Course Structure & Syllabus
of
B.Tech Programme
in
INFORMATION TECHNOLOGY

(From the Session 2015-16)

VSSUT, BURLA
VEER SUREN德拉 SAI UNIVERSITY OF TECHNOLOGY, BURLA

VISION

To emerge as an internationally acclaimed Technical University to impart futuristic technical education and creation of vibrant research enterprise to create quality engineers and researchers, truly world class leader and unleashes technological innovations to serve the global society and improve the quality of life.

MISSION

The Veer Surendra Sai University of Technology, Odisha, Burla strives to create values and ethics in its products by inculcating depth and intensity in its education standards and need based research through

- Participative learning in a cross-cultural environment that promotes the learning beyond the class room.
- Collaborative partnership with industries and academia within and outside the country in learning and research.
- Encouraging innovative research and consultancy through the active participation and involvement of all faculty members.
- Facilitating technology transfer, innovation and economic development to flow as natural results of research where ever appropriate.
- Expanding curricula to cater broader perspectives.
- Creation of service opportunities for upliftment of the society at large.

DEPARTMENT OF CSE & IT

VISION

To be a recognized leader by imparting quality technical education and thereby facilitating the extensive research environment, equipping students with latest skills in the field of technology supplemented with practical orientation to face challenges in the fast morphing modern computing industry and academia for the betterment of the society.
MISSION

a. To produce best quality computer science / IT professionals and researchers by providing state-of-the-art training, hands on experience and healthy research environment.

b. To collaborate with industry and academia around the globe for achieving quality technical education and excellence in research through active participation of all the stakeholders.

c. To promote academic growth by establishing Center of Excellences and offering inter-disciplinary postgraduate and doctoral programs.

d. To establish and maintain an effective operational environment and deliver quality, prompt cost effective and reliable technology services to the society as well as compliment the local and global economic goals.

GRADUATE ATTRIBUTES:

The Graduate Attributes of NBA for UG Programme are:

- Engineering Knowledge
- Problem Analysis
- Design/Development of solutions
- Conduct investigations of complex problems
- Modern tool usage
- The Engineer and society
- Environment and sustainability
- Ethics
- Individual and Team Work
- Communication
- Project Management & Finance
- Lifelong learning
### PROGRAM EDUCATIONAL OBJECTIVES

<table>
<thead>
<tr>
<th>PEO-1</th>
<th>To provide graduating students with core competencies by strengthening their mathematical, scientific and basic engineering fundamentals</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEO-2</td>
<td>To train graduates in diversified and applied areas with analysis, design and synthesis of data to create novel products and solutions to meet current industrial and societal needs.</td>
</tr>
<tr>
<td>PEO-3</td>
<td>To inculcate high professionalism among the students by providing technical and soft skills with ethical standards.</td>
</tr>
<tr>
<td>PEO-4</td>
<td>To promote collaborative learning and spirit of team work through multidisciplinary projects and diverse professional activities.</td>
</tr>
<tr>
<td>PEO-5</td>
<td>To encourage students for higher studies, research activities and entrepreneurial skills by imparting interactive quality teaching and organizing symposiums, conferences, seminars, workshops and technical discussions.</td>
</tr>
<tr>
<td>Mission Statement</td>
<td>PEO1</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>To produce best quality computer science / IT professionals and researchers by</td>
<td>✓</td>
</tr>
<tr>
<td>providing state-of-the-art training, hands on experience and healthy research</td>
<td></td>
</tr>
<tr>
<td>environment.</td>
<td></td>
</tr>
<tr>
<td>To collaborate with industry and academia around the globe for achieving quality</td>
<td>✓</td>
</tr>
<tr>
<td>technical education and excellence in research through active participation of</td>
<td></td>
</tr>
<tr>
<td>all the stakeholders.</td>
<td></td>
</tr>
<tr>
<td>To promote academic growth by establishing Center of Excellences and offering</td>
<td>✓</td>
</tr>
<tr>
<td>inter-disciplinary postgraduate and doctoral programs.</td>
<td></td>
</tr>
<tr>
<td>To establish and maintain an effective operational environment and deliver</td>
<td>✓</td>
</tr>
<tr>
<td>quality, prompt cost effective and reliable technology services to the society</td>
<td></td>
</tr>
<tr>
<td>as well as compliment the local and global economic goals.</td>
<td></td>
</tr>
</tbody>
</table>
PROGRAM OUTCOMES: At the end of the program the student will be able to:

1. An ability to apply fundamental knowledge of computing, mathematics, science and engineering appropriate to the discipline.
2. An ability to analyze a problem, identify and formulate the computing requirements appropriate to its solution.
3. An ability to design, implement, and evaluate a computer-based system, process, component, or program for various applications like public health, environmental safety, human resource management, economical sustainability, cross-cultural and societal needs.
4. An ability to formulate models, design and conduct experiments, as well as to analyze and interpret data.
5. An ability to use current techniques, skills, and modern tools necessary for computing practice.
6. An ability to analyze the local and global impact of computing on individuals, organizations, and society.
8. An understanding of professional, ethical, legal, security and social issues and responsibilities.
9. An ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a common goal.
10. Development of emphatic written and verbal communication skills.
11. Continuous professional development through long term learning.
12. An understanding of engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects.
Mapping of program outcomes with program educational objectives:

<table>
<thead>
<tr>
<th>PEOs</th>
<th>Program Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>To provide graduating students with core competencies by strengthening</td>
<td>X</td>
</tr>
<tr>
<td>their mathematical, scientific and basic engineering fundamentals</td>
<td></td>
</tr>
<tr>
<td>To train graduates in diversified and applied areas with analysis,</td>
<td>X</td>
</tr>
<tr>
<td>design and synthesis of data to create novel products and solutions</td>
<td></td>
</tr>
<tr>
<td>to meet current industrial and societal needs.</td>
<td></td>
</tr>
<tr>
<td>To inculcate high professionalism among the students by providing</td>
<td>X</td>
</tr>
<tr>
<td>technical and soft skills with ethical standards.</td>
<td></td>
</tr>
<tr>
<td>To promote collaborative learning and spirit of team work through</td>
<td></td>
</tr>
<tr>
<td>multidisciplinary projects and diverse professional activities.</td>
<td></td>
</tr>
<tr>
<td>To encourage students for higher studies, research activities and</td>
<td></td>
</tr>
<tr>
<td>entrepreneurial skills by imparting interactive quality teaching and</td>
<td></td>
</tr>
<tr>
<td>organizing symposiums, conferences, seminars, workshops and technical</td>
<td></td>
</tr>
<tr>
<td>discussions.</td>
<td></td>
</tr>
</tbody>
</table>
## FIRST YEAR
(COMMON TO ALL BRANCHES)

<table>
<thead>
<tr>
<th>FIRST SEMESTER</th>
<th></th>
<th>SECOND SEMESTER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
<td><strong>Subject</strong></td>
<td><strong>Contact Hrs.</strong></td>
<td><strong>CR</strong></td>
</tr>
<tr>
<td>Mathematics-I</td>
<td>3 - 1 - 0</td>
<td>4</td>
<td>Mathematics-II</td>
</tr>
<tr>
<td>Physics/Chemistry</td>
<td>3 - 1 - 0</td>
<td>4</td>
<td>Chemistry/Physics</td>
</tr>
<tr>
<td>Basic Electrical Engineering/Basic Electronics</td>
<td>3 - 1 - 0</td>
<td>4</td>
<td>Basic Electronics/Basic Electrical Engineering</td>
</tr>
<tr>
<td>English/Environmental Studies</td>
<td>3 - 1 - 0</td>
<td>4</td>
<td>Environmental Studies/English</td>
</tr>
<tr>
<td><strong>Sessionals</strong></td>
<td></td>
<td></td>
<td><strong>Sessionals</strong></td>
</tr>
<tr>
<td>Physics Laboratory/Chemistry Lab</td>
<td>0 - 0 - 3</td>
<td>2</td>
<td>Chemistry Lab/Physics Laboratory</td>
</tr>
<tr>
<td>Workshop-I/Engineering Drawing</td>
<td>0 - 0 - 3</td>
<td>2</td>
<td>Engineering Drawing/Workshop-I</td>
</tr>
<tr>
<td>Basic Electrical Engineering Lab/Basic Electronics Lab</td>
<td>0 - 0 - 3</td>
<td>2</td>
<td>Basic Electronics Lab/Basic Electrical Engineering Lab</td>
</tr>
<tr>
<td>/CS15-984</td>
<td>Business Communication and Presentation Skill/Programming Lab</td>
<td>0 - 0 - 3</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15-5-15</strong></td>
<td><strong>28</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
## SECOND YEAR

<table>
<thead>
<tr>
<th>THIRD SEMESTER</th>
<th>FOURTH SEMESTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td>Course Code</td>
</tr>
<tr>
<td>Course Code</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## THIRD YEAR

<table>
<thead>
<tr>
<th>FIFTH SEMESTER</th>
<th>Contact Hrs.</th>
<th>CR</th>
<th>SIXTH SEMESTER</th>
<th>Contact Hrs.</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
<td><strong>Subject</strong></td>
<td><strong>L .T .P</strong></td>
<td><strong>Theory</strong></td>
<td><strong>Course Code</strong></td>
<td><strong>Subject</strong></td>
</tr>
<tr>
<td>CS15-026</td>
<td>Operating Systems</td>
<td>3 - 1 – 0</td>
<td>4</td>
<td>CS15-004</td>
<td>Compiler Design</td>
</tr>
<tr>
<td>CS15-031</td>
<td>Software Engineering and OOAD</td>
<td>3 - 1 – 0</td>
<td>4</td>
<td>CS15-010</td>
<td>Data Communication and Computer Network</td>
</tr>
<tr>
<td>CS15-021</td>
<td>Microprocessor and Micro controller</td>
<td>3 - 1 – 0</td>
<td>4</td>
<td>CS15-029</td>
<td>Simulation &amp; Modeling</td>
</tr>
<tr>
<td>CS15-019</td>
<td>Graph Theory</td>
<td>3 - 1 – 0</td>
<td>4</td>
<td>CS15-005</td>
<td>Computer Graphics</td>
</tr>
<tr>
<td>IT15-002</td>
<td>Cryptography and Network Security</td>
<td>3 - 1 – 0</td>
<td>4</td>
<td></td>
<td>Core Elective-I</td>
</tr>
<tr>
<td><strong>Sessionals</strong></td>
<td></td>
<td></td>
<td><strong>Sessionals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS15-985</td>
<td>Operating Systems Lab</td>
<td>0 - 0 – 3</td>
<td>2</td>
<td>CS15-997</td>
<td>Compiler Design Lab</td>
</tr>
<tr>
<td>CS15-999</td>
<td>Advanced Computing Lab</td>
<td>0 - 0 – 3</td>
<td>2</td>
<td>CS15-994</td>
<td>Computer Network Lab</td>
</tr>
<tr>
<td>CS15-986</td>
<td>MP &amp; MC Lab</td>
<td>0 - 0 – 3</td>
<td>2</td>
<td>CS15-982</td>
<td>Simulation and Modeling Lab</td>
</tr>
<tr>
<td>CS15-981</td>
<td>Software Engg. Lab</td>
<td>0 - 0 – 3</td>
<td>2</td>
<td>CS15-995</td>
<td>Computer Graphics Lab</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15-5-15</td>
<td>28</td>
<td><strong>Total</strong></td>
<td>15-5-15</td>
<td>28</td>
</tr>
</tbody>
</table>
FORTH YEAR

### SEVENTH SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Subject</th>
<th>Contact Hrs.</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS15-001</td>
<td>Advanced Computer Architecture</td>
<td>3 - 1 - 0</td>
<td>4</td>
</tr>
<tr>
<td>IT15-006</td>
<td>Internet and Web Programming</td>
<td>3 - 1 - 0</td>
<td>4</td>
</tr>
<tr>
<td>CS15-017</td>
<td>Embedded and Real-Time System</td>
<td>3 - 1 - 0</td>
<td>4</td>
</tr>
<tr>
<td>Core Elective-II</td>
<td></td>
<td>3 - 1 - 0</td>
<td>4</td>
</tr>
<tr>
<td>Open Elective-I</td>
<td></td>
<td>3 - 1 - 0</td>
<td>4</td>
</tr>
</tbody>
</table>

**Sessionals**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Subject</th>
<th>Contact Hrs.</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS15-987</td>
<td>Minor Project</td>
<td>0 - 0 - 3</td>
<td>2</td>
</tr>
<tr>
<td>IT15-997</td>
<td>Internet Web Programming Lab</td>
<td>0 - 0 - 3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total**

| 15-5-6 | 24 |

### EIGHTH SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Subject</th>
<th>Contact Hrs.</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS15-022</td>
<td>Mobile Computing</td>
<td>3 - 1 - 0</td>
<td>4</td>
</tr>
<tr>
<td>CS15-027</td>
<td>Parallel and Distributed Systems</td>
<td>3 - 1 - 0</td>
<td>4</td>
</tr>
<tr>
<td>Open Elective-II</td>
<td></td>
<td>3 - 1 - 0</td>
<td>4</td>
</tr>
</tbody>
</table>

**Sessionals**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Subject</th>
<th>Contact Hrs.</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS15-983</td>
<td>Seminar</td>
<td>0 - 0 - 0</td>
<td>2</td>
</tr>
<tr>
<td>CS15-996</td>
<td>Comprehensive Viva</td>
<td>0 - 0 - 0</td>
<td>2</td>
</tr>
<tr>
<td>CS15-988</td>
<td>Major Project</td>
<td>0 - 0 - 6</td>
<td>8</td>
</tr>
</tbody>
</table>

**Total**

| 9-3-6 | 24 |

**Core Electives-I**

- CS15-015  Distributed Computing Systems
- IT15-002  Information Security
- CS15-024  Object Oriented Analysis and Design
- CS15-006  Computer Graphics and Visualization
- CS15-030  Soft Computing
- CS15-028  Pattern Recognition
- CS15-014  Digital Image Processing
- CS15-002  AI and Robotics
- IT15-009  Software Testing
- CS15-034  Wireless Sensor Network
Core Electives-II

CS15-033 VLSI Algorithms
IT15-005 Information Retrieval
IT15-007 Software Architecture
IT15-003 Data mining
CS15-018 Game Theory
CS15-003 Combinatorial optimization
CS15-009 Computer Vision
IT15-008 Software Project Management
CS15-020 Human Computer Interface
IT15-001 Cloud Computing

Open Electives-I

Entrepreneurship (Mechanical)
Energy Management (EEE)
Mobile Computing (El &TC)
Industrial Management and Operation Research (Production)
Numerical Methods in Engineering (Civil)

Open Electives-II

Project Management (Civil)
Remote Sensing and GIS (Civil)
Alternative Energy Sources (Electrical)
Digital Image Processing (EEE)
Digital Switching and Telecommunication Networking (El &TC)

DETAILED SYLLABUS
PHYSICS (3 – 1 – 0)

Course Objective:
It provides basic understanding of bonding in solids and crystal structure. It helps to understand the behavior of electron in a solid and its applications in engineering like memory devices, transformer core and electromagnetic machinery.

Module I (10 Hours)

Polarization: Introduction, Types of Polarization, Production of polarized light (elementary idea) Brewster’s law, Malu’s law, Double refraction (only statement, explanation), Construction and working of Nicol prism, Half wave plate and Quarter wave plate, Application of polarization (Polarimeter: Construction, Principle, Working).

Module II (10 Hours)

Module III (10 Hours)
Quantum mechanics: Need for Quantum Physics, wave particle duality, Davisson Germer experiment, Schroedinger wave equation (time dependent and time independent), properties of wave function, Operators, eigen value, eigen function, expectation value, probability density, Simple applications: particle in a box, finite well, step potential and tunneling

Module IV (10 Hours)
Lasers: Introduction, Characteristics of lasers, Einstein’s coefficients & Relation between them, Lasing action, Population inversion, Different types of Lasers (Ruby Laser, He-Ne Laser), Three and Four level pumping schemes, Applications of LASER (elementary ideas)


Nanomaterials: Introduction, Classification, Physical characteristics and applications (fundamentals)

Course Outcome:
CO1: Analyse and understand the basics of electricity and how these basic ideas are used to enhance our current prosperity.
CO2: Understand the differences between classical and quantum mechanics and learn about semiconductor technology.
CO3: Analyse and learn about how materials behave at low temperature, causes for their behaviour and applications.
CO4: Analyse and understand various types of lasers and optical fibers and their applications.
CO5: Understand the fabrication of nanomaterials, carbon nanotubes and their applications in various fields.

Text books:
1. Optics – A.K.Ghatak
2. Concepts of Modern Physics – A. Beiser

Reference Books:
1. Electricity & Magnetism – D. Griffiths
2. Quantum Mechanics – Gascirowicz
Course Objective:
This syllabus aims at bridging the concepts and theory of chemistry with examples from fields of practical application, thus reinforcing the connection between science and engineering. It deals with the basic principles of various branches of chemistry which are fundamental tools necessary for an accomplished engineer.

Module–I
Failure of Classical Mechanics, Schrodinger’s Wave Equation (Need not be Derived), Energy for 1-D Potential Box, Interaction of Wave with Matter
Fundamental of Microwave, IR, UV-Vis Spectroscopy: Basic Concept of Spectroscopy, Selection Rule, Numericals, Frank-Condon Principle,

Module – II
Thermodynamics of Chemical Processes: Concept of Entropy, Chemical Potential, Equilibrium Conditions for Closed Systems, Phase and Reaction Equilibria, Maxwell Relations

Module–III
Electrode Potentials and its Relevance to Oxidation and Reduction, Measurement of EMF, Determination of pH, Hydrogen, Glass, Quinhydrone Electrodes, Dry Cells, Fuel Cells and Corrosion: Concept, Galvanic Corrosion

Module–IV
Kinetics of Chemical Reactions: Reversible, Consecutive and Parallel Reactions, Steady State Approximation, Chain Engineering application of materials: Organometallics and Nanomaterials

Course Outcome:
CO1: Understand various water treatment methods, boiler troubles understand conduction mechanism in conducting polymers.
CO2: Understand construction and the working principle of different electrodes batteries/ sensors and their applicability.
CO3: Understand the types of corrosion and protection methods.
CO4: Understand the instrumental mechanism and its applicability

Textbooks:
Course Objective:
The objective of this course is to learn types of matrices and their properties, concept of eigenvalues and eigen vectors of a matrix, multiple integration and its applications, properties of laplace transform and inverse laplace transform, and convolution theorem.

Module 1: (10 Lectures)
Open sets, Closed sets, Limit points of a set, Limits, Continuous functions, Functions continuous on closed intervals, The derivative, Increasing and decreasing functions, Statement and applications of Darboux’s theorem, Rolle’s theorem, Lagrange’s mean value theorem, Cauchy’s mean value theorem, Extremum values; Riemann integral: Definition and existence of the integral, Integral as a limit of sums, some integrable functions, Fundamental theorem of calculus, Mean value theorems for integral calculus.

Module 2: (10 Lectures)

Module 3: (10 Lectures)
Eigenvalues, Eigenvectors, Some Applications of Eigenvalue Problems, Symmetric, Skew-Symmetric, and Orthogonal Matrices, Eigenbases, Diagonalization, Quadratic Forms, Complex Matrices and Forms, Inclusion of Matrix Eigenvalues, Power Method for Eigenvalues

Module 4: (10 Lectures)
Numerical methods in general, Introduction, Solution of Equations by Iteration, Interpolation, Numerical Integration and Differentiation

Course Outcome:
CO1: Explain the Knowledge of solving System of equations, Eigen value problems.
CO2: Identify the shape of the geometrical figures from the study of quadratic forms
CO3: Discuss the convergence and Divergence of infinite series it is useful in the study of communication systems.
CO4: Determine the solutions for differential equations which are useful in the Study of Circuit theory and oscillatory systems.
CO5: Apply partial differential equations for Electro- magnetic theory, Transmission lines and Vibrating membranes

Text Books:
1) S.C. Malik and S. Arora, Mathematical Analysis, New Age International
2) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt. Ltd

Chapters: S.C. Malik - 2(2.1- 2.3), 5(5.1-5.3), 6(6.1, 6.3-6.7), 7(7.1), 9(9.1, 9.6, 9.7, 9.9.9.10)

Reference Books:
1) George B. Thomas , Jr. and Ross L. Finney, Calculus and Analytic Geometry, Addison Wesley Publishing Company
3) K.A. Stroud, Advanced Engineering Mathematics, Industrial Press

Mathematics-II

Course Objective:
The objective of the course is to learn state mean value theorem and apply it in communication systems & to express any differentiable function in Power series in signals and systems. Also, it help students to simplify the complicated integrals by changing variables, provide interpolation technique useful in analyzing data that is in the form of unknown function.

Module 1: (10 Lectures)
Basic Concepts, Modeling, Separable ODEs, Modeling, Exact ODEs, Integrating Factors, Linear ODEs, Bernoulli Equation, Population Dynamics, Existence and Uniqueness of Solutions. Homogeneous Linear ODEs of Second Order, Homogeneous Linear ODEs with Constant Coefficients, Euler-Cauchy Equations, Existence and Uniqueness of Solutions, Wronskian, Nonhomogeneous ODEs, Solution by Variation of Parameters.

Module 2: (10 Lectures)

Module 3: (10 Lectures)
Laplace Transforms, Laplace Transform, Inverse Transform, Linearity. s-Shifting, Transforms of Derivatives and Integrals, ODEs, Unit Step Function, t-Shifting, Short Impulses, Dirac's Delta Function, Partial Fractions, Convolution, Integral Equations, Differentiation and Integration of Transforms.
Module 4: (10 Lectures)


Course Outcome:

CO1: State Mean value theorems & apply it in communication systems, equilibrium states of physical systems
CO2: State generalized mean value theorems to express any differentiable function in Power series in signals and systems.
CO3: Simplify the complicated integrals by changing variables
CO4: Interpret the divergence (physically), Grad and Curl in electromagnetic fields.
CO5: Provide interpolation techniques which are useful in analyzing the data that is in the form of unknown function.

Text Book:


Chapters: 1(1.1-1.5, 1.7), 2(except 2.4, 2.8, 2.9), 3, 4(4.1, 4.2), 5(5.1, 5.2, 5.4), 6(6.1-6.5), 12(12.1-12.5, 12.11)

Reference Books:

2) K.A. Stroud, Advanced Engineering Mathematics, Industrial Press
3) J. Sinha Roy and S. Padhy, Ordinary and Partial Differential Equation, Kalyani Publisher.
4) Richard Bronsan and Gabriel Costa, Schaum’s Outline of Differential Equations, McGraw Hill

English for Communication

Course Objective:
The objective of this course is for developing the ability to communicate effectively in professional environment by enhancing their skills in communication.

Module 1: Fundamentals of Communication (10 Hours)
1. Communication: Process, pattern and stages of communication, channels and types of communication and Barriers to Communication.
2. Functions of language: Descriptive, Expressive and Social Functions.
3. Formal and Informal English
4. Plain English (Cross cultural communication)
5. Bias free language

**Module 2: Communicative Grammar** (10 Hours)
1. Time, Tense and Aspects
2. Verbs of State and Events
3. Use of Modal Verbs
4. Passive and Active Voice
5. Conditionals

**Module 3: Sounds of English** (10 Hours)
1. The Speech Mechanism and Organs of Speech
2. Consonant Sounds of English
3. Vowel Sounds of English
5. Problem sounds for Indian Speakers

**Module 4: Business and Official Writing** (10 Hours)
1. Paragraph writing and Sentence Linker
2. Business and Official Letters
3. Report and Proposal writing,
4. Notice, Circular and Memo writing
5. Résumé (CV) Writing.

**Course Outcome:**
CO1: Aware of the elements of functional English in order to make them authentic users of language in any given academic and/or professional situation
CO2: Proficient in making academic presentations
CO3: Exposed to the real-time career oriented environment
CO4: Develop felicity of expression and familiarity with technology enabled communication
CO5: Exposed to the corporate etiquette and rhetoric

**Text Books:**
1. Effective Technical Communication by M Ashraf Rizvi (Tata McGraw Hill)
3. A Communicative Grammar of English by G.N. Leech and Jan Svartik (OUP)

**Reference Books:**
“Business communication” by Ramachandran, Lakshmi and Krishna (Macmillan)

**ENGINEERING MECHANICS**

**Course Objective:**
The objective of the course is to Construct free body diagrams and calculates the reactions necessary to ensure static equilibrium, understand internal forces, locate centroids and determine moment of inertia for composite areas. It also help students to analyze the systems with frictional forces, determine the mass moment of inertia of rigid bodies, and apply Newton’s second law of motion and dynamic equilibrium to particle motion.
Module – I (10 Hours)
Concurrent forces on a plane: Composition, resolution and equilibrium of concurrent coplanar forces, method of moment, friction (chapter 1). (7)
Parallel forces on a plane: General case of parallel forces, center of parallel forces and center of gravity, centroid of composite plane figure and curves (chapter 2.1 to 2.4) (4)

Module – II (10 Hours)
General case of forces on a plane: Composition and equilibrium of forces in a plane, plane trusses, method of joints and method of sections, plane frame, principle of virtual work, equilibrium of ideal systems. (8)
Moments of inertia: Plane figure with respect to an axis in its plane and perpendicular to the plane, parallel axis theorem (chapter 3.1 to 3.4, 5.1, appendix A.1 to A.3) (3)

Module - III (10 Hours)
Rectilinear translation: Kinematics, principle of dynamics, D Alembert’s Principle, momentum and impulse, work and energy, impact (chapter 6). (11)

Module – IV (10 Hours)
Curvilinear translation: Kinematics, equation of motion, projectile, D Alembert’s principle of curvilinear motion. (4)
Kinematics of rotation of rigid body (Chapter 9.1) (3)

Course Outcome:
CO1: Construct free body diagrams and calculate the reactions necessary to ensure static equilibrium.
CO2: Understand internal forces in members.
CO3: Locate centroids and determine moment of inertia for composite areas.
CO4: Analyze the systems with frictional forces.
CO5: Determine the mass moment of inertia of rigid bodies
CO6: Apply Newton’s second law of motion and dynamic equilibrium to particle motion.

Text book:

Reference books:
Fundamental of Engineering mechanics (2nd Edition):
S Rajasekharan & G Shankara Subramanium; Vikas Pub. House Pvt ltd.
Engineering mechanics: K.L. Kumar; Tata MC Graw Hill.

COMPUTER PROGRAMMING

L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective of the course is to illustrate flowchart and algorithm for a given problem, understand basic Structure of the C-PROGRAMMING, declaration and usage of variables,
inscribe C programs using operators, exercise conditional and iterative statements to inscribe C programs, to solve real time problems using functions and inscribe C programs using Pointers to access arrays, strings and functions.

**Module I:**
Introduction to computing- Block architecture of a computer, bit, bytes, memory, representation of numbers in memory. Introduction to problem solving- Basic concepts of an algorithm, program design methods, flowcharts.C Language Fundamentals- Character set, Identifiers, Keywords, Data Types, Constant and Variables, Statements.Error Handling- Input & Output ASSIGNMENTS, Formatted Outputs. Operators and Expressions- Operators, Precedence of operators.

**Module II:**
Decision Control Structure, Loop Control Structure and Case Control Structure. Functions- Monolithic vs Modular programs, User defined vs standard functions, formal vs Actual arguments, Functions category, function prototypes, parameter passing, Recursion. Arrays- 1D Array, 2D Array & Multi-Dimensional Array. Strings - Declaration & Initialization, String Handling Functions.

**Module III:**

**Module IV:**

**Course Outcome:**
CO1: Understand the basic terminology used in computer programming
CO2: Able to write, compile and debug programs in C language.
CO3: Able to use different data types in a computer program.
CO4: Design programs involving decision structures, loops and functions.
CO5: Understand the dynamics of memory by the use of pointers.
CO6: Able to use different data structures and create/update basic data files.

**Text Books:**
1. C: The Complete Reference: Herbert Schildt

**Reference Books:**
1. Let us C- Y.Kanetkar, BPB Publications.
2. Programming with ANSI and Turbo C- Kamthane, A.N. Pearson Education
3. C How to Program - Deitel and Deitel, Pearson Education.
4. The C programming Language- Brian W. Kernighan and Dennis M. Ritchie,Prentice-Hall.

**BASIC ELECTRICAL ENGINEERING (3-1-0)**

**Course Objectives:**
The course objective is to identify the basic elements of the electrical engineering, write the programs for controlling electrical elements and understand the significance of electrical engineering for software fields.

**Module-I** (10 Hours)
DC Networks: Kirchhoff's laws, node and mesh analysis, Delta-star and star-delta transformations. Superposition, Thevenin's and Norton's theorem. Transients, in R-L, R-C and R-L-C circuits with DC. Excitation.

**Module-II** (10 Hours)
DC Generator: Different types, Principle of Operation of DC generator, EMF equation, methods of excitation. DC Motor: Back e.m.f., speed and torque of a DC Motor, Conditions for maximum Power. Speed control of DC shunt motor.

**Module-III** (10 Hours)
Three phase Induction Motor: Construction and principle of operation, types; Slip-torque characteristics.

**Module-IV** (10 Hours)

**Course Outcome:**
CO1: Identify the basic elements of the electrical engineering
CO2: To write the programs for controlling electrical elements
CO3: The significance of electrical engineering for software fields

Text Books:

Reference Books

BASIC ELECTRONICS (3-1-0)

Course Objective:
This course helps students to identify the applications and functions of electronics in Engineering, Recognize basic electronic components and devices used for different electronic functions, and using basic techniques for analyzing analogue and digital electronic circuits.

UNIT-I (10 Hours)
Properties of Semiconductors: Intrinsic, Extrinsic Semiconductors, Current Flow in Semiconductors,
Diodes: p-n junction theory, Current-Voltage characteristics, Analysis of Diode circuits, Rectifiers, Clippers, Clampers, Special diodes- LED, Photo diode, Zener Diode.

UNIT-II (14 Hours)
Bipolar junction Transistor (BJTs): Device Structure and Operation, Current-Voltage Characteristics, BJT as an Amplifier and as a Switch, Introduction to Power Amplifiers, A, B and C types.

UNIT-III (10 Hours)
UNIT-IV (10 Hours)
Introduction to Electronic Instruments: CRO: CRT, Waveform Display, Applications of CRO, Electronic Multimeter, Audio Signal Generator: Block diagram, Front Panel Controls.
Principles of Communication: Fundamentals of AM & FM, Block diagram of Transmitters & Receivers.

Course Outcome:
CO1: Identify the applications and functions of electronics in Engineering.
CO2: Recognise basic electronic components and devices used for different electronic functions.
CO3: Be able to use basic techniques for analysing analogue and digital electronic circuits.

TEXT BOOKS:

REFERENCE BOOKS:
1. Integrated Electronics, Millman and Halkias, TMH Publications.

ENVIRONMENTAL SCIENCE & ENGINEERING

Course Objective
The objective is to understand the importance of environment, identify the environmental problems and issues on local, regional and global scale, identify problems due to human interactions with the environment, encouragement to contribute solutions for the existing environmental issues and understand the enforcement of environmental acts in our constitution.

Module – I (6 Hours)
Components of Earth System: Lithosphere, Cryosphere, Atmosphere, Hydrosphere, Biosphere and Outer space.
Ecological concepts and natural Resources: Ecological perspective and value of environment, Environmental auditing, Biotic components, Levels of organizations in environment Ecosystem Process: Energy, Food chain, Environmental gradients, Tolerance levels of environmental factor. Natural Resources covering Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative). Hydrological cycle, water balance, energy budget, precipitation, infiltration, evaporation and evapotranspiration.

Module – II (15 Hours)
Environmental Pollution: Definition, Causes, effects and control measures of: Water pollution, Air pollution, Noise pollution, Soil pollution, Marine pollution, Thermal pollution, Nuclear hazards
Environmental Issues: Climate change, Global warming, Acid rain, Ozone layer depletion, Sustainable development, Bio gas, Natural gas, Biodiversity, Urban problems related to energy,
Module – III (12 Hours)
Drinking water standard (IS 10500), Water Quality Criteria and wastewater effluent standards
Water treatment: Water sources and their quality, Lay out of a water treatment plant and working of each unit/ principles of each process i.e. Screening, Aeration, Sedimentation, coagulation, flocculation, Filtration, Disinfection. Miscellaneous treatment: Removal of color, tastes and odour control, removal of iron and manganese, fluoridation and defloridation. Advanced water treatment: Ion exchange, electro-dialysis, RO, desalination
Working principles of ready-made water filter/purification system commercially available
Lay out of a wastewater treatment plant and working of each unit.

Module – IV (7 Hours)
Solid waste management: Source, classification and composition of MSW, Storage and transport of MSW, MSW management, Waste minimization of MSW, Reuse and recycling, Biological & thermal treatment (principles only), land fill
Biomedical Waste management – sources, treatment (principles only) and disposal
Hazardous Waste Management- Introduction, Sources, Classification, treatment (principles only)
Introduction to e-waste management.
Environmental impact Assessment: Project screening for EIA, Scoping studies
Environmental policies and acts (Air, Noise, Water, Forest, E-waste, Hazardous waste acts).

Course Outcome:
CO1: Understand the importance of environment
CO2: Identify the environmental problems and issues on local, regional and global scale
CO3: Identify problems due to human interactions with the environment
CO4: Get encouragement to contribute solutions for the existing environmental issues
CO5: Understand the enforcement of environmental acts in our constitution

Text Book:

Reference Books:

PHYSICS LAB

Course Objective:
The objective of the course is that the student will have exposure to various experimental skills. The experiments are selected from areas of Physics like Physical optics, Lasers, Fiber optics, Electricity & Magnetism.
List of Experiments

1. To Determine the Young's Modulus (Y) of the material of a Wire by Searle's Method.
2. Determination of Surface Tension of water by Capillary rise method.
3. Determination of Acceleration due to gravity by using a Bar Pendulum.
4. To determine thermal conductivity of a bad conductor by using Lee's Apparatus.
5. Determination of Wavelength of monochromatic light with the help of a Newton's Ring Apparatus.
7. To verify the laws of transverse vibration of string by using sonometer.
8. To determine the Rigidity modulus of the material of a wire by using Barton’s apparatus.
9. To draw the characteristics of a Bipolar Junction Transistor.
10. To draw the V-I characteristics of a P. N Junction diode.

Course Outcome:
CO1: Elucidate the concepts of physics through involvement in the experiment by applying theoretical knowledge
CO2: Illustrate the basics of electro magnetism, optics, mechanics, semiconductors & quantum theory
CO3: Develop an ability to apply the knowledge of physics experiments in the later studies

CHEMISTRY LAB

Course Objective:
The objective of the course is to expose the students to various experiments of chemistry like Titrimetry, Mineral Analysis, Colorimetry, Potentiometry, Determination of viscosity of sample oil, Preparation of Aspirin & Adsorption of Acetic acid on charcoal.

List of Experiments:

1. Determination of amount of sodium hydroxide and sodium carbonate in a Mixture.
2. Determination of Total hardness of water by EDTA method.
3. Estimation of calcium present in the limestone.
4. Preparation of aspirin.
5. Standardization of KMnO4 using sodium oxalate.
6. Determination of ferrous iron in Mohr’s salt by potassium permanganate.
7. Determination of Rate constant of acid catalyzed hydrolysis of ester.
8. Determination of dissolved oxygen in a sample of water.
10. Determination of Flash point of given oil by Pensky Marten’s Flash point Apparatus.
11. Determination of available chlorine in bleaching powder.
Course Outcome:
CO1: Perform the analytical experiments; improve analytical skills and attitude which help them to apply these skills in their field of engineering.
CO2: Understand the handling maintenance and performance of analytical instruments.
CO3: Understand the practical knowledge of various chemical phenomena by demonstration of experiments.

PROGRAMMING LAB (CS15-984)

L-T-P: (0-0-3) Cr: 2

Course Objective:
The objective of this course is to illustrate flowchart and algorithm for a given problem, Understand basic Structure of the C-PROGRAMMING, declaration and usage of variables, inscribe C programs using operators, Exercise conditional and iterative statements to inscribe C programs.

Introduction to OS : Linux/Unix, Dos, Windows, Vi editor, File Handling, Directory Structure, File Permissions, Creating and editing simple c programs, Compilation and Execution

C programming on variables and expression assignment, simple arithmetic loops, If-else, Case statements, Break, Continue, Go to

Single and Multidimensional arrays

Functions, Recursion, File handling in C

Pointers, address operator, Declaring pointers and operators on pointers, Address of an array, Structures, Pointer to structure, Dynamic memory allocation

Fundamental Programs on Data Structures (Stack, Queue, Linked lists, Trees, Graphs)

Course Outcome:
CO1: Able to write, compile and debug programs in C language.
CO2: Understand basic Structure of the C-Programming, declaration and usage of variables.
CO3: Formulate problems and implement algorithms in C.
CO4: Able to effectively choose programming components that efficiently solve computing problems in real-world.

BASIC ELECTRICAL ENGINEERING LAB (0-0-3)

Course Objective:
The objective is to have basic understanding of, and ability to apply, techniques for steady-state DC circuit analysis, transient analysis of RLC circuits, familiarity with computer tools and their use in steady-state DC and transient analysis of linear circuits.
List of Experiments:

1. Preliminary: Preparation of symbol chart for various systems & components as per ISS, To study the constructional & operational features for Voltmeter, Ammeter, Wattmeter, Frequency meter, multi-meter and Rheostat, Study of safety rules as per ISS
3. Study of BH Curve
4. Determination of open circuit characteristics (O.C.C) of D.C shunt generator when separately excited at different speeds.
5. Measurement of earth resistance and insulation resistance
6. Starting of Induction motor and measurement of three phase power & power factor by 2-wattmeter method.
7. Calibration of a single phase Energy Meter by directed loading & Phantom loading

Course Outcome:
CO1: A basic understanding of, and ability to apply, techniques for steady-state DC circuit analysis
CO2: A basic understanding of, and ability to apply, techniques for transient analysis of RLC circuits
CO3: Familiarity with computer tools and their use in steady-state DC and transient analysis of linear circuits

BASIC ELECTRONICS LAB

Course Objective:

The objective is to identify the applications and functions of electronics in Engineering.
Recognize basic electronic components and devices used for different electronic functions, use basic techniques for analysing analogue and digital electronic circuits, design analogue and digital electronic circuits at block level and manage the tools in a basic electronics laboratory and use electronic simulation tools.

List of Experiments:

1. Familiarity with electronic components and devices( Testing of semiconductor diode, Transistor, IC Pins connection) Digital multimeter should be used.
2. Study and use of CRO to view waveforms and measure its Amplitude and Frequency.
8. Verification of Truth table of Logic gates (AND, OR,NOT, NAND, NOR, EX-OR)
Course Outcome:

CO1: Identify the applications and functions of electronics in Engineering.
CO2: Recognise basic electronic components and devices used for different electronic functions.
CO3: Be able to use basic techniques for analysing analogue and digital electronic circuits.
CO4: Be able to design analogue and digital electronic circuits at block level.
CO5: Be able to manage the tools in a basic electronics laboratory and use electronic simulation tools.

ENGINEERING DRAWING

Course Objective:
This course focuses on representing various conics and curves, dimensioning to a given drawing, construction of Plain and Diagonal scales, Orthographic projections of Lines, Planes, and Solids, Construction of Isometric Scale, Isometric Projections and Views, and Sectioning of various Solids and their representation.

List of Experiment

1. Introduction to Engineering Drawing: Drawing instruments, lines, lettering and dimensioning.
2. Scales: Plain, Diagonal and Vernier Scales.
5. Sections of solids; Development of surfaces
6. Isometric Projections: Principles, Isometric Scale, Isometric Views, Isometric Views of lines, Planes, Simple and compound Solids,

Course Outcome:
CO1: Representing various conics and curves.
CO2: Perform dimensioning to a given drawing.
CO3: Construction of Plain and Diagonal scales.
CO5: Construction of Isometric Scale, Isometric Projections and Views.
CO6: Sectioning of various Solids and their representation.

Text Book:

Reference Books:
Engineering Drawing by Venugopal, New Age publisher.
Workshop -I

Course Objective:
The objective is to Model and design various basic prototypes in the carpentry trade, basic prototypes in the trade of Welding, basic prototypes in the trade of Tin smithy and perform various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, Series wiring, Go down wiring.

List of experiments:
1. Carpentry Section: Wooden rack/bench/chair/stool (any one)
2. Fitting Section: Paper Wt., Square or Rectangular joint (male and female joint) (any one)
3. Black Smith Section: Weeding hook/Hexagonal headed bolt blank (any one)

Course Outcome:
CO1: Model and design various basic prototypes in the carpentry trade such as Lap joint, Lap Tee joint, Dove tail joint, Mortise & Tenon joint, Cross-Lap joint
CO2: Design and model various basic prototypes in the trade of Welding such as Lap joint, Lap Tee joint, Edge joint, Butt joint and Corner joint.
CO3: Make various basic prototypes in the trade of Tin smithy such as plain Cylindrical pipe, Cylindrical pipe one end inclined, Cylindrical pipe both ends inclined, Hexagonal pipe one end inclined, and funnel preparations.
CO4: Perform various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, Series wiring, Go down wiring

ENGLISH COMMUNICATION SKILLS (Credit: 0-0-2)

Course Objective:
The objective is to improve communicational skills by conducting group discussions, to explore one-to-one interaction and to discuss various public issues by creating number of groups.

List of Experiments
1. Giving Introduction (Self and others)
2. Group Discussion
3. Interviews
4. Role Play
5. Listening skill Development
6. Reading skill Development
7. Writing skill Development
8. Speaking skill Development
9. Meeting
10. Presentation

TextBooks:
Soft Skills – By Dr K Alex (S Chand)

Course Outcome:
CO1: To improve communicational skills by conducting group discussions
CO2: To explore one-to-one interaction
CO3: To discuss various public issues by creating number of groups

MATHEMATICS - III

Course Objective:
The course provides the knowledge of solving linear differential equations with constant coefficients, Analyze general periodic functions in the form of an infinite convergent series of sine and cosines useful in digital signal processing, Exercise Fourier transforms in designing the computer storage devices in Circuit theory.

Module 1: (10 Lectures)

Module 2: (10 Lectures)
Fourier series and integral, Dirichlet criterion, Parseval’s identity, the convolution theorem.

Module 3: (10 Lectures)
Orthogonal curvilinear coordinates, Jacobians, gradient, divergence, curl and Laplacian in curvilinear coordinates, Special curvilinear coordinates.

Module 4: (10 Lectures)
Gama function, The Beta function – Dirichlet integral; Other special functions– Error function, exponential integral, sine and cosine integrals, Bessel's Equation, Bessel Functions Jₙ(x), Bessel Functions of the Second Kind Yₙ(x), Legendre's Equation, Legendre Polynomials Pₙ(x).

Course Outcome:
CO1: Provide the Knowledge of solving linear differential equations with constant coefficients.
CO2: Analyze general periodic functions in the form of an infinite convergent series of sine and cosines useful in digital signal processing.
CO3: Exercise Fourier transforms in designing the computer storage devices in Circuit theory.
CO4: Apply the numerical methods for transitioning a mathematical model of a problem to an programmable algorithm obtaining solution numerically or graphically
CO5: Afford Mathematical devices through which solutions of numerous boundary value problems of engineering can be obtained.

Text Books:

Chapters: 5(5.3, 5.5, 5.6), 9(9.4, 9.7, 9.8, 9.9), 10, 11(11.1-11.3, 11.6, 11.7), A3.4, A3.1

Reference Books:
DIGITAL ELECTRONICS CIRCUIT (3-1-0)

Course Objective:

This course objective is to have an understanding in basic parameters of a logic inverter, analyze and design an NMOS logic inverter with a resistive load, an enhancement NMOS load or a depletion NMOS load, analyze and design a CMOS logic inverter, TTL and ECL logic inverter, Understand the operation of latch circuit and flip-flop circuits.

Module-I (12 Hours)
Binary addition and subtraction using 2’s complements and 1’s complements, Binary codes-BCD codes, Gray codes, Excess-3 code, ASCII Character Code
Gate level Minimization: Boolean functions, Canonical & standard form; min terms & max term, Digital Logic Gates for Multiple inputs. The Map Method, K Map for two, three, four, five input variables, Product of Sum (POS), Sum of product (SOP) simplification, Don’t care conditions. NAND & NOR Implementation, AND-OR invert, OR-AND invert implementation, Ex-OR Function

Module-II (8 Hours)
Combinational Logic: Combinational Circuits, Analysis & Design of Binary Half Adder & Full Adder circuit, Half and Full-subtractor circuit, Binary Multiplier, Magnitude comparator, Decoders, Encoders, Multiplexers, Error detection & correction: Parity Generator and Checker Circuit

Module-III (12 Hours)
Synchronous Sequential Logic: Sequential Circuit, Latches, Flip-flop (S-R, J-K, D, T, M/S), Analysis of Clocked Sequential circuits, State Reduction & Assignment, Design procedure. Register & Counters: Shift Register, Synchronous Counter, Modulo-n Counters, Up-Down Counter, Asynchronous Counter, Ripple Counters, Ring Counters

Module-IV (8 Hours)
Memory & Programmable Logic: Read only Memory (ROM), Random Access Memory (RAM), Memory Decoding, Programmable Logic Array (PLA), Programmable Array Logic (PAL), Sequential Programmable Devices. Register Transfer Levels: Register transfer Level (RTL) notation, Algorithmic State machine, Design Example. Digital Integrated logic Circuits: RTL, DTL, TTL, ECL, MOS & C-MOS Logic circuits
Course Outcome:
CO1: An ability to understand basic parameters of a logic inverter.
CO2: An ability to analyze and design an NMOS logic inverter with a resistive load, an enhancement NMOS load or a depletion NMOS load.
CO3: An ability to analyze and design a CMOS logic inverter.
CO4: An ability to analyze a TTL and ECL logic inverter.
CO5: An ability to understand the operation of latch circuit and flip-flop circuits.
CO6: An ability to understand the operation of different types of semiconductor memory.

Text books:

Reference Books:
Digital Fundamentals – Floyd & Jain, Pearson education

DATA STRUCTURES AND ALGORITHMS (CS15-011)

L-T-P: 3-1-0  Cr.-4

Course Objective:
The objective of the course is to interpret and compute asymptotic notations of an algorithm to analyze the consumption of resources (time/space), exemplify and implement stack, queue and list ADT to manage the memory using static and dynamic allocations, implement binary search tree to design applications, identify, model, solve and develop code for real life problems like shortest path and MST using graph theory.

MODULE – I Preliminaries and Linear Data Structures ( 12 lectures)

Introduction to Data Structures and Algorithms, Analysis of Algorithms, Asymptotic notations, Time and space trade-off, ADT. Arrays and Lists, Strings, Row/Column major representation of Arrays, Sparse matrix. Linked List: Singly linked list, circular linked list, doubly linked list, operations on linked list. Stack: Push; Pop, stack representation using array and linked list, Applications of Stack, Recursion. Queue: Representation using array and linked list, Insertion and deletion operations, circular queue, Dequeue, priority queue.

MODULE – II Non-Linear Data Structures ( 12 lectures)

Tree : General tree; Binary tree - definitions and properties; binary tree traversal algorithms with and without recursion. Binary Search Tree - creation, insertion and deletion operations, Threaded tree (One way and Two way); AVL tree balancing; B-tree; Application of trees, Heaps.
Graph : Representation, Traversals-BFS and DFS, Minimum Spanning Tree – Kruskal and Prim’s Algorithms , Shortest Path, All pairs Shortest Path, Dijksktra Algorithm, Transitive Closure.
MODULE – III Sorting, Searching (8 lectures)

Internal sorting algorithms and Complexities: Insertion, Selection, Bubble, Quick, Heap sort, Radix, Multi way merge sort, External sorting. Searching: Linear, Binary Search, Search trees traversal, Digital Search trees, Tries.

MODULE – IV Hashing (8 Lectures)

Hashing techniques, Hash function, Address calculation techniques - common hashing functions Collision resolution, Linear probing, quadratic probing, Double hashing, Bucket addressing. Rehashing

Course Outcome:

CO1: Interpret and compute asymptotic notations of an algorithm to analyze the consumption of resources (time/space).
CO2: Exemplify and implement stack, queue and list ADT to manage the memory using static and dynamic allocations
CO3: Implement binary search tree to design applications like expression trees
CO4: Identify, model, solve and develop code for real life problems like shortest path and MST using graph theory.
CO5: Develop and compare the comparison-based search algorithms and sorting algorithms.
CO6: Identify appropriate data structure and algorithm for a given contextual problem and develop in C.

Text Books:

1. Data Structures Using C – A.M. Tenenbaum (PHI)
2. Introduction to Data Structures with Applications by J. Tremblay and P. G. Sorenson (TMH)

Reference Books:

1. Data Structures and algorithm Analysis in C – M. A. Weiss (Pearson Education)
2. Data Structures using C++ - E. Horowich, S. Sahni

OBJECT ORIENTED PROGRAMMING (CS15-025)

L-T-P: 3-1-0  Cr.-4

Course Objective:

The objective of the course is to map real world problems into the Programming language, solve the problems in systematic way, and efficiently implement linear, nonlinear data structures and various searching and sorting techniques.
Module – I (10 Lectures)
Introduction to object oriented programming, user-defined types, polymorphism, and encapsulation. Getting started with C++ syntax, data-type, type conversions, functions, exceptions and statement, namespaces, exceptions, explicit and mutable, operators, flow control, functions, recursion. Arrays, pointers, this pointer, generic pointer and structures.

Module – II (10 Lectures)
Abstraction mechanisms: Classes, private, public construction, member functions, static members, references etc. class hierarchy, derived classes. Inheritance: simple inheritance, polymorphism, aggregation, object slicing, base initialization virtual functions.

Module – III (12 Lectures)
Prototypes, linkages, operator overloading, ambiguity, friends, member operators, operator function, I/O operator etc. Memory management: new delete, object copying copy constructors, assignment operator, this input/output. Exception handling: Exceptions and derived classes, function exception declarations, Unexpected exceptions, Exceptions when handling exceptions, resource capture and release etc.

Module – IV (08 Lectures)
Templates and standard Template library: template classes, declaration, template functions, containers, algorithms, iterators, manipulating string objects, hashes, iostreams and other type. Projects design and development using C++.

Course Outcome:
CO1: Can map any problem into object oriented programming.
CO2: Understand how to implement and use the various concepts of OOP.
CO3: Demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating the usage of data abstraction, encapsulation and inheritance.
CO4: Apply the concepts of inheritance and polymorphism for code reusability and optimization.
CO5: Can use template programming for writing generic programs on object oriented programming.

Text Books:
1. Ashok N. Kamthane- Object oriented programming with ANSI & Turbo C ++., Pearson Education.
2. E. Balguru Swamy – C ++, TMH publication.

Reference Books:
1. Programming with ANSI C++, 2/e, Bhushan Trivedi, Oxford University Press
3. Robert Lafore-Object-oriented programming in Microsoft C ++
DATA STRUCTURE LABORATORY (CS15-992)

L-T-P: (0-0-3)                      Cr: 2

Course Objective:
The objective is to develop linear and non-linear data structure, express different operation on AVL tree, evaluate infix to postfix expression, and apply searching and sorting algorithms in real life applications.

List of Experiments:

1. (a) Write a C Program to create a stack using an array and perform – i) Push operation, ii) Pop operation
(b) Write a C Program to create a queue and perform – i) Push, ii) Pop, iii) Traversal

2. Write a C Program that uses Stack Operations to perform the following:-
   i) Converting an infix expression into postfix expression
   ii) Evaluating the postfix expression

3. (a) Write a C Program that uses functions to perform the following operations on a single linked list : i)Creation, ii) Insertion, iii) Deletion, iv) Traversal
   (b) Write a C Program that uses functions to perform the following operations on a double linked list: i)Creation, ii) Insertion, iii) Deletion

4. Write a C Program that uses functions to perform the following operations on a Binary Tree : i) Creation, ii) Insertion, iii) Deletion

5. Write a C Program to construct an AVL-Tree and delete the selective nodes.


7. C Programs on : i) Sequential Search, ii) Binary Search

Course Outcome:

CO1: Develop linear and non-linear data structure
CO2: Express different operation on AVL tree
CO3: Evaluate infix to postfix expression
CO4: Apply searching and sorting algorithms in real life applications

C++ PROGRAMMING LABORATORY (CS15-998)

L-T-P: (0-0-3)                      Cr: 2

Course Objective:
The objective is to analyze basic system information, perform troubleshooting and optimize the system performance, configure a Linux distribution to perform common system administrator tasks, develop shell scripts and programming and employ these principles in solving technical problems, examine the differences and similarities of Linux GUI’s and select the appropriate Linux GUI.

1. Programs on concepts of class and objects ( 1 class )
2. Programs using Inheritance (1 class)
3. Programs using Polymorphism (1 class)
4. Programs on use of Operator overloading (1 class)
5. Programs on use of memory management (1 class)
6. Programs on exception handling and use of templates (1 class)
7. Programs on file handling in C++ (1 class)
8. Design a problem on stock and accounting of a small organization, railway reservation, payroll preparation and optimization problem (3 classes)

Course Outcome:

CO1: Analyze basic system information, perform troubleshooting and optimize the system performance.
CO2: Configure a Linux distribution to perform common system administrator tasks.
CO3: Develop shell scripts and programming and employ these principles in solving technical problems.
CO4: Examine the differences and similarities of Linux GUI’s and select the appropriate Linux GUI.
CO5: Generate local or domain users accounts and implement security policies.
CO6: Design FTP servers and Web servers to deploy services for the clients.

JAVA PROGRAMMING LABORATORY (IT15-996)

L-T-P: (0-0-3) Cr: 2

Course Objective:
The objective of the course is to implement object oriented principles for reusability, assign priorities and resolve run-time errors with Multithreading and Exception Handling techniques, interpret Events handling techniques for interaction of the user with GUI, analyze JDBC drivers to connect Java applications with relational databases, and develop client/server applications using socket programming.

1. Introduction, Compiling & executing a java program.
2. Data types & variables, decision control structures: if, nested if etc.
3. Loop control structures: do, while, for etc.
4. Classes and objects.
5. Data abstraction & data hiding, inheritance, polymorphism.
6. Threads, exception handlings and applet programs
7. Interfaces and inner classes, wrapper classes, generics
8. Developing a simple paint like program using applet
9. Developing a scientific calculator
10. Develop a multi threaded producer consumer Application
11. Generating prime numbers and Fibonacci series
12. Multithreaded GUI application

Course Outcome:
CO1: Implement object oriented principles for reusability
CO2: Assign priorities and resolve run-time errors with Multithreading and Exception Handling techniques
CO3: Interpret Events handling techniques for interaction of the user with GUI
CO4: Analyze JDBC drivers to connect Java applications with relational databases
CO5: Develop client/server applications using socket programming

ENGINEERING ECONOMICS (4-0-0)

Course Objective:
The objective is to understand Henri Fayol’s principles of management, appreciate the functions of a Personnel Department and evaluate a job for wage determination, apply Law of diminishing Utility and Law of equimarginal utility for any market condition, understand Factors influencing demand, and Elasticity of demand, the relations between ATC and MC and relations between AC and MC.

MODULE-1

MODULE-2

MODULE-3
Analysis of Public Projects: Benefit cost analysis, Public goods, Common Property, Free Rider Problem, market failure and externalities, private and social cost, Social Welfare Functions- Welfare maximisation and pare to optimality, market responses to externalities- Mergers, social conventions, property right and bargaining case theorem

MODULE-4
Linear models: simple regression model -the problem and estimation, classical normal linear regression model, Two- Variable regression- Internal estimation and hypothesis testing, Multiple Regression analysis- The problem of estimation, Dummy Variable Regression Models, Multiple parameter sensitivity analysis, linear Programming- graphic and simplex method; Game theory- the pay off matrix of game, Nash Equilibrium, the mixed strategies and the prisoner's dilemma
Course Outcome:
CO1: Understand Henri Fayol’s principles of management,
CO2: Appreciate the functions of a Personnel Department and evaluate a job for wage determination.
CO3: Apply Law of diminishing Utility and Law of equimarginal utility for any market condition
CO4: Understand Factors influencing demand, and Elasticity of demand, the relations between ATC and MC and relations between AC and MC.
CO5: Understand how to maximize profit under competition.
CO6: Apply various work study techniques to reduce work content and ineffective time

Textbook:
Gujrati and Sangeeta. (2007). Basic Econometrics, TMH, New Delhi

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Objective:
The objective is to analyze the designing process of combinational and sequential circuits, express arithmetic logic and shift micro operations in symbolic form at a register transfer level, identify the addressing modes used in macro instructions, apply algorithms for arithmetic operations and implementation for ALU design, and develop micro code for typical instructions in symbolic form.

Module-I (10 Period)
Introduction:
Basic Organization of Computers, Classification Micro, Mini, Mainframe and Super Computer.
System Bus and Interconnection: Single and multi-bus, Computer Function Von-Neumann M/c: Structure of IAS.
Computer Arithmetic:
Data Representation:Fixed Point Representation, Floating Point Representation. Addition and Subtraction, Multiplication (Booth Algorithm), Division Algorithm, Floating Point Arithmetic Operation, Decimal Arithmetic Operation.

Module-II (10 Period)
Instruction Set Architecture:
Instruction Format: Three Address, Two Address, One Address and Zero Address Instruction, Addressing Modes: Types of Addressing modes, Numerical Examples, Program Relocation,
Compaction, Data Transfer & Manipulation: Data transfer, Data Manipulation, Arithmetic, Logical & Bit Manipulation Instruction, Program Control: Conditional Branch Instruction, CPU Organization:
Fundamental Concepts: Instruction-cycle, Fetching and storing a word in Memory, Register Transfer, Performing an Arithmetic & Logic Operation, Branching. Control word, Stack Organisation, Register Stack, Memory Stack, RPN, Ecaluation of Arithmetic Expression using RPN, Subroutine,Control Unit Operation: Hardware Control & Micro Programmed Control.

Module-III (10 Period)
Memory Organization:

Module-IV (10 Period)
Input/Output Organization:
Interrupt:
Class of interrupt, Priority Interrupt: Daisy Chaining Priority, Parallel Priority Interrupt. Program Interrupt, Types of Interrupt, RISC & CISC Characteristic.
Parallel Processing:
Flynn's Classification, Introduction to Pipelining and hazards, Speedup, Efficiency, Throughput.

Course Outcome:
CO1: Understand the basic computer components and their connection through buses.
CO2: Knowledge of instructions, their formats and addressing modes.
CO3: Analysis of register transfers and micro operations of instructions.
CO4: Analyzing use of memory, types, data retrieval, mapping, access etc.
CO5: Designing ALU, CU, Memory, I/O Interfacing.

Text Books:

Reference Books:

DATABASE MANAGEMENT SYSTEMS (CS15-012)

Course Objective:
The objective is to analyze the basic concepts and architecture associated with DBMS, apply normalization steps in database design and removal of data anomalies, describe the characteristics of database transactions, create, maintain and manipulate a relational database using SQL, and employ the conceptual and relational models to design large database systems.

Module – I

Module – II
Relation Query Languages:Relational Algebra, SQL, Integrity Constraints, Tuple and Domain Relational Calculusand QBE. Relational Database Design: Functional dependencies, Armstrong’s Axioms,Dependency Preservation, Lossless design, Normal Forms: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

Module – III

Module – IV
Advanced Topics: (Introduction to concepts only)Object- Oriented and object Relational databases, Temporal Data Base, Spatial Data Base, Logical Database,Web databases, Distributed Databases, Data Mining and Warehousing, Semantic Web and Ontology.

Course Outcome:
CO1: Analyze the basic concepts and architecture associated with DBMS
CO2: Apply normalization steps in database design and removal of data anomalies
CO3: Describe the characteristics of database transactions and how they affect database integrity and consistency.
CO4: Create, maintain and manipulate a relational database using SQL
CO5: Employ the conceptual and relational models to design large database systems

Text Books:

Reference Books:

DESIGN AND ANALYSIS OF ALGORITHMS (CS15-013)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective is to understand asymptotic notations to analyze the performance of algorithms, identify the differences in design techniques and apply to solve optimization problems, apply algorithms for performing operations on graphs and trees, solve novel problems, by choosing the appropriate algorithm design technique for their solution and justify their selection, and analyze deterministic and nondeterministic algorithms to solve complex problems.

MODULE – I

MODULE –II

MODULE -III

MODULE -IV
NP-Completeness, Polynomial time verification, Reducibility, Proof of NP-Completeness (NCDP, cDP, CNDP, Hamiltonian cycle), Approximation Algorithms, Traveling Salesman Problem.
Course Outcome:

CO1: Understand asymptotic notations to analyze the performance of algorithms
CO2: Identify the differences in design techniques and apply to solve optimization problems.
CO3: Apply algorithms for performing operations on graphs and trees.
CO4: Solve novel problems, by choosing the appropriate algorithm design technique for their solution and justify their selection
CO5: Analyze deterministic and nondeterministic algorithms to solve complex problems

Text Books


Reference Books


THEORY OF COMPUTATION (CS15-032)

Course Objectives:

Finite automata are useful models for many important kinds of hardware and software. Here are the most important kinds:

- Software for designing and checking the behaviour of digital circuits;
- The “lexical analyzer” of a typical compiler, that is, the compiler component that breaks the input text into logical units, such as identifiers, keywords, and punctuation;
- Software for scanning large bodies of text, such as collections of Web pages, to find occurrences of words, phrases, or other patterns;
- Software for verifying systems of all types that have a finite number of distinct states, such as communication protocols or protocols for secure exchange of information.

Module I: Fundamentals & Finite Automata: 10 Hours:

Alphabet, Strings, Language, Operations, Mathematical proving techniques, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, Deterministic Finite Automaton (DFA) and Non deterministic Finite Automaton (NFA), transition diagrams and Language recognizers, Equivalence of DFA and NFA, NFA to DFA conversion, NFA with e-transitions - Significance, acceptance of languages. Equivalence between NFA with and without e-transitions, minimisation of FSM, Finite Automata with output- Moore and Mealy machines and conversion of Mealy to Moore and vice-versa.
Module II: Regular Expression and Languages: 10 Hours:
Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Regular grammars-right linear and left linear grammars, conversion of right linear grammar to left linear and vice-versa, equivalence between regular grammar, regular expression and FA, Pumping lemma of regular sets, closure properties of regular sets.

Module III: Context Free Grammars and Push Down Automata: 10 Hours:

Module IV: Turing Machine and its Computational Complexity: 10 Hours:
Chomsky hierarchy of languages, Context sensitive language, Context sensitive grammar,Turing Machine, definition, model, design of TM, Variants of TM, linear bounded automata,Computable functions, recursively enumerable languages. Church’s hypothesis. Decidable, Undecidable and reducible problems, Efficiency of computation, Turing Machine and complexity, Language family and complexity classes, the complexity classes P and NP.

Course Outcome:
CO1: Have a good knowledge of formal computational models and its relationship to formal languages.
CO2: Be able to classify languages based on their type of grammars.
CO3: Design and Implementation of .FA, PDA and TM for various problems
CO4: Understand the basic concepts of complexity theory and limits of computation.

TEXT BOOKS:
1. “Introduction to Automata Theory Languages and Computation”. Hopcroft H.E. and Ullman J. D. Pearson Education
2. Introduction to Theory of Computation –Sipser 2nd edition Thomson

REFERENCE BOOKS:
1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation ,John C Martin, TM
ORGANISATIONAL BEHAVIOUR

Course objective:
The objective of the course is to know the new challenges of organizational manager, learn leadership and managerial skills, and learn how to become an effective leader, and know the organizational culture and discipline.

Module-1
OB: Learning objectives, Definition & Meaning, Why to study OB, An OB model, New challenges for OB Manager
LEARNING: Nature of learning, How learning occurs, Learning & OB
Case Study Analysis

Module-2
PERSONALITY: Meaning & Definition, Determinants of Personality, Personality Traits, Personality & OB
PERCEPTION: Meaning & Definition, Perceptual process, Importance of Perception in OB
MOTIVATION: Nature & Importance, Herzberg’s Two Factor theory, Maslow’s Need Hierarchy theory, Alderfer’s ERG theory
Case Study Analysis

Module-3
COMMUNICATION: Importance, Types, Barriers to communication, Communication as a tool for improving Interpersonal Effectiveness
GROUPS IN ORGANISATION: Nature, Types, Why do people join groups, Group Cohesiveness & Group Decision Making- managerial Implications, Effective Team Building
LEADERSHIP: Leadership & management, Theories of leadership- Trait theory, Behavioural Theory, Contingency Theory, Leadership & Followership, How to be an Effective Leader
CONFLICT: Nature of Conflict & Conflict Resolution
TRANSACTIONAL ANALYSIS: An Introduction to Transactional Analysis
Case Study Analysis

Module-4
ORGANISATIONAL CULTURE: Meaning & Definition, Culture & Organisational Effectiveness
HUMAN RESOURCE MANAGEMENT: Introduction to HRM, Selection, Orientation, Training & Development, Performance Appraisal, Incentives
ORGANISATIONAL CHANGE: Importance of Change, Planned Change & OB Techniques
INTERNATIONAL OB: An Introduction to Individual & Interpersonal Behaviour in Global Perspectives
Case Study Analysis

Course Outcome:
CO1: To know the new challenges of organizational manager
CO2: To learn leadership and managerial skills
CO3: To learn how to become an effective leader
CO4: To know the organizational culture and discipline
COMPUTER ORGANIZATION AND ARCHITECTURE LAB

Course Objective:

The objective is to learn simulation of fast multiplication and division algorithms, disassemble and assemble of personal computer and familiar with different components of motherboard.

1. Simulation and design of Fast Multiplication and Division Programs.
2. Some experiments using hardware training kits for floppy drive, dot matrix printer etc.
3. Dismantling and Assembling a PC along with study of connections, ports, chipsets, SMPS etc. Draw a block diagram of motherboard and other board.
4. A Study Project on some hardware technologies (memory, serial bus, parallel bus, microprocessor, i/o devices, motherboard etc.)

Course Outcome:

CO1: Solving capability of binary arithmetic operations through programming. (Like: conversion, addition, subtraction, multiplication, division)
CO2: To develop instruction simulator designing capability.
CO3: To learn about hardware faults in PCs, printers and hard disks.
CO4: To realize working of RAM, ALU.
CO5: To learn design of ALU, Memory, etc.

DESIGN AND ANALYSIS OF ALGORITHMS LAB (CS15-990)

L-T-P: (0-0-3) Cr: 2

Course Objective:

The objective of this course is to implement polynomial addition, heap sort, DFS and BFS, estimate time and space complexity of an algorithm, and learn NP complete and NP hard problem and their solutions.

Elementary Problems
1. Implement polynomial addition using a single linked list.
2. Implement insertion routine in an AVL tree using rotation.
3. Implement heap sort using a max heap.
4. Implement DFS/BFS routine in a connected graph.

Divide and Conquer Algorithm
1. write a quick sort routine, run it for a different input sizes and calculate the time of running. Plot a graph input size vs time.
2. Implement two way merge sort and calculate the time of sorting.

Greedy Algorithm:
1. Given a set of weights, form a Huffman tree from the weight and also find out the code corresponding to each weight.
2. Take a weighted graph as an input, find out one MST using Kruskal/Prim's algorithm.

**Dynamic Programming:**
1. Find out a solution for 0/1 Knapsack problem.
2. Given two sequences of character, find out their longest common subsequence using dynamic programming.

**NP complete and NP hard problems:**
1. Find out a solution to graph colorability problem of an input graph.
2. Find out a solution to sum of subset problems.

**Course Outcome:**
CO1: Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.
CO2: Master a variety of advanced abstract data type (ADT) and data structures and their Implementations.
CO3: Master different algorithm design techniques (brute-force, divide and conquer, greedy, etc.).
CO4: Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

**DATABASE MANAGEMENT SYSTEMS LAB (CS15-991)**

L-T-P: (0-0-3)  
Cr: 2

**Course Objective:**

The objective of the course is to be familiar with SQL syntax, distinguish different join operations, creation and manipulation of SQL views, and use of package.

1. Use of SQL Syntax for creation, insertion, updation, and deletion operation.
2. Use of SQL for Single table retrieval and group by clauses.
3. Use of SQL for sub-queries, set operations, and date manipulations.
4. Use of SQL for multiple table retrieval using join.
5. Use of Creation and Manipulation of SQL Views.
6. Programming approach using PL/SQL.
7. Use of PL/SQL Cursors (implicit, explicit, and parameterized).
8. Concurrency control using LOCK.
9. Data Redundancy using ROLLBACK, SAVEPOINT, and COMMIT.
10. Use of Package (ORACLE)

**Course Outcome:**

CO1: To develop conceptual understanding of the subject so as to understand the mapping of a given problem to its corresponding database schema.
CO2: To educate students with fundamental knowledge of SQL and SQL commands.
CO3: To understand different applications and constructs of PL/SQL.
CO4: To develop the ability of writing queries/sub-queries on the various database objects based on the given problem.
CO5: To enhance database handling, data manipulation and data processing skills for enabling the students in designing and developing database applications for real-world problems.

THEORY OF COMPUTATION LABORATORY (CS15-980)

L-T-P: (0-0-3)  Cr: 2

Course Objective:

The objective is to implement Deterministic Finite Automata and Non-Deterministic Finite Automata, study of NPDA and DPDA, and implement Turing Machine for various applications.

1. Implementation of Type 3 automaton(DFA, NFA, Regular expression)
2. Conversion of NFA to DFA
3. Conversion of RE to Regular Grammar and Vice versa
4. Implementation of Type 2 automaton (PDA, CFG)
5. Implementation of Type 0 automaton (TM)

Course Outcome:

CO1: Understanding of formal grammars, analysis and compilation.
CO2: Understanding of hierarchical organization of problems depending on their complexity.
CO3: Critical, logical-mathematical reasoning.
CO4: Ability to transform informal problems into formal ones and vice versa.
CO5: Ability to analyze and summarize problems.
CO6: Ability to apply mathematical knowledge and logic in solving problems.

CRYPTOGRAPHY AND NETWORK SECURITY (IT15-002)

L-T-P: 3-1-0  Cr.-4

Course Objective:

The objective of the course is to learn the importance of security in network, various types of attacks, different cryptographic techniques, learn symmetric and asymmetric key cryptography based algorithms, digital certificates, and public key management.

Module I  (12 LECTURES)

Module II  (8 LECTURES)
Computer-based Symmetric Key Cryptographic Algorithms: Algorithm Types and Modes, An overview of Symmetric Key Cryptography, DES, International Data Encryption Algorithm (IDEA), RC5, Blowfish, AES, Differential and Linear Cryptanalysis.

**Module III**
( 8 LECTURES)

**Module IV**
( 12 LECTURES)

**Course Outcome:**
CO1: Understand theory of fundamental cryptography, encryption and decryption algorithms.
CO2: Learn to program and apply the encryption algorithms.
CO3: Build cryptosystems by applying encryption algorithms.
CO4: Apply the cryptosystems so far learned to building of information and network security mechanisms.
CO5: Grasp algorithms and techniques for identity authentication message authentication develop identity management.

**Text Books:**
2. Data Communications and Networking- by Behourz A Forouzan

**Reference Book:**

---

**GRAPH THEORY (CS15-019)**

L-T-P: 3-1-0  Cr.-4

**Course Objective:**
The objective of this course is to learn fundamental concepts of graphs, paths, cycles, trails, trees, understand Ramsey’s Theorem Graph isomorphism, special graphs, decomposition, Connection, Characterizing bipartite graphs Hamiltonian cycles, Dirac’s Theorem, Eulerian circuits, vertex and edge connectivity, Berge’s Theorem, Hall’s Theorem, learn vertex coloring, edge coloring and list coloring.
Module-I (9 lectures)
Fundamental Concepts: Graphs, Paths, Cycles, Trails, Vertex Degrees, Counting, directed graphs.
Trees and Distance: Basic Properties, Spanning Trees and Enumeration, Optimization and Trees.
Ramsey’s Theorem Graph isomorphism, special graphs, decomposition, Connection.
Characterizing bipartite graphs Hamiltonian cycles: Dirac’s Theorem

Module-II (9 lectures)
Eulerian circuits: characterization of Eulerian graphs Cut-vertices, edges.
Trees: equivalent conditions for trees, and related results.
Vertex and edge connectivity: Whitney's inequality, cubic graphs, expansion.
2- and 3-connected graphs: Whitney’s theorem
in Testing Center, Thomassen's 3-connectivity theorem Menger’s theorem with applications.

Module-III (9 lectures)
Introduction to matchings: Berge’s theorem.
Bipartite matching: Hall’s Theorem, Konig-Egervary theorem.
General matchings: Tutte’s theorem, Berge-Tutte formula, Petersen’s 1-factor theorem,
Petersen’s 2-factor theorem

Module-IV (9 lectures)
Vertex-coloring, chromatic number, constructions of Mycielski and Zykov,
Brooks’ theorem. Turan’s Theorem.
Edge-coloring, chromatic index of bipartite graphs, Vizing’s Theorem.
List coloring, Kernel lemma and Galvin’s Theorem.
Planarity: Planar and plane graphs, Euler’s Formula, Kuratowski graphs, Kuratowski’s Theorem
List coloring of planar graphs: Thomassen’s Theorem, planar duals
Lower bound for Ramsey’s Theorem.

Module-V (4 Lectures)
Advanced Topics on: Connectivity; spanning trees; Cut vertices & edges; covering; matching;
independent sets; Colouring; Planarity; Isomorphism.

Course Outcome:
CO1: Learn fundamental Concepts: Graphs, Paths, Cycles, Trails, Vertex Degrees, Counting, and directed graphs.
CO3: Introduction to Berge’s theorem, Hall’s theorem, Konig-Egervary theorem, Tutte’s theorem, Berge-Tutte formula, Petersen’s 1-factor theorem, Petersen’s 2-factor theorem.
CO4: Determine vertex coloring, edge coloring, list coloring, and planarity.

**Text Book**

1. Introduction to Graph Theory – Douglas B. West, PHI.

**MICROPROCESSORS AND MICROCONTROLLERS (CS15-021)**

**L-T-P: 3-1-0**

**Cr.-4**

**Course Objective:**
The objective of the course is to understand 8086/8088 pin and timing diagram analyze role of microprocessor and microcontroller in computer systems, distinguish between maskable and non-maskable interrupt, and role of DMA in microprocessor.

**Module I: Architecture of Microprocessors**
General definitions of mini computers, microprocessors, micro controllers and digital signal processors. Overview of 8085 microprocessor. Overview of 8086 microprocessor. Signals and pins of 8086 microprocessor

**Module II: Assembly language of 8086**
Description of Instructions. Assembly directives. Assembly software programs with algorithms. Interfacing with RAMs, ROMs along with the explanation of timing diagrams. Interfacing with peripheral ICs like 8255 etc. Interfacing with keyboards, LEDs, LCDs, ADCs, and DACs etc.

**Module III: Architecture of Micro controllers**

**Module IV: Interfacing with 8051**
Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs. Interfacing with DACs, etc.

**Course Outcome:**
CO1: Analyze working of 8086 and its architecture.
CO2: Learning the instructions used in 8086 & its application.
CO3: Compare the various interface techniques like 8255, 8279, 8259, 8251, 8257 ICs

**TEXT BOOK:**

REFERENCES:

OPERATING SYSTEMS(CS15-026)

L-T-P: 3-1-0   Cr.-4

Course Objective:

The objective of the course is to analyze the concepts of Operating System and process, illustrate the Scheduling of a processor for a given problem instance, identify the deadlock situation and provide appropriate solution, analyze memory management techniques and implement page replacement Algorithm, and understand the implementation of file systems and directories.

Module – I


Module - II

Module - III  

Module – IV  
I/O systems: Overview, I/O Hardware, Application of I/O interface, Kernel I/O – subsystem  
Transforming I/O requests to Hardware operations. Secondary storage Structure: Disk Structure.  
Disk scheduling, Disk management, Swap space management, Disk Reliability, Case Studies  
LINUX, WINDOW NT.

Course Outcome:  
CO1: Be familiar with the functions, structure and various types of operating systems.  
CO2: To master the concepts of a process and how the processes are scheduled and synchronized.  
CO3: To develop the understanding of detecting a deadlock situation and be able to recovery from it.  
CO4: To understand the different approaches to memory management and disk management.  
CO5: To understand the structure and organization of the file systems and I/O systems.

TEXT BOOK  
Operating System Concepts: Abraham Silberschatz and Peter Bear Galvin, Addison Wesley,  
Chapter – 1, Chapter –3 (3.1,3.2,3.3 ), Chapter – 4, chapter – 5 ( 5.1, 5.2, 5.3 ) , Chapter –7 (7.1,-7.7), Chapter-8, chapter – 8, Chapter – 9, Chapter-10, Chapter- 11, Chapter-12, (12.1-12.5),  
Chapter-13(13.1-1.35)

Reference Book :  
2. Operating Systems and system programing, SCITECH, P. Blkeiahn Prasad.  
3. Moswen O.S. – PHI, Andrew, S. Tannenbaum

SOFTWARE ENGINEERING &OOAD (CS15-031)  
L-T-P: 3-1-0  
Cr.-4

Course Objective:  
The objective of this course is to identify and build an appropriate process model for a given project, analyze the principles at various phases of software development, translate a specification into a design, and identify the components to build the architecture for a given problem, all using an appropriate software engineering methodology. It also focuses to define a Project Management Plan and tabulate appropriate Testing Plans at different levels during the development of the software, and understand the software project estimation models and estimate the work to be done, resources required and the schedule for a software project.
Module-I

Introduction – evolution & impacts, motivation for software engineering, programs vs software products, emergence of software engineering, recent trends in software development practices. Software life cycle models – reasons behind using life cycle models, study of various life cycle models – classical waterfall, iterative waterfall, prototyping, evolutionary, spiral, etc. comparison of various life cycle models.

Module-II


Module-III

Software design & modelling – Cohesion & Coupling, Software Design Approaches, Object Oriented Design vs. Function Oriented Design, Function Oriented Software Design (SA/SD Methodology, Structured Analysis, DFDs, Structured & Detailed Design), Object Oriented Software Development (Design Patterns & Generalized Process), Object Modelling using UML (UML Concepts, UML Diagrams, USE Case Model; Class, Interaction, Activity & State Chart Diagrams)

User interface design – Basic concepts & its types, Component based GUI Development, User Interface Design Methodology

Module-IV

Coding & testing – Coding & Code Review, Testing – Unit, Black box & White box, Debugging, Program Analysis Tools, Integration &System Testing, General issues related to testing.
Software reuse – Basic Issues, Refuse Approach, Reuse at Organizational Level.

Course Outcome:
CO1: Identify and build an appropriate process model for a given project
CO2: Analyze the principles at various phases of software development.
CO3: Translate a specification into a design, and identify the components to build the architecture for a given problem, all using an appropriate software engineering methodology.
CO4: Define a Project Management Plan and tabulate appropriate Testing Plans at different levels during the development of the software.
CO5: Understand the software project estimation models and estimate the work to be done, resources required and the schedule for a software project.

Text Book:
1. Rajib Mall, “Fundamental of Software Engineering”, PHI

Reference Book:

OPERATING SYSTEMS LAB (CS15-985)

L-T-P: (0-0-3) Cr: 2

Course Objective:
The objective is to be familiar with Unix and Linux command, implement different scheduling algorithms, develop first fit, best fit and worst fit algorithm for memory, illustrate the function of a dispatcher, make packaging and sending in IPC, and implement various synchronization problem.

1. Study of Unix/Linux Commands.(2 classes)
2. Write a program to allocate blocks of memory.
3. Write a program to implement best fit algorithm in paging memory.
4. Write a program to implement the bit vector for free space management.
5. Write a program to implement first fit algorithm in paging memory.
6. Write a program to implement worst fit algorithm in paging memory.
7. Write a program to create a unique file name by the user or by the system.
8. Write a program to implement DEKKERS ALGORITHM for mutual exclusion problem.
9. Write a program to implement DINING PHILOSOPHER problem.
10. Write a program for FCFS cpu scheduling algorithm.
11. Write a program for FIFO page replacement algorithm.
12. Write a program for LRU page replacement algorithm.
13. Write a program for Optimal page replacement algorithm.
14. Write a program to implement paging scheme.
15. Write a program for ROUND ROBIN CPU scheduling algorithm.
16. Write a program for SJF cpu scheduling algorithm.
17. Write a program to implement producer-consumer problem of IPC.
18. Write a program for to create two processes and wait for them to complete.
19. Write a program to make packaging and sending as in IPC.
20. Write a program to illustrate the function of a dispatcher.

Course Outcome:

CO1: Introduction to Shell Programming and basic UNIX Commands.
CO2: Demonstrate the installation process of various operating systems.
CO3: Understand and analyze theory and implementation on process creation, synchronization.
CO4: Implement virtualization by installing Virtual Machine software.
CO5: Simulation of CPU Scheduling Algorithms.
CO6: Acquire detailed understanding of Linux kernel and execute various shell programs.

ADVANCE COMPUTING LAB (CS15-999)

Course Objective:

The objective of this course is to learn client-server application programming using TCP/IP and UDP protocols, monitoring network traffic, client-side programming and server side programming, and VBScript Programming.

1. Client-server application programming in C using TCP/IP (like a chatting application) and UDP Protocols. (2 classes)
2. Script program to monitor network traffic like pinging and log the messages.
3. Study and analysis of network packet filter tools like tcpdump
4. Program in C++ to monitor network traffic and display the necessary messages.
6. VBScript programming
7. C# . Net Programming

Course Outcome:

CO1: Learn client-server application programming using TCP/IP and UDP protocols.
CO2: Program to monitor network traffic like pinging and log the messages.
CO3: Learn VBScript programming and C# . Net Programming

MP&MC LAB (CS15-986)

Course Objective:

The objective is to be familiar with 8085 and 8086 tool kit, generate square wave on all lines of 8255 with different frequencies, study of stepper motor and its operations, implement traffic light controller and elevator, and transfer a block of data to another memory location using indexing.
1. Addition of two 8-bit numbers, sum 8 bits
2. Subtraction of two 8-bit numbers, difference 8 bits
3. Addition of two 8-bit numbers, sum 16 bits.
4. Decimal addition of two 8-bit numbers, sum 16 bits.
5. Addition of two 16-bit numbers, sum 16 bits or more.
6. Find one's complement of an 8-bit number and 16-bit number.
7. Find two's complement of an 8-bit number and 16-bit number.
8. Find multiplication of two numbers using multiple addition.
10. Find square from lookup table.
11. Find the largest number in a data array.
12. To arrange a series of numbers in ascending or descending order.
13. Sum of a series of two 8-bit numbers, sum 8 bits
14. Sum of a series of two 8-bit numbers, sum 16 bits
15. 8-bit multiplication, product 16 bit
16. Programs on multibyte addition, subtractions etc.
17. To find the square root of a number.

Course Outcome:

CO1: Students should be able to solve basic binary math operations using assembly language programming.
CO2: Students should be able to demonstrate programming proficiency using the various addressing modes and data transfer instructions in assembly languages.
CO3: Students should be able to program using the capabilities of the stack, the program counter, and the status register and show how these are used to execute a machine code program.
CO4: Students should be able to write assembly language programs for a specific application

SOFTWARE ENGINEERING LAB (CS15-981)

L-T-P: (0-0-3) Cr: 2

Course Objective:

The objective is to implement time management software of a company, implement restaurant, supermarket, newspaper agency, medicine shop, book shop automation system, and implement library and payroll management system.

1. Time management software of a company
2. Hotel automation software
3. Judiciary information system software
4. Restaurant automation software
5. Supermarket automation software
6. Newspaper agency automation software
7. Medicine shop software
8. Bookshop automation software
9. Road tax information management system  
10. Railway reservation system  
11. Electricity billing system  
12. Inventory control system  
13. Library management system  
14. Payroll management system  
15. Banking system

**Course Outcome:**

CO1: To understand requirement analysis and plan SRS based on their findings.  
CO2: To understand and design ER Diagram, DFD and Structure Chart Diagram.  
CO3: To study and design different UML diagrams.  
CO4: To design test cases based on the functional requirements.

**COMPILER DESIGN (CS15-004)**

L-T-P: 3-1-0  
Cr.-4

**Course Objective:**

The objective of the course is to introduce the major concept areas of language translation and compiler design, enrich the knowledge in various phases of compiler and its use, code optimization techniques, machine code generation, and use of symbol table, extend the knowledge of parser by parsing LL parser and LR parser, and provide practical programming skills necessary for constructing a compiler.

**Module – I: Compiler Overview and Lexical Analysis**  
8 Hours:  
Overview of language processing: preprocessors, compiler, assembler, interpreters, linkers, Bootstrap loaders and cross compiler. Structure of a compiler: phases of a compiler. Lexical Analysis: Role of Lexical Analysis, Input buffering, Regular Expressions, NFA, DFA, Minimization of DFA, Transition diagram for tokens, reserved words and identifiers. Lexical error and its recovery, LEX.

**Module – II: Syntax Analysis**  
12 Hours:  
Role of a parser, Top down parsing, derivation, ambiguity, left recursion, left factoring, backtracking parsing, recursive decent parsing, predictive parsing, LL(1) Grammars. Bottom up parsing, Shift Reduce Parsing, handle, handle pruning, Operator precedence parser, precedence function, LR Parsers, Construction of SLR, CLR, LALR Parsing tables, parser conflicts, Dangling ELSE Ambiguity, Error recovery in Parsing. YACC.

**Module – III : Semantic Analysis and Intermediate code generation**  
10 Hours:  
Semantic analysis, SDD and SDTS, evaluation of semantic rules, implementation of S-attributed and L-attributed definition. Type analysis and type checking. Intermediate code, three address code, quadruples, triples, indirect triplet, abstract syntax trees, Declarations, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls. Symbol
Module – IV: Optimization and Code generation

10 Hours:

Course Outcome:
CO1: Understand the concept of language translation and compiler design.
CO2: Identify the similarities and differences among various parsing techniques and grammar transformation techniques
CO3: Apply their basic knowledge Data Structure to design Symbol Table, Lexical Analyser, Intermediate Code Generation, Parser (Top Down and Bottom up Design) and will able to understand strength of Grammar and Programming Language.
CO4: Understand various Code optimization Techniques and Error Recovery mechanisms.
CO5: Understand and Implement a Parser.

Text books:

Reference books:
1. Compiler construction, Principles and Practice, Kenneth C Louden, CENGAGE

COMPUTER GRAPHICS (CS15-005)

L-T-P: 3-1-0  Cr.-4

Course Objective:
The objective is to be familiar with GUI, use of points and lines algorithm, learn basic transformation such as translation, rotation and scaling, learn line and polygon clipping, and use of halftone pattern and dithering.

Module I

Application of Computer Graphics:
Graphics Hardware: Display Devices, Raster-Scan and Random Scan Displays, Direct View Storage Tube, Flat Panel Displays, Input Devices, Hard Copy Devices.

Module II
(10 Lectures)
Two-Dimensional Geometric Transformations: Basic Transformations (Translation, Rotation, Scaling), Matrix Representation and Homogeneous coordinates, Composite Transformation, Reflection, Shear, Transformation between coordinate system.
Two-Dimensional Viewing: Viewing Pipeline, Window-to-viewport Coordinate Transformation.
Two-Dimensional Clipping: Point Clipping, Line Clipping (Cohen-Sutherland Algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm)

Module III
(12 Lectures)
Three-Dimensional Transformation and Projection: Translation Rotation, Scaling, Reflections, Shear, Projection: Types of Projections (Parallel and Prospective), Mathematical Description of Projections
Three-Dimensional Viewing and Clipping: Three-Dimensional Viewing, Clipping, Viewing Transformation
Geometric Forms and Models: Simple and Complex geometric forms, Wireframe Model
Three Dimensional Object Representations: Curve Design, Blending Functions and its types, Spline Curve, Bezier Curves and Surfaces, B-Spline Curves and surfaces.

Module IV
(08 Lectures)
Illumination Models: Basic Models, Displaying Light Intensities, Halftone Pattern and Dithering Techniques
Surface Rending Methods: Polygon Rendering Methods, Gouraud and Phong Shading

Course Outcome:
CO1: Knowledge of the principal basics of computer graphics
CO2: Differentiate the most common modeling approaches
CO3: Carry out geometric affine transformations
CO4: Discuss the interaction of light with a 3D scene
CO5: Discuss different aspects of color in computer graphics

Text Books:
**Reference Books:**

**DATA COMMUNICATION & COMPUTER NETWORKS**

**L-T-P: 3-1-0**

**Cr.-4**

**Course Objective:**
The objective is to analyze the concepts of networks, types and architectures, identify error free transmission of data and analyzes data collision with various protocols, apply various routing algorithms over a network to provide optimal path, illustrate the real time applications of networks, and examine the addressing entities of a network with implementation of TCP, UDP protocols.

**Module – I (12 Lectures)**

Overview of Data Communications and Networking.
Analog Transmission: Modulation of Digital Data; Telephone modems, modulation of Analog signals. Multiplexing : FDM , WDM , TDM ,
Transmission Media: Guided Media, Unguided media (wireless)
Circuit switching and Telephone Network: Circuit switching, Telephone network.

**Module –II (12 Lectures)**

**Data Link Layer**
Error Detection and correction: Types of Errors, Detection, Error Correction
Data Link Control and Protocols:
Flow and Error Control, Stop-and-wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point –to- Point Protocol, Multiple Access, Random Access, Controlled Access, Channelization.
Local area Network: Ethernet, Traditional Ethernet, Fast Ethernet, Gigabit Ethernet.
Wireless LANs: IEEE 802.11, Bluetooth virtual circuits: Frame Relay and ATM.

**Module – III (8 Lectures)**

**Network Layer:**
Host to Host Delivery: Internetworking, addressing, Routing.
Network Layer Protocols: ARP, RARP, NAT, BOOTP, DHCP, IPV4, ICMP, IPV6, ICMPV6 and Unicast routing protocols
Transport Layer: Process to Process Delivery: UDP, TCP, congestion control and Quality of service.

Module-IV (8 Lectures)
Application Layer:
Client Server Model, Peer to peer network, Domain Name System (DNS): Electronic Mail (SMTP) and file transfer (FTP) HTTP and WWW.

Course Outcome:
CO 1: Analyze 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: Illustrate the real time applications of networks
CO 5: Examine the addressing entities of a network with implementation of TCP, UDP protocols.

Text Books:

Reference Book:
2. Computer Networks: Natalia Olifer, Victor Olifer, Willey India
4. Data communication & Computer Networks: Gupta, Prentice Hall of India
5. Network for Computer Scientists & Engineers: Zheng, Oxford University Press
6. Data Communications and Networking: White, Cengage Learning

SIMULATION AND MODELING (CS15-029)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective is to understand the inventory concepts which include the technique of simulation, major application areas, concept of a system, environment, continuous and discrete systems
models, Monte Carlo method etc., study of probability concepts in simulation including stochastic variables, discrete and continuous, probability functions, numerical evaluation of continuous probability functions etc., analyze discrete system simulation and GPSS which includes discrete events, representation of time, simulation of a telephone system, delayed calls, introduction to GPSS, and understand simulation languages and practical systems.

**Module I** (10 hrs)

Introduction: Definition, Advantages and Disadvantages of Simulation, Areas of application, Concept of a System, Environment, Components of a system, Continuous and discrete systems, Modeling, Types of models, Monte Carlo Method, Comparison of Simulation and Analytical Methods. Discrete and continuous models.

**Module II** (10 hrs)

Probability Concepts in Simulation: Discrete and Continuous Probability Functions, Random Number Generators – Linear Congruential Generator, Mid Square Method, rejection Method, Testing of random Numbers, Generation of Stochastic variates in Arrival Patterns and Service times.

**Module III** (10 hrs)

Discrete System Simulation: Discrete Events, Representation of Time, generation of arrival patterns, fixed time step versus next event simulation, Simulation of a Telephone System, delayed calls.

Computer model of queuing and scheduling systems, Design and Evaluation of simulation Experiments: Length of simulation runs, validation, variance reduction techniques, analysis of simulation output.

**Module IV** (10 hrs)

Simulation Languages: Introduction to GPSS: Creating and moving transactions, queues, facilities and storages, gathering statistics, conditional transfers, program control statements, priorities and parameters, standard numerical attributes, functions, gates, logic switches and tests, Variables, Select and Count, Continuous and discrete systems languages,

**Course Outcome:**

CO1: The goal is to introduce students about system, models, simulation & procedure of simulation. 
CO2: Knowledge of I/P models, validation, O/P analysis through simulation. 
CO3: To impart the simulate ability through simulation to languages.

**Text Book:**

2. System Simulation with Digital computer – Narsingh Deo, PHI

Reference Book:


COMPILER DESIGN LAB (CS15-997)

L-T-P: (0-0-3) Cr: 2

Course Objective:

The objective is to be familiar with LEX and YACC, identify token in a program, implement FIRST and FOLLOW, develop LL(1) parsing, and design recursive descent parser.

1. Introduction to LEX and YACC
2. Write a LEX program to evaluate the arithmetic expression
3. Write a LEX program for tokenizing the given program.
4. Integration LEX with YACC program
5. Write a LEX program to find out the comment lines of a given program.
6. Write a LEX program to identify the strings ending with abb.
7. Write a YACC program to evaluate the following grammars: \{a^n b^n | n > 0\}, \{a^n b^n c^n | n > 0\}, \{(ab)^n | n > 0\}

Course Outcome:

CO1: Able to understand the fundamental concepts of most programming languages & the tradeoff between language design and implementation.
CO2: Understand the concept of Lexical analysis and syntax analysis.
CO3: Able to use the powerful compiler generation tools such as Lex and YACC.

COMPUTER NETWORK LAB (CS15-994)

L-T-P: (0-0-3) Cr: 2

Course Objective:

The objective is to demonstrate techniques to correct and detect errors during transmission, demonstrate understanding of how computers communicate with each other and the routing algorithms employed to assure that the communication is reliable, and implementation of client server applications with protocols TCP and UDP.

1. To study about different physical equipment used for networking.
2. To Connect 2 PCs using Peer to Peer communication.
3. Development of Stop & Wait protocol for file transfer
4. Study of Network Utilities.
5. Write a program to generate CRC code for checking error.
6. To Plot Efficiency of pure Aloha and slotted ALOHA in MATLAB.
7. To plot Channel Efficiency for Ethernet in MATLAB.
8. To Study the Network Simulator (NS2).
10. To implement UDP protocol and study performance using Network simulator (ns2).
11. a) Write a program to implement bit stuffing &Destuffing.
     b) Write a program to implement character stuffing &Destuffing.
12. Write a C program for IPV4, Implementation of decimal to binary, Implementation of binary to decimal.

**Course Outcome:**

CO1: Demonstrate techniques to correct and detect errors during transmission.
CO2: Demonstrate understanding of how computers communicate with each other and the routing algorithms employed to assure that the communication is reliable
CO3: Implementation of client server applications with protocols TCP and UDP.

**SIMULATION AND MODELLING LAB (CS15-982)**

**L-T-P:** (0-0-3)

**Course Objective:**

The objective of the course is to study comparison of simulation and analytical methods, implement Monte Carlo method, learn continuous and discrete systems, testing of random numbers, and recent trends and development.
1. Introduction to MATLAB
2. Programming in Matlab: Introduction, Branching statements, loops, functions, additional data types, plots, arrays, inputs/outputs etc.
3. Program to display a Matrix
4. Program to Addition of matrix
5. Program to transpose of a Matrix.
8. Simulation of events/models using MATLAB

**Course Outcome:**

CO1: Comparison of simulation and analytical methods
CO2: Implement Monte Carlo method
CO3: Learn continuous and discrete systems
CO4: Testing of random numbers
CO5: Recent trends and development
Course Objective:

The objective is to implement points and lines algorithm, implement line and polygon clipping, implement translation, rotation and scaling of an object, and implementation of algorithms using open GL.

1. Write a program to construct the following figures and color them using graphics built-in library functions:
   i) Smiling Face
   ii) Indian Flag
   iii) House
2. Write a program to construct a moving car using graphics built-in library functions.
3. Write a program to construct a line by using slope-intercept method.
4. Write a program to construct a line using DDA algorithm.
5. Write a program to construct a dotted line using DDA algorithm.
6. Write a program to construct a dashed line using DDA algorithm where the length of dash is given by user.
7. Write a program to construct a dashed line using Bresenham’s algorithm where the length of dash is given by user for m +ve, m<1, Direction of line left to right.
8. Write a program to construct a line using Bresenham’s algorithm for the following cases:
   i) m +ve, m<1, Direction of line left to right
   ii) m +ve, m<1, Direction of line right to left
   iii) m +ve, m>1, Direction of line left to right
   iv) m +ve, m>1, Direction of line right to left
9. Write a program to construct a line using Bresenham’s algorithm where the line is drawn simultaneously from both sides for m +ve, m<1, Direction of line left to right.
10. Write a menu driven program to create a circle using polynomial method:
    i. Without using the symmetric concept
    ii. Using the symmetric concept
11. Write a menu driven program to create a circle using trigonometric method:
    iii. Without using the symmetric concept
    iv. Using the symmetric concept
12. Write a program to construct a circle using the symmetric concept by applying the Mid-Point Circle Algorithm.
13. Write a program to construct a circle using the symmetric concept by applying the Bresenham’s Circle Algorithm.
14. Write a program to draw two intersecting circles by applying i) Mid-Point   ii) Bresenham’s method and then fill the three areas differently.
15. Write a program to generate the following shapes using i) Mid-Point  ii) Bresenham’s circle drawing method:
16. Write a program to create a circle and a rectangle and fill those using the boundary fill algorithm using the 4-connected method.
17. Write a program to create a triangle and an ellipse and fill those using the flood fill algorithm using the 8-connected method.
18. Write a program to create a polygon with ‘n’ vertices and fill it using scan line fill algorithm.
19. Write a program to apply the series of transformations: Translation, Rotation and Scaling on the following graphical objects:
   i) Line
   ii) Circle
   iii) Triangle
   iv) Rectangle
   Display the original and transformed figures after applying each transformation.
20. Write a program to construct a rectangle and then rotate it by angle θ w.r.t. pivot point Pr(Xr,Yr). Display the original and transformed figure.
21. Write a program to create a circle and then scale the circle by S(Sx,Sy) w.r.t. fixed point Pf(Xf,Yf). Display the original and transformed figure.
22. Write a program to apply the reflection transformations on the following graphical objects: (For viewing the reflected image, create the x-y axis with origin at center of the screen)
   i) Reflect a Triangle about the line y = 0
   ii) Reflect a Triangle about the line y = 5
   iii) Reflect a Rectangle about the line x = 0
   iv) Reflect a Rectangle about the line x = 5
   Display the original and transformed figure for each of the above cases.
23. Write a program to apply the shearing transformations on the following graphical objects:
   i. Shear a Triangle about the line y = 0
   ii. Shear a Triangle about the line y = 5
   iii. Shear a Rectangle about the line x = 0
   iv. Shear a Rectangle about the line x = 5
24. Display the original and transformed figure for each of the above cases.

Course Outcome:

CO1: Implement points and lines algorithm
CO2: Implement line and polygon clipping
CO3: Implement translation, rotation and scaling of an object
CO4: Implementation of algorithms using open GL
ADVANCED COMPUTER ARCHITECTURE (CS15-001)

L-T-P: 3-1-0  Cr.-4

Course Objective:
The objective of this course is to gain in depth knowledge of architecture, learn parallel processing and its application to solve workloads, and understanding pipelined and non-pipelined processing.

Module-I
Flynn’s classification: SISD, SIMD, MISD, MIMD, message passing, Loosely coupled and tightly coupled system, Basic ideas on parallel algorithm: SIMD algorithm for matrix multiplication.
Pipelining: Linear pipe line processor, Asynchronous and Synchronous models, speed up, Efficiency, Throughput, Nonlinear pipeline processor, Instruction pipeline, Conditions of Parallelism pipeline hazards, Arithmetic pipeline

Module-II
Parallel Interconnection Systems: Static and Dynamic Networks, Linear Array, Ring, Star, Tree, Mesh, Systolic Array, Chordal ring, Completely connected network, Cube connected cycles, Torus, K-ary-n cube, Barrel shifter, single stage interconnection network, Multistage Interconnection Networks, Control Structure, Node degree, diameter, Bisection width, symmetric, functionality, Network Latency, Bandwidth, Scalability, Data routing functions: - Permutation, Perfect shuffle exchange, Hypercube Routing function.

Module-III
Instruction level parallelism:
Concepts and challenges – Hardware and software approaches, Dynamicscheduling, Speculation, Branch prediction. Amdhal’s Law.

Module-IV
Cache performance, Reducing cache miss penalty and miss rate, Reducing hit time, Main memory and performance, Memory Interleaving technology, Buses, RAID

Module-V
Software and hardware multithreading, SMT and CMP architectures, Design issues, Case studies, Intel Multi-core architecture, SUN CMP architecture, heterogeneous multi-core processors, Case study: IBM Cell Processor.

Course Outcome:
CO1: Gain in depth knowledge of architecture
CO2: Learn parallel processing and its application to solve workloads
CO3: Understanding pipelined and non-pipelined processing
Text Books:
  2. Computer Architecture – A quantitative approach By J.L Hennessy and D.A.Patterson (Morgan)

EMBEDDED AND REAL TIME SYSTEM (CS15-017)
L-T-P: 3-1-0
Cr.-4

Course Objective:
The objective is to get an introduction to embedded system, processor in the system, other hardware units, software embedded into a systems, exemplary embedded system-on-chip (SOC) and VLSI circuit, study devices and device drivers, I/O devices, timer and counting devices, serial communication using the IC, CAN and advance I/O buses between the networked multiple devices, host system or computer parallel communication between the networked I/O multiple devices using the ISA, PCI, PCI-X and advance buses, device drivers, parallel port devices drivers in a system, serial port device drives in a system, interrupt servicing (handling) mechanism.

Module- I
Introduction to embedded systems: Categories of embedded systems, overview of embedded system architecture; specialties of embedded systems recent trends in embedded systems, Communication interfaces: RS232/UART RS422/RS485.

Module- II
Survey of software Architectures: Round Robin, Round Robin with interrupts, Function Queue scheduling Architecture, RTOS Architecture, Architecture selection, Introduction to RTOS, Task and task states, Task and data, Semaphore and shared data, More operating system services, Message Queues, Mail boxes and pipes, Timer functions, events, Memory Management, Interrupt routine in an RTOS environment.

Module- III

Module-IV
Writing Software for Embedded Systems: The compilation process, Native versus cross compilers, Run time libraries, Writing a library, Using alternative libraries, Using a standard library, Porting Kernels, C extensions for Embedded Systems, Downloading, Emulation and Debugging Techniques, Buffering and other data structures: What is a Linear buffer, Directional buffer, Double buffering, buffer exchanging, Linked lists, FIFO, Circular buffers, Buffer under run and overrun, Allocating buffer memory, memory leakage, Memory and performance trade offs.
Course Outcome:
CO1: Introduction to embedded system, processor in the system, other hardware units, software embedded into a systems, exemplary embedded system-on-chip (SOC) and VLSI circuit.
CO2: Study devices and device drivers, I/O devices, timer and counting devices, serial communication using the IC, CAN and advance I/O buses between the networked multiple devices, host system or computer parallel communication between the networked I/O multiple devices using the ISA, PCI, PCI-X and advance buses, device drivers, parallel port devices drivers in a system, serial port device drives in a system, interrupt servicing (handling) mechanism.
CO3: Software and programming concept: processor selection for an embedded system, memory selection for an embedded system, embedded programming in C ++, embedded programming in JAVA.
CO4: Case studies of programming with RTOS: case study of an embedded system for a smart card hardware and software co-design

TEXT BOOKS


REFERENCES


INTERNET & WEB PROGRAMMING (IT15-006)

L-T-P: 3-1-0
Cr.-4

Course Objective:
The objective of the course is to compare and Contrast HTML, DHTML, CSS, JavaScript, XML and other Web technologies, implement JavaScript Language to perform functionalities at client side application areas which include Banking, develop Graphical User Interface applications in Java by importing Applets and AWT, assess and evaluate the role of “WEBSERVERS” for the management and delivery of electronic information, design well formed JSP and Servlets
Documents, and develop Web based applications by Servlets and JSP to have an interactive applications such as Client Server Architecture.

Module I  
(10 Lectures)

Internet architecture: Internet overview, evolution of internet. Internet components: Local Area Networks, Access Networks, Core Networks, Routers, Transmission infrastructure, ISPs. TCP/IP model, TCP/IP vs OSI model.

HTML: HTML Overview, Structure of HTML Documents, Document Types, HTML Elements and attributes. Anchor Attributes, Image Tag and its attributes, Image and Anchors, Table

Module II  
(10 Lectures)

Image Map: Attributes, Client Side Image Maps and Server Side Maps.

HTML Layout: Background, colors and text, Tables, Frames, Layers, Page content Division <Div>, <SPAN>.

CSS: Style Sheet Basic, Properties, Positioning with Style Sheet. Forms: <FORM> Elements, Form controls. Dynamic HTML.

Module III  
(10 Lectures)

Java Script: Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, String Operators, Special Operators, ? (Conditional operator), ,(Comma operator), delete, new, this, void, Statements: Break, comment, continue, delete, do … while, export, for, for…in, function, if…else, import, labelled, return, switch, var, while.


Module IV  
(10 Lectures)

Events and Event Handlers: General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDbClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload.


Course Outcome:
CO1: Compare and Contrast HTML, DHTML, CSS, JavaScript, XML and other Web technologies.
CO2: Implement JavaScript Language to perform functionalities at client side application areas which include Banking.
CO3: Develop Graphical User Interface applications in Java by importing Applets and AWT.
CO4: Assess and evaluate the role of “WEBSERVERS” for the management and delivery of electronic information.
CO5: Design well formed JSP and Servlets Documents.
CO6: Develop Web based applications by Servlets and JSP to have an interactive applications such as Client Server Architecture.

Text Books:
Computer Networking A Top-Down Approach Featuring the Internet by Kurose and Ross.

Reference Books:

INTERNET AND WEB PROGRAMMING LAB (IT15-997)

L-T-P: (0-0-3) Cr: 2

Course Objective:
The objective is to be familiar with HTML and PHP, embedding audio and video files in HTML, develop server side scripting, and learning CGI scripting using PERL or C.

1. Web design environment : HTML elements coding and testing
2. Cascading style sheet
3. Implementation of website navigation
4. Implementation of table elements
5. Implementation of textual linking
6. Implementation of page templates
7. Implementation of frames and frame elements
8. Implementation of web typography
9. Implementation of graphics and coloring
10. Server side and client side scripting (PHP and JavaScript)
11. Mini project on website design using active and dynamic contents

Course Outcome:
CO1: Plan, design, create, and implement a web site.
CO2: Incorporate accessibility standards in web development.
CO3: Employ web technology tools to facilitate communication and collaboration
Course Objective:
The objective is to be familiar with personal communication services, study global system for mobile communication, learn server-side programming, and learn case studies of the IRIDIUM and GLOBALSTAR, and quality of services in 3G.

Module – I
Overview of wireless technologies: Signal propagation, Multiplexing, Modulation and Spread Spectrum techniques; Media access control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), FDMA, TDMA, CDMA.

Module – II
Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP), General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.11 standard
Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms.

Module – III
Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Module – IV
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management),

Module – V
Server-side programming in Java, Pervasive web application architecture, Device Independent example application
Course Outcome:

CO1: To impart fundamental concepts of mobile communication and different architecture.
CO2: To provide a computer systems perspective on the converging areas of wireless networking like protocols on routing, media access, security etc.
CO3: To introduce selected topics of current research interest in the field.

Text Book:

1. Mobile Communication, J.Schiller, Pearson
2. Mobile computing, Talukdar & Yavgal.

Reference Book:


PARALLEL AND DISTRIBUTED SYSTEMS (CS15-027)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective is to gain knowledge in issues for constructing the distributed systems, examine how the message oriented communication can be done in a Distributed system to achieve the synchronous and asynchronous communication, implement the suitable clock Synchronization algorithms to manage the resources in a distributed operating system environment, compare the client and data centric consistency models to improve performance and scalability in terms of memory, and analyze issues dealing with recovery failure and able to implement Distributed file system in Network file system.

Module – I

Module – II
Hyper Quick Sort, Merge Sort, Bitonic Merge Sort, Odd Even Transposition, Enumeration Sort, Sorting on the CRCW Model, CREW Model and EREW Model, MPI and PVM.

Module – III

Module – IV

Course Outcome:
CO1: Gain knowledge in issues for constructing the distributed systems
CO2: Examine how the message oriented communication can be done in a Distributed system to achieve the synchronous and asynchronous communication
CO3: Implement the suitable clock Synchronization algorithms to manage the resources in a distributed operating system environment.
CO4: Compare the client and data centric consistency models to improve performance and scalability in terms of memory.
CO5: Analyze issues dealing with recovery failure and able to implement Distributed file system in Network file system

Text Books

Reference Books:

ARTIFICIAL INTELLIGENCE AND ROBOTICS (CS15-002)

Course Objective:
The objective of the course is to learn different forms of logic, deal with inconsistencies and uncertainties of logic, familiar with informed and uniformed searching techniques, study different matching techniques, and learn pattern recognition and expert systems.

Module 1:

Module 2:
Module 3:
Machine Learning: Supervised learning, unsupervised learning, Reinforcement learning, Artificial Neural Net, perceptron model, feed-forward neural network, Back propagation.

Module 4:

Course Outcome:
CO1: To understand the modern view of AI as the study of agents that receive percepts from the environment and perform actions.
CO2: To demonstrate awareness of the major challenges facing AI and the complexity of typical problems within the field.
CO3: To exhibit strong familiarity with a number of important AI techniques, including in particular search, knowledge representation, planning and constraint management.
CO4: To assess critically the techniques presented and to apply them to real world problems.

Text book:
Fu, Gonzales and Lee, Robotics, McGraw Hill
Robotics and Control Mittal and Nagrath Tata McGraw-Hill Education
Artificial Intelligence, Dan W Patterson, Prentice Hall of India

Reference Books:
Robert Shilling, Fundamentals of Robotics-Analysis and control, Prentice Hall of India
Artificial Intelligence, Nils J.Nilsson, ELSEVIER.
E.Rich and K.Knight, Artificial Intelligence, - TMH

COMPUTER GRAPHICS AND VISUALIZATION (CS15-006)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective is to be familiar with GUI, use of points and lines algorithm, learn basic transformation such as translation, rotation and scaling, learn line and polygon clipping, and use of halftone pattern and dithering.
MODULE I (10 LECTURES)
Introduction: Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging systems; The synthetic camera model; The programmer’s interface; Graphics architectures; Programmable pipelines; Performance characteristics. Graphics Programming: The Sierpinski gasket; Programming two-dimensional applications. The OpenGL: The OpenGL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program; Polygons and recursion; The three-dimensional gasket; Plotting implicit functions.

MODULE II (12 LECTURES)
Input and Interaction: Interaction; Input devices; Clients and servers; Display lists; Display lists and modeling; Programming event-driven input; Menus; Picking; A simple CAD program; Building interactive models; Animating interactive programs; Design of interactive programs; Logic operations. Geometric Objects and Transformations: Scalars, points, and vectors; Three-dimensional primitives; Coordinate systems and frames; Modeling a colored cube; Affine transformations; Rotation, translation and scaling. Transformations in homogeneous coordinates; Concatenation of transformations; OpenGL transformation matrices; Interfaces to three-dimensional applications; Quaternions.

MODULE III (10 LECTURES)
Viewing: Classical and computer viewing; Viewing with a computer; Positioning of the camera; Simple projections; Projections in OpenGL; Hidden-surface removal; Interactive mesh displays; Parallel-projection matrices; Perspective-projection matrices; Projections and shadows. Lighting and Shading: Light and matter; Light sources; The Phong lighting model; Computation of vectors; Polygonal shading; Approximation of a sphere by recursive subdivisions; Light sources in OpenGL; Specification of materials in OpenGL; Shading of the sphere model; Global illumination.

MODULE IV (08 LECTURES)
Curves and surfaces: Representation of curves and surfaces; Design criteria; Parametric cubic polynomial curves; Interpolation; Hermite curves and surfaces; Bezier curves and surfaces; Cubic B-Splines; General B-Splines; Rendering curves and surfaces; Curves and surfaces in OpenGL.

Course Outcome:
CO1: Be familiar with GUI
CO2: Use of points and lines algorithm
CO3: Learn basic transformation such as translation, rotation and scaling
CO4: Learn line and polygon clipping
CO5: Use of halftone pattern and dithering

TEXT BOOK:

REFERENCE BOOKS:
Course Objective:
The objective is to study of digital images, bits and bytes, raster scan format, quantization, understanding of scaling, translation, rotation, sums and differences, study of contrast and grey levels, histograms, Gaussian and other non-linear stretches, understanding of topography and shaded relief displays, contours, parallax and stereo, perspective viewing and anaglyphs, and study on image morphing, false color images, principle components analysis.

Module-I: Introduction

Module-II: Image Enhancement in the Spatial Domain

Module-III: Image Enhancement in the Frequency Domain

Module-IV: Morphological Image Processing and Image Segmentation
Dilation and erosion, opening and closing, Hit-or-Miss transformations, basic morphological algorithms, Detection of discontinues, edge linking and boundary detection, thresholding, region–based segmentation.

Module-V: Use of Image Processing in Pattern Recognition
Introduction to the tools of Matlab and Open CV. Case study on Object Identification, Biometrics and Content Based Image retrieval.

Course Outcome:
CO1: Study of digital images, bits and bytes, raster scan format, quantization
CO2: Understanding of scaling, translation, rotation, sums and differences
CO3: Study of contrast and grey levels, histograms, Gaussian and other non-linear stretches
CO4: Understanding of topography and shaded relief displays, contours, parallax and stereo, perspective viewing and anaglyphs
CO5: Study on image morphing, false color images, principle components analysis

**Text Books:**

**Reference Books:**
Vipul Singh, Digital Image Processing With Matlab&LabView, Reed Elsevier India Pvt Ltd, 2013,

**DISTRIBUTED COMPUTING SYSTEMS (CS15-015)**

L-T-P: 3-1-0  
Cr.-4

**Course Objective:**
The objective is to gain knowledge in issues for constructing the distributed systems, examine how the message oriented communication can be done in a Distributed system to achieve the synchronous and asynchronous communication, implement the suitable clock Synchronization algorithms to manage the resources in a distributed operating system environment, compare the client and data centric consistency models to improve performance and scalability in terms of memory, and analyze issues dealing with recovery failure and able to implement Distributed file system in Network file system.

**Module – I**

**Module – II**
Introduction to Synchronization, Clock Synchronization, Synchronization Algorithms: Centralized and Distributed, Logical Clocks: Event Ordering, Implementation, Lamport’s Timestamps and Vector Timestamps, Global State, Mutual Exclusion: Centralized, Distributed and Token Ring Algorithm, Election Algorithms: Bully and Ring.

**Module - III**
Management: Centralized-Manager, Broadcast, Fixed and Dynamic Distributed-Manager Algorithm, Replication vs Migration.

Module - IV

Course Outcome:
CO1: Gain knowledge in issues for constructing the distributed systems
CO2: Examine how the message oriented communication can be done in a Distributed system to achieve the synchronous and asynchronous communication
CO3: Implement the suitable clock Synchronization algorithms to manage the resources in a distributed operating system environment.
CO4: Compare the client and data centric consistency models to improve performance and scalability in terms of memory.
CO5: Analyze issues dealing with recovery failure and able to implement Distributed file system in Network file system

Text Books

Reference Books

OBJECT ORIENTED ANALYSIS AND DESIGN (CS15-024)

L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective of the course is to give students a detailed understanding of processes and techniques for building large object-oriented software systems. To develop skills to evolve object-oriented systems from analysis, to design, to implement and to understand most of the major object-oriented technologies including basic OO concepts, processes, languages, databases, user interfaces, frameworks, and design patterns.
Module - I
Review of Object modeling, new paradigm, object oriented thinking-rethinking, Objects and Classes. Links and association, Generalization and specialization, Inheritance, Grouping concepts, aggregation, composition, abstracts classes, Polymorphism, Metadata, Constraints, Reuse.
Object Oriented Lifecycle Model, Introduction to Object Oriented Methodology, Overview of various object oriented methodologies - OOD, HOOD, OMT, CRC, OOA, OOSA, OOSE, OOSD, OORASS.

Module - II
Architecture: Introduction, System development is model building, model architecture, requirements model, analysis model, the design model, the implementation model, test model. Analysis: Introduction, the requirements model, the analysis model.

Module - III
Construction: Introduction, the design model, block design, working with construction. Testing: introduction, on testing, unit testing, integration testing, system testing, the testing process.

Module - IV

Course Outcome:
CO1: Identify and build an appropriate process model for a given project
CO2: Analyze the principles at various phases of software development.
CO3: Translate a specification into a design, and identify the components to build the architecture for a given problem, all using an appropriate software engineering methodology
CO4: Define a Project Management Plan and tabulate appropriate Testing Plans at different levels during the development of the software
CO5: Understand the software project estimation models and estimate the work to be done, resources required and the schedule for a software project

Text books:

PATTERN RECOGNITION (CS15-028)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective of this course is to learn machine perception, pattern recognition systems, Applications of pattern recognition, probability of events, random variables, Joint distributions and densities, moments of random variables, Baye’s Theorem, multiple features, conditionally
independent features, decision boundaries, histograms, Kernel and window estimators, nearest neighbor classification techniques, and unsupervised learning and clustering.

**Module-I**  
INTRODUCTION: Machine perception, pattern recognition systems, design cycle, learning and adaptation, training and learning in pattern recognition approach, Applications of pattern recognition, Patterns and features, different types of pattern recognition

**Module-II**  
PROBABILITY: Introduction, probability of events, random variables, Joint distributions and densities, moments of random variables, estimation of parameters from samples, minimum risk estimators.

**Module-III**  
STATISTICAL DECISION MAKING: Introduction, Baye’s Theorem, multiple features, conditionally independent features, decision boundaries, unequal costs of error, estimation of error rates, the leaving one-out technique. Characteristic curves, estimating the composition of populations.

**Module-IV**  
NONPARAMETRIC DECISION MAKING: Introduction, histograms, Kernel and window estimators, nearest neighbor classification techniques, adaptive decision boundaries, adaptive discriminate Functions, minimum squared error discriminate functions, choosing a decision making technique.

**Module-V**  
UNSUPERVISED LEARNING AND CLUSTERINGS: Unsupervised Bayesian learning, data decryption and clustering, criterion functions and clustering, Hierarchical clustering, Online clustering, component analysis.

**Module-VI**  
ARTIFICIAL NEURAL NETWORKS: Introduction, nets without hidden layers, nets with hidden layers, the back Propagation algorithms, Hopfield nets, an application.

**Course Outcome:**
CO1: Understand pattern recognition systems and applications of pattern recognition systems.
CO2: Learn Joint distributions and densities and estimation of parameters from samples, minimum risk estimators.
CO3: Identify Baye’s Theorem, unequal costs of error and characteristic curves
CO4: Learn unsupervised learning and clustering
CO5: Understand artificial neural networks

**TEXT BOOKS:**
2. Pattern Recognition and Image Analysis, Earl Gose, Richard J and Steve J, PHI
3. Pattern recognition (Statistical, structural and Neural Approaches), Robert Schalkoff
 Course Objective:
The objective is to be familiar with neural network and artificial neural network, learning effect of tuning parameters of back propagation neural network, gain knowledge in associative memory and adaptive resonance, theory, analyze convergence in genetic algorithm, and examine how the hybrid system can solve the real life problems.

 Module 1: Neural Network

 Module 2: Fuzzy Logic
Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, membership functions, Fuzzy set theory and operations, Extension principle of fuzzy set, fuzzy inference, Fuzzy implications, fuzzy relation, fuzzy reasoning, fuzzy c-means clustering, fuzzy inference Engine on VLSI architecture, Defuzzification techniques

 Module 3: Evolutionary Computing
Fundamentals of genetic algorithms: Encoding, Fitness functions, Reproduction Genetic Modeling : Cross cover, Inversion and deletion, Mutation operator, Bit-wise operators, Bitwise operators used in GA. Convergence of Genetic algorithm. GA as an alternative to back propagation, Applications of GA in navigational planning of robots, Real life Problems.

 Module 4: Hybrid Systems

 Course Outcome:
CO1: Soft computing refers to principle components like fuzzy logic, neural networks and genetic algorithm, which have their roots in Artificial Intelligence.
CO2: Healthy integration of all these techniques has resulted in extending the capabilities of the technologies to more effective and efficient problem solving methodologies.

 Text Books:
Computational Intelligence Principles, Techniques and Applications, Amit Konar, Springer publication.
1. Neural Networks, Fuzzy Logic, and Genetic Algorithm (synthesis and Application) S.Rajasekaran, G.A. Vijayalakshmi Pai, PHI
Reference Books:

WIRELESS SENSOR NETWORKS (CS15-034)

L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective of this course is to learn fundamentals of Wireless Sensor Networks, understand single-node architecture, network architecture, gateway concepts, networking sensors, geographic sensors, routing protocols, Sensor Node Hardware – Berkeley Motes, Node-level software platforms, and State-centric programming.

Module - I

Module - II

Module - III

Module - IV

Course Outcome:
CO1: Be familiar with basics and challenges of wireless sensor network
CO2: Learning single-node and network architectures
CO3: Gain knowledge in routing protocols and time synchronisation
CO4: Analyze sensor node hardware and node level simulators

Text books:

Reference Books:

INFORMATION SECURITY (IT15-002)

L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective is to learn Security Goals, Attacks, Security services and Mechanism, understand different cryptographic algorithms, know about viruses and malicious code, security in operating systems, database security, network security, legal and ethical issues.

Module I: (8 LECTURES)

Module II: (14 LECTURES)
Data Encryption Standard (DES), Security of DES, Advanced Encryption Standard (AES), Analysis of AES, Use of Modern Block Ciphers, Use of Stream ciphers. Public Key Encryption, Hash Functions, Key exchange, Digital Signatures

Module III: (8 LECTURES)
Viruses and Malicious Code:
Secure Programs, Non-malicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats
Operating Systems Security:
Access Control, File Protection, User Authentication, Security Policies, Models of Security

Module IV: (10 LECTURES)
Database Security:
Security requirements, Reliability and integrity, Sensitive data, Inference, multilevel database, proposals for multilevel security.
Security in Network:
Legal and Ethical Issues:
Protection of data and Information Laws, Employees rights, Software failure, Computer Crime, Privacy, Ethics

Course Outcome:
CO1: Be familiar with security goals, attacks, and different types of ciphers  
CO2: Learning DES, AES, modern block cipher and digital signatures  
CO3: Gain knowledge in malicious codes and viruses  
CO4: Analyze security in operating system, network and database.  
CO5: Learn different legal and ethical issues

Text Books:  

Reference Book:  
Stallings ,Cryptography and Network Security., PHI, 4th ed.2010  
A. Kahate, Cryptography and Network Security, TMH.

SOFTWARE TESTING (IT15-009)

L-T-P: 3-1-0 Cr.-4

Course Objective:  
The objective of this course is to learn basic of software testing, software testing life-cycle, testing methodology, black box testing, white box testing, mutation testing, test management, testing metrics, testing tools, object-oriented testing and web-based testing.

MODULE I:  

MODULE II:  

MODULE III:  

MODULE IV:  
Automation & Testing Tools- Need for Automation, Categorization of Testing Tools, Selection of Testing Tools, Overview of Testing Tools. Testing Object Oriented Software- OOT Basics,
Course Outcome:
CO1: Be familiar with software testing goals and software testing life cycle.
CO2: Learning black box testing, white box testing, mutation testing and regression testing.
CO3: Gain knowledge in test management and testing metrics.
CO4: Analyze & develop automated testing tools
CO5: Learn object-oriented testing and web-based testing.

Text books
Foundations of Software Testing – Aditya P Mathur. Pearson Education

Reference books
Software Testing - B.Bezier- 2nd Edn, Techniques, Dreamtech, New Delhi
Software Testing Principles and Tools By M.G. Limaye TMG Hill Publication

COMBINATORIAL OPTIMIZATION (CS15-003)

L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective of this course is to learn linear optimization problems, sorting, different types of graph, knowledge about linear programming algorithms, integer programming, shortest paths and network flows.

MODULE I (10 periods)
Graphs : Trees, Circuits, and Cuts , Connectivity, Eulerian and Bipartite Graphs, Planarity, Planar Duality.

MODULE II (10 periods)

MODULE III (10 periods)
Integer Programming : The Integer Hull of a Polyhedron, Unimodular Transformations, Total Dual Integrality , Totally Unimodular Matrices, Cutting Planes.
Shortest Paths: Shortest Paths From One Source, Shortest Paths Between All Pairs of Vertices, Minimum Mean Cycles.

**MODULE IV**
(10 periods)

**Course Outcome:**
CO1: Be familiar with linear optimization problem.
CO2: Analyze linear programming algorithms, separation and optimization.
CO3: Gain knowledge in integer programming and shortest paths
CO4: Learning network flows and minimum cost flows.

**Text Book** –

---

**COMPUTER VISION (CS15-009)**

L-T-P: 3-1-0

**Course Objective:**
The objective of this course is to gain knowledge in Digital Image Formation and low-level processing, Depth estimation and Multi-camera views, Feature Extraction: Edges, Scale-Space Analysis, Image Segmentation, Object Recognition, clustering and classification, motion analysis and its applications.

**Module I**
(10 Lectures)
Depth estimation and Multi-camera views: Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.

**Module II**
(10 Lectures)
Feature Extraction: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.
Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection.

**Module III**
(08 Lectures)
Object Recognition: Structural, model-based, appearance and shape-based methods; probabilistic paradigms; discriminative part-based models; BOW, ISM, Learning methods.


Module IV (12 Lectures)
Motion Analysis: Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.
Shape from X: Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges.
Miscellaneous: Applications: CBIR, CBVR, Activity Recognition, computational photography, Biometrics, stitching and document processing; Modern trends - super-resolution; GPU, Augmented Reality; cognitive models, fusion and SR&CS.

Course Outcome:
CO1: Gain knowledge in Digital Image Formation and low-level processing
CO2: Learn techniques of Depth estimation and Multi-camera views
CO3: Analyze Feature Extraction and Scale-Space Analysis,
CO4: Learning Image Segmentation, Object Recognition, clustering and classification, motion analysis and its applications.

Textbooks:

Reference Books:

GAME THEORY (CS15-018)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective of this course is to get introduction about game theory, Strategic Games and Nash Equilibrium Strategic games, Auctions Accident Laws, Mixed Strategy Nash Equilibrium, and Extensive Games and Nash Equilibrium.

Module-I
Introduction to Game Theory: Game theory, Theory of rational choice, Interacting decision makers. Strategic Games and Nash Equilibrium Strategic games: examples Nash equilibrium:
Module-II
Illustrations of Nash Equilibrium Cournot’s model of duopoly market, Bertrand’s model of duopoly market Electoral Competition War of Attrition, Auctions Accident Laws.

Module-III

Module-IV
Extensive Games and Nash Equilibrium Introduction to extensive games Strategies and outcomes Nash equilibrium Subgame perfect Nash equilibrium Backward induction. Illustrations of Extensive Games and Nash Equilibrium Stackelberg model of duopoly markets Ultimatum game

Course Outcome:
CO1: Gain knowledge about game theory, Strategic Games and Nash Equilibrium
CO2: Learning Strategic games, Auctions Accident Laws.
CO3: Analyze Mixed Strategy Nash Equilibrium, and Extensive Games and Nash Equilibrium

Textbooks:
Osborne, M.J. An Introduction to Game Theory, Oxford University Press, 2004
Gibbons, R.A Primer in Game Theory, Pearson Education, 1992

HUMAN-COMPUTER INTERFACE (CS15-020)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective is to learn basics of human computer interaction, Basic Components of Emotion, Emotion dynamics and stability analysis, System Modeling and Stability, Stability Analysis of T-S Fuzzy Systems, EEG Prediction by Adaptive Filtering, Machine Interactive Systems, and Emotion Recognition from Voice Samples.

Module I:
Introduction to human computer interaction, Input-output channels, human memory, Thinking, Emotion, cause of emotion, characteristics of emotion Basic Components of Emotion, regulation and control of Emotion, biological basis of Emotion, emotion learning, mathematical modelling of emotional dynamics, controlling emotion by artificial means, effect of emotion modelling on Human machine interaction, Emotion dynamics and stability analysis, text entry devices, device for virtual reality and 3D interaction, models of interaction, frameworks and HCL.
Module II:

Module III:

Course Outcome:
CO1: Learn basics of human computer interaction, and Basic Components of Emotion.
CO2: Be familiar with Emotion dynamics and stability analysis.
CO5: Learning Emotion Recognition from Voice Samples.

Text Books
Emotional Intelligence: A Cybernetic Approach, Aruna Chakraborty and Amit Konar, springer

Reference Books
B. Shneiderman, C. Plaisant, M. Cohen, and S. Jacobs, Designing the User Interface: Strategies for Effective Human-Computer Interaction, Addison-Wesley,
Y. Rogers, H. Sharp, and J. Preece, Interaction Design: Beyond Human-Computer Interaction, John Wiley & Sons

VLSI ALGORITHMS (CS15-033)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective is to learn VLSI Physical Design Automation, various Partitioning Algorithms, Performance Driven Partitioning, Classification of Placement Algorithms, Classification of Floor planning Algorithms, Classification of Pin Assignment Algorithms, Global Routing, and detailed routing.

Module I  INTRODUCTION AND BASIC CONCEPTS  (8 Lectures)
Module II PARTITIONING (8 Lectures)

Module III PLACEMENT, FLOOR PLANNING AND PIN ASSIGNMENT (12 Lectures)
Floor-planning: Problem Formulation, Classification of Floor planning Algorithms, Constraint Based Floorplanning, Integer Programming Based Floorplanning, Rectangular Dualization.
Pin Assignment: Problem Formulation, Classification of Pin Assignment Algorithms, General Pin Assignment, Channel Pin Assignment.

Module IV ROUTING, COMPACTION AND FPGA (12 Lectures)
Concepts of Compaction, Physical Design Automation of FPGAs.

Course Outcome:
CO1: Learn VLSI Physical Design Automation, and various Partitioning Algorithms.
CO2: Analyze Performance Driven Partitioning
CO3: Be familiar with Classification of Placement Algorithms, Classification of Floor planning Algorithms, Classification of Pin Assignment Algorithms,
CO4: Gain knowledge about Global Routing, and detailed routing.

Text Book:

CLOUD COMPUTING (IT15-001)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective is to learn emerging techniques in cloud computing and its applications, fault tolerance and security in cloud, learn different Resource Allocation, Leases, Task scheduling algorithms, introduction to Energy Efficient Task Consolidation, High-Throughput Computing, and knowledge about CloudSim, Cloudlet, Virtual Machine and its Provisioning.

Module – I

Module – II

Module - III

Module - IV

Course Outcome:
CO1: Learn emerging techniques in cloud computing and its applications.
CO2: Gain knowledge in fault tolerance and security in cloud
CO3: Learn different Resource Allocation, Leases, Task scheduling algorithms
CO4: Introduction to Energy Efficient Task Consolidation, High-Throughput Computing
CO5: Acquire knowledge about CloudSim, Cloudlet, Virtual Machine and its Provisioning.

Text Books
DATA MINING (IT15-003)

L-T-P: 3-1-0  Cr.-4

Course Objective:
The objective is to learn Data Mining overview, Data Warehouse and OLAP Technology, Data Mining Primitives, System Architectures, Mining Association Rules in Large Databases, Classification and Prediction, Classification by Back propagation, Categorization of Major Clustering Methods, and Applications and Trends in Data Mining.

Module - I
Data Mining overview, Data Warehouse and OLAP Technology Data Warehouse Architecture, Steps for the Design and Construction of Data Warehouses, A Three-Tier Data Warehouse Architecture, OLAP, OLAP Queries, Metadata Repository, Data Preprocessing – Data Integration and Transformation, Data Reduction, Data Mining Primitives, System Architectures – Data Mining Primitives: What Defines a Data Mining Task? Task-Relevant Data, The Kind of Knowledge to be Mined, KDD

Module - II
Mining Association Rules in Large Databases, Association Rule Mining, Market Basket Analysis: Association Rule Mining, Basic Concepts, Association Rule Mining A Road Map, Mining Association Rules from Frequent Itemsets, Mining Multilevel Association Rules from Transaction Databases, Multilevel Association Rules, Approaches to Mining Multilevel Association Rules, Mining Distance-Based Association Rules, From Association Mining to Correlation Analysis,

Module - III
Classification and Prediction – What is Classification? What Is Prediction? Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Bayes Theorem, Classification by Back propagation, A Multilayer Feed-Forward Neural
Module – IV

Course Outcome:
CO1: Learn Data Mining overview, Data Warehouse and OLAP Technology
CO2: Gain knowledge in Data Mining Primitives, System Architectures, Mining Association Rules in Large Databases
CO3: Learn Classification and Prediction, Classification by Back propagation, Categorization of Major Clustering Methods
CO4: Be familiar with Applications and Trends in Data Mining.

Textbooks:
Data Mining: Concepts and Techniques by Jiawei Han and Micheline Kamber, Morgan Kaufmann Publisher (Elseviers)
Data Mining Concepts, Models, Methods and Algorithms By Mehmed Kantardzic Wiley Interscience, IEEE Press.

INFORMATION RETRIEVAL (IT15-005)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective of this course is to learn Digital libraries and Data Warehouses, Information Retrieval System Capabilities, Cataloging and Indexing, Inverted file structures, Automatic Indexing algorithms, User Search Techniques, Information Visualization technologies, and Information System Evaluation.

Module-I
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses, Information Retrieval System Capabilities: Search, Browse, Miscellaneous

Module-II
Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information
Extraction Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

Module-III

Module-IV
User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext. Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

Module-V

Course Outcome:
CO1: Learn Digital libraries and Data Warehouses.
CO2: Gain knowledge about Information Retrieval System Capabilities, Cataloging and Indexing.
CO4: Know Information Visualization technologies, and Information System Evaluation.

Textbook:

Reference Books :
Modern Information Retrieval By Yates Pearson Education.

SOFTWARE ARCHITECTURE (IT15-007)
L-T-P: 3-1-0 Cr.-4

Course Objective:
The objective of this course is to learn different patterns categories and relationship between them, know about software architectural patterns, architecture in life-cycle, Reconstructing Software Architectures, Software Product Lines, Off-the-Shelf Components, Component-based design, different design patterns and their implementation.
Module-I
Review of Basic Concepts: What is a pattern? What makes a pattern? Pattern Categories; Relationships between patterns; Pattern description; Patterns and software architecture; What software architecture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.

Module-II
Designing the Architecture: Architecture in the life cycle; Designing the architecture; Forming the team structure; Creating a skeletal system. Reconstructing Software Architectures: Introduction; Informal extraction; Database construction; View fusion; Reconstruction; Examples.

Module-III
Software Product Lines: Introduction; What makes software product lines work? Scoping; Architectures for product lines; What makes software product lines difficult? Building Systems from Off-the-Shelf Components: Impact of components on architecture; Architectural mismatch; Component-based design as search; ASEILM example.

Module-IV
Some Design Patterns: Introduction; Management: Command processor, View handler; Communication: Forwarder-Receiver, Client-Dispatcher-Receiver, Publisher-Subscriber. Pattern Systems: What is a Pattern System? Pattern classification; Pattern selection; Pattern systems as implementation guidelines; The evolution of pattern systems.

Course Outcome:
CO1: Learn different patterns categories and relationship between them
CO2: Know about software architectural patterns, architecture in life-cycle,
CO4: Aware of different design patterns and their implementation.

Text books:
Mary Shaw and David Garlan: Software Architecture-Perspectives on an Emerging Discipline, PHI Learning, 2007.

Reference books:
E. Gamma, R. Helm, R. Johnson, J. Vlissides: Design Patterns-Elements of Reusable Object-Oriented Software, Pearson Education, 1995.
SOFTWARE PROJECT MANAGEMENT (IT15-008)

L-T-P: 3-1-0

Course Objective:
The objective of this course is to gain knowledge about software project management, project planning, project evaluation, Selection of an appropriate project approach, Software Effort Estimation Techniques, Cost Monitoring, Organizational Behaviour, Importance Of Software Quality, Defining Software Quality, ISO 9126, Practical Software Quality Measures, and Product Versus Process Quality Management.

Module I:

Module II:

Module III:

**Module IV:**

**Course Outcome:**
CO1: Gain knowledge about software project management, project planning, and project evaluation.
CO2: Learn selection of an appropriate project approach, and Software Effort Estimation Techniques
CO3: Analyze Cost Monitoring, Organizational Behavior.

**Text Books:**
B.Huges and M.Cotterell- Software Project Management 3rd Edn, TMH, New Delhi.
Ashfaque Ahmed- Software Project Management- CRC Press.

**Reference Book:**