transient response of RL, RC and RLC circuits for AC and DC inputs.
- Determine the resonance condition for series and parallel circuits.
- Describe the operation and characteristics of different types of semiconductor diodes.

UNIT I  CIRCUIT ANALYSIS TECHNIQUES FOR DC CIRCUITS             12

UNIT II  CIRCUIT ANALYSIS TECHNIQUES FOR AC CIRCUITS             12
Mesh current and node voltage method of analysis – Thevenin’s theorem, Superposition theorem, Norton’s theorem, Maximum power transfer theorem.

UNIT III  RESONANT CIRCUITS                                                                                12

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

UNIT V  SEMICONDUCTOR DIODES                                      12

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13B25 BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to ECE, CSE, EEE, EIE and IT)

L T P C
4 0 0 4

COURSE OUTCOMES
- An ability to identify the various systems and its components of various power plants.
- An ability to state and differentiate the working principles of IC engines.
- Students will be able to identify the various systems and components of refrigeration and air conditioning systems.

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.

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10

UNIT IV IC 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: 60 PERIODS

REFERENCES
13B26  COMPUTER PROGRAMMING LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

L T P C
0 1 2 2

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to:

- Demonstrate how to use the UNIX Shell commands.
- Use the Shell programming constructs.
- Learn tracing mechanisms (for debugging), user variables, Shell variables, read-only variables, positional parameters, reading input to a Shell script.
- Test on numeric values, test on file type, and test on character strings using shell scripts.
- Write moderately complex Shell scripts and make them executable.

Execute programs written in C under UNIX environment.

LIST OF EXPERIMENTS

1. Study of UNIX OS, vi Editor.

2. Use of Basic UNIX Shell Commands:
   
   ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.

3. Shell Programming:
   
   i. Interactive shell scripts
   ii. Positional parameters
   iii. Arithmetic Operators
   iv. if-then-fi, if-then-else-fi, nested if-else
   v. Logical operators
   vi. if - elif, case structure
   vii. while, until, for loops, use of break
   viii. Metacharacters

4. Shell scripts for the following:
   
   i. Showing the count of users logged in
   ii. Printing column wise list of files in your home directory
   iii. To count lines, words and characters in its input (do not use wc)

5. C Programming on UNIX:
   
   i. Dynamic Storage Allocation
   ii. Pointers
   iii. Functions
   iv. File Handling

TOTAL: 45 PERIODS

SOFTWARE REQUIREMENTS

- UNIX/LINUX OS
- Gcc compiler
PART A - PHYSICS LABORATORY – II

COURSE OUTCOMES
At the end of the Laboratory classes, the students
- demonstrate and report the elastic behaviour of materials
- demonstrate the interference property of light waves
- demonstrate the diffraction property of light waves
- measure the thermal properties of conducting materials
- identify the substance that deforms continuously when subjected to shearing stress.

LIST OF EXPERIMENTS
1. Determination of Young’s modulus – Uniform bending method.
2. Determination of Band Gap of a semiconductor material.
3. Determination of Hall Co-efficient.
5. Determination of wavelength of mercury spectrum using spectrometer and grating
7. Torsional pendulum – Determination of Moment of Inertia of the disc and Rigidity modulus of the material of the wire.

- A minimum of FIVE experiments shall be offered.

PART B - CHEMISTRY LABORATORY – II

COURSE OUTCOMES
The student
- can estimate the amount of alkalinity and Dissolved Oxygen (DO) present in the water sample.
- gain knowledge in the estimation of copper in an alloy and iron in rust.
- quantify electrolyte and ion by measuring the conductance and emf.

LIST OF EXPERIMENTS
1. Estimation of copper in brass by EDTA method.
2. Determination of Dissolved Oxygen (DO) in water (Winkler’s method)
3. Estimation of alkalinity of Water sample
4. Estimation of Fe^{3+} ion in rust by Dichrometry
5. Conductometric titration (Mixture of acids vs NaOH)
6. Potentiometric Titration (Fe^{2+} vs K_{2}Cr_{2}O_{7})
7. Estimation of Fe^{2+} ion by spectrophotometry.

TOTAL: 45 PERIODS

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
13B28    CIRCUITS AND DEVICES LABORATORY
(ECE)    L T P C
0 0 3 2

COURSE OUTCOMES
Upon successful completion of this course, students will be able to
• Analyze the circuits using various network theorems and laws.
• Determine the parameters from the characteristics of diodes.
• Analyze the given circuit from their transient and steady state response

LIST OF EXPERIMENTS:
1. Verification of Ohm’s laws
2. Verification of Mesh and Nodal analysis
3. Verification of KVL and KCL
4. Verification of Thevenin’s Theorem
5. Verification of Norton’s Theorem.
6. Verification of superposition Theorem
7. Verification of Maximum power transfer Theorem
8. Transient response of RL and RC circuits for DC input
9. Frequency response of series and parallel resonance circuits
10. Characteristics of PN diode
11. Characteristics of Zener diode
12. Characteristics of Photodiode

TOTAL: 45 PERIODS
13B29 ENGLISH LANGUAGE SKILL LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
The Student will
• improve their pronunciation skill.
• gather information from any speech.
• imbibe the stress and intonation of the native speakers’ accent.

1. Micro Skills
   ▪ Spotting the Homonyms / Silent letter words / mispronounced words
   ▪ Identifying the missing words in native speech
   ▪ Finding the cluster words
   ▪ Marking correct punctuation
   ▪ Marking word chunks
   ▪ Identification of sentences

2. Content Comprehension and making inferences
   ▪ Listening to audio files of Speech, Poetry, Recent Issues, News clippings, etc
     a. True / False
     b. Multiple Choice Questions
     c. Filling the blanks
     d. Filling the charts

3. Listen and Act
   ▪ Drawing the map using audio
   ▪ Picture completing task
   ▪ Transferring data to Graph

4. Interpreting the video clippings

5. Listening to Conversations

TOTAL: 30 PERIODS
COURSE OUTCOMES

On successful completion of the course, the students should be able to

- Perform Fourier series analysis of the functions.
- Implement the properties of Fourier transforms and Compute the Fourier transforms of various function.
- Calculate the Fourier series solution of Wave and Heat equations.
- Grasp analytic functions and their properties and be introduced to the host of conformal mappings with suitable examples that have direct application.
- Understand the basics of complex integration and the concept of contour integration encountered in practice.

UNIT I  FOURIER SERIES  12

UNIT II  FOURIER TRANSFORMS  12

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

UNIT V  COMPLEX INTEGRATION  12
Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s expansions – Singular points – Residues – Residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding poles on boundaries).

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of course the student will be able to
• Understand the various ecosystem and biodiversity
• Classify the different types of natural resources and identify the role of individual in conservation of resources
• Identify and analyse the causes, effects and control measures of environmental pollution
• Identify the different types of environmental hazards and their management
• Analyse the social issues related to the environment and how human population affect the environment.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers– energy flow in the ecosystem – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) aquatic (pond) ecosystems. Field study of simple ecosystems – pond and forest. Introduction to biodiversity: definition- genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - India as a mega-diversity nation – hot spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation. Field study of common plants, insects, birds.

UNIT II NATURAL RESOURCES
Forest resources: Use and over-exploitation, deforestation, case studies- dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide Problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, case studies – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain

UNIT III ENVIRONMENTAL POLLUTION
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Noise pollution (e) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – e-Waste: Definition-dimension of the problem - source-toxic Substances in e-waste - risks related to toxic substances - environmental problems-role of an individual in prevention of pollution.

UNIT IV ENVIRONMENTAL HAZARDS
Environmental hazards: Definition – Hazard- Types-Natural and man-made hazards – Natural hazards: Causes, effect and management of Earthquake, Flood, Landslide, Cyclones and Tsunami; Man-made Hazards: Hazards due to dams and reservoirs, hazards due to nuclear power plant, Industrial hazards. Case study: Chernobyl disaster, Bhopal gas tragedy.

UNIT V SOCIAL ISSUES, HUMAN POPULATION AND THE ENVIRONMENT

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
13EC33 DIGITAL ELECTRONICS L T P C
3 1 0 4

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to:

- Acquire knowledge about the fundamental concepts of digital logic and optimize the gates in the digital circuits using Boolean algebra, Karnaugh map and Tabulation method.
- Analyze and design combinational circuits using logic gates and digital IC’s.
- Design a synchronous and asynchronous sequential circuit to meet the given specifications.
- Comprehend the basics of programmable logic devices and implement circuits using PLDs.

UNIT I MINIMIZATION TECHNIQUES

Minimization Techniques: Boolean postulates and laws, De-Morgan's Theorem, Principle of Duality, Boolean expression, Minimization of Boolean expressions Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), Karnaugh map Minimization, Don't care conditions, Quine-McCluskey method of minimization.

UNIT II COMBINATIONAL CIRCUITS


UNIT III SEQUENTIAL CIRCUITS

Latches, Flip-flops - SR, JK, D, T, and Master-Slave, Characteristic table and equation, Application table, Edge Triggering, Level Triggering, Realization of one flip flop using other flip flops, Asynchronous Ripple or serial counter, Design of Synchronous counters: state diagram, State table, State minimization, State assignment, Excitation table and maps, Circuit implementation, Modulo-n counter, Registers, Shift registers, Universal shift registers, Shift register counters, Ring counter, Shift counters, Sequence generators.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS


UNIT V MEMORY DEVICES

Classification of memories, ROM - ROM organization, PROM, EPROM, EEPROM, EAPROM, RAM - RAM organization, Write operation, Read operation, Memory cycle, Timing wave forms, Memory decoding, Memory expansion, Static RAM Cell, Bipolar RAM cell, MOSFET RAM cell, Dynamic RAM cell, Programmable Logic Devices, Programmable Logic Array (PLA), Programmable Array Logic (PAL), Field Programmable Gate Arrays (FPGA), Implementation of combinational logic circuits using ROM, PLA, PAL.

L: 45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13EC34 ELECTROMAGNETIC FIELDS

COURSE OUTCOMES
Upon successful completion of this course, students will be able to:
1. Apply vector calculus to understand the behavior of static electric and magnetic fields in standard configurations.
2. Calculate electric and magnetic fields from stationary and dynamic charge and current distributions.
3. Analyze various geometries of conductors, charge distribution, and current to determine the terminal behavior of capacitors and inductors.
4. Develop field equations starting from a basic knowledge of Maxwell’s Equations.
5. Analyze the propagation of plane waves in various materials.

UNIT I STATIC ELECTRIC FIELDS 12
Coulomb's Law in Vector Form, Definition of Electric Field Intensity, Principle of Superposition, Electric Field due to discrete charges, Electric field due to continuous charge distribution, Electric Field due to charges distributed uniformly on an infinite and finite line, Electric Field on the axis of a uniformly charged circular disc, Electric Field due to an infinite uniformly charged sheet.
Electric Scalar Potential, Relationship between potential and electric field, Potential due to electrical dipole, Electric Flux Density, Gauss Law, Gauss Law application.

UNIT II STATIC MAGNETIC FIELD 12

UNIT III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS 12
Poisson's and Laplace's equation, Electric Polarization, Nature of dielectric materials, Definition of Capacitance, Capacitance of various geometries using Laplace's equation, Electrostatic energy and energy density, Boundary conditions for electric fields, Electric current, Current density, point form of ohm's law. Definition of Inductance, Inductance of loops and solenoids, Definition of mutual inductance, simple examples. Energy density in magnetic fields, magnetization and permeability, magnetic boundary conditions.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS 12

UNIT V ELECTRO MAGNETIC WAVES 12
Derivation of Wave Equation, Uniform Plane Waves, Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors, Skin effect, Wave polarization.

L: 45 T: 15 TOTAL: 60 PERIODS
TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of this course, students will be able to:

- Compare the characteristics of various transistors.
- Analyze BJT and FET amplifier circuits with respect to various parameters such as dc biasing, Q-point stability.
- Derive expressions relating amplifier parameters based on various small-signal transistor models.
- Perform frequency analysis of BJT and FET amplifiers.
- Demonstrate knowledge of rectifier circuits, voltage regulators and filter circuits.

UNIT I TRANSISTORS AND SPECIAL SEMICONDUCTOR DEVICES 12
BJT: Construction and Operation of NPN and PNP Transistors - Study of CE, CB and CC Configurations and comparison of their characteristics – Breakdown in Transistors.
FET: Construction and Operation of N-Channel JFET – Expression for Drain Current, Comparison of JFET and BJT. MOSFET: Structure and Operation of Enhancement and Depletion MOSFET – Comparison of MOSFET with JFET
SPECIAL SEMICONDUCTOR DEVICES: SCR Characteristics and Two Transistor Equivalent model – UJT – DIAC and TRIAC – Phototransistor.

UNIT II TRANSISTOR BIASING AND STABILITY ANALYSIS 12
Need for Biasing – Fixed Bias Circuit: Load line and quiescent point, Selection of operating point, Variation of quiescent point – Stability Factors – Different Types of biasing circuits: Collector to base bias, Voltage divider bias (Self Bias) – Advantage of self-bias over other types of biasing – Bias compensation: Diode, Thermistor and Sensistor compensations – Biasing circuits for JFET and MOSFET.

UNIT III MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 12
Single stage CE, CB and CC Amplifiers - Two-Port Devices and Network Parameters – Hybrid model for Two-Port Network – Analysis of a Transistor Amplifier Circuit using $h$-Parameters – Simplified CE hybrid model – Analysis of CE, CC and CB amplifiers using Approximate Model – Miller’s Theorem – Methods of increasing input impedance using Darlington connection and Bootstrapping – Multistage Amplifiers. CS, CG and CD (FET) Amplifiers, Basic Emitter Coupled Differential Amplifier Circuit – Operation, CMRR, Use of constant current circuit to improve CMRR.

UNIT IV FREQUENCY RESPONSE OF AMPLIFIERS 12
General shape of frequency response of amplifiers - Definition of cutoff frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cutoff frequency - Hybrid – Π equivalent circuit of BJTs - High frequency analysis of BJT amplifiers to obtain upper cutoff frequency, Gain bandwidth Product - High frequency equivalent circuit of FETs - High frequency analysis of FET amplifiers – Gain bandwidth product of FETs - General expression for frequency response of multistage amplifiers - Calculation of overall upper and lower cutoff frequencies of multistage amplifiers - Amplifier rise time, sag and their relation to cutoff frequencies.

UNIT V RECTIFIERS AND POWER SUPPLIES 12
Classification of power supplies – Rectifiers: Half-wave, full-wave and bridge rectifiers with resistive load - Analysis for $V_{dc}$ and ripple voltage with C, L, LC and CLC filters - Voltage multipliers - Voltage regulators: Zener diode shunt regulator, Transistorised series and shunt regulators - Switched mode power supply (SMPS) - Power control using SCR.
TEXT BOOKS

REFERENCES
13EC36       C++ AND DATA STRUCTURES        L T P C
                                     3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
• Recognize and use object oriented programming constructs to write object oriented programs
• Describe encapsulation, polymorphism and inheritance.
• Identify the suitable data organization structure and its implementation methods.
• Analyze the importance of self-balancing trees for effective organizing the data.
• Enumerate the systematic way of solving problems.

UNIT I  PRINCIPLES OF OBJECT ORIENTED PROGRAMMING    9
Introduction – Tokens – Expressions - C++ classes and objects - constructors and destructors – operators
overloading and type conversions.

UNIT II ADVANCED OBJECT ORIENTED PROGRAMMING  9
Inheritance - Extending classes – Pointers - Virtual functions - polymorphism - File handling –
Templates - Exception handling - Manipulating strings.

UNIT III LINEAR DATA STRUCTURES   9
Lists, Stacks and queues: Array and linked list implementation of List, Stack, Queue – Applications of List:
Polynomial addition – sparse matrix – Applications of stack: Infix to Postfix – Evaluation of expression –
Function calls.

UNIT IV NONLINEAR DATA STRUCTURES    9
shortest path Algorithm - Prim's and Kruskal's Algorithms - Network flow problems.

UNIT V SORTING AND SEARCHING    9
Sorting: Insertion sort - Shell sort - Heap sort - Merge sort - Quick sort. Searching: Linear search – Binary
search – Fibonacci search.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13EC37   ELECTRONIC CIRCUITS LABORATORY   L   T   P   C
0   0   3   2

COURSE OUTCOMES
. Upon successful completion of this course, students will be able to:

- Determine the parameters from the characteristics of transistors.
- Acquire a basic knowledge in Transistor amplifier and Various Biasing techniques.
- Construct a simple power supply circuit.
- Calculate the CMRR of differential amplifier.

LIST OF EXPERIMENTS
1. Characteristics of CE configuration.
   - Determination of h-parameters from I/O characteristics.
2. Characteristics of CB configuration.
   - Determination of h-parameters from I/O characteristics.
3. Characteristics of UJT and SCR.
   - Plot the V/I Characteristics
4. Characteristics of JFET.
   - Determination of FET parameters from I/O characteristics
5. Fixed Bias amplifier circuit using BJT.
   - Determination of bias resistance to locate Q-point at center of load line.
   - Plot the frequency response.
6. Voltage divider bias (self-bias) circuit using BJT.
   - Plot the frequency response.
7. Darlington Amplifier using BJT.
   - Measurement of gain, input resistance and output resistance.
8. Source follower with Bootstrapped gate resistance.
   - Measurement of gain, input resistance and output resistance with and without Bootstrapping.
9. Differential amplifier using BJT.
   - Measurement of CMRR.
    - Measurement of DC output voltage under different loading conditions.
    - Plot the Load regulation characteristics and calculate the Load regulation.

TOTAL: 45 PERIODS
13EC38  C++ AND DATA STRUCTURES LABORATORY                  L  T  P  C  0  0  3  2

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to
• Implement common data structures, such as trees, lists.
• Design and apply appropriate data structures for solving computing problems.
• Develop the appropriate objects required to solve a programming problem.
• Practice exception handling mechanisms to handle runtime errors.
• Solve problems using advanced object-oriented concepts like inheritance, polymorphism, and generic programming.

LIST OF EXPERIMENTS

1. Design C++ classes with static members, methods with default arguments, friend functions. (For example, design matrix and vector classes with static allocation, and a friend function to do matrix-vector multiplication).
2. Develop C++ class hierarchy for various types of inheritances.
3. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor and overloading of assignment operator.
4. Design a simple application to demonstrate dynamic polymorphism and RTTI.
5. Design stack and queue classes with necessary exception handling
6. Implement singly and doubly linked lists.
7. Represent a polynomial as a linked list and write functions for polynomial addition.
8. Implement stack and use it to convert infix to postfix expression.
9. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
10. Implement binary search tree and AVL Tree.

TOTAL: 45 PERIODS

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS (PER BATCH)

HARDWARE
• 30 Personal Computers with Pentium III or Pentium IV
• RAM – 256 MB or higher
• Hard disk – 40 GB or higher

SOFTWARE
• Turbo C ++(freeware) – to be installed in all PCs
• OS – Linux (or) Windows 2000/ Windows XP/ NT.
13EC41 PROBABILITY AND RANDOM PROCESSES

COURSE OUTCOMES
On successful completion of the course, the students should be able to
- Have a well-founded knowledge of random variables and standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable.
- Understand and characterize the phenomena which evolve with respect to time in probabilistic manner.
- Implement the concepts of correlation and spectral densities.
- Analyze the response of random inputs to linear time invariant systems.

UNIT I RANDOM VARIABLES
Discrete and continuous random variables – Moments - Moment generating function and their properties. Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

UNIT II TWO DIMENSIONAL RANDOM VARIABLE
Joint distributions - Marginal and conditional distributions - Covariance - Correlation and Regression – Transformation of random variables.

UNIT III CLASSIFICATION OF RANDOM PROCESSES

UNIT IV CORRELATION AND SPECTRAL DENSITIES

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS
Linear time invariant system - System transfer function – Linear systems with random inputs–Auto correlation and cross correlation functions of input and output – White noise.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

- Classify amplifiers by mode of operation.
- Compare the various feedback topologies to get desired performance.
- Construct a circuit to generate sine wave for a particular frequency.
- Design an amplifier to tune to the particular frequency.
- Design a square wave generator for a particular frequency.

UNIT I     LARGE SIGNAL AMPLIFIERS

Classification of amplifiers, Class A large signal amplifiers, and second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio amplifier, efficiency of class A amplifier. Class B amplifier, efficiency, push-pull amplifier, distortion in amplifiers, complementary symmetry (class B) push-pull amplifier, Class C, Class D amplifier, class S amplifier, MOSFET power amplifier, thermal stability and heat sink.

UNIT II    FEEDBACK AMPLIFIERS

Block diagram, Loop gain, Gain with feedback, Effects of negative feedback, Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections, voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor.

UNIT III   OSCILLATORS


UNIT IV    TUNED AMPLIFIERS

Small signal tuned amplifiers, Analysis of capacitor coupled single tuned amplifier, double tuned amplifier, effect of cascading single tuned and double tuned amplifiers on bandwidth, Stagger tuned amplifiers, large signal tuned amplifiers, Class C tuned amplifier, Efficiency and applications of Class C tuned amplifier, Stability of tuned amplifiers, Neutralization, Hazeltine neutralization method.

UNIT V     WAVE SHAPING AND MULTIVIBRATOR CIRCUITS

RC & RL Integrator and Differentiator circuits, Storage, Delay and Calculation of Transistor Switching Times, Speed-up Capacitor, Diode clippers, Diode comparator, Clampsers. Collector coupled Astable multivibrator, Monostable multivibrator, Bistable multivibrators, Triggering methods for Bistable multivibrators, Schmitt trigger circuit using BJT.

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
On the successful completion of the course, the students should be able to:

- Understand the constructional details and characteristics of DC machines.
- Illustrate the performance of single phase transformers under no load and loaded conditions.
- Discriminate the construction and operation of single phase and three phase induction motor.
- Evaluate the voltage regulation of synchronous machines and describe the operation of various special machines.
- Outline the basic structure of electrical power system and its components.

UNIT I  D.C. MACHINES

UNIT II  TRANSFORMERS

UNIT III  INDUCTION MOTORS

UNIT IV  SYNCHRONOUS AND SPECIAL MACHINES

UNIT V  TRANSMISSION AND DISTRIBUTION

Total: 45 PERIODS

TEXT BOOKS

REFERENCES
13EC44  TRANSMISSION LINES AND WAVEGUIDES  L  T  P  C
3  1  0  4

COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

• Explain the meaning and use of fundamental transmission line concepts: traveling and Standing waves, wavelength, characteristic impedance, attenuation.
• Analyze common transmission lines (coaxial, micro strip, etc.) and examine their Characteristic impedance.
• Use the Smith chart (generalized reflection coefficient plane) for fundamental Transmission line calculations.
• Design simple matching networks using lumped elements, quarter-wave sections, and Stub tuners.
• Discuss basic principles associated with waveguides (metallic and dielectric): mode (TM, TE, and TEM), cutoff frequency, guide wavelength, velocities.
• Select proper common waveguides (metallic parallel-plate and rectangular, dielectric Slab) for the given specifications such as frequency range, attenuation.

UNIT I  LUMPED FILTERS  12
The neper - the decibel - Characteristic impedance of Symmetrical Networks – Current and voltage ratios - Propagation constant, Properties of Symmetrical Networks - Filter fundamentals – Low pass, High pass, band pass, band elimination filters and Constant K Filters - Behaviour of the Characteristic impedance- m derived sections - Filter circuit design - Filter performance - Crystal Filters.

UNIT II  TRANSMISSION LINE PARAMETERS  12
A line of cascaded T sections - Transmission lines - General Solution, Physical Significance of the equations, the infinite line, wavelength, velocity, propagation, Distortion line, coaxial cable, Reflection on a line not terminated in Z₀, Reflection Coefficient, Open and short circuited lines, Insertion loss.

UNIT III  THE LINE AT RADIO FREQUENCY  12
Parameters of open wire line and Coaxial cable at RF - Line constants for dissipation - voltages and currents on the dissipation less line - standing waves - nodes - standing wave ratio - input impedance of open and short circuited lines - power and impedance measurement on lines –λ/4 line, Impedance matching - single and double-stub matching, circle diagram, smith chart and its applications - Problem solving using Smith chart.

UNIT IV  GUIDED WAVES BETWEEN PARALLEL PLANES  12
Application of the restrictions to Maxwell's equations - transmission of TM, TE and TEM waves between Parallel planes - wave propagation - Velocities of the waves - characteristic impedance – Attenuators.

UNIT V  WAVEGUIDES  12
Application of Maxwell's equations to the Rectangular waveguide – TM and TE waves in Rectangular waveguide - Cylindrical waveguide - The TEM wave in coaxial lines - Excitation of wave guides - Guide termination and resonant cavities.

L: 45  T: 15  TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of this course, students will be able to:

- Describe the construction of OP-AMP IC and also DC, AC characteristics of OP-AMP.
- Design a circuit using OP-AMP for various applications such as Inverting, Non-inverting, Logarithmic and anti-logarithmic amplifiers, Precision rectifier, active filters etc.
- Design AM and FM modulator and demodulators using PLL logic.
- Design ADC Circuit using comparator and ADC IC.
- Design a function generator for various waveforms such as sine wave, triangular wave, square wave etc using 555 timer or OP amp ICs or 566 or 565 ICs.

UNIT I IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR ICs
Advantages of IC over discrete components, Manufacturing process of monolithic IC, Construction of monolithic bipolar transistor, Monolithic diodes, Integrated Resistors, Monolithic Capacitors, Inductors. Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, General operational amplifier stages, DC and AC performance characteristics, slew rate, Open and closed loop configurations.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS
Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters, Sine-wave generators, Triangular wave generator, Saw-tooth wave generator, Astable and Monostable Multivibrators.

UNIT III ANALOG MULTIPLIER AND PLL
Analog Multiplier using Emitter Coupled Transistor Pair, Gilbert Multiplier cell, Variable transconductance technique, Analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS
Analog and Digital Data Conversions, D/A converter, specifications, weighted resistor type, R-2R Ladder type, Voltage Mode and Current Mode R-2R Ladder types, switches for D/A converters, high speed sample and hold circuits, A/D Converters, specifications, Flash type, Successive Approximation type, Single Slope type, Dual Slope type.

UNIT V TIMER, VOLTAGE REGULATORS AND FUNCTION GENERATOR ICs
Timer IC 555 - Description and Functional Diagram, Monostable operation, Astable operation, IC Voltage regulators, Three terminal fixed and adjustable voltage regulators, IC 723 general purpose regulator, IC L8038 function generator - Description and Functional Diagram, SMPS

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES

Upon successful completion of this course, students will be able to:

- Recognize, analyze and manipulate basic continuous time (CT) and discrete time (DT) signals.
- Classify continuous and discrete time systems as to their linearity, time invariance, causality and stability.
- Represent and analyze both CT and DT Signals using appropriate transforms.
- Analyze both CT and DT Linear Time Invariant systems using appropriate transforms.

UNIT I  CLASSIFICATION OF SIGNALS AND SYSTEMS

Continuous time signals (CT signals), Discrete time signals (DT signals), Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals, periodic and aperiodic, random signals, CT systems and DT systems, Basic properties of systems, Linear Time Invariant systems and properties.

UNIT II  ANALYSIS OF CONTINUOUS TIME SIGNALS

Fourier series analysis, Spectrum of CT signals, Fourier Transform and Laplace Transform in Signal Analysis.

UNIT III  LINEAR TIME INVARIANT - CONTINUOUS TIME SYSTEMS

Differential equation, Block diagram representation, Impulse response, Convolution integral, frequency response, LTI systems analysis using Fourier and Laplace transforms, State variable equations and matrix representation of systems.

UNIT IV  ANALYSIS OF DISCRETE TIME SIGNALS

Sampling of CT signals and aliasing, DTFT and properties, Z-transform and properties of Z-transform.

UNIT V  LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS

Difference equation, Block diagram representation, Impulse response, Convolution sum, LTI systems analysis using DTFT and Z-transforms, State variable equations and matrix representation of systems.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS


REFERENCES

13EC47  ELECTRONIC CIRCUITS AND SIMULATION LABORATORY  L  T  P  C
0  0  3  2

COURSE OUTCOMES
Upon successful completion of this course, students will be able to:

- Acquire a basic knowledge in various Transistor feedback amplifier and Transistor as Multivibrator.
- Analyze and design analog electronic circuits using discrete components.
- Design, construct and measure various analog circuits through simulation software and compare the results in the laboratory with theoretical analysis.

LIST OF EXPERIMENTS
1. Design and Construct negative feedback amplifiers. Plot the Frequency response and Determine the Input, output impedance with and without feedback.
2. Design and construct RC Phase shift oscillator for the given specifications.
3. Design and construct Hartley Oscillator and Colpitts Oscillator for the given specifications.
4. Construct various types of Clippers and Clampers circuit.
5. Construct a Class A Power Amplifier and Determine the efficiency.
6. Construct a Class B Complementary Symmetry Power Amplifier and Determine the efficiency.
7. Construct and simulate Differential amplifier using PSPICE.
8. Construct and simulate Transistor based Astable, Monostable and Bistable multivibrator using PSPICE.
9. Construct and simulate Clipper, Clamper, Low pass RC circuit and High pass RC circuit using PSPICE.

TOTAL: 45 PERIODS
13EC48 DIGITAL AND LINEAR INTEGRATED CIRCUITS LABORATORY

COURSE OUTCOMES
Upon successful completion of this course, students will be able to:

- Analyze, design, construct and troubleshoot broad range of combinational circuits using logic gates and digital IC’s.
- Analyze, design, construct and troubleshoot broad range of sequential circuits using digital IC’s.
- Experimentally verify the different kind of op-amp based circuits for the given design specifications.
- Design a simple DC power supply using discrete components and IC

LIST OF EXPERIMENTS

Digital IC’s
1. Design and implementation of Adder and Subtractor using logic gates.
2. Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154.
3. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147.
4. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters.
5. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip-flops.

LINEAR IC
6. Design and verification of Inverting amplifier, Non inverting amplifier, Integrator and Differentiator.
7. Design and verification of the Instrumentation amplifier
8. Design and verification of Active low pass, high pass and band pass filters.
10. Design and verification of Astable and Monostable multivibrators using NE 555 Timer.
11. Design and verification of PLL characteristics and its use as Frequency Multiplier.
12. Design and verification of DC power supply using LM317 and LM723.

TOTAL: 45 PERIODS
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
• Express themselves fluently and appropriately in social and professional contexts.
• Develop the sub-skills required for paper presentations and group discussions.
• Acquire the soft skills and interpersonal skills which will help them to excel in their workplace.

A) LANGUAGE FUNCTIONS (15 hrs)
1. Compare and contrast
2. Giving reasons
3. Reporting
4. Expressing agreement and disagreement
5. Evaluating different standpoints
6. Analyzing a problem and giving solution
7. Describing daily routines, events, and weather
8. Describing Objects
9. Defending a point of view
10. Talking about future plans and intentions

Language Functions:
The teacher should build micro activities to develop the use of language required to handle these sub-functions of communication. In the process, the learners should get used to the linguistic Elements needed for these functions.

B) SPEECH PRACTICE (15 hrs)
The themes are:
1. Cloning
2. Artificial satellites
3. Renewable sources
4. Telecommunication
5. Cyber Revolution
6. Space research
7. Polythene pollution
8. Fossil fuels
9. Safety measures in Automobiles
10. Ecological threats
11. Water resources
12. Nuclear technology
13. Scientific farming
14. Thermal power plants
15. Nano Technology
16. Robotics
17. Artificial intelligence
18. Role of Fibre Optics
19. Exploration of Mars
20. Gas turbines
21. Indian space missions
22. Converting agricultural wastes for useful purposes
23. Developments in transportation
24. Scientific Farming
25. Impact of global warming
26. Desalination of water
27. Technology for national security
28. Industrial development and ecological issues
29. Recent trends in Automobiles
30. Hazards of E-waste
31. Mobile Jammer
32. Touch Screen Technology
33. Tidal Power
34. 3G Technology
35. Tsunami Warning System
36. Blue Tooth Technology

Seminar presentation on the themes allotted:
Each student should collect materials from Books, Internet, Journals and Newspapers for his/her theme and prepare a short Seminar Paper for 4 to 5 Pages. The presentation should be for 10 minutes using power point frames. It should be followed by a Viva Voce during which others should come forward to question, clarify, supplement or evaluate.

C) GROUP DISCUSSION / DEBATE (10hrs)
Grouping (each group consisting of 12 members)
Topics (12 topics – 3 topics to be selected by each group - to be practiced in cycles)

Group Discussion / Debate Topics:
1. Advertising is a legalized form of lying- Discuss.
2. Communicative competency in English is the golden key for success in the Global arena.
3. Is it just to force people to retire?
4. Attitude decides one’s altitude in life.
5. Should an aspiring student go for a course which is in demand or for a course which he/she likes?
6. Is westernization a cultural degradation or enrichment?
7. Is Brain drain a threat to India?
9. Do Mobile phones spoil the youth?
10. No two generations see eye to eye- Discuss.
11. Is scientific advancement a boon or a bane?
12. Does ragging develop friendship?

D) SPEAKING ON THE GIVEN PICTURE/DIAGRAM/CHART/TABLE (5 hrs)
RECORD LAY OUT:
Every student has to maintain a record in which he/she has to incorporate the following details.
- First page containing learner details and the topic of specialization
- Use of appropriate Language used in Language Function should be listed.
- Three newspaper cuttings or journal or internet sources related to the specialized theme. (To be pasted on the pages)
- 10 Quiz questions of the specialized topic with expected answers.
- The seminar paper presented by the learner (to be pasted).
- Notes of observation - Lab. (Details about Interview skills – GD – Soft skills)
- The record should be duly signed by the course teacher and submitted to the External Examiner for verification during the semester practical.

REFERENCES
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Analyze, Generate and detect non-linear and linear AM.
CO 2: Analyze, Generate and detect FM.
CO 3: Model the components of continuous wave communication systems
CO 4: Characterize the noise and theoretically predict SNR, Figure of merit of analog communications systems in AWGN channel.
CO 5: Explore the basic concepts of pulse communication.

UNIT I AMPLITUDE MODULATION TECHNIQUES 12
An overview of electronic communication system, Spectrum of AM, AM power calculations, Generation and detection of AM, DSBSC, SSBSC and VSB modulation techniques, Comparison of AM techniques.

UNIT II ANGLE MODULATION TECHNIQUES 12

UNIT III ANALOG COMMUNICATION SYSTEMS 12
Block schematic of AM transmitters, TRF receiver, Super heterodyne receiver, AM Receiver using PLL, Block Schematic of FM Transmitters and Receivers, Multiplexing systems – Frequency Division Multiplexing, Quadrature carrier multiplexing, case study: Television system.

UNIT IV NOISE THEORY 12
Noise sources and types, Shot noise, Thermal noise, White Noise, Narrow band noise and its representation models, Noise figure and noise temperature, Signal to Noise Ratio, Noise Analysis in AM and FM Receivers, Pre-emphasis and De-emphasis in FM.

UNIT V PULSE ANALOG MODULATION TECHNIQUES 12
Sampling Theory- Sampling of Continuous time signal- Spectrum of sampled signal. Ideal sampling and Reconstruction, Aliasing effect, Practical sampling, Pulse Amplitude Modulation, Time Division Multiplexing.

L:45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13EC52 DIGITAL SIGNAL PROCESSING L T P C
3 1 0 4

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Explain the relationship between DTFT, DFT and FFT and computation of DFT.
CO 2: Design analog and digital IIR filters and realize them.
CO 3: Design digital FIR filters and realize them.
CO 4: Analyse the finite word length effects in signal processing.
CO 5: Explain the concepts of Multirate signal processing.

UNIT I DISCRETE FOURIER TRANSFORM 12
DFT and its properties, Relation between DTFT, DFT and FFT, DFT computations using Decimation in time and Decimation in frequency algorithms, Inverse DFT using FFT algorithms, Use of FFT in linear filtering, Sectionalized convolution-overlap add and save procedure.

UNIT II INFINITE IMPULSE RESPONSE DIGITAL FILTERS 12

UNIT III FINITE IMPULSE RESPONSE DIGITAL FILTERS 12

UNIT IV FINITE WORD LENGTH EFFECTS 12
Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error - Overflow error - Roundoff noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling

UNIT V MULTIRATE SIGNAL PROCESSING 12
Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion-Design of narrow band filters -Applications of Multirate signal processing.

L:45, T:15,TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13EC53 MICROPROCESSORS AND MICROCONTROLLER

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Describe the fundamental features and operation of contemporary Microcontroller and Microprocessor.

CO 2: Explain the pin configuration and Memory organization of a typical 8085 Microprocessor & 8051 Microcontroller.

CO 3: Analyze the Instruction Set of 8085 Micro-processor and 8051 Micro controller.

CO 4: Develop assembly language source code for applications that use I/O ports, timer and single/multiple interrupts.

CO 5: Produce interfacing examples using 8085 Micro-processor & 8051 Microcontroller.

UNIT I INTRODUCTION
Introduction to 8085 microprocessor architecture-Memory Interfacing-I/O Data transfer concepts-Addressing modes-Timing diagram-Interrupts system-Instruction set- Simple programming in 8085, Architecture of 8086.

UNIT II MICROPROCESSOR PERIPHERAL INTERFACING
Introduction, Generation of I/O Ports, Programmable Peripheral Interface (PPI)-Intel 8255, Programmable Keyboard & display (8279), Programmable Interval timers (Intel 8253), UART (8251), D-to-A converter, A-to-D converter, DMA controller , Interrupt controller.

UNIT III 8051 MICROCONTROLLER
Introduction to 8051 Micro-controller, Architecture, Memory organization, Special function registers, Port Operation, Memory Interfacing, I/O Interfacing, Interrupts.

UNIT IV 8051 INSTRUCTION SET AND PROGRAMMING
Programmer’s model of 8051, Operand types, Operand addressing, Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions, Simple Programs.

UNIT V SYSTEM DESIGN USING 8051
Traffic light control, washing machine control, RTC Interfacing using I²C Standard- Motor Control using Relay, PWM, DC & Stepper Motor control, Electronic lock system.

L: 45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

13EC54 CONTROL SYSTEMS ANALYSIS AND DESIGN  L T P C
3 1 0 4

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

- CO 1: Develop the mathematical model and describe the transfer function of electrical and electronic systems using block diagrams and signal flow graph.
- CO 2: Analyze the time response and steady state error of the first order and the second order control systems.
- CO 3: Investigate the control systems using frequency domain plots.
- CO 4: Determine the stability of the control systems in time, frequency and spatial domain representations.
- CO 5: Derive the state space representation of the control system and determine its controllability and observability.

UNIT I CONTROL SYSTEM MODELING 12
Control systems – Terminology and Basic Structure, Open loop and Closed loop systems, Differential equation, Transfer function, Mathematical Modeling of Electrical and Op-amp based Electronic systems, Block diagram reduction Techniques, Signal flow graph.

UNIT II TIME RESPONSE ANALYSIS 12
Standard test signals, First order systems, Impulse and Step Response analysis of second order systems, Time domain specification, Steady state errors and error constants.

UNIT III FREQUENCY RESPONSE ANALYSIS 12
Frequency response analysis, Bode plot, Polar plot, Nyquist plot, Frequency Domain specifications from the plots, Lead Lag Compensator design and analysis.

UNIT IV STABILITY ANALYSIS 12

UNIT V STATE VARIABLE ANALYSIS 12
State space representation of Continuous Time systems, State equations, Transfer function from State Variable Representation, Solutions of the state equations, Concepts of Controllability and Observability, State space representation for Discrete time systems.

L: 45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13EC55 PROFESSIONAL ETHICS AND HUMAN VALUES
(Common to all branches)  

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO1: recognize the core values that shape the ethical behavior of an engineer

CO2: expose awareness on professional ethics and human values.

CO3: distinguish their role in technological development

UNIT I HUMAN VALUES 9

UNIT II ENGINEERING ETHICS 9

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9
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 9

UNIT V GLOBAL ISSUES 9
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.

L:45 TOTAL: 45PERIODS

TEXT BOOKS

REFERENCES

13EC57 ANALOG COMMUNICATION AND SIGNAL PROCESSING LABORATORY

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Discuss the instruction set of DSP Processor and apply them in signal processing.
CO 2: Design and apply DSP concepts like convolution, filtering on various signals and get familiarized with MATLAB codings.
CO 3: Apply MATLAB coding to obtain Spectral response of a signal, sampling principles and finite-word-length effects in signal processing.
CO 4: Demonstrate the behaviour of various types of modulators and demodulators for analog modulation techniques.
CO 5: Construct the TDM/FDM circuit/ pre-emphasis, de-emphasis circuits and demonstrate their significance.

LIST OF EXPERIMENTS
1. Study of AM modulator & demodulator
2. Study of FM modulator & demodulator
3. Study and verification of Time Division Multiplexing/Frequency Division Multiplexing.
4. Study of pre-emphasis and de-emphasis circuits
5. Verification of Sampling Theorem and effects of aliasing using MATLAB
6. Study and verification of Linear and Circular Convolution using MATLAB.
7. Designing of FIR/IIR Filters using MATLAB.
8. Calculation of FFT of a signal using MATLAB.
9. Study of various addressing modes using TMS320C64XX/67XX processor.
10. Implementation of linear &circular convolution using TMS320C64XX/67XX processor.
12. Wave form generation using TMS320C64XX/67XX processor.
13. Calculation of FFT using TMS320C64XX/67XX processor.

P:45 TOTAL: 45 PERIODS
13EC58 MICROPROCESSOR AND MICROCONTROLLER LABORATORY

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Perform Arithmetic, Logical and Bit Manipulation operations in 8085 microprocessor and 8051 microcontroller.

CO 2: Establish serial and parallel communication between two microprocessors.

CO 3: Interface 8051/8085 with ADC, DAC, Stepper motor, 8279, 8259 and 8253.

CO 4: Verify Timer, Interrupts and UART operations in 8051 microcontroller.

LIST OF EXPERIMENTS
1. Programs for arithmetic & logical operations using 8085 Microprocessor.
2. Programs for Sorting & Searching using 8085 Microprocessor.
3. Parallel communication between two kits using 8255 interfacing card.
4. Waveform generation using 8255 and 8253/8254 interfacing card.
5. Interfacing ADC and DAC using 8051 Micro-controller.
7. Programming and verifying Timer, Interrupts and UART operations in 8051 Micro-controller.
8. Interfacing of LED and LCD with 8051 Micro-controller.
10. Serial Communication between 8051 Micro-controller kit and PC.

P:45 TOTAL: 45 PERIODS

Prepared by Module coordinator Programme coordinator Board Chairman

Verified by
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Compute the channel capacity and describe digital communication systems.
CO 2: Calculate signal to quantization noise ratio for PCM, DPCM, ADPCM, DM & ADM.
CO 3: Design an encoder and decoder for error control.
CO 4: Analyze baseband reception techniques.
CO 5: Evaluate the error performance of coherent detection systems.

UNIT I INFORMATION THEORY AND INTRODUCTION TO DIGITAL COMMUNICATION SYSTEM

UNIT II BASEBAND FORMATTING TECHNIQUES
Quantization – Uniform and Non-uniform; Encoding Techniques – Temporal waveform encoding - PCM, Bandwidth of PCM system, Noise in a PCM system, SNR of PCM system with quantization noise, Adaptive PCM, DPCM, SNR improvement in DPCM, Delta modulation, SNR of DM system, Adaptive Delta modulation.

UNIT III CHANNEL CODING TECHNIQUES AND LINE CODES
Error Control Codes - Block Codes, Convolutional Codes, Concept of Error Free Communication; Classification of line codes, desirable characteristics and power spectra of line codes.

UNIT IV BASEBAND RECEPTION TECHNIQUES
Geometric representation of Signals, Gram Schmidt Orthogonalization Procedure, Noise in Communication Systems; Receiving Filter – Correlator type, Matched Filter type; Equalizing Filter - Signal and system design for ISI elimination, Implementation, Eye Pattern analysis; Detector – Maximum Likelihood Detector, Error Probability, Figure-of-Merit for Digital Detection.

UNIT V BANDPASS SIGNAL TRANSMISSION AND RECEPTION
Memoryless modulation methods - Representation and Spectral characteristics, Binary ASK, Binary PSK, Binary FSK, QAM, QPSK; Band pass receiving filter, Error performance – Coherent detection systems:ASK,FSK,PSK.Introduction to spread spectrum techniques.

L:45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

13EC62 COMPUTER ARCHITECTURE AND ORGANIZATION L T P C

3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Explain the organization of digital computers and the basic operations of different components.
CO 2: Describe the representation and manipulation of data on the computer.
CO 3: Design the system level components and analyze the issues of pipelining.
CO 4: Posses the knowledge of memory hierarchy and its impact on computer cost/performance.
CO 5: Analyze how various computer components interact in order to exchange information.

UNIT I INTRODUCTION

UNIT II DATA PATH DESIGN
Addition and subtraction of signed numbers – Design of fast adders – multiplication of positive numbers- signed operand multiplication and fast multiplication – non restoring division algorithm – Combinational ALU - floating point numbers and operations

UNIT III BASIC PROCESSING UNIT

UNIT IV MEMORY SYSTEM

UNIT V I/O ORGANIZATION

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

13EC63 COMPUTER COMMUNICATION NETWORKS L T P C
3 1 0 4

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Describe and Discuss the concepts of networks, types and architectures.
CO 2: Identify error free transmission of data and analyse data collision with various protocols.
CO 3: Apply various routing algorithms over a network to provide optimal path.
CO 4: Examine the addressing entities of a network with implementation of TCP, UDP protocols.
CO 5: Illustrate the real time applications of networks.

UNIT I INTRODUCTION TO COMPUTER COMMUNICATION NETWORKS AND PHYSICAL LAYER 12

UNIT II DATA LINK LAYER 12
Multiple access: Random access – Controlled access

UNIT III NETWORK LAYER 12

UNIT IV TRANSPORT LAYER 12

UNIT V APPLICATION LAYER 12

L:45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

13EC64 ANTIENNAS AND WAVE PROPAGATION  
**COURSE OUTCOMES**
Upon successful completion of this course, the students will be able to

**CO 1:** Distinguish the properties and parameters of antenna such as radiation pattern, radiation impedance, directivity, antenna gain, effective area.

**CO 2:** Design an antenna system with the radiating elements in an array, given the radiation parameters such as radiation pattern, gain, operating frequency, transmit/receive power.

**CO 3:** Design aperture and special antennas for the given specification.

**CO 4:** Analyze and classify the antennas for wireless applications.

**CO 5:** Identify the mechanism of the atmospheric effects on radio wave propagation.

**UNIT I PHYSICAL CONCEPT OF RADIATION**  
Basic properties of transmitting and receiving antenna, Antenna parameters: Radiation pattern, Directivity, Gain, Radiation resistance, Mutual impedance, Input impedance, Polarization, Bandwidth, Beamwidth, Effective aperture, Vector effective length, Antenna temperature. Reciprocity principle and its applications, Friis transmission formula. 

**Wire antennas:** Short dipole, Radiation resistance and Directivity, Half wave Dipole, Monopole, Small loop antennas.

**UNIT II THEORY OF ARRAY ANTENNAS**  
Antenna Arrays: Linear Array and Pattern Multiplication, Two-element Array, Uniform Array, Array with non-uniform Excitation-Binomial Array, log-periodic dipole arrays and Yagi-uda arrays.

**UNIT III APERTURE ANTENNAS AND SPECIAL ANTENNAS**  

**UNIT IV ANTENNA MEASUREMENTS AND ANTENNAS FOR MOBILE APPLICATIONS**  
Microstrip Patch Antenna-Planar-Coplanar, Intenna, PIFA, Basic Concepts of Smart Antennas-Beamforming- Fixed weight beamforming - Adaptive beamforming. 

**Antenna Measurements:** Radiation Pattern measurement, Gain and Directivity Measurements, Anechoic Chamber.

**UNIT V RADIO WAVE PROPAGATION**  

**TEXT BOOKS**

**REFERENCES**
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Explain the basic CMOS circuits and the CMOS process technology.
CO 2: Design Combinational and Sequential circuits.
CO 3: Discuss the concepts of CMOS Testing.
CO 4: Model the digital system using Verilog HDL.

UNIT I CMOS TECHNOLOGY 12

UNIT II CLASSIFICATION OF ICs AND CMOS CIRCUIT CHARACTERIZATION 12
SSI, MSI, LSI, VLSI definitions, ASIC classification - Full Custom ASICs, Standard-Cell Based ASICs, Gate-Array-Based ASICs, Channeled, Channelless, Structured Gate Array and Architecture of Generic FPGA. Delay Estimation, Logical Effort and Transistor Sizing, Power Dissipation, Interconnect, Design Margin, Reliability, Scaling.

UNIT III COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN 12
Combinational Circuit Design: Circuit Families – Static CMOS, Ratioed Circuits, Dynamic Circuits, Pass-transistor Circuits, Low power Logic Design, Comparison of Circuit Families
Sequential Circuit Design: Sequencing Static Circuits, Circuit design of Latches and Flip-Flops.

UNIT IV CMOS TESTING 12

UNIT V SPECIFICATION USING VERILOG HDL 12

L: 45 T:15 TOTAL: 60 PERIODS

TEXT BOOKS
REFERENCES

13EC67 DIGITAL COMMUNICATION AND NETWORKS LABORATORY

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Demonstrate techniques to Detect and Correct errors during transmission.
CO 2: Demonstrate understanding of the routing algorithms employed for reliable Computer Communication Networks.
CO 3: Demonstrate the behavior of various types of modulators and demodulators for digital Modulation techniques.

LIST OF EXPERIMENTS
1. PC to PC Serial communication using RS 232C.
2. Analysis of logical link control layer protocols - Stop & wait, Sliding window.
3. Ethernet LAN protocol / to create scenario and study the performance of CSMA/CD, CSMA/CA protocol ethereal simulation.
5. Implementation of VLAN/ NAT.
8. Study of Pulse Modulation- PAM using discrete components
9. Study of Digital Modulation schemes – ASK, PSK, QPSK, and FSK using discrete components and MATLAB
10. Study of AWGN channel characteristics using MATLAB.

P: 45 TOTAL: 45 PERIODS
13EC68 VLSI DESIGN LABORATORY
L T P C
0 0 3 2

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Design and Implement a digital circuit for given specifications and analyze it using FPGA based software tools.
CO 2: Perform the ASIC based circuits design for given specifications and analyze it in terms of Speed, Area and Power consumption using ASIC based software tools.

LIST OF EXPERIMENTS
1. Design entry and simulation of combinational logic circuits (8 bit adders, 4 bit multipliers, address decoders, multiplexers), test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
2. Design entry and simulation of sequential logic circuits (Counters, PRBS generators, Accumulators), test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
3. Combinational logic circuits design using CADENCE tool. Concepts of floor plan, timing analysis, area analysis & power consumption analysis to be highlighted.
4. Sequential logic circuits design using CADENCE tool. Concepts of floor plan, timing analysis, area analysis & power consumption analysis to be highlighted.
5. Implementation of combinational and sequential logic circuits simulated in experiment 1 and experiment 2 in FPGA.
6. Design the schematic of CMOS inverter, perform layout simulation, parasitic extraction and performance analysis using CADENCE Tool.
7. Design a 4 input NAND and NOR gates for different CMOS families. Obtain the layout for the design and compare the delay performance.
8. Design a carry look ahead adder using standard cell approach.

P: 45 TOTAL: 45 PERIODS
13ECAA FUNDAMENTALS OF DIGITAL IMAGE PROCESSING  L  T  P  C
3  0  0  3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Describe the principles of image fundamentals and apply the mathematical knowledge to process the images.

CO 2: Apply the image enhancement techniques to gray scale and color images for improving the visual content of the image.

CO 3: Apply the proper restoration techniques for a specific application.

CO 4: Analyze the segmentation methods for a specific application.

CO 5: Evaluate the rate of image compression achieved for different techniques.

UNIT I DIGITAL IMAGE FUNDAMENTALS
Elements of digital image processing systems, Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

UNIT II IMAGE ENHANCEMENT

UNIT III IMAGE RESTORATION

UNIT IV IMAGE SEGMENTATION

UNIT V IMAGE COMPRESSION
Need for data compression- Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Explain the concepts of pipelining, parallel processing.
CO 2: Apply optimization techniques to design IIR and FIR filters.
CO 3: Discuss scaling and round-off noise issues and their impact on performance.
CO 4: Explain the concepts of numerical strength reduction and wave pipelining.

UNIT I DSP SYSTEMS, PIPELINING AND PARALLEL PROCESSING
Introduction – Representations of DSP algorithms - Iteration Bound - data flow graph representations, loop bound and iteration bound, Longest path Matrix algorithm; Pipelining and parallel processing - Pipelining of FIR digital filters, parallel processing, pipelining and parallel processing for low power.

UNIT II RETIMING, UNFOLDING AND RANK ORDER FILTERS
Retiming - definitions and properties; Unfolding - an algorithm for Unfolding, properties of unfolding, parallel processing application; Algorithmic strength reduction in filters and transforms - 2-parallel FIR filter, 2-parallel fast FIR filter, parallel architectures for rank-order filters, Odd- Even Merge-Sort architecture, parallel rank-order filters.

UNIT III FAST CONVOLUTION, PIPELINING AND PARALLEL PROCESSING OF IIR FILTERS
Fast convolution - Cook-Toom algorithm, modified Cook-Toom algorithm; Pipelined and parallel recursive filters - inefficient/efficient single channel interleaving, Look Ahead pipelining in first-order IIR filters, Look-Ahead pipelining with power-of-two decomposition, Clustered Look-Ahead pipelining, parallel processing of IIR filters, combined pipelining and parallel processing of IIR filters.

UNIT IV ROUNDOFF NOISE AND BIT-LEVEL ARITHMETIC ARCHITECTURES
Scaling and roundoff noise- scaling operation, roundoff noise, state variable description of digital filters, scaling and roundoff noise computation, roundoff noise in pipelined first-order IIR filters; Bit-Level Arithmetic Architectures- parallel multipliers with sign extension, parallel carry-ripple array multipliers, parallel carry-save multiplier, 4x 4 bit Baugh- Wooley carry-save multiplication, design of Lyon's bit-serial multipliers using Horner's rule.

UNIT V NUMERICAL STRENGTH REDUCTION AND WAVE PIPELINING
Numerical Strength Reduction - subexpression elimination, multiple constant multiplications, iterative matching, Two-phase clock generator, clock skew in edge triggered single-phase clocking, two-phase clocking, wave pipelining.

L:45 TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES
13ECAC DIGITAL SIGNAL PROCESSORS L T P C

COU RSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Perform the fixed and floating point arithmetic operation and analyze the computational accuracy.
CO 2: Explain the basic architectural features of Programmable DSP’s.
CO 3: Explain the architecture and addressing modes of ‘C54XX processor.
CO 4: Explain the architecture and addressing modes of ‘C6X processor.
CO 5: Discuss the recent trends in DSP system design.

UNIT I COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS 9
Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT II ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES 9
Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT III PROGRAMMABLE DIGITAL SIGNAL PROCESSORS 9
Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX Processors, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT IV ARCHITECTURE OF ‘C6X PROCESSORS 9

UNIT V RECENT TRENDS IN DSP SYSTEM DESIGN 9

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECAD WAVELETS AND ITS APPLICATIONS

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
  CO 1: Use Fourier tools to analyze signals
  CO 2: Discuss about MRA and representation using wavelet bases
  CO 3: Acquire knowledge about various wavelet transforms and design wavelet transform
  CO 4: Apply wavelet transform for various signal & image processing applications

UNIT I FUNDAMENTALS
Vector Spaces – Properties– Dot Product – Basis – Dimension, Orthogonality and Orthonormality –
Relationship Between Vectors and Signals – Signal Spaces – Concept of
Convergence – Hilbert Spaces for Energy Signals- Fourier Theory: Fourier series expansion, Fourier
transforms, Short time Fourier transforms, Time-frequency analysis.

UNIT II MULTI RESOLUTION ANALYSIS
Definition of Multi Resolution Analysis (MRA) – Haar Basis – Construction of General Orthonormal
MRA – Wavelet Basis for MRA – Continuous Time MRA Interpretation for the DTWT – Discrete
Time MRA – Basis Functions for the DTWT – PRQMF Filter Banks.

UNIT III CONTINUOUS WAVELET TRANSFORMS
Wavelet Transform – Definition and Properties – Concept of Scale and its Relation with Frequency –
Continuous Wavelet Transform (CWT) – Scaling Function and Wavelet Functions (Daubechies
Coiflet, Mexican Hat, Sinc, Gaussian, Bi Orthogonal)– Tiling of Time – Scale Plane for CWT.

UNIT IV DISCRETE WAVELET TRANSFORM
Filter Bank and Sub Band Coding Principles – Wavelet Filters – Inverse DWT Computation by Filter
Banks – Basic Properties of Filter Coefficients – Choice of Wavelet Function Coefficients –
Derivations of Daubechies Wavelets – Mallat's Algorithm for DWT – Multi Band Wavelet
Transforms Lifting Scheme- Wavelet Transform Using Polyphase Matrix

UNIT V APPLICATIONS
Wavelet methods for signal processing- Image Compression Techniques: EZW–SPHIT Coding –
Detection and Object Isolation, Image Fusion, and Object Detection.

TEXT BOOKS

REFERENCES
   Applications”, WileyInterscience Publication, John Wiley & Sons Inc.,2004

13ECAE BIOSIGNAL PROCESSING

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Categorize and model the biomedical signals.
CO 2: Analyze and process neurological signals.
CO 3: Develop a practical diagnosis system to analyze cardiological signals.
CO 4: Investigate optimal and adaptive filtering techniques for removing artifacts.
CO 5: Exploit the latest trends and their applications in biomedical signal processing.

UNIT I INTRODUCTION TO BIOMEDICAL SIGNAL 9
Nature of Biomedical Signals, Typical Sources of Biomedical Signals, Biomedical Signal Analysis: Objectives and Difficulties-Computer Aided Diagnosis. Concurrent, Coupled and Correlated Processes: Illustration with case studies, Application-segmentation of PCG.

UNIT II NEUROLOGICAL SIGNAL PROCESSING 9

UNIT III CARDIOLOGICAL SIGNAL PROCESSING 9
Basic electrocardiography, ECG Data Acquisition, ECG lead systems, ECG parameters and their estimation, Use of multi scale analysis for parameter estimation, Arrhythmia analysis monitoring, Long-term continuous ECG recording.

UNIT IV FILTERING FOR REMOVAL OF ARTIFACTS 9

UNIT V BIOSIGNAL CLASSIFICATION AND DIAGNOSTIC DECISION 9
Diagnostic of bundle-branch block-Illustration, Pattern classification, Supervised and Unsupervised pattern classification, probabilistic models and statistical decision. Training test steps, Neural Networks and Applications.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

13ECBA RADAR AND NAVIGATIONAL AIDS L T P C

<table>
<thead>
<tr>
<th>COURSE OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upon successful completion of this course, the students will be able to:</td>
</tr>
<tr>
<td>CO 1: Explain the fundamentals of Radars and its propagation.</td>
</tr>
<tr>
<td>CO 2: Analyze the detection of signals in the presence of noise.</td>
</tr>
<tr>
<td>CO 3: Discuss the concepts of Radar transmitter and receiver</td>
</tr>
<tr>
<td>CO 4: Identifying various types of navigation system</td>
</tr>
</tbody>
</table>

UNIT I RADAR EQUATIONS 9

UNIT II MTI AND PULSE DOPPLER RADAR 9

UNIT III RADAR SIGNAL DETECTION AND PROPAGATION OF WAVES 9

UNIT IV RADAR NAVIGATION 9

UNIT V RADAR TRANSMITTER AND RECEIVER 9

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES


13ECBB STATISTICAL THEORY OF COMMUNICATION

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

COURSE OUTCOMES
Upon successful completion of the course, the students will able to

CO 1: State the basic of classical detection and estimation theory.

CO 2: Formulate signal parameters

CO 3: Formulate continuous waveforms and Linear systems

UNIT I CLASSICAL DETECTION AND ESTIMATION THEORY

UNIT II REPRESENTATIONS OF RANDOM PROCESSES

UNIT III DETECTION OF SIGNALS – ESTIMATION OF SIGNAL PARAMETERS

UNIT IV ESTIMATION OF CONTINUOUS WAVEFORMS
Derivation of Estimator equations – A Lower bound on the mean square estimation error – Multidimensional waveform estimation – Non random waveform estimation.

UNIT V LINEAR ESTIMATION

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS


REFERENCES
13ECBC  MULTIMEDIA COMPRESSION AND COMMUNICATION  L  T  P  C
3  0  0  3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Explain the characteristics of different multimedia components.
CO 2: Analyze the algorithms used for text and image compression.
CO 3: Illustrate the different audio and video compression principles.
CO 4: Explain the basic concepts and the protocols of VoIP technology.
CO 5: Illustrate the service requirements, protocols and mechanisms used for different multimedia applications.

UNIT I  MULTIMEDIA COMPONENTS  9
Introduction, Special features of multimedia, Multimedia components and their characteristics - Text, audio, images, graphics, animation, video.

UNIT II  TEXT AND IMAGE COMPRESSION  9

UNIT III  AUDIO AND VIDEO COMPRESSION  9

UNIT IV  VoIP TECHNOLOGY  9

UNIT V  MULTIMEDIA NETWORKING  9
Multimedia networking applications, Streaming stored audio and video, Making the best Effort service, Protocols for real time interactive Applications, Distributing multimedia, Beyond best effort service, Scheduling and policing mechanisms, Integrated services, Differentiated Services, RSVP.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECBD INFORMATION THEORY AND CODING TECHNIQUES  L  T  P  C
           3  0  0  3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Define entropy, mutual information and channel capacity.
CO 2: Apply Source coding techniques for Text, Audio, speech, image and video.
CO 3: Analyze Error detecting and correcting capabilities of block codes and convolutional codes.

UNIT I INFORMATION THEORY

UNIT II SOURCE CODING: TEXT, AUDIO AND SPEECH
Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm, Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3, Speech: Channel Vocoder, Linear Predictive Coding

UNIT III SOURCE CODING: IMAGE AND VIDEO

UNIT IV ERROR CONTROL CODING: BLOCK CODES
Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder and decoder – CRC.

UNIT V ERROR CONTROL CODING: CONVOLUTIONAL CODES

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECBE GLOBAL NAVIGATION SATELLITE SYSTEM

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Describe the working of GPS.
CO 2: Discuss the satellite constellation, signal structure and errors in GPS.
CO 3: Explain the applications of GPS.

UNIT I OVERVIEW OF GPS
Introduction to Global navigation satellite system, Kepler’s law and orbital dynamics, Satellite Orbital parameters, Orbital Perturbations, GPS observables, Basic Equations for finding user position, pseudorange measurement in receiver, user position determination from pseudoranges.

UNIT II GPS SATELLITE CONSTELLATION AND SIGNAL STRUCTURE
GPS System segments - signals - signal generation – Signal characteristics – signal power levels, Determination of GPS satellite coordinates, GPS data formats: receiver independent exchange format (RINEX)

UNIT III DIFFERENTIAL GPS
Basic concepts of DGPS, Local area DGPS, Extension of Range of Accurate DGPS, Real time and Post processing DGPS, Data link, RTCM format

UNIT IV GPS RECEIVERS AND ERRORS
GPS receiver, Signal conditioning, Signal Acquisition, Carrier and code tracking, Converting tracking outputs to Navigation data, Subframe matching and Parity check, GNSS antennas, Weak signals and their Acquisition, GPS Error sources, Error correction models, Receiver noise, Ionospheric effects on GPS signals

UNIT V GLOBAL NAVIGATION SATELLITE SYSTEM
GLONASS components – Constellation details – Signal structure – Time and Co-ordinate systems, NAVSTAR GPS, GALILEO

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECBF ELECTROMAGNETIC INTERFERENCE AND COMPATABILITY

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Explain EMI Sources and EMI problems.
CO 2: Discuss the concepts of EMI coupling in cables and other equipments.
CO 3: Describe the mitigation techniques for EMI.
CO 4: Explain the standards and regulations for EMI/EMC.
CO 5: Discuss the various EMI test methods.

UNIT I BASIC CONCEPTS
Definition of EMI and EMC, Intra and Inter system EMI, Sources and victims of EMI, Conducted and Radiated EMI emission and susceptibility, Transient & ESD, Case Histories, Radiation Hazards to humans.

UNIT II COUPLING MECHANISM
Common mode coupling, Differential mode coupling, Common impedance coupling, Ground loop coupling, Field to cable coupling, Cable to cable coupling, Power mains and Power supply coupling.

UNIT III EMI MITIGATION TECHNIQUES
Shielding - principle, choice of materials for H, E and free space fields, and thickness, EMI gaskets, Bonding, Grounding - circuits, system and cable grounding, Filtering, Transient EMI control devices and applications, PCB Zoning, Component selection, mounting, trace routing.

UNIT IV STANDARDS AND REGULATION
Units of EMI; National and International EMI Standardizing Organizations - IEC, ANSI, FCC, CISPR, British standard, EN Emission and Susceptibility standards and specifications; MIL461E Standards.

UNIT V EMI TEST METHODS AND INSTRUMENTATION
EMI test sites - Open area site, TEM cell, GTEM cell, Shielded chamber, Shielded Anechoic chamber, EMI test receivers, Spectrum Analyzer, Antennas and factors, Current probes and calibration factor; MIL-STD test methods, Civilian STD Test methods.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECCA OPEN SOURCE BASED EMBEDDED SYSTEM DESIGN L T P C
3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Explain the architecture of OMAP-3 and its peripherals.
CO 2: Explore the embedded system development using crane board.
CO 3: Identify the android application development.
CO 4: Analyze Linux device driver development

UNIT I CONCEPTS OF OPEN SOURCE BASED EMBEDDED SYSTEM
Concepts of Embedded Systems - Different types of processors - How and why Linux – Contributing to Open source - General Linux architecture - Device Driver architecture - High level code walk through of Linux kernel - Configuring a Linux kernel - Detailed review of the Linux boot process.

UNIT II OMAP-3 AND CRANE BOARD
Introduction to OMAP-3 -Introduction to Crane board - Basic introduction to hardware handling - Crane board and its peripherals - Interfacing external peripherals on Crane board - Basics of reading and understanding a schematic.

UNIT III SYSTEM FIRMWARE FOR CRANE BOARD
Configuring and building the system firmware for the Crane board- Using the firmware to boot the Crane board - Simple C application on the Crane board - Interfacing an external peripheral.

UNIT IV CROSS TOOLS AND DEVICE DRIVER DEVELOPMENT
Cross Tools and development – Tool chain and their components -Using a cross compiler – Device driver development - Development of a basic driver -Development of a simple character driver.

UNIT V ANDROID APPLICATION DEVELOPMENT
Introduction to Android SDK- Development of a simple Android application- Steps involved in bringing up Android on Crane board.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECCB ADVANCED MICROPROCESSORS

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

COURSE OUTCOMES
Upon successful completion of the course, the students will be able to:

CO 1: Furnishes complete knowledge about the background of ARM family, specifically ARM Cortex – M3

CO 2: Imparts essential knowledge for programming in Cortex- M3 (assembly directives, operands, data structures and instruction set).

CO 3: Provides fundamental skill on programming with interrupts.

CO 4: Provides a detailed study on methodologies that allow modularity in programming.

UNIT I ARM CORTEX – M3 PROCESSOR

UNIT II ASSEMBLY DIRECTIVES AND OPERANDS
Concept of the directive-Different directives: Directives for simple memory reservation, directive for memory reservation with initialization, directives for memory management, directive for project management, Special directive like CN, DCFSU,ENTRY,IMPORT,EXPORT-Operands of Instruction: Operands for Common instruction, immediate operand, memory access operands, initialization and use of operands, Addressing modes-Structure of program.

UNIT III ALGORITHMIC AND DATA STRUCTURES FOR CORTEX PROGRAMMING
Alternative Structures: Simple alternative, complete alternative, special case of alternative, multiple choice alternative-Iterative Structures: Repeat until loop, while do-loop, for loop-Compound condition: Alternative with AND, Iterative with AND, Alternative with OR, Iterative with OR-Data Structure: Table in one dimension, Tables in multiple dimensions, Registration, Non-dimensional table, Queue, stack- Cortex instruction set-Simple Assembly programming with CORTEX M3.

UNIT IV MANAGING EXCEPTIONS
Process after reset-possible exceptions: NMI, TRAPS like hard fault, memory management fault, bus fault, usage fault, SV Call trap, monitor, PENDSV service, Internal SYSTICK timer-Interrupts-Priority management: Priority levels and sublevels, nested mechanism- Entry and return in exception processing – NVIC registers for exception handling- Simple Assembly programming with CORTEX M3.

UNIT V INTERNAL MODULARITY AND EXTERNAL MODULARITY
Internal Modularity: Concepts of procedure-procedure arguments: Arguments by value and by reference, passing arguments by general registers, passing arguments by stack, passing arguments by system stack, local data & its reservation, chained list- Simple Assembly programming with CORTEX M3.

External Modularity: Different tools in ARM tool chain-Role of Assembler: Files produced by Assembler, placement counters, symbol table, translation, relocation table-Role of the linker: Functioning principle, product of the linker like map file and executable file image, scatter loading file-loader and debugging unit- Simple Assembly programming with CORTEX M3.

L:45 TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
13ECCC ADVANCED VLSI DESIGN L T P C 3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to:
- CO 1: Discuss the concepts of ASIC Logic cells.
- CO 2: Analyze the various programmable ASICs.
- CO 3: Acquire the knowledge about the concepts of Logic synthesis and simulation.
- CO 4: Explain the ASIC construction concepts.

UNIT I INTRODUCTION TO ASICS, CMOS LOGIC AND ASIC LIBRARY DESIGN
Types of ASICs - Design flow - CMOS transistors - Combinational Logic Cell - Sequential logic cell - Data path logic cell - Transistors as Resistors - Transistor Parasitic Capacitance- Logical effort - Library cell design - Library architecture.

UNIT II PROGRAMMABLE ASICS, PROGRAMMABLE ASIC LOGIC CELLS AND PROGRAMMABLE ASIC I/O CELLS

UNIT III PROGRAMMABLE ASIC INTERCONNECT AND PROGRAMMABLE ASIC DESIGN SOFTWARE
Actel ACT - Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - Altera MAX 9000 - Altera FLEX - Design systems - Logic Synthesis - Half gate ASIC.

UNIT IV LOW LEVEL DESIGN ENTRY, LOGIC SYNTHESIS AND SIMULATION
Schematic entry - Low level design language - PLA tools – EDIF - CFI design representation - Logic synthesis - Definition - A Logic synthesis example (Verilog) - Types of Simulation (definitions only).

UNIT V ASIC CONSTRUCTION, FLOOR PLANNING, PLACEMENT AND ROUTING
System Partitioning - Objectives of Partitioning - A Simple Partitioning example; Floor planning - Goals and Objectives - Measurement of Delay in floor planning - Channel definition - I/O and Power Planning - Clock Planning; Placement - Terms and definitions - Goals and Objectives - an example with simple placement - physical design flow; Global routing - Objectives and methods - Detailed routing - Objectives - Detailed routing with left edge algorithm - Special routing - Circuit extraction and DRC.

L:45 TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES
13ECCD   FUNDAMENTALS OF SEMICONDUCTOR CHIP TESTING  L  T  P  C
            3  0  0  3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Explain the need for IC testing.
CO 2: Explain various IC testing techniques.
CO 3: Calculate DC, AC parameters, Timing parameters from the testing.
CO 4: Compare the various features of CAD tools used for IC testing.

UNIT I   INTRODUCTION TO SEMICONDUCTOR IC TESTING  9

UNIT II   DIGITAL DOMAIN TESTING – CONCEPTS AND METHODS  9

UNIT III   AUTOMATIC TEST EQUIPMENT ARCHITECTURE  9

UNIT IV   TESTING OF SEMICONDUCTOR DEVICES  9

UNIT V   CAD TOOLS FOR TESTING  9

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Compare the different ARM processors.
CO 2: Explain different types of instruction used in ARM.
CO 3: Develop ARM assembly programmes.
CO 4: Design interfacing circuit with ARM processor.

UNIT I ARM PROCESSOR FUNDAMENTALS
Introduction to ARM Processors, ARM programmers model, ARM architecture Revisions, ARM Nomenclature, Functional block diagram of ARM Processor Families: ARM 7, ARM 9, ARM 11 and Cortex, Comparison of Cortex families.

UNIT II ARM INSTRUCTION SET
Data Processing Instructions, MOVE Instructions, Barrel Shifter Operations, Arithmetic Instructions, Logical Instructions, Comparison and Test Instructions, Multiply Instructions, Branch Instructions, Load – Store Instructions, Single Register Transfer, Single Register Load Store Addressing Modes, Multiple Register Transfer, Addressing Modes for Stack Operations, Swap Instruction, Software Interrupt Instruction, PSR, MRS and MSR Instructions, Coprocessor Instructions.

UNIT III ARM ASSEMBLY PROGRAMMING

UNIT IV EXCEPTION AND INTERRUPT HANDLING
Exception Handling, ARM Processor Exceptions and Modes, Exception Priorities, Link Register Offsets, Interrupts, Interrupt Latency, Vector table, Basic Interrupt Stack Design and Implementation, Nested Vector interrupt controller of Cortex M3 Processor.

UNIT V ARM INTERFACING APPLICATIONS

TEXT BOOKS

REFERENCE
13ECCF EMBEDDED AND REAL TIME SYSTEMS L T P C
3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Explain the fundamental concept of design of embedded and real time systems.
CO 2: Analyze the various platforms used for embedded computing and the performance of
embedded systems design.
CO 3: Distinguish the software architectures for embedded system design.
CO 4: Summarize the basic properties of a real time operating system.
CO 5: Describe the services of operating system.

UNIT I INTRODUCTION TO EMBEDDED COMPUTING
Complex systems and micro processors – Design example: Model train controller – Embedded
system design process – Formalism for system design – Instruction sets Preliminaries – ARM
Processor – CPU: Programming input and output – Supervisor mode, exception and traps.
Coprocessor – Memory system mechanism – CPU performance – CPU power consumption.

UNIT II COMPUTING PLATFORM AND DESIGN ANALYSIS
CPU buses – Memory devices – I/O devices – Component interfacing – Design with microprocessors
– Development and Debugging – Program design – Model of programs Assembly and Linking –
Basic compilation techniques – Analysis and optimization of execution time, power, energy, program
size – Program validation and testing.

UNIT III SOFTWARE ARCHITECTURES
Round-Robin – Round-Robin with Interrupts – Function-Queue-Scheduling Architecture – Real-

UNIT IV PROCESS AND OPERATING SYSTEMS
Multiple tasks and multi processes – Processes – Context Switching – Operating Systems Scheduling
policies - Multiprocessor – Inter Process Communication mechanisms – Message Mailboxes –
Message Queues – Evaluating operating system performance.

UNIT V TASK MANAGEMENT AND MEMORY MANAGEMENT
Task Management: Creating Tasks – Task Stacks-Stack Checking-Task’s Priority – Suspending Task
– System Time – Memory Management: Memory Control Blocks – Creating Partition – Obtaining a
Memory Block function – Returning a Memory Block Function.

L:45 TOTAL: 45 PERIODS

TEXT BOOK
1. Wayne Wolf, “Computers as Components - Principles of Embedded Computer System

REFERENCES
   grave Publisher, 2004.
5. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc-
13ECDA MEDICAL ELECTRONICS L T P C
3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Analyze the human functioning system and its instrumentations with respect to bioelectric potential and biochemical reactions.

CO 2: Define the quantities from diagnostic equipments and assist with therapeutic equipments.

CO 3: Discuss and handle radiological and nuclear equipments for diagnosis.

CO 4: Explain the safety consequences in usage of recording instruments and avoiding electrical shock.

CO 5: Explore the wireless communication technology for biotelemetry and telemedicine.

UNIT I BIOPOTENTIAL AND BIO-CHEMICAL MEASUREMENTS 9

UNIT II CLINICAL DIAGNOSIS AND THERAPEUTIC EQUIPMENTS 9
Blood flow meter, Cardiac Output Measurement, Blood cell counters, Pacemakers, Defibrillators, Hemodialysis Machine, Heart-Lung machine

UNIT III RADIOLOGY AND NUCLEAR EQUIPMENTS FOR DIAGNOSIS 9

UNIT IV LATEST MEDICAL EQUIPMENTS AND ELECTRICAL SAFETY 9
Magnetic Resonance Imaging, Ultrasonic Imaging, Thermal Imaging, Laser in Medicine, Physiological Effects of Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention

UNIT V BIO-TELEMETRY AND TELEMEDICINE 9

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECDB ADVANCED ELECTRONIC SYSTEM DESIGN  L  T  P  C
3  0  0  3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to

CO 1: Explain the RF components such as resonator, filter, transmission lines, etc.
CO 2: Apply optimization techniques to design of RF amplifiers using transistors.
CO 3: Discuss modern Power Supplies using SCR and SMPS technology
CO 4: Explain about signal shielding & grounding techniques and study of A/D and D/A
Converters.

UNIT I  INTRODUCTION TO RF DESIGN  9
RF behaviour of passive components, Chip components and circuit board considerations, Review of
transmission lines, Impedance and admittance transformation, Parallel and series connection of
networks, ABCD and scattering parameters, Analysis of amplifier using scattering parameter. RF
filter – Basic resonator and filter configurations – Butterworth and Chebyshev filters. Implementation
of microstrip filters design. Band pass filter and cascading of band pass filter elements.

UNIT II  RF TRANSISTOR AMPLIFIER DESIGN  9
Impedance matching using discrete components. Microstrip line matching networks. Amplifier
classes of operation and biasing networks – Amplifier power gain, Unilateral design(S12 =0) –
Simple input and output matching networks – Bilateral design - Stability circle and conditional
stability, Simultaneous conjugate matching for unconditionally stable transistors. Broadband
amplifiers, High power amplifiers and multistage amplifiers.

UNIT III  DESIGN OF POWER SUPPLIES  9
DC power supply design using transistors and SCRs, Design of crowbar and fold back protection
circuits, Switched mode power supplies, Forward, flyback, buck and boost converters, Design of
transformers and control circuits for SMPS .

UNIT IV  DESIGN OF DATA ACQUISITION SYSTEMS  9
Amplification of Low level signals, Grounding, Shielding and Guarding techniques, Dual slope, quad
slope and high speed A/D converters, Microprocessors Compatible A/D converters, Multiplying A/D
converters and Logarithmic A/D converters, Sample and Hold, Design of two and four wire
transmitters.

UNIT V  DESIGN OF PRINTED CIRCUIT BOARDS  9
Introduction to technology of printed circuit boards (PCB), General lay out and rules and parameters,
PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits,
Computer Aided design of PCBs.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECDC MICRO ELECTRO MECHANICAL SYSTEMS L T P C
3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Integrate the knowledge of semiconductors and solid mechanics to fabricate MEMS devices.
CO 2: Analyze various Electrostatic and Thermal sensors.
CO 3: Differentiate Piezoresistive and Piezoelectric sensors.
CO 4: Categorize different etching techniques used for Micro machining.
CO 5: Summarize the use of Polymer in MEMS.

UNIT I INTRODUCTION 9

UNIT II ELECTROSTATIC AND THERMAL SENSORS 9
Electrostatic sensors and Actuators - Parallel plate capacitors, Applications of Parallel plate capacitors, Inter digitated Finger capacitor, Applications of Comb drive devices, Thermal Sensing and Actuation-Thermal Expansion, Thermal couples, Thermal resistors, Applications, Magnetic Actuators – Micromagnetic components, Case studies of MEMS in magnetic actuators.

UNIT III PIEZORESISTIVE AND PIEZOELECTRIC SENSORS 9
Piezoresistive sensors - Piezoresistive sensor materials, Stress analysis of mechanical elements, Applications of Piezoresistive sensors, Piezoelectric sensors and actuators-piezoelectric effects, piezoelectric materials, Applications of Piezoelectric sensors.

UNIT IV MICRO MACHINING 9

UNIT V POLYMER AND OPTICAL MEMS 9
Polymer in MEMS - Polymide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon Applications of Polymer in MEMS, Optical MEMS – Lenses and Mirrors - Actuators for Active Optical MEMS.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECDD ELECTRONIC INSTRUMENTATION AND MEASUREMENTS

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to:
CO 1: Discuss the basic concepts and definitions in measurements.
CO 2: Operate and develop various electrical and electronic systems.
CO 3: Measure and construct various instruments.
CO 4: Explain the operation and design of electronic instruments for parameter measurement.

UNIT I BASIC MEASUREMENT CONCEPTS
Measurement systems - Static and dynamic characteristics - Units and Standards of measurements - Error analysis - Moving coil, Moving iron meters - Multimeters - True RMS Meters - Bridge measurements-Maxwell, Hay, Schering, Anderson and Wien bridge - Q meters.

UNIT II BASIC ELECTRONIC MEASUREMENTS

UNIT III TRANSDUCERS

UNIT IV DIGITAL INSTRUMENTS
Digital voltmeter – Multimeters - Frequency counters - Measurement of frequency and time interval - Extension of frequency range - Measurement errors - Display devices – Touch Screen, LCD.

UNIT V DATA ACQUISITION SYSTEMS

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECEA MOBILE ADHOC NETWORKS  

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

**COURSE OUTCOMES**

Upon successful completion of this course, the students will be able to

CO 1: Summarize the challenges in the design of wireless adhoc networks.
CO 2: Categorize and analyze the proposed protocols at MAC and routing layers of adhoc networks.
CO 3: Analyze the attacks pertaining to network layer.
CO 4: Elaborate the QoS requirements and Energy Management schemes.

**UNIT I INTRODUCTION**

Introduction to adhoc networks – Definition - Characteristics features, applications. Characteristics of Wireless channel, adhoc Mobility Models: - Indoor and outdoor models. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

**UNIT II MEDIUM ACCESS PROTOCOLS**


**UNIT III NETWORK PROTOCOLS**

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Hybrid routing algorithm, Hierarchical Routing – Tree-Based and Mesh-Based Multicast routing algorithms.

**UNIT IV END-END DELIVERY AND SECURITY**


**UNIT V QUALITY OF SERVICE AND ENERGY MANAGEMENT SCHEMES**


**TEXT BOOKS**


**REFERENCES**

13ECEB WIRELESS SENSOR NETWORKS L T P C
3 0 0 3

COURSE OUTCOMES
Upon Successful completion of this course, the students will be able to
CO 1: Describe the basic concepts and architecture of Wireless Sensor Networks.
CO 2: Develop the protocol stack for WSN.
CO 3: Design the simple Sensor Node for a specific application.

UNIT I INTRODUCTION
Challenges for Wireless Sensor Networks, Enabling Technologies for WSN, Single node
architecture – Energy consumption of sensor nodes - Network architecture – Sensor network
scenarios - Optimization Goals and Figures of Merit - Design principles for WSN.

UNIT II PHYSICAL LAYER
Introduction, wireless channel and communication fundamentals – frequency allocation,
modulation and demodulation, wave propagation effects and noise, channels models, spread
spectrum communication, packet transmission and synchronization, quality of wireless channels
and measures for improvement, Physical layer and transceiver design consideration in wireless
csensor networks: Energy usage profile, choice of modulation schemes, Antenna Considerations.

UNIT III DATALINK LAYER
MAC protocols – fundamentals of wireless MAC protocols, Low duty cycle protocols: STEM, S-
MAC - wakeup concepts, contention-based protocols: CSMA, PAMAS - Schedule-based
protocols: SMACS - IEEE 802.15.4 low rate WPAN.

UNIT IV NETWORK LAYER
Geographic routing, Hierarchical Routing – LEACH, PEGASIS, Location Based Routing – GAF,
GEAR, Data aggregation – Various aggregation techniques.

UNIT V INFRASTRUCTURE ESTABLISHMENT AND CASE STUDY
Topology Control - Localization and Positioning - Target detection tracking, Medicine and Health
Care, Environmental disaster monitoring.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
4. C. Siva Ram Murthy and B. S. Manoj, “Adhoc Wireless Networks Architectures and
Protocols”, Prentice Hall, PTR, 2004
13ECEC HIGH SPEED NETWORKS (Common to ECE, CSE and IT) L T P C 3 0 0 3

1. COURSE OUTCOMES
   Upon successful completion of this course, the students will be able to
   CO 1: Develop an in-depth understanding, in terms of architecture, protocols and applications, of major high-speed networking technologies.
   CO 2: Apply queuing analysis to control the effect of the congestion in high speed networks.
   CO 3: Compare the various approaches of the Integrated and Differentiated Services.
   CO 4: Discuss the protocols which provide QoS support for Real Time Applications.

2. TEXT BOOKS

3. REFERENCES
13ECED       PRINCIPLES OF NETWORK SECURITY       L T P C

3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Describe the need for security and the various security techniques.
CO 2: Explain the various symmetric and asymmetric key algorithms.
CO 3: Apply suitable authentication functions to ensure authentication.
CO 4: Elaborate different types of security services used in various applications.
CO 5: Provide solutions for security at the system level.

UNIT I      INTRODUCTION

UNIT II     SYMMETRIC AND ASYMMETRIC KEY ALGORITHMS

UNIT III    AUTHENTICATION AND HASH FUNCTION

UNIT IV     NETWORK SECURITY

UNIT V      SYSTEM LEVEL SECURITY

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECFA  TOTAL QUALITY MANAGEMENT  
(13MEDA,13ECFA, 13CEFA,13ITFA)  

COURSE OUTCOMES  
Upon completion of this course the students will be able to,  
CO 1: Recognize the need for total quality management and areas of application of this 
management concept.  
CO 2: Predict the need for customer expectations and employee involvement.  
CO 3: Estimate six-sigma and perform benchmarking.  
CO 4: Devise methods to use Quality Function Deployment (QFD), failure Mode Effect Analysis 
(FMEA) and Taguchi’s loss functions.  
CO 5: Describe ISO 9000 and Environmental Management System (EMS) standards.  

UNIT I  INTRODUCTION  
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of 
manufacturing and service quality - Basic concepts of TQM - Definition of TQM - Contributions of 
Deming, Juran and Crosby – Cost of Quality, Analysis Techniques for Quality Costs -Barriers to 
TQM.  

UNIT II  TQM PRINCIPLES  
Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, 
Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and 
Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA 
Cycle, 5S, Kanban, Kaizen, POKA-YOKE, Supplier Partnership – Partnering, sourcing, Supplier 
Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, 

UNIT III  TQM TOOLS & TECHNIQUES I  
The seven traditional tools of quality – New management tools – Deviation and Standard Deviation; 
Phases and Defective Units of Six Sigma; Its Importance; Overview of Master Black and Green Belt- 
Benchmarking- Reason to benchmark, Bench marking process – FMEA – Stages, Types.  

UNIT IV  TQM TOOLS & TECHNIQUES II  
Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality 
Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – 
Stages of FMEA.  

UNIT V  QUALITY SYSTEMS  
• Need for ISO 9000 - ISO 9000-2000 Quality System –Elements, Documentation, Quality 
auditing- QS 9000 – ISO 14000 - ISO/TS 16949 – Concepts, Requirements and Benefits – Case 
studies of TQM implementation in manufacturing and service sectors including IT.  

L:45 TOTAL: 45 PERIODS  

TEXT BOOKS  
Indian Reprint (2010).  
REFERENCES

FEW HYPERLINKS FOR REFERENCES
- http://nptel.ac.in/courses/110101010/16
13ECFB ENTREPRENEURSHIP DEVELOPMENT (13ECFB, 13MEDC)  

COURSE OUTCOMES  
Upon successful completion of this course, the students will be able to  
CO1: describe the concept of entrepreneurship and need for becoming an entrepreneur.  
CO2: discuss about competencies and motivation acquired for an entrepreneur.  
CO3: demonstrate their plan to start a small enterprise.  
CO4: analyze the financial and accounting details needed for starting and running a small enterprise.  
CO5: summarize the various supports available to start a small enterprise.

UNIT I ENTREPRENEURSHIP  

UNIT II ENTREPRENEURIAL MOTIVATION AND COMPETENCIES  

UNIT III BUSINESS  

UNIT IV FINANCING AND ACCOUNTING  

UNIT V SUPPORT TO ENTREPRENEURS  

L:45 TOTAL: 45 PERIODS

TEXT BOOKS  

REFERENCES:  
13ECGA PRINCIPLES OF OPERATING SYSTEMS L T P C 3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Identify the functions of Operating Systems.
CO 2: Discuss the concepts of process management.
CO 3: Predict and analyze deadlocks.
CO 4: Describe the importance of storage management.
CO 5: Understand the basics of file systems and I/O systems.

UNIT I PROCESSES 9
Introduction to operating systems – operating system structures – system calls – system programs –
system structure - Processes: Process concept – Process scheduling – Cooperating processes –
Interprocess communication – Communication in client-server systems.

UNIT II THREADS, PROCESS SCHEDULING AND SYNCHRONIZATION 9
Threads: Multi-threading models – Threading issues - CPU Scheduling: Scheduling criteria –
Scheduling algorithms – Multiple processor scheduling – Real time scheduling. Process
Synchronization: The critical-section problem – Semaphores – Classic problems of synchronization.

UNIT III DEADLOCK 9
Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock

UNIT IV STORAGE MANAGEMENT 9
Memory Management: Background – Swapping – Contiguous memory allocation – Paging –
Segmentation – Segmentation with paging - Virtual Memory: Background – Demand paging –
Process creation – Page replacement – Allocation of frames.

UNIT V FILE SYSTEMS AND I/O SYSTEMS 9
Protection - File-System Implementation: Directory implementation –Allocation methods – Free
space management – efficiency and performance - I/O Systems – kernel I/O subsystem – streams –

L:45 TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES
13ECGB  

SOFT COMPUTING  

L  T  P  C  

3  0  0  3  

COURSE OUTCOMES  

Upon successful completion of this course, the students will be able to  

CO 1: Acquire knowledge of soft computing theories and fundamentals.  
CO 2: Apply the Soft computing approaches to solve real-world problems.  
CO 3: Discriminate the principles of Artificial Neural Networks, Fuzzy sets, Fuzzy logic and Genetic algorithms.  
CO 4: Illustrate the use of ANN, Fuzzy sets to solve hard real-world problems.  

UNIT I  INTRODUCTION  


UNIT II  FUZZY SETS AND FUZZY LOGIC  


UNIT III  FUZZY MEASURES AND REASONING  

Fuzzy arithmetic and measures - Fuzzy rule base – Fuzzy Approximate reasoning - Categorical, qualitative, syllogistic, dispositional - Fuzzy inference systems - Fuzzy decision making - Fuzzy logic control systems: Architecture, model and application.  

UNIT IV  MACHINE LEARNING AND GENETIC ALGORITHM  


UNIT V  APPLICATIONS WITH CASE STUDY  


L: 45 TOTAL: 45 PERIODS  

TEXT BOOKS  


REFERENCES  

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Understand the complexity of the real world objects
CO 2: Learn the best practices for designing Web forms and Usability Reviews
CO 3: Understand the Principles behind the design and construction of Web applications
CO 4: Develop and Deploy an Enterprise Application

UNIT I REVIEW OF OBJECT ORIENTED CONCEPTS 7

UNIT II INTERNETWORKING 9

UNIT III CLIENT BASED TECHNOLOGIES 9

UNIT IV WEB DATABASE PROGRAMMING 10

UNIT V SERVER BASED TECHNOLOGIES 10
Presentation tier using JSP – Role of Java EE in Enterprise applications – Basics of Servlets - To introduce server side programming with JSP - Standard Tag Library.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
2. http://www.w3.org/
7. Developing Web Applications with JavaServer Faces found online at http://java.sun.com/developer/technicalArticles/GUI/JavaServerFaces/
8. Short introduction to log4j found online at http://logging.apache.org/log4j/1.2/manual.html
11. http://www.junit.org/
14. The Complete reference - JSP
15. Servlet Tutorial can be found online at http://java.sun.com/docs/books/tutorial
17. JSF Tutorial can be found online at
   http://java.sun.com/j2ee/1.4/docs/tutorial/doc/JSFIntro.html
13ECGD SOCIAL COMPUTING L T P C
(Common to IT, ECE and CSE)

3 0 0 3

COURSE OUTCOMES
Upon Successful completion of this course, the students will be able to
CO 1: Describe the key concepts of analysis and design of social computing systems.
CO 2: Discuss the range of social computing applications.
CO 3: Apply the knowledge of social interaction technologies like blogs, wikis, podcasts, etc.,
CO 4: Show Proficiency in the general social network research process from data collection to mining.

UNIT I FUNDAMENTAL CONCEPTS AND THEORIES 9

UNIT II DESIGN METHODOLOGIES 9

UNIT III DEVELOPMENT 9

UNIT IV TOOLS AND TECHNOLOGIES 9
ERP-Systems- Modern Socio-Technical Systems Design - The design order Principle - The minimal Critical Specification Principle- The Task Completeness Principle - Evaluating the Effectiveness of Social Visualization Within Virtual Communities. The Hybrid Course

UNIT V SOCIAL COMPUTING AND COMMUNITY DETECTION 9
Basic Concepts - social computing task. Nodes, ties and Influence- Importance of Nodes - Strengths of Ties- Influence Modeling. Node-Centric Community Detection - Group-Centric Community Detection. Social Media Mining-Classification with Network Data.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECGE                      MOBILE COMPUTING                      L T P C
(Common to IT, ECE, EEE and CSE)                                      3 0 0 3

COURSE OUTCOMES
Upon Successful completion of this course, the students will be able to
CO 1: Explain the specifications and functionalities of various protocols/standards of mobile networks
CO 2: Explain the concepts and working principle of Wireless LANs, PAN, Mobile Networks, and Sensor Networks
CO 3: Describe the important issues and concerns on security and privacy in mobile application development
CO 4: Explain the structure and components for Mobile IP and Mobility Management.

UNIT I  INTRODUCTION  9

UNIT II  SATELLITE SYSTEMS & BROADCAST SYSTEMS  9

UNIT III  MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER  9

UNIT IV  MOBILE ADHOC NETWORKS & WIRELESS SENSOR NETWORKS  9

UNIT V  MOBILE APPLICATION DEVELOPMENT AND OPERATING SYSTEMS  9

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon Successful completion of this course, the students will be able to
CO 1: Apply statistical analysis methods in Big Data Platform.
CO 2: An ability to analyze a problems appropriate to mining data streams.
CO 3: Apply the knowledge of clustering techniques in data mining.
CO 4: Explain about social networking data analytics.
CO 5: Use Visualization techniques for Distributed file systems

UNIT I INTRODUCTION TO BIG DATA

UNIT II MINING DATA STREAMS

UNIT III FREQUENT ITEMSETS AND CLUSTERING

UNIT IV SOCIAL NETWORKING DATA ANALYTICS
An introduction to social networkdataAnalytics-Introduction,Online Social Networks: Research Issues,Research Topics in Social Networks. Data mining in social media-Data mining in a Nutshell, Social Media,Motivations for Data Mining in Social Media, Data Mining Methods for Social Media,visualizing social networks,A Taxonomy of Visualizations,The Convergence of Visualization, Interaction and Analytics

UNIT V FRAMEWORKS AND VISUALIZATION
MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications:

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13ECGG CLOUD COMPUTING (Common to IT, ECE, EEE and CSE) 3 0 0 3

COURSE OUTCOMES
Upon Successful completion of this course, the students will be able to
CO 1: Explain the fundamentals of cloud computing
CO 2: Distinguish the various cloud services
CO 3: Explore some important cloud computing driven commercial systems such as GoogleApps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

UNIT I UNDERSTANDING CLOUD COMPUTING 9

UNIT II DEVELOPING CLOUD SERVICES 9

UNIT III CLOUD COMPUTING FOR EVERYONE 9
Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation

UNIT IV USING CLOUD SERVICES 9

UNIT V OTHER WAYS TO COLLABORATE ONLINE 9

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

REFERENCE
13ECGH BUSINESS INTELLIGENCE AND ITS APPLICATIONS L T P C
(Common to CSE and ECE) 3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to,

CO 1: Develop a foundation in Business Intelligence (BI) for Business Analysis.
CO 2: Understand the different aspects of the BI environment, and key success factors.
CO 3: Understand Technology enabling process in an organization.
CO 4: Identify and analyze the new Techniques in BI.
CO 5: Be able to apply the techniques in the context of a business problem.

UNIT I INTRODUCTION TO BUSINESS INTELLIGENCE 9
Business intelligence and its impact - Factors driving Business Intelligence – Business Intelligence and Related Technologies – Case Study - Obstacles to Business Intelligence.

UNIT II BUSINESS INTELLIGENCE CAPABILITIES 9

UNIT III TECHNOLOGY ENABLING BUSINESS INTELLIGENCE 9
Technology enabling Organizational Memory – Information Integration – Enabling Insights and Decision – Enabling Presentation - OLAP Cube, Data Slice and Dice - BI in Practice - Performance Dashboards - Balanced Scorecards - IT Governance - Case Study.

UNIT IV BUSINESS INTELLIGENCE IMPLEMENTATION: INTEGRATION AND EMERGING TRENDS 9

UNIT V MANAGEMENT AND FUTURE OF BUSINESS INTELLIGENCE 9
Development of BI - Business Intelligence System - Reporting system - Data Warehouse - Data Mart - Knowledge Management Systems - Discussion and Case Study – The Future of Business Intelligence.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS


REFERENCES

13ECGJ       ARTIFICIAL INTELLIGENCE AND ROBOTICS       L T P C
             (Common to CSE and ECE)             3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Demonstrate the Understanding of the problem solving techniques involved in artificial
    intelligence.
CO 2: Understand the Logical reasoning realization of artificial intelligence.
CO 3: Summarize the importance of planning and learning with respect to artificial intelligence
    and robotics.
CO 4: Understand the terminologies used in Robotic Systems and understand the robotics
    programming.

UNIT I       PROBLEM SOLVING       9
Introduction - Agents - Problem formulation - uninformed search strategies - heuristics - informed
search strategies.

UNIT II      LOGICAL REASONING       9
Logical agents - propositional logic - inferences - first-order logic - inferences in first order -
    logic - forward chaining - backward chaining.

UNIT III     PLANNING       9
Planning with state-space search - partial-order planning - planning graphs - planning and acting in
the real world.

UNIT IV      LEARNING       9
Learning from observation - Inductive learning - Decision trees - Explanation based Learning -
    Statistical learning methods.

UNIT V       ROBOTICS       9
Introduction to Robotics - Robot Components - Robotic programming: Architecture - Planning -
    Languages - OS - Sample robots.

L:45 TOTAL: 45 PERIODS

TEXT BOOKS
    Hall, 2010.

REFERENCES
1. David Poole, Alan Mackworth and Randy Goebel, “Computational Intelligence: A logical