Detailed Syllabus
for
Third Year B. Tech. Program in Computer Engineering

With effective from July 2019-20
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Weekly Teaching hrs</th>
<th>Evaluation Scheme</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L  T  P</td>
<td>MSE   CA  ESE</td>
<td></td>
</tr>
<tr>
<td><strong>Mandatory</strong></td>
<td><strong>Induction Program</strong></td>
<td>3 Weeks duration in the beginning of the semester.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTBS101</td>
<td>Engineering Mathematics - I</td>
<td>3 1 -</td>
<td>20 20 60</td>
<td>4</td>
</tr>
<tr>
<td>BTBS102</td>
<td>Engineering Physics</td>
<td>3 1 -</td>
<td>20 20 60</td>
<td>4</td>
</tr>
<tr>
<td>BTES103</td>
<td>Engineering Graphics</td>
<td>2 - -</td>
<td>20 20 60</td>
<td>2</td>
</tr>
<tr>
<td>BTHM104</td>
<td>Communication Skills</td>
<td>2 - -</td>
<td>20 20 60</td>
<td>2</td>
</tr>
<tr>
<td>BTES105</td>
<td>Energy and Environment Engineering</td>
<td>2 - -</td>
<td>20 20 60</td>
<td>2</td>
</tr>
<tr>
<td>BTES106</td>
<td>Basic Civil and Mechanical Engineering</td>
<td>2 - -</td>
<td>- 50 -</td>
<td>Audit</td>
</tr>
<tr>
<td>BTBS107L</td>
<td>Engineering Physics Lab</td>
<td>- - 2</td>
<td>- 60 40</td>
<td>1</td>
</tr>
<tr>
<td>BTBS108L</td>
<td>Engineering Graphics Lab</td>
<td>- - 4</td>
<td>- 60 40</td>
<td>2</td>
</tr>
<tr>
<td>BTHM109L</td>
<td>Communication Skill Lab</td>
<td>- - 2</td>
<td>- 60 40</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>14 2 8</td>
<td>100 330 420</td>
<td>18</td>
</tr>
</tbody>
</table>
### Dr. Babasaheb Ambedkar Technological University

**Semester II**  
**Group B**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Weekly Teaching hrs</th>
<th>Evaluation Scheme</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTBS201</td>
<td>Engineering Mathematics - II</td>
<td>3 1 -</td>
<td>20 20 60</td>
<td>4</td>
</tr>
<tr>
<td>BTBS202</td>
<td>Engineering Chemistry</td>
<td>3 1 -</td>
<td>20 20 60</td>
<td>4</td>
</tr>
<tr>
<td>BTES203</td>
<td>Engineering Mechanics</td>
<td>2 1 -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>BTES204</td>
<td>Computer Programming in C</td>
<td>2 - -</td>
<td>20 20 60</td>
<td>2</td>
</tr>
<tr>
<td>BTES205</td>
<td>Workshop Practices</td>
<td>- - 4</td>
<td>- 60 40</td>
<td>2</td>
</tr>
<tr>
<td>BTES206</td>
<td>Basic Electrical &amp; Electronics Engineering</td>
<td>2 - -</td>
<td>- 50 -</td>
<td>Audit</td>
</tr>
<tr>
<td>BTBS207L</td>
<td>Computer Programming Lab</td>
<td>- - 2</td>
<td>- 60 40</td>
<td>1</td>
</tr>
<tr>
<td>BTBS208L</td>
<td>Engineering Chemistry Lab</td>
<td>- - 2</td>
<td>- 60 40</td>
<td>1</td>
</tr>
<tr>
<td>BTES209L</td>
<td>Engineering Mechanics Lab</td>
<td>- - 2</td>
<td>- 60 40</td>
<td>1</td>
</tr>
<tr>
<td>BTES210P</td>
<td>Mini Project</td>
<td>- - 2</td>
<td>- 60 40</td>
<td>1</td>
</tr>
<tr>
<td>BTES211P</td>
<td>Field Training / Internship / Industrial Training (minimum of 4 weeks which can be completed partially in First Semester and Second Semester or in at one time).</td>
<td>- - -</td>
<td>- - -</td>
<td>Credit to be evaluated in III Sem.</td>
</tr>
</tbody>
</table>

**TOTAL**  
12 3 12 80 430 440 19
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Weekly Teaching hrs</th>
<th>Evaluation Scheme</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BTBSC301</td>
<td>Engineering Mathematics – III</td>
<td>3 1 -</td>
<td>20 20 60</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>BTCOC302</td>
<td>Discrete Mathematics</td>
<td>2 1 -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>BTCOC303</td>
<td>Data Structures</td>
<td>2 1 -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>BTCOC304</td>
<td>Computer Architecture &amp; Organization</td>
<td>2 1 -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>BTCOC305</td>
<td>Digital Electronics &amp; Microprocessors</td>
<td>2 1 -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>BTHM3401</td>
<td>Basic Human Rights</td>
<td>2 - -</td>
<td>- 50 -</td>
<td>Audit</td>
</tr>
<tr>
<td>7</td>
<td>BTCOL306</td>
<td>Python Programming</td>
<td>1 - 2</td>
<td>- 60 40</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>BTCOL307</td>
<td>HTML and JavaScript</td>
<td>1 - 2</td>
<td>- 60 40</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>BTCOL308</td>
<td>Data Structures Lab</td>
<td>- - 2</td>
<td>- 60 40</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>BTCOL309</td>
<td>Digital Electronics &amp; Microprocessor Lab</td>
<td>- - 2</td>
<td>- 60 40</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>BTES211P</td>
<td>Field Training / Internship / Industrial Training Evaluation</td>
<td>- - -</td>
<td>- - 50</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>15 5 8</strong></td>
<td><strong>100 390 510</strong></td>
<td><strong>23</strong></td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Weekly Teaching hrs</td>
<td>Evaluation Scheme</td>
<td>Credit</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>------------------------------------------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>--------</td>
</tr>
<tr>
<td>1</td>
<td>BTCOC401</td>
<td>Design &amp; Analysis of Algorithms</td>
<td>2L 1T -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>BTCOC402</td>
<td>Probability &amp; Statistics</td>
<td>2L 1T -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>BTCOC403</td>
<td>Operating Systems</td>
<td>2L 1T -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Elective-I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BTCOE404A</td>
<td>Object Oriented Programming in Java</td>
<td>2L 1T -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>BTCOE404B</td>
<td>Object Oriented Programming in C++</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>BTID405</td>
<td>Product Design Engineering</td>
<td>1L - 2P -</td>
<td>60 40</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Elective-II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BTBS405A</td>
<td>Physics of Engineering Materials</td>
<td>2L 1T -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>BTCOE406B</td>
<td>Numerical Methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BTHM3402</td>
<td>Soft Skills and Personality Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>BTCOL407</td>
<td>Design &amp; Analysis of Algorithms Lab</td>
<td>- - 2P -</td>
<td>60 40</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>BTCOL408</td>
<td>Introduction to Data Science with R</td>
<td>1L - 2P -</td>
<td>60 40</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>BTCOL409</td>
<td>Object Oriented Programming Lab</td>
<td>- - 2P -</td>
<td>60 40</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>BTCOL410</td>
<td>Operating System Lab</td>
<td>- - 2P -</td>
<td>60 40</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>BTCOF411</td>
<td>Field Training/Internship/Industrial Training Evaluation (Credit to be evaluated in V Sem.)</td>
<td>- - - - - - - -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>12 5 10 100 400 500</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Weekly Teaching hrs</td>
<td>Evaluation Scheme</td>
<td>Credit</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-----------------------------------------------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>BTCOC501</td>
<td>Database Systems</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>BTCOC502</td>
<td>Theory of Computations</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>BTCOC503</td>
<td>Machine Learning</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>BTCOE504</td>
<td><strong>Elective-III</strong></td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A) Introduction to Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(B) Cyber Laws</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Open Elective offered by other departments</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>BTCOE505</td>
<td><strong>Elective-IV</strong></td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A) Economics &amp; Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(B) Business Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>BTCOC506</td>
<td>Competitive Programming-I</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>BTCOL507</td>
<td>Database System Laboratory</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>BTCOL508</td>
<td>Machine Learning Laboratory</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>BTCOS509</td>
<td>Seminar</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>BTCOF411</td>
<td>Internship/Industrial Training</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>14</strong></td>
<td><strong>3</strong></td>
<td><strong>8</strong></td>
</tr>
</tbody>
</table>

Dr. Babasaheb Ambedkar Technological University
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Weekly Teaching hrs</th>
<th>Evaluation Scheme</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>BTCOC601</td>
<td>Compiler Design</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>BTCOC602</td>
<td>Computer Networks</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>BTCOE603</td>
<td><strong>Elective-V</strong> (A) Human Computer Interaction (B) Artificial Intelligence (C) Object-Oriented Analysis Design</td>
<td>2</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>BTCOE604</td>
<td><strong>Elective-VI</strong> (A) Geographic Information System (B) Biology (C) Internet of Things</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>BTCOE605</td>
<td><strong>Open Elective-VII</strong> (A) Development Engineering (B) National Social Service (C) Consumer Behaviour</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>BTCOC606</td>
<td>Competitive Programming-II</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>BTCOL607</td>
<td>(A) Mobile Application Development</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(B) Internet of Things Laboratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>BTCOL608</td>
<td>Computer Networks Laboratory</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>BTCOF609</td>
<td>Filed Training / Internship / Industrial Training (Credit to be evaluated in VII Sem.)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>TOTAL</strong></td>
<td>14</td>
<td>3</td>
</tr>
</tbody>
</table>
## Dr. Babasaheb Ambedkar Technological University

### Semester VII

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Weekly Teaching hrs</th>
<th>Evaluation Scheme</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BTCOC701</td>
<td>Software Engineering</td>
<td>2 - -</td>
<td>20 20 60</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>BTCOE702</td>
<td><strong>Elective-VIII</strong>&lt;br&gt;(A) Bioinformatics&lt;br&gt;(B) Distributed System&lt;br&gt;(C) Cloud Computing</td>
<td>2 1 -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>BTCOE703</td>
<td><strong>Elective-IX</strong>&lt;br&gt;(A) Advanced Operating System&lt;br&gt;(B) Computer Graphics&lt;br&gt;(C) Bio-Metrics&lt;br&gt;(D) Digital Image Processing</td>
<td>2 1 -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>BTCOE704</td>
<td><strong>Open Elective-X</strong>&lt;br&gt;(A) Information Security&lt;br&gt;(B) Business Intelligence&lt;br&gt;(C) Blockchain</td>
<td>2 1 -</td>
<td>20 20 60</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>BTCOL705</td>
<td>Full Stack Development (LAMP/MEAN)</td>
<td>1 - 2 -</td>
<td>60 40</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>BTCOL706</td>
<td>System Administration</td>
<td>1 - 2 -</td>
<td>60 40</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>BTCOP707</td>
<td>Project-I</td>
<td>- - 6 -</td>
<td>60 40</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>BTCOF609</td>
<td>Internship/Industrial Training</td>
<td>- - - -</td>
<td>60 40</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>10 3 10</td>
<td>80 320 400</td>
<td>22</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Course Code</td>
<td>Course Title</td>
<td>Weekly Teaching hrs</td>
<td>Evaluation Scheme</td>
<td>Credit</td>
</tr>
<tr>
<td>--------</td>
<td>--------------</td>
<td>------------------------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L T P MSE CA ESE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>BTCOE801</td>
<td><strong>Elective-XI</strong></td>
<td>2 1 - 20 20 60 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A) Software Product Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(B) Quantum Computing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(C) Software Testing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(D) Big Data Analytics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>BTCOE802</td>
<td><strong>Open Elective-XII</strong></td>
<td>2 1 - 20 20 60 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A) 3D Printing And Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(B) Robotics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(C) Advanced Database Techniques</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BTCOE803</td>
<td><strong>Open Elective-XIII</strong></td>
<td>2 1 - 20 20 60 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A) Virtual Reality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(B) Deep Learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(C) Elective offered by other dept.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BTCOP804</td>
<td>Project-II</td>
<td>- - 8 - 60 40 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong></td>
<td>6 3 8 60 120 220 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>BTCOF805</td>
<td>Industrial In-plant Training</td>
<td>- - 18 - 120 180 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>BTCOP804</td>
<td>Project-II</td>
<td>- - 8 - 60 40 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong></td>
<td>- - 26 - 180 220 17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## NPTEL Mapping of Courses (Semester V to VIII)

<table>
<thead>
<tr>
<th>No.</th>
<th>DBATU Course</th>
<th>NPTEL Course</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Semester V</strong></td>
</tr>
<tr>
<td>1</td>
<td>Database Systems</td>
<td>Fundamental of Database System</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Arnab Bhattacharya, IIT Kanpur</td>
</tr>
<tr>
<td>2</td>
<td>Theory of Computations</td>
<td>Formal Languages and Automata Theory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Diganta Goswami, IIT Guwahati</td>
</tr>
<tr>
<td>3</td>
<td>Machine Learning</td>
<td>Introduction to Machine Learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Sudeshana Sarkar, IIT Kharagpur</td>
</tr>
<tr>
<td>4</td>
<td>Introduction to Research</td>
<td>Introduction to Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Pratap Haridoss</td>
</tr>
<tr>
<td>5</td>
<td>Economics and Management</td>
<td>Economics, Management &amp; Entrepreneurship</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. P. K. Mahapotra, IIT Kharagpur</td>
</tr>
<tr>
<td>6</td>
<td>Business Communication</td>
<td>International Business Communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Aradhana Malik, IIT Kharagpur</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Semester VI</strong></td>
</tr>
<tr>
<td>1</td>
<td>Compiler Design</td>
<td>Compiler Design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>By Prof. Santanu Chattopadhyay, IIT Kharagpur</td>
</tr>
<tr>
<td>2</td>
<td>Computer Network</td>
<td>Computer Network</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Soumya Kanti Ghosh, IIT Kharagpur</td>
</tr>
<tr>
<td>3</td>
<td>Human Computer Interaction</td>
<td>Human Computer Interaction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. K. Ponnurangam, IIT Delhi</td>
</tr>
<tr>
<td>4</td>
<td>Artificial Intelligence</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. P. Dasgupta, IIT Kharagpur</td>
</tr>
<tr>
<td>5</td>
<td>Geographic Information System</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. A. K. Saraf, IIT Roorkee</td>
</tr>
<tr>
<td>6</td>
<td>Biology</td>
<td>Basic Biology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Vishal Trivedi, IIT Guwahati</td>
</tr>
<tr>
<td>7</td>
<td>Internet of Things</td>
<td>Design for Internet of Things</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. T. V. Prabhakar, IISC Bangalore</td>
</tr>
<tr>
<td>8</td>
<td>Consumer Behaviour</td>
<td>Introduction to Consumer Behavior</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Shrabanti Mukharjee, IIT Kharagpur</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Semester VII</strong></td>
</tr>
<tr>
<td>1</td>
<td>Distributed System</td>
<td>Distributed System</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Rajiv Misra, IIT Patna</td>
</tr>
<tr>
<td>2</td>
<td>Cloud Computing</td>
<td>Cloud Computing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Soumya Kanti Ghosh, IIT Kharagpur</td>
</tr>
<tr>
<td>Semester VIII</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1  | Software Testing | Software Testing  
|     |                  | Prof. Rajib Mall, IIT Kharagpur |
| 2  | Robotics         | Robotics  
|     |                  | Prof. Dilip Kumar Pratihar, IIT Kharagpur |
| 3  | Virtual Reality  | Virtual Reality  
|     |                  | Prof. Steve Lavalle, University of Illinois |
| 4  | Deep Learning    | Deep Learning  
|     |                  | Prof. Mitesh Khapra, IIT Madras |
BTCOC501 Database Systems

[Unit 1] 6 Hrs
**Database system architecture:** Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).
**Data models:** Entity-relationship model, Relational integrity constraints, data manipulation operations.

[Unit 2] 6 Hrs
**Relational query languages:** Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS – MYSQL, ORACLE, DB2, SQL server.

[Unit 3] 6 Hrs
**Relational database design:** Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

[Unit 4] 6 Hrs
**Query processing:** Evaluation of relational algebra expressions, Query equivalence, Join strategies.

[Unit 5] 6 Hrs
**File Organization and Indexing:** Indices, B-trees, hashing.

[Unit 6] 6 Hrs
**Transaction processing:** Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

**Text Books:**

**Reference Books:**
BTCOC502 Theory of Computations

[Unit 1] 6 Hrs
Finite Automata and Regular Expressions: Definition of deterministic finite automata, Non-deterministic finite automata, Moore and Mealy machines and their conversions, Regular expressions, Recursive definition, NFA with ε-moves, Inter-conversion between NFA and DFA, Regular expression and FA, Pumping lemma.

[Unit 2] 6 Hrs
Context Free Grammars: Definition, Production rules, Ambiguous grammar, Removal of ambiguity, Chomsky hierarchy, Context Free Grammar (CFG) – definition, Simplification of CFG.

[Unit 3] 6 Hrs
Context Free Languages: Definition of context free languages, Regular grammar definition, Left linear, Right linear grammar, Inter-conversion between left linear and right linear regular grammar, Regular grammar and finite automata, CNF, GNF, Derivation graphs, Type 0 and Type 1 grammars.

[Unit 4] 6 Hrs
Pushdown Automata: Formal definition, Pushdown automata (PDA), Deterministic Pushdown automata (DPDA) – definition, Non-deterministic Pushdown automata (NPDA) - definition, relative powers of DPDA and NPDA.

[Unit 5] 6 Hrs
Turing Machines and Undecidability: Definition, Computing with Turing machine, Extensions of Turing machines, Random access Turing machines, Non-deterministic Turing machines, Grammars, The Church’s Turing hypothesis, Universal Turing machines, The Halting problem, Unsolvable problems about Turing machines.

Reference Books:

Text Books:
**BTCOC503 Machine Learning**

[**Unit 1**] 6 hrs  
Introduction: Basic definitions, types of learning, hypothesis space and inductive bias, evaluation, cross-validation, Linear regression, Decision trees, overfitting.

[**Unit 2**] 6 hrs  
Instance based learning, Feature reduction, Collaborative filtering based recommendation, Probability and Bayes learning.

[**Unit 3**] 6 hrs  
Logistic Regression, Support Vector Machine, Kernel function and Kernel SVM.

[**Unit 4**] 6 hrs  
Neural network: Perceptron, multilayer network, backpropagation, introduction to deep neural network.

[**Unit 5**] 6 hrs  
Computational learning theory, PAC learning model, Sample complexity, VC Dimension, Ensemble learning.

[**Unit 6**] 6 hrs  
Clustering: k-means, adaptive hierarchical clustering, Gaussian mixture model.

**Reference Books:**

[Unit 1]
What is research; Overview of research.

[Unit 2]
Literature survey, Conducting Systematic Research Survey.

[Unit 3]
Experimental skills; Data analysis; modelling skills.

[Unit 4]
Technical writing, Technical Presentations, Creativity in Research.

[Unit 5]
Technical writing, Technical Presentations, Creativity in Research, Research plagiarism.

[Unit 6]
Conducting a sample Research Survey on a given topic

Reference Books:
BT COE 504(B) Cyber Laws

[Unit 1]

[Unit 2]

[Unit 3]

[Unit 4]
Penalties, Compensation And Offences Under The Cyberspace And Internet In India Penalties, Compensation and Adjudication of Violations of Provisions of IT Act and Judicial Review Some Important Offences under the Cyberspace Law and the Internet in India, Other Offences under the Information Technology Act in India.

[Unit 5]

Reference Books:
4. Sunit Belapure Nina Godbole, Cyber Security, Wiley India Pvt. Ltd.
[Unit 1]
Introduction, Market Equilibrium: Demand and Supply, Elasticity of Demand Demand Forecasting, Production, Exercises on Economics, Cost-Volume-Profit Relationships, Cost Management Systems and Activity Costing System

[Unit 2]

[Unit 3]

[Unit 4]
Depreciation Accounting, Evolution of Management Thoughts, Functions of Management Directing.

[Unit 5]
Product Development, Forecasting Revisited, Capacity Planning, Product / Services Strategies and Plant Layout, Production Planning and Control.

[Unit 6]
Inventory Management, Supply Chain Management, Marketing Management, Forms of Ownership, Starting a New Company and Small-Scale Industrial Understandings, Capital Financing, Entrepreneurship.
[Unit 1]

[Unit 2]
Intercultural Communication, Nonverbal Communication, Thought and Speech, Translation as Problematic Discourse.

[Unit 3]
Barriers to Communication, Listening, Communication Rules, Communication Style.

[Unit 4]
Interpersonal Communication, Relational Communication, Organizational Communication.

[Unit 5]
Collaboration, Communication in Groups and Teams, Persuasive Communication.

[Unit 6]
Negotiation and Conflict Management, Leadership, Written Communication in International Business, Role of Technology in international Business Communication, Moving to Another Culture, Crisis Communication, Ethics in Business Communication.
[Unit 1]

Introduction
Online Judge The Programming Challenges Robot Judge, Understanding Feedback From the Judge, Choosing Programming Languages, Reading Our Programs, Standard Input/Output, Programming Hints, Elementary Data Types.

Challenging Problems
(1) The 3n + 1 Problem (2) Minesweeper (3) The Trip, (4) LCD Display (5) Graphical Editor (6) Interpreter (7) Check the Check (8) Australian Voting.

[Unit 2]

Elementary Data Structures

Challenging Problems

[Unit 3]

Strings
Character Codes, Representing Strings, Program Design Example: Corporate Renamings, Searching for Patterns, Manipulating Strings, Completing the Merger, String Library Functions.

Challenging Problems

[Unit 4]

Sorting
Sorting, Sorting Applications Sorting Algorithms, Program Design Example: Rating the Field, Sorting Library Functions, Rating the Field.

Challenging Problems
(1) Vito’s Family (2) Stacks of Flapjacks (3) Bridge (4) Longest Nap (5) Shoemaker’s Problem (6) CDVII (7) ShellSort (8) Football.
[Unit 5]

**Arithmetic and Algebra**

**Challenging Problems**

[Unit 6]

**Combinatorics**
Basic Counting Techniques, Recurrence Relations, Binomial Coefficients, Other Counting Sequences, Recursion and Induction Problems.

**Challenging Problems**

**List of Practical:**
At least twenty five problems solving on competitive programming platforms such as, [https://uva.onlinejudge.org](https://uva.onlinejudge.org), [http://hackerrank.com](http://hackerrank.com), [http://codechef.com](http://codechef.com)

**Reference Books:**
4. Gayle Lakaman Cracking the Coding Interview.
5. The Hitchhiker’s Guide to the Programming Contests.
List of Experiments:
1. Defining schema for applications.
2. Creating tables, Renaming tables, Data constraints (Primary key, Foreign key, Not Null), Data insertion into a table.
4. Sub-queries, Set operations, Joins.
5. Creation of databases, writing SQL and PL/SQL queries to retrieve information from the databases.
6. Assignment on Triggers & Cursors.
7. Normal Forms: First, Second, Third and Boyce Codd Normal Forms.
8. Assignment in Design and Implementation of Database systems or packages for applications such as office automation, hotel management, hospital management.
9. Deployment of Forms, Reports Normalization, Query Processing Algorithms in the above application project.
10. Large objects – CLOB, NCLOB, BLOB and BFILE.
11. Distributed database Management, creating web-page interfaces for database applications using servlet.
As a part of lab exercises for Machine Learning Laboratory, it is suggested that the student should get hands-on experience by solving data analysis problems available on Machine Learning competition platforms such as HackerEarth and Kaggle. Some of the suggestive list of problem solving is given below. The link address is as retrieved from www.hackerearth.com on 17 June 2019. Knowledge of R programming or Python is required to solve these problems, students get this prerequisite in Second Year.

<table>
<thead>
<tr>
<th></th>
<th>Regression Analysis and Plot interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Logistic Regression Analysis in R</td>
</tr>
<tr>
<td>3</td>
<td>Random Forest and Parameter Tuning in R</td>
</tr>
<tr>
<td>4</td>
<td>Clustering Algorithms and Evaluation in R</td>
</tr>
<tr>
<td>5</td>
<td>Machine Learning Project in Python on House Prices Data</td>
</tr>
</tbody>
</table>
BTCOC601 Compiler Design

[Unit 1] 6 Hrs
**Introduction to Compiling**
Definition, analysis of the source program, the phases of a compiler, the grouping of phases, Compiler Construction tools, A simple one-pass compiler,

[Unit 2] 6 Hrs
**Lexical Analysis**
The role of the Lexical analyzer, Input buffering, Specification of Tokens, A Language for Specifying Lexical Analyzers, Design of a Lexical Analyzer generator.

[Unit 3] 6 Hrs
**Syntax Analysis**
The role of the Parser, Context-free grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Operator-precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators.

[Unit 4] 6 Hrs
**Syntax-Directed Translation**

Unit 5 6 Hrs
**Intermediate Code Generation**
Intermediate Languages, Declarations, Assignment Statements, Boolean Expressions, Case Statements, Back patching, Procedure Calls.

[Unit 6] 6 Hrs
**Code Generation**

**Text Books:**
[Unit 1] 6 Hrs


[Unit 2] 6 Hrs

LAN Technologies: X.25, Frame relay, ATM, Ethernet (802.3), FDDI, Token Rings, Resilient Packet Rings, Wireless LANs: Wi-Fi (802.11), Cell Phone Technologies, Broadband Wireless: Wi-MAX (802.16), Bluetooth (802.15.1), RFID.

[Unit 3] 6 Hrs

Data Link Layer: Data Link Layer Design Issues: Service provided to network layer Framing, Error Control, Flow Control, Error Detection and Correction: error correcting codes, error detecting codes.

[Unit 4] 6 Hrs


[Unit 5] 6 Hrs

Application Layer Protocols: DNS, SMTP, POP, FTP, HTTP.

[Unit 6] 6 Hrs


Reference Books:

Text Books:
BTCOE603(A) Human Computer Interaction

[Unit 1] 6 Hrs

[Unit 2] 6 Hrs

[Unit 3] 6 Hrs

[Unit 4] 6 Hrs


[Unit 5] 6 Hrs

Reference Books:

Text Books:
2. B. Shneiderman, Designing the User Interface, Addison-Wesley Publishing Company.
Dr. Babasaheb Ambedkar Technological University

BTCOE603(B) Artificial Intelligence

[Unit 1]
Introduction

Intelligent Agents

[Unit 2]
Problem-solving

[Unit 3]
Constraint Satisfaction Problems
Defining Constraint Satisfaction Problems, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

[Unit 4]
Game Playing
Adversarial Search, Games, Optimal Decisions in Games, Alpha–Beta Pruning.

[Unit 5]
Logical Agents
Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic: A Very Simple Logic, Propositional Theorem Proving, Effective Propositional Model Checking, Agents Based on Propositional Logic

First-Order Logic

[Unit 6]
Uncertainty

Reference Books:
[Unit 1]
Introduction Overview of object oriented system, Object orientation, Objects, attributes, object behavior, Object respond to messages, encapsulation, Inheritance, Polymorphism, object relationships and association, aggregation, Object identity static and dynamic binding, Object persistence, meta classes. Object oriented system development life cycle.

[Unit 2]
Object oriented modeling Modeling, UML Modeling, class diagram, activity diagram, Sequence diagram, collaboration diagram state chart diagram, interaction diagram, Implementation diagram, use case diagram.

[Unit 3]
Object oriented analysis Use case analysis, CRC card analysis.

[Unit 4]
Object Oriented Design, Design Patterns.

[Unit 5]
Implementation from Design to Implementation, Programming Style, Object-Oriented languages, Non-Object-Oriented languages, Object Oriented Databases, Computer animation, Electrical Distribution design System, Future of Object-Oriented Technology.

Text Books:
1. Grady, Booch, Object Oriented analysis and design with applications, 2nd Edition, PHI.
Dr. Babasaheb Ambedkar Technological University

BTOE604(A) Geographic Information System

[Unit 1]
What is Geographic Information Systems?, Different components of GIS, Different types of vector data, Raster data models and their types TIN data model.

[Unit 2]
Advantages and disadvantages associated with vector, raster and TIN Non-spatial data attributes and their type Raster data compression techniques Different raster data file formats Spatial database systems and their types.

[Unit 3]
Pre-processing of spatial datasets Different map projections, Spatial interpolation techniques Different types of resolutions Digital Elevation Model (DEM).

[Unit 4]
Quality assessment of freely available DEMS GIS analysis-1 GIS analysis-2 and applications Errors in GIS Key elements of maps

Reference Books:
2. Introduction to Geographic Information Systems by Chang Kang-tsung (Karl), 2006
[Unit 1]
Introduction
Introduction, Different Fields of Biology.

[Unit 2]
Origin of Life and Evolution
Different theories of origin of life, Experimental evidences supporting different theories. Lamarck, Darwanism and other theories of evolution, Documentary evidences supporting different evolution theories.

[Unit 3]
Ecology
Ecosystem, Food Chain, Pollution

[Unit 4]
Physiology
Process of Food intake and Digestion, Nerves conduction and electrophysiology, Muscle contraction and locomotion, Different Methods of Reproduction in prokaryotic and eukaryotic system

[Unit 5]
Cell Biology and Sub-Cellular Structures
Structure and function of eukaryotic and prokaryotic cells

[Unit 6]
Biological System
Structure-function of biological macromolecules, Central Dogma of Life, Replication, Transcription, Translation,

Reference Books:
[Unit 1] 8 Hrs

Introduction to IoT
Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

[Unit 2] 9 Hrs

Elements of IoT
Hardware Components Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces, Software Components Programming API’s (using Python / Node.js / Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

[Unit 3] 18 Hrs

IoT Application Development
Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.

[Unit 4] 10 Hrs

IoT Case Studies
IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation

Reference Books:
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, “Introduction to Internet of Things: A practical Approach”, ETI Labs
5. Adrian McEwen, “Designing the Internet of Things”, Wiley
[Unit 1]
Introduction, Various Definitions of Development Engineering.

[Unit 2]
World Poverty and Development, Poverty in the India, Sustainable Development, Culture and Global Competence, The Engineer’s Role.

[Unit 3]

[Unit 4]

[Unit 5]
Engineering for Sustainable Community Development: The Engineer as a Helper Participatory Community Development, Teamwork and Project Management, Community Assessment: Learning About a Community, Project Selection, Humanitarian Technology, Participatory Technology Development, Humanitarian STEM Education.

[Unit 6]
ICT for Development, AI for Humanitarian purposes, Blockchain and Social Development.

Reference Books:
[Unit 1]

Introduction and Basic Concepts of NSS: History, Philosophy, Aims & objectives of NSS Organizational structure, Concept of regular activities, Special camping, Day Camps, Basis of adoption village/slums, Methodology of conducting Survey.

[Unit 2]

Youth and community mobilization: Definition, Profile of youth, Categories of youth, Issues, Challenges and opportunities for youth, Youth as an agent of social change, Youth-adult partnership, Mapping of community stakeholders, Identifying methods of mobilization, Needs & importance of volunteerism.

[Unit 3]

Importance and Role of Youth Leadership: Meaning and types of leadership, Qualities of good leaders; Traits of leadership, Importance and role of youth leadership.

[Unit 4]

Life Competencies and skill: Definition and importance of life competencies, Communication, Inter Personal, Problem solving and decision making, Positive thinking, Self-confidence and self-esteem, Life goals, Stress and time management.

[Unit 5]

Social Harmony and National Integration: Indian history and culture, Role of youth in peace-building and conflict resolution, Role of youth in Nation building.

[Unit 6]

Youth Development Programmes in India: National Youth Policy, Youth development programmes at the National Level, State Level and voluntary sector, Youth-focused and Youth-led organizations.

Reference Books:
4. Rashtriya Seva Yojana Sankalpana – Prof. Dr. Sankay Chakane, Dr. Pramod Pabrekar, Diamond Publication, Pune.
6. Annual report of National Service Scheme (NSS) published by DTE, Mantralaya.
7. NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA- Socio and cultural guidelines.
8. Case material as a Training Aid for Field Workers, Gurmeet Hans.
9. Social service opportunities in hospitals, Kapil K. Krishnan, TISS.
[Unit 1]
Introduction to the Study of Consumer Behavior

Market Research and Consumer Behavior
Relevance of Market Research with Consumer Behavior, Approaches to Consumer Behavior Research, Quantitative Research, Qualitative Research.

[Unit 2]

[Unit 3]
The Consumer Decision Making Process

[Unit 4]
Models of Consumer Behavior
The Economic model, Learning model, Psychoanalytic model, The sociological model.

Psychological Influences on Consumer Decision Making
Consumer Attitude: Belief, Affect, Attitude and Intention, Attitude Formation and Attitude Change, Consumer Communication.

[Unit 5]
Sociological Influences on Consumer Decision Making
Consumer groups, Consumer reference groups, Family and Life cycle, Social class and mobility, lifestyle analysis, Culture; Sub-Culture, Cross Culture, Interpersonal Communication and influence, Opinion Leadership.

Diffusion of innovation Diffusion Process, Adoption Process, Consumer Innovators, Multiplicative innovation adoption (MIA) model.

[Unit 6]
Organizational Buying
Dr. Babasaheb Ambedkar Technological University

influencing Organizational Buying Behaviour, Decision Makers in Organizational Buying, Webster and Wind model of Organizational buying behaviour, The Sheth model of Industrial buying, The Sheth model of Industrial buying.

**Consumer Behavior Analysis and Marketing Strategy**


**Reference Books**


Dr. Babasaheb Ambedkar Technological University

BTCOC606 Competitive Programming-II

[Unit 1]
Number Theory
Prime Numbers, Finding Primes, Counting Primes, Divisibility Greatest Common Divisor, Least Common Multiple, Modular Arithmetic, Congruence’s Operations on Congruence’s, Solving Linear Congruence’s, Diophantine Equations, Number Theoretic Libraries.

Challenging Problems

[Unit 2]
Backtracking
Backtracking, Constructing All Subsets, Constructing All Permutations, Program Design Example: The Eight-Queens Problem, Pruning Search.

Challenging Problems
(1) Little Bishops (2) 15-Puzzle Problem (3) Queue (4) Servicing Stations (5) Tug of War (6) Garden of Eden (7) Color Hash (8) Bigger Square Please

[Unit 3]
Graph Traversal
Flavors of Graphs, Data Structures for Graphs, Graph Traversal: Breadth-First, Breadth-First Search, Exploiting Traversal, And Finding Paths Graph Traversal: Depth-First Finding Cycles Connected Components Topological Sorting.

Challenging Problems

[Unit 4]
Graph Algorithm
Graph Theory, Degree Properties, and Connectivity, Cycles in Graphs, Planar Graphs, Minimum Spanning Trees, Shortest Paths, Dijkstra’s Algorithm, All-Pairs Shortest Path, Network Flows and Bipartite Matching


[Unit 5]
Dynamic Programming
Don’t Be Greedy, Edit Distance, Reconstructing the Path, Varieties of Edit Distance, Program Design Example: Elevator Optimization

Challenging Problems
[Unit 6]
Grids

List of Practical:
At least twenty five problems solving on competitive programming platforms such as, https://uva.onlinejudge.org, http://hackerrank.com/, http://codechef.com/

Reference Books:

4. Gayle Lakaman Cracking the Coding Interview.
5. The Hitchhiker’s Guide to the Programming Contests.
BTCOL607 Mobile Application Development for iOS / Android

Note: The course on mobile application development can be taught for two different mobile OS platforms either iOS or Android.

The students can opt any one either iOS or Android for studying mobile application development. Either Part (A) or Part (B) of the following syllabus needs to be completed. It is not required to complete both parts i.e. Part(A) and Part(B)

Part (A) Mobile Application Development with SWIFT for iOS

Build a foundation in Swift, UI Kit and networking through hands-on labs and guided projects. Students can build an app of their own design by the end of the course.

1. Get Started with App Development. Learn about the basics of data, operators, and control flow in Swift, as well as documentation, debugging, Xcode, building and running an app, and Interface Builder. They then apply this knowledge to the guided project, Light, to create a simple flashlight app.

2. Introduction to UI Kit. Explore Swift strings, functions, structures, collections, and loops. Learn about UIKit—the system views and controls that make up a user interface—and how to display data using Auto Layout and stack views. Put this knowledge to practice in the guided project, Apple Pie, to build a word-guessing game app.

3. Navigation and Workflows. Discover how to build simple workflows and navigation hierarchies using navigation controllers, tab bar controllers, and segues. Also examine two powerful tools in Swift, optionals and enumerations. Put this knowledge into practice with the guided project, Personality Quiz, a personalized survey that reveals a fun response to the user.

4. Tables and Persistence. Learn about scroll views, table views, and building complex input screens. Explore how to save data, share data to other apps, and work with images in the user’s photo library. Use new skills in the guided project, List, a task-tracking app that allows the user to add, edit, and delete items in a familiar table-based interface. Students can customize the app to keep track of any type of information, such as a collection, tasks, or playlists.

5. Working with the Web. Learn about animations, concurrency, and working with the web. Apply learning in the guided project, Restaurant, a customizable menu app that displays the available dishes from a restaurant and allows the user to submit an order. This app uses a web service that allows students to set up the menu with their own menu items and photos.

6. Prototyping and Project Planning. Design, prototype, and architect a project of your own design.

List of Experiments: (Guided Projects)

1. Create a simple Flashlight app
2. Apple Pie Game - Word-guessing game app
3. Personality Quiz - a personalized survey that reveals a fun response to the user.
4. List – a task tracking app that allows the user to add, edit and delete items in a familiar table-based interface. Customize the app to keep track of any type of information, such as a collection, tasks or playlists.
5. Restaurant Menu - a customizable menu app that displays the available dishes from a restaurant and allows the user to submit an order.

Reference Books:
3. App Development with Swift - #iBooks
4. Intro to App Development with Swift - #iBooks

Part (B) Mobile Application Development for Android

1. Introduction to mobile computing, installing of required software and preparing the working environment, creating your first Android Application.

2. Layouts, Views, Resources, Activities, Intents, Background tasks, Connecting to the Internet, Fragments, Preferences.

3. User Interaction – input, menu items, custom views.

4. User Experience – themes and styles, material design, adaptive layouts, accessibility, localization, debugging the UI.

5. Storing Data, SQLite database, Sharing Data, content resolver and providers, loaders to load data Services, background work, alarms, broadcast receivers.

6. Notification, widgets, transferring data efficiently, publishing app, Multiple form factors, sensors, Google cloud messaging, monetizing your app.

List of Experiments:
1. Install the Android SDK and developer tools and build a test project to confirm that those tools are properly installed and configured.
2. Write a program using a Table Layout for our restaurant data entry form; add a set of radio buttons to represent the type of restaurant.
3. Write a program using activity class to show different events.
4. Write a program to send user from one application to another. (For example redirection to map).
5. Write a program to play audio files.
6. Write a program to play video files.
7. Write a program to capture image using built in camera.
8. Write a program to send SMS.
9. Write a program to convert text to speech.
10. Write a program to call a number.

Reference Books:
1. Study of Raspberry-Pi, Beagle board, Arduino and other micro controller.
2. Study of different operating systems for Raspberry-Pi. Understanding the process of OS installation on Raspberry-Pi.
3. Study of Connectivity and configuration of Raspberry-Pi circuit with basic peripherals, LEDS. Understanding GPIO and its use in program.
4. Understanding the connectivity of Raspberry-Pi circuit with temperature sensor. Write an application to read the environment temperature. If temperature crosses a threshold value, the application indicated user using LEDSs.
5. Understanding the connectivity of Raspberry-Pi circuit with IR sensor. Write an application to detect obstacle and notify user using LEDs.
6. Understanding and connectivity of Raspberry-Pi with camera. Write an application to capture and store the image.
7. Study of different CPU frequency governors. Write an application to change CPU frequency of Raspberry-Pi.
8. Write an application using Raspberry-Pi to control the operation of a hardware simulated traffic signal.
9. Write an application using Raspberry-Pi to control the operation of a hardware simulated lift elevator.
10. Write a server application to be deployed on Raspberry-Pi. Write client applications to get services from the server application.
11. Create a small dashboard application to be deployed on cloud. Different publisher devices can publish their information and interested application can subscribe.
12. Develop a Real time application like smart home with following requirements: When user enters into house the required appliances like fan, light should be switched ON. Appliances should also get controlled remotely by a suitable web interface. The objective of this application is student should construct complete Smart application in group.
1. Simulate and Understand IP forwarding within a LAN and across a router.
2. Study the working of spanning tree algorithm by varying the priority among the switches.
3. Understand the working of “Connection Establishment” in TCP using a network simulator.
4. Study how the Data Rate of a Wireless LAN (IEEE 802.11b) network varies as the distance between the Access Point and the wireless nodes is varied.
5. Study the working and routing table formation of Interior routing protocols, i.e. Routing Information Protocol (RIP) and Open Shortest Path First (OSPF).
6. Plot the characteristic curve throughput versus offered traffic for a Slotted ALOHA system.
7. Understand the impact of bit error rate on packet error and investigate the impact of error of a simple hub based CSMA / CD network.
8. Study the performance of networks based on Star, Bus and Ring topologies.
9. TCP/IP Sockets: Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.
10. Write a program for calculating the shortest path using Link State Routing Algorithms

Experiments can be done using NS2, NETSIM, NCTU etc.