UNIVERSITY VISION AND MISSION

VISION

B.S. Abdur Rahman Institute of Science & Technology aspires to be a leader in Education, Training and Research in Engineering, Science, Technology and Management and to play a vital role in the Socio-Economic progress of the Country.

MISSION

- To blossom into an internationally renowned University
- To empower the youth through quality education and to provide professional leadership
- To achieve excellence in all its endeavors to face global challenges
- To provide excellent teaching and research ambience
- To network with global Institutions of Excellence, Business, Industry and Research Organizations
- To contribute to the knowledge base through Scientific enquiry, Applied Research and Innovation.
VISION AND MISSION OF THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION

The vision of the Department of Computer Science and engineering is to impart quality education, inculcate professionalism and enhance the problem solving skills of the students in the domain of Computer Science and Engineering with a focus to make them industry ready, involve in possible areas of research, to pursue and have continual professional growth.

MISSION

- Equip the students with strong fundamental concepts, analytical capability, programming and problem solving skills.
- Create an ambience of education through faculty training, self learning, sound academic practices and research endeavors.
- Facilitate a research culture in the department leading to high quality publications and funded projects.
- To identify potential areas of research and create centre of excellence in those areas.
- Provide opportunities to promote organizational and leadership skills in students through various extra – curricular activities.
- Expose the students to emerging and upcoming technologies through co-curricular events.
- To make the students as for as possible industry ready to enhance their employability in the industries.
- To improve department industry collaboration through internship programme and interaction with professional society through seminar/workshops.
- Imbibe social awareness and responsibility in students to serve the society.
**PROGRAMME EDUCATIONAL OBJECTIVES AND OUTCOMES**

**B.Tech. (Computer Science and Engineering)**

**The Program Educational Objectives of B.Tech.**
- To introduce the fundamentals of science and engineering concepts essential for a computer engineer.
- To inculcate the knowledge of mathematical foundations and algorithmic principles for effective problem solving.
- To provide knowledge in computer science, modeling & design of computer based systems.
- To impart knowledge to analyze, design, test and implement software required for various applications.
- To hone personality skills, trigger social commitment and inculcate societal responsibilities.

**Programme Outcomes for B.Tech (CSE)**
- **PO1:** Analyse and build models applying the knowledge of mathematics, statistics, electronic, electrical and computer science discipline and solve the problem.
- **PO2:** Identify the sources of information for data collection, design and conduct the experiments and interpret the result.
- **PO3:** Think out-of-the box and solve the real time problems using their creativity in designing human friendly software systems.
- **PO4:** Comprehend computer engineering concepts of the new research developments and apply them to develop relevant software and hardware products.
- **PO5:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:** Apply the computing knowledge to solve the socially relevant problems.
- **PO7:** Understand the impact of engineering solutions in global, economic, environmental, societal context and apply it in exploring the new developments, research trends and involve them in research.
PO8: Develop professional integrity by understanding and appreciating professional, legal, ethical, cyber security and related issues and act with responsibility.

PO9: Communicate, collaborate and work as a team by involving in the group projects of multi-disciplinary nature.

PO10: To prepare documents as per the standards and present effectively to improve software documentation skills.

PO11: Apply the hardware and software project management techniques to estimate the time and human resources required to complete computer engineering projects.

PO12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

PSO1: Understand, analyze and develop essential proficiency in the areas related to algorithms, system software, multimedia, web design, big data analytics, networking and apply the knowledge to solve practical problems.

PSO2: Apply standard practices and strategies in hardware and software project development using open-ended programming environments for successful career and entrepreneurship.
REGULATIONS 2013 FOR B.TECH. DEGREE PROGRAMMES

(WITH AMENDMENTS INCORPORATED TILL JUNE 2016)
REGULATIONS - 2013 FOR B.TECH. DEGREE PROGRAMMES

1.0 PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:


ii. "Branch" means specialization or discipline of B.Tech Degree Programme like Civil Engineering, Mechanical Engineering, etc.,

iii. "Course" means a theory or practical subject that is normally studied in a semester, like Mathematics, Physics, Engineering Graphics, Computer Practice, etc.,

iv. "University" means B.S.Abdur Rahman University.

v. "Dean (Academic Affairs)" means the Dean (Academic Affairs) of B.S. Abdur Rahman University.

vi. "Dean (Student Affairs)" means the Dean (Students Affairs) of B.S. Abdur Rahman University.

vii. "Controller of Examinations" means the Controller of Examination of B.S. Abdur Rahman University, who is responsible for conduct of examinations and declaration of results.

2.0 ADMISSION

2.1a) Candidates for admission to the first semester of the eight semester B.Tech. degree programme shall be required to have passed the Higher Secondary Examination of the (10+2) curriculum (Academic stream) prescribed by the appropriate authority or any other examination of any university or authority accepted by the University as equivalent thereto.

2.1b) Candidates for admission to the third semester of the eight semester B.Tech. programme under lateral entry scheme shall be required to have passed the Diploma examination in Engineering / Technology of the Department of Technical Education, Government of Tamil Nadu or any other examination of any other authority accepted by the University as equivalent thereto.
2.2 Notwithstanding the qualifying examination the candidate might have passed, the candidate shall also write an entrance examination prescribed by the University for admission. The entrance examination shall test the proficiency of the candidate in Mathematics, Physics and Chemistry on the standards prescribed for plus two academic stream.

2.3 The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by the University from time to time.

3.0 BRANCHES OF STUDY

3.1 Regulations are applicable to the following B.Tech. degree programmes in various branches of Engineering and Technology, each distributed over eight semesters with two semesters per academic year.

B.TECH. DEGREE PROGRAMMES:

1. Aeronautical Engineering
2. Automobile Engineering
3. Civil Engineering
4. Computer Science and Engineering
5. Electrical and Electronics Engineering
6. Electronics and Communication Engineering
7. Electronics and Instrumentation Engineering
8. Information Technology
9. Manufacturing Engineering
10. Mechanical Engineering
11. Polymer Engineering
12. Biotechnology
13. Cancer Biotechnology
14. Food Biotechnology
4.0 STRUCTURE OF THE PROGRAMME

4.1 Every Programme will have a curriculum with syllabi consisting of theory and practical courses such as,

i. Basic Sciences (BS)
ii. Humanities & Social Sciences (HS)
iii. Management Sciences (MS)
iv. Engineering Sciences Fundamentals (ESF)
v. Engineering Core Courses (EC)
vi. Professional Electives (PE)
vii. General Electives (GE)
viii. Workshop practice, laboratory work, industrial training, seminar presentation, project work, etc.

4.2 Each course is normally assigned certain number of credits: one credit per lecture period per week

- one credit per tutorial period per week
- one credit for two to three periods and two credits for four periods of laboratory or practical courses
- one credit for two periods of seminar / project work per week
- one credit for two weeks of industrial training

4.3 Each semester curriculum shall normally have a blend of lecture courses not exceeding seven and practical courses not exceeding four.

4.4 For the award of the degree, a student has to earn a minimum total credits specified in the curriculum of the relevant branch of study. This minimum will be between 175 and 185 credits, depending on the program.

4.5 The medium of instruction, examinations and project report shall be English, except for courses on languages other than English.
5.0 DURATION OF THE PROGRAMME

5.1 A student is ordinarily expected to complete the B.Tech. programme in eight semesters (six semesters in the case of a lateral entry scheme), but in any case not more than 14 continuous semesters reckoned from the date of first admission (12 semesters in the case of lateral entry student).

5.2 Each semester shall consist of a minimum of 90 working days or 450 periods.

5.3 Semester end examination will normally follow immediately after the last working day of the semester.

6.0 CLASS ADVISOR AND FACULTY ADVISOR

6.1 CLASS ADVISOR

A faculty member will be nominated by the HOD as Class Advisor for the whole class (2nd to 8th semester).
He/she is responsible for maintaining the academic, curricular and co-curricular records of all students throughout their period of study.
However, for the first semester alone the class advisors and faculty advisors will be nominated by first year coordinator.

6.2 FACULTY ADVISOR

To help the students in planning their courses of study and for general counseling on the academic programme, the Head of the Department of the students will attach a certain number of students to a faculty member of the department who shall function as Faculty Advisor for the students throughout their period of study.
Such Faculty Advisor shall offer advice to the students on academic and personal matters, and guide the students in taking up courses for registration and enrolment every semester.

7.0 COURSE COMMITTEE

Common course offered to more than one discipline or group, shall have a "Course Committee", comprising all the faculty members teaching the common course with one of them nominated as Course Coordinator. The nomination of the course coordinator shall be made by the Head of the Department / Dean (Academic Affairs), depending on whether all the faculty members teaching the common course belong to the same department / different departments.

8.0 CLASS COMMITTEE

For the first semester, a common Class Committee will be constituted for all branches by the Dean (Academic Affairs). During other semesters, separate Class
Committees will be constituted by the respective Head of the Department of the students

8.1 The first semester Class Committee composition will be as follows:

i. The first semester Coordinator shall be the Chairman of the class committee
ii. Course coordinators of all common courses.
iii. Faculty members of all individual courses.
iv. One male and one female first semester student of each class of B.Tech, program to be nominated by the first semester coordinator.
v. All first semester class advisors and faculty advisors.

8.2 The composition of the class committee for each branch of B.Tech, from 2\textsuperscript{nd} to 8\textsuperscript{th} semester, will be as follows:

i. One senior faculty member preferably not teaching to the concerned class, appointed as Chairman by the Head of the Department.
ii. Faculty members of individual courses.
iii. Two students, (preferably one male and one female) of the class per group of 30 students or part thereof, to be nominated by the Head of the Department, in consultation with the faculty advisors.
iv. All faculty advisors and the class advisor of the class.
v. Head of the Department

8.3 The class committee shall meet at least thrice during the semester. The first meeting will be held within two weeks from the date of commencement of classes, in which the nature of continuous assessment for various courses and the weightages for each component of assessment will be decided for the first, second and third assessments. The second meeting will be held within a week after the date of first assessment report, to review the students’ performance and for follow up action. The third meeting will be held within a week after the second assessment report, to review the students' performance and for follow up action.

8.4 During these three meetings the student members representing the entire class, shall meaningfully interact and express opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process.

8.5 The class committee, excluding the student members, shall meet within 10 days from the last day of the semester end examination to analyze the performance of the students in all the components of assessments and decide the grades for students in each course. The grades for a common course shall be decided by the concerned course committee and shall be presented to the class committee(s) by the concerned course coordinator.
9.0 REGISTRATION AND ENROLMENT

9.1 Except for the first semester, every student shall register for the ensuing semester during a specified week before the semester end examination of the current semester. Every student shall submit a completed Registration form indicating the list of courses intended to be enrolled during the ensuing semester. Late registration along with a late fee will be permitted up to the last working day of the current semester.

9.2 From the second year onwards, all students shall pay the prescribed fees for the year on a specific day at the beginning of the semester confirming the registered courses. Late enrolment along with a late fee will be permitted up to two weeks from the date of commencement of classes. If a student does not enroll, his/her name will be removed from rolls.

9.3 The students of first semester shall register and enroll at the time of admission by paying the prescribed fees.

9.4 A student should have registered for all preceding semesters before registering for a particular semester.

10.1 CHANGE OF A COURSE

A student can change an enrolled course within 15 days from the commencement of the course, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

10.2 WITHDRAWAL FROM A COURSE

A student can withdraw from an enrolled course at any time before the second assessment for genuine reasons, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

11.0 TEMPORARY BREAK OF STUDY FROM A PROGRAMME

A student can avail a onetime temporary break of study covering the current semester and/or next semester period with the approval of the Head of the Institution at any time before the start of third assessment of current semester, within the maximum period of 14 or 12 semesters as the case may be. If any student is debarred for want of attendance or suspended due to any act of indiscipline it will not be considered as break of study.

A student availed break of study has to rejoin only in the same semester from where he left.
12.0 CREDIT LIMIT FOR ENROLMENT & MOVEMENT TO HIGHER SEMESTER

12.1 A student can enroll for a maximum of 30 credits during a semester including redo courses.

12.2 The minimum credit requirement to move to the higher semester is

- Not less than a total of 20 credits, to move to the 3\(^{rd}\) semester
- Not less than a total of 40 credits, (20 for lateral entry) to move to the 5\(^{th}\) semester
- Not less than a total of 60 credits, (40 for lateral entry) to move to the 7\(^{th}\) semester

13.0 ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

13.1 Every theory course shall have a total of four assessments during a semester as given below:

<table>
<thead>
<tr>
<th>Assessment No.</th>
<th>Course Coverage in Weeks</th>
<th>Duration</th>
<th>Weightage of Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment 1</td>
<td>1 to 4</td>
<td>1.5 hours</td>
<td>15%</td>
</tr>
<tr>
<td>Assessment 2</td>
<td>5 to 8</td>
<td>1.5 hours</td>
<td>15%</td>
</tr>
<tr>
<td>Assessment 3</td>
<td>9 to 12</td>
<td>1.5 hours</td>
<td>15%</td>
</tr>
<tr>
<td>Attendance #</td>
<td></td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Semester End Exam</td>
<td>Full course</td>
<td>3 hours</td>
<td>50%</td>
</tr>
</tbody>
</table>

# 76-80% - 1 Mark ; 81-85 – 2 Marks ; 86-90 – 3 Marks ; 91-95 – 4 Marks and 96 – 100 – 5 Marks

13.2 Appearing for semester end examination for each course is mandatory and a student should secure a minimum of 40% marks in each course in semester end examination for the successful completion of the course.

13.3 Every practical course will have 60% weightage for continuous assessment and 40% for semester end examination. However, a student should have secured a minimum of 50% marks in the semester end practical examination.
13.4 In the case of Industrial training, the student shall submit a report, which will be evaluated along with an oral examination by a committee of faculty members, constituted by the Head of the department. A progress report from the industry will also be taken into account for evaluation.

13.5 In the case of project work, a committee of faculty members constituted by the Head of the Department will carry out three periodic reviews. Based on the project report submitted by the student(s), an oral examination (viva-voce) will be conducted as the semester end examination, for which one external examiner, approved by the Controller of Examinations, will be included. The weightage for periodic review will be 50% and remaining 50% for the project report and Viva Voce examination.

13.6 Assessment of seminars and comprehension will be carried out by a committee of faculty members constituted by the Head of the Department.

13.7 The continuous assessment marks earned for a course during his/her first appearance will be used for grading along with the marks earned in the semester-end examination / arrear examination for that course until he/she completes.

14.0 SUBSTITUTE EXAMINATIONS

14.1 A student who has missed, for genuine reasons, a maximum of one of the four assessments of a course may be permitted to write a substitute examination. However, permission to take up a substitute examination will be given under exceptional circumstances, such as accident, admission to a hospital due to illness, etc.

14.2 A student who misses any assessment in a course shall apply in a prescribed form to the Head of the department / Dean within a week from the date of missed assessment. However the substitute tests and examination for a course will be conducted within two weeks after the last day of the semester-end examinations.

15.0 ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

15.1 A student should secure not less than 75% overall attendance in that semester taking into account the total no. of periods in all courses put together attended by the student as against the total no. of periods in all courses offered during that semester. If a student who could secure overall attendance between 65% and 75% only in a particular semester due to medical reasons (hospitalization / accident / specific illness) or due to participation in the College / University / State / National / International level sports events with prior permission from the Officials concerned shall be given exemption from the prescribed attendance requirement and he / she shall be permitted to appear for the current semester examinations.

*The students who do not fulfill the above attendance requirement will not be permitted to write the semester end examination and will not be permitted to*
move to next semester. Such students should repeat all the courses of the semester in the next Academic year.

15.2 The faculty member of each course shall furnish the cumulative attendance details to the class advisor. The class advisor will consolidate and furnish the list of students who have earned less than 75% overall attendance, to the Dean (Academic Affairs) through the Head of the Department / School Dean. Thereupon, the Dean (Academic Affairs) shall issue orders preventing students from appearing for the semester end examination of all the courses of that semester.

15.3 A student who is awarded “U” grade in a course will have the option of either to write semester end arrear examination at the end of the subsequent semesters, or to redo the course whenever the course is offered. Marks earned during the redo period in the continuous assessment for the course, will be used for grading along with the marks earned in the end-semester (re-do) examination. If any student obtained “U” grade, the marks earned during the redo period for the continuous assessment for that course will be considered for further appearance as arrears.

15.4 If a student with “U” grade prefers to redo any particular course fails to earn the minimum 75% attendance while doing that course, then he/she will not be permitted to write the semester end examination and his / her earlier ‘U’ grade and continuous assessment marks shall continue.

16.0 PASSING AND DECLARATION OF RESULTS AND GRADE SHEET

16.1 All assessments of a course will be made on absolute marks basis. However, the Class Committee without the student members shall meet within 10 days after the semester-end examination and analyze the performance of students in all assessments of a course and award letter grade. The letter grades and the corresponding grade points are as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
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<tr>
<td>E</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td></td>
</tr>
</tbody>
</table>
"W" denotes withdrawal from the course. "U" denotes unsuccessful performance in the course. "AB" denotes absence for the semester end examination.

16.2 A student who earns a minimum of five grade points (‘E’ grade) in a course is declared to have successfully completed the course. Such a course cannot be repeated by the student.

16.3 The results, after awarding of grades, shall be signed by the Chairman of the Class Committee and Head of the Department and declared by the Controller of Examinations.

16.4 Within one week from the date of declaration of result, a student can apply for revaluation of his / her semester-end theory examination answer scripts of courses, on payment of prescribed fee, through proper application to Controller of Examinations. HOD/Dean shall constitute a revaluation committee consisting of Chairman of the class committee as convener, the faculty member of the course and a senior member of faculty knowledgeable in that course. The committee shall meet within a week to revalue the answer scripts and submit its report to the Controller of Examinations for consideration and decision.

16.5 After results are declared, grade sheets shall be issued to each student, which will contain the following details. The list of courses enrolled during the semester including Redo courses, if any, and the grade scored, the Grade Point Average (GPA) for the semester and the Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards. GPA is the ratio of the sum of the products of the number of credits of courses registered and the points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester.

\[
\text{GPA} = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}
\]

Where \( n = \text{number of courses} \)

The Cumulative Grade Point Average CGPA shall be calculated in a similar manner, considering all the courses enrolled from first semester.

"W" grades will be excluded for calculating GPA.

"U", "AB" and "W" grades will be excluded for calculating CGPA.
After successful completion of the programme, the Degree will be awarded with the following classifications based on CGPA.

<table>
<thead>
<tr>
<th>Classification</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>8.50 and above and passing all the courses in first appearance and completing the programme within the normal 8 or 6 (for lateral entry) semesters</td>
</tr>
<tr>
<td>First Class</td>
<td>6.50 and above and completing the programme within a maximum of 10 or 8 (for lateral entry) semesters.</td>
</tr>
<tr>
<td>Second Class</td>
<td>All others</td>
</tr>
</tbody>
</table>

However, to be eligible for First Class with Distinction, a student should not have obtained U grade in any course during his/her study and should have completed the U.G. programme within a minimum period covered by the minimum duration plus authorized break of study, if any (clause 11). To be eligible for First Class, a student should have passed the examination in all courses within the specified minimum number of semesters reckoned from his/her commencement of study plus two semesters. For this purpose, the authorized break of study will not be counted. The students who do not satisfy the above two conditions will be classified as second class. For the purpose of classification, the CGPA will be rounded to two decimal places. For the purpose of comparison of performance of students and ranking, CGPA will be considered up to three decimal places.

17.0 ELECTIVE CHOICE: OPTION TO DO PROJECT ALONE IN FINAL SEMESTER

17.1 Apart from the various elective courses listed in the curriculum for each branch of specialization, the student can choose a maximum of two electives from any other specialization under any department, during the entire period of study, with the approval of the Head of the parent department and the Head of the other department offering the course.

17.2 In the curriculum of eighth Semester, along with the project work, if two elective courses alone are listed, then the Dean (Academic Affairs) may permit a student, as per approved guidelines, on the recommendation of the Head of the department, to do a full semester major industrial project work. In such a case, the above two elective courses or any other two elective courses in lieu thereof have to be enrolled during any semester preceding or succeeding the project work, if offered.
18.0 PERSONALITY AND CHARACTER DEVELOPMENT

18.1 All students shall enroll, on admission, in any of the personality and character development programmes, NCC / NSS / NSO / YRC / Rotaract and undergo practical training.

- **National Cadet Corps (NCC)** will have to undergo specified number of parades.
- **National Service Scheme (NSS)** will have social service activities in and around Chennai.
- **National Sports Organization (NSO)** will have sports, games, drills and physical exercises.
- **Youth Red Cross (YRC)** will have social service activities in and around Chennai.
- **Rotaract** will have social service activities in and around Chennai.

19.0 DISCIPLINE

19.1 Every student is required to observe disciplined and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.

19.2 Any act of indiscipline of a student, reported to the Dean (Student Affairs), through the HOD / Dean will be referred to a Discipline and Welfare Committee, nominated by the Vice-Chancellor, for taking appropriate action.

20.0 ELIGIBILITY FOR THE AWARD OF DEGREE

20.1 A student shall be declared to be eligible for the award of B.Tech. degree provided the student has:

i. successfully completed all the required courses specified in the programme curriculum and earned the number of credits prescribed for the specialization, within a maximum period of 14 semester (12 semesters for lateral entry) from the date of admission, including break of study.

ii. no dues to the Institution, Library, Hostels

iii. no disciplinary action pending against him/her.

20.2 The award of the degree must have been approved by the University.

21.0 POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council has the right to modify the above regulations from time to time.
<table>
<thead>
<tr>
<th>No.</th>
<th>Group</th>
<th>Code</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BS</td>
<td>MAB1181</td>
<td>Algebra, Geometry and Calculus</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>HS</td>
<td>ENB1181</td>
<td>English*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>French*</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>ISB1181 Arabic*</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>BS</td>
<td>PHB1181</td>
<td>Physics</td>
<td>3</td>
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<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>BS</td>
<td>CHB1181</td>
<td>Chemistry</td>
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<tr>
<td>5</td>
<td>ESF</td>
<td>GEB1101</td>
<td>Engineering Graphics</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>HS</td>
<td>SSB1181</td>
<td>Introduction to Economics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>BS</td>
<td>PHB1182</td>
<td>Physics Lab</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>BS</td>
<td>CHB1182</td>
<td>Chemistry Lab</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>ESF</td>
<td>GEB1102</td>
<td>Basic Engineering Practices Laboratory</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>ESF</td>
<td>GEB1103</td>
<td>Computer Programming &amp; Applications</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

* Any one language

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**25**
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Group</th>
<th>Course Code</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>BS</td>
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26 PE CSBX27 Knowledge Engineering
27 PE CSBX28 Visualization Techniques
28 PE CSBX29 Data Warehousing And Business Intelligence
29 PE CSBX30 Web Mining
30 PE CSBX31 Content Management And Web Publishing
31 PE CSBX32 Software Requirements Engineering
32 PE CSBX33 Software Testing Techniques
33 PE CSBX34 Software Agents
34 PE CSBX35 User Interface Design
35 PE CSBX36 Pattern Recognition
36 PE CSBX37 Foundations On Software Quality Assurance
37 PE CSBX38 Software Development Methodologies
38 PE CSBX39 Computer Graphics
39 PE CSBX40 Foundation Of Project Management
40 PE CSBX41 Software Process Model
41 PE CSBX42 Software Maintenance
42 PE CSBX43 Software Design Patterns
43 PE CSBX44 Social Network Analysis
44 PE CSBX46 Nosql Database
45 PE CSBX47 Multicore Architecture
46 PE CSBX48 Virtualization Techniques
47 PE ECB3101 Digital Signal Processing
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OBJECTIVES:

The course is aimed at

- Developing the skills of engineering students in the basics of chosen topics of Mathematics that are imperative for effective understanding of engineering subjects.
- Laying the foundation for learning further topics of Mathematics in higher semesters in a graded manner.
- Enabling the learners to appreciate the important role of mathematical concepts in engineering applications.

MODULE I  MATRICES


MODULE II  VECTOR ALGEBRA


MODULE III THREE DIMENSIONAL ANALYTICAL GEOMETRY


MODULE IV  DIFFERENTIAL GEOMETRY


MODULE V  MULTI-VARIATE FUNCTIONS

MODULE VI ORDINARY DIFFERENTIAL EQUATIONS

Linear equations of second order with constant and variable coefficients – Simultaneous first order linear equations with constant coefficients – homogeneous equations of Euler’s type – method of undetermined co-efficients, method of variation of parameters.

Total Hours : 60

TEXT BOOKS:


REFERENCES:


OUTCOMES:

On completion of the course the students will be able to

- Solve Eigenvalue and Eigenvector problems.
- Solve three dimensional geometry problems.
- Use differential calculus for solving problems pertaining to engineering applications.
OBJECTIVES:

- To enable students to use language appropriately and effectively
- To help learners improve their vocabulary and to enable them speak fluently and appropriately in different contexts.
- To help students develop listening skills for academic and professional purposes
- To develop reading comprehension skills and enhance their ability to read official documents.
- To develop their creative thinking and practice creative writing.

MODULE I  BASIC LANGUAGE SKILLS AND GRAMMAR  4

Conducting a language proficiency test in the language laboratory to assess the use of various parts of speech, vocabulary, phrasal verbs and idiomatic expressions of students.

MODULE II  LISTENING  8

Listening to BBC radio plays and VOA special lessons to teach Phonetics, accent and intonation of spoken English Appreciation and critical review of popular movies like ‘My Fair Lady’, ‘Sound of Music’. (Excerpts from the movies) - Historical/popular speeches made by Winston Churchill, Abraham Lincoln (Gettysberg’s Address), Swami Vivekananda.

MODULE III  SPEAKING  8

(a) Self introduction – pair work – introducing one another – short conversations – exchanging opinions – agreement /disagreement
(b) Short presentation (extempore speech) based on visuals – Personal narrations

MODULE IV  READING  8

Newspaper articles, circular, notices – Note making – vocabulary extension – Critical review of newspaper articles.
(a) Science fiction- Issac Asimov’s “The Dead Past” (Abridged version) - Wings of Fire – Creative thinking – retelling a story with different ending; critical appreciation of plot and characters

MODULE V  CREATIVE WRITING

(a) Writing slogans for Advertisements
(b) Writing descriptive paragraphs based on visuals

MODULE VI  ENGLISH FOR ACADEMIC AND BUSINESS PURPOSES  9

a. English for academic purpose: letters to the editor, letter seeking permission for industrial visit, letter inviting a dignitary for technical symposium

Total Hours: 45

REFERENCES:


OUTCOME:

- After completion of the course, students will have the ability to communicate correctly and effectively in academic and professional contexts through exposure and practice in LSRW skills.
OBJECTIVES:

- To improve their proficiency in French language.
- To empower them for successful communication in their professional contexts.

DOSSIER 0 FENÊTRE SUR...

Contenus – l'alphabet - se présenter – les langues – les nationalités – les nombres de 0 à 60 – les adjectifs de nationalités – les verbes : s'appeler, être. L'acte de parole

DOSSIER 1 LES UNS, LES AUTRES....


Demander quelque chose – les mois de l'année – les nombres de 70 à 99 – les articles indéfinis – l'adjectif interrogatif (quel, quelle)

Quelques événements culturels – donner des informations personnelles – indiquer ses gouts – l'expression des gouts – les prépositions (les noms de pays). L'acte de parole

DOSSIER 2 ICI /AILLEURS

Contenus – Parler de sa ville – Donner/ Demander des explications – les prépositions de lieu – articles contractés – pourquoi / parce que

Auberges de jeunesse et hôtels – s'informer sur un hébergement- quelques verbes et indications de direction – quelques formules de politesse.

Le code postal et les départements le libellé d'une adresse en France – Ecrire une carte postale – Dire le temps qu'il fait – les adjectifs démonstratifs - Formules pour commencer / terminer.

L'acte de parole
DOSSIER 3 SOLO OU DUO

Contenus – Les animaux de compagnie les animaux préférés des Français - parler de sa profession – les professions - les activités sportifs - les noms animaux – les verbes : aimer, adorer, détester, faire, aller.

Nouveaux mode de rencontres – caractériser une personne (physique et psychologique) – les adjectifs qualificatifs – les pronoms toniques.


L'acte de parole

L'examen oral

Total Hours: 45

TEXT BOOK:

1. Alter EGO I – Goyal – Langers (0 – 5 Lessons)

OUTCOMES:

On completion of the course,

- The students will be able to deal with their clients effectively at global level.
- Their proficiency in French Language will have improved.
OBJECTIVES:

- To read and write in Arabic language.
- To learn vocabulary of different fields
- To develop situational communication skills.

MODULE I  PREPARATORY ARABIC

Introducing Arabic Alphabets.

Listening and Reading.

Audio & Video aided listening, Tajweed listening,

Writing Arabic Alphabets (connected & unconnected).

Introducing words.

Reading simple sentences.

Learning names of the things in and around the class room.

Exercises.

MODULE II  FUNCTIONAL ARABIC

Listening Arabic texts, stories and action verbs

Communicating Simple sentences.

Jumla’ Ismiyya and Jumla’ Fi’liyya

Situational Conversation:
  - Greetings, Introduction.
  - Classroom, College, Picnic.
  - Dining and Kitchen.

Reading skills.

Exercises
MODULE III FUNCTIONAL ARABIC  

Implication of effective listening.

Audio aids.

Writing Simple sentences.

Communicating ordinal and cardinal numbers.

Situational communication:
  Playground, library.

Forms of plural – Sample sentences.

Introduction to tenses.

Exercises.

MODULE IV FUNCTIONAL ARABIC  

Communication:
  Family, travel
  Market, Prayer hall

Writing skills:
  Note making.
  Sequencing of sentences.

Developing answers from the questions.

Exercises.

MODULE V  TECHNICAL ARABIC  

Importance of technical communication.

Reading and writing skills.

Audio & Video aided listening.

Introduction to Arabic terms related to administration.

Situation communication:
Air travel, Office administration, passport, visa.
Exercises.

MODULE VI TECHNICAL ARABIC

Situation communication:
- Contractual work, machineries and equipments..
- Computer, internet browsing.
- Banking,

Exercises.

Total Hours: 45

TEXT BOOK:
1. Arabic for professionals and employees, Kilakarai Bukhari Aalim Arabic College, Chennai, India, 2013.

REFERENCES:
1. Arabic Reader for Non Arabs (Ummul Qura University, Makkah), Kilakarai Bukhari Aalim Arabic College, 2005.

OUTCOMES:
On successful completion of the course, the student will be able to:
- Write correct sentences in Arabic.
- Communicate in Arabic at primary level in working situations in the fields of engineering and administration.
OBJECTIVES:

- To introduce basic physics concepts relevant to Engineering and Technology students.
- To get familiarize with solving problems in basic physics.
- To acquaint applications of physics for Engineering issues.

MODULE I  PROPERTIES OF MATTER  7


MODULE II  CRYSTAL PHYSICS  6


MODULE III  QUANTUM PHYSICS  7


MODULE IV  WAVE OPTICS  9

MODULE V  LASER & FIBRE OPTICS


MODULE VI  ULTRASONICS AND NDT


Total Hours: 45

TEXT BOOKS:


REFERENCES:

OUTCOMES:
At the end of the course, the students will be able to

• Apply the knowledge of properties of matter in Engineering Mechanics and Fluid Dynamics.
• Characterize Engineering materials
• Use Lasers for Fiber Optics Technology and Material Processing
• Do non-destructive testing using Ultrasonic Techniques
OBJECTIVES:

To make students conversant with the

- Water quality for potable and industrial purposes.
- Different engineering materials, their physico-chemical properties and specific applications.
- Concept of electrochemistry, corrosion and theories of corrosion.
- Principles of spectroscopy and applications.
- Basic principles of green chemistry and the need for green processes in industries.

MODULE I  WATER TECHNOLOGY  8


MODULE II  ENGINEERING MATERIALS  8


Refractories: characteristics, classification – acidic, basic and neutral refractories, properties – refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling – general method of manufacture of refractories, properties and uses of high alumina bricks, magnesite and zirconia bricks.

Nanomaterials: Definition – types of Nanomaterials; nanofilms, nanowires, carbon nanotubes, quantum dots and fullerenes (\(C_{60}\)) – Size and shape
dependent optical, electrical, thermal and mechanical properties; Synthesis of nanomaterials – Top down and bottom up approach; Applications of nanomaterials – Catalysis, Electronics and Telecommunication, Medicines, Composites and Energy.

MODULE III ELECTROCHEMISTRY AND CORROSION

Construction of a cell – Standard and single electrode potential – electrochemical series – EMF and its measurement – Nernst equation, application and problems – Types of electrodes: standard hydrogen electrode, calomel electrode, ion selective electrode - glass electrode and determination of pH using glass electrode – polarization, overvoltage, decomposition potential (statements only) – Conductometric and potentiometric titrations.

Corrosion: Definition – Dry corrosion and Wet corrosion with mechanisms – Factors influencing corrosion.

MODULE IV CHEMISTRY OF POLYMERS


MODULE V SPECTROSCOPY


MODULE VI GREEN CHEMISTRY

Introduction – Significance – Industrial applications of green chemistry; Green technology – Latest green laboratory technique for saving experimental resources and infrastructural framework; Principles of green chemistry – R4M4 model (Reduce, Reuse, Recycle, Redesign; Multipurpose, Multidimensional, Multitasking, Multi-tracking) – Life cycle analysis technique (cradle to grave approach)

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

At the end of the course, students will be able to

- Estimate the degree of hardness in water; solve related problems and treatment methods for potable water.
- Select materials for specific engineering applications.
- Use electrochemistry principles to understand the mechanism of corrosion.
- Analyze trace quantity of metals using instrumental methods.
- realize the need of green practices in industries.
OBJECTIVES:

- To introduce the students of all engineering programs, the basic concepts of engineering drawing, which is the basic communication medium for all engineers
- To provide an exposure to the appropriate standards for technical drawings
- To provide practical exposure on important aspects like drawing analytic curves, orthographic projections, section of solids, development of surfaces, pictorial views and free hand drawing
- To introduce computerized drafting

MODULE I  BASICS AND ENGINEERING CURVES  

Drawing instruments, dimensioning, BIS conventions, types of lines, simple geometric constructions.
Conic sections: ellipse, parabola, hyperbola
Special curves: Cycloid, epicycloid, hypocycloid, involutes, helix

MODULE II  ORTHOGRAPHIC PROJECTION  

Orthographic projection – first angle, third angle projection methods, free hand sketching of orthographic views of simple machine parts as per first angle projection. Projection of points. Commands and demonstration of drafting packages.

MODULE III  PROJECTION OF STRAIGHT LINES AND PLANES  


MODULE IV  PROJECTION OF SOLIDS  

Projection of solids: Axis inclined to one reference plane only - prism, pyramid, cone, cylinder – change of position and auxiliary projection methods.
MODULE V  SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

Section of solids: prism, pyramid, cone, cylinder, and sphere – sectional views – true shape of sections - solids in simple position and cutting plane inclined to one reference plane only.

Development of surfaces: truncated solids - prism, pyramid, cone, cylinder, frustum of cone and pyramid.

MODULE VI  PICTORIAL PROJECTIONS

Isometric projection: isometric scale - isometric projection and view of prism, pyramid, cylinder, cone, frustums and truncated solids.

Perspective projection: prism, pyramid, cylinder, frustums – visual ray and vanishing point methods.

Total Hours: 60

TEXT BOOK:

REFERENCES:

OUTCOMES:
Students who complete this course will be able to:
- Draw various views of engineering components
- Graphically communicate their concepts and ideas on new designs
OBJECTIVES:

- Primarily to give an overview of fundamentals of economics to the engineering students in particular
- To introduce the basic concepts of demand, supply and equilibrium.
- To familiarize on National Income concepts
- To provide fundamental concepts of money, banking and exchange.
- To give an idea on industrial sector, markets and trade.
- To give an overview on five year plans, budget, policies and taxation.
- To provide an overview of Indian economy and the role of engineers in economic development.

MODULE I INTRODUCTION

Classification of economy – open and closed economy – sectors of economy
– Basic principles of micro economics – supply, demand and equilibrium, elasticity of demand- pricing models.

MODULE II NATIONAL INCOME DETERMINATION

National Income concepts – GNP, GDP, disposable Income; Aggregate demand and Aggregate supply, macroeconomic equilibrium - concepts of MPS, APS, MPC APC, Inflation – prices indices WPI, CPI and Inflation control.

MODULE III MONEY AND BANKING

Monetary system - Role of Central Bank – Monetary policy – Commercial banks, Development banks; Money market – the role of money.

MODULE IV INDUSTRY, MARKET AND TRADE

MODULE V  BUDGET, POLICIES AND INDICATORS


MODULE VI  ECONOMIC GROWTH AND THE ROLE OF ENGINEERS

India Economy – the role of market in the Indian economy – Development in the post independence era – Growth of the economy, Globalization and liberalization – reforms made and their effects, challenges and opportunities, Engineers – Engineers’ contributions to the economic growth.

Total Hours : 45

REFERENCES:


OUTCOMES:

- Students will have an exposure to the basic concepts of microeconomics and macroeconomics.
- Students will have gained knowledge in government budget, economic planning and its implementation, money, banking and trade.
- They will have learnt about the economic reforms introduced in Indian economy and the role of engineers towards the economic growth and development of the country.
OBJECTIVES:

- To understand the basic concepts of properties of matter, wave optics.
- To understand the properties of ultrasonic and Laser.
- To understand the crystal growth technique.
- To correlate the experimental results with the theoretical values.

LIST OF EXPERIMENTS:

1. Torsional Pendulum- Determination of rigidity modulus of a given wire.
2. Determination of coefficient of viscosity of a liquid by Poiseuille’s method.
3. Determination of Young’s modulus of a beam using non-uniform bending method.
4. Determination of a thickness of a given wire – Air wedge.
5. Spectrometer- determination of wavelength of given source by using grating.
7. Determination of numerical aperture and acceptance angle of an optical fiber.
9. Growth of crystal by slow evaporation technique.
10. Determination of angle of divergence of Laser beam.
11. Photo electric effect experiment.

OUTCOMES:

On completion of this course, the student will know

- Properties of matter, wave optics and quantum physics
- Properties and application of Ultrasonic and Laser
- Principle and concept of crystal growth technique
OBJECTIVES:
To make students conversant with the

- Estimation of hardness and TDS in water samples.
- Construction of cell and determination of EMF.
- Estimation of pH of solutions.
- Verification of Beer Lambert’s law.

LIST OF EXPERIMENTS:

1. Estimation of hardness in domestic water.
2. Estimation of total dissolved solids (TDS) in domestic water.
3. Construction and determination of EMF of a cell.
4. Determination of single electrode potential.
5. Estimation of strong acid in the industrial effluents.
7. Verification of Beer-Lambert’s law and estimation of Cu$^{2+}$ present in unknown sample.
9. Study of effect of inhibitors in free radical polymerization (Demo).

OUTCOMES:
At the end of the course, students will be able to

- Estimate the degree of hardness and TDS in water samples.
- Construct and calculate EMF of cell.
- Apply the concept of Beer lamberts law.
OBJECTIVES:

- To provide a practical exposure to basic engineering practices like carpentry, fitting, plumbing, welding and making of simple electrical and electronic circuits
- To have an understanding on the use of various tools, instruments and methods
- To enable the students to appreciate the practical difficulties and safety issues

CIVIL ENGINEERING PRACTICE

1. Study of plumbing in general household and industrial systems
2. Making a small window frame with Lap and Mortise & Tenon Joints

MECHANICAL ENGINEERING PRACTICE

1. Fabrication of a small Table frame with Butt, Lap and Fillet Joints
2. Machining of a simple component like a table weight using lathe
3. Mould preparation for simple component

ELECTRICAL ENGINEERING PRACTICE

1. Comparison of incandescent, Fluorescent, CFL and LED lamps.
2. Study of Protection Circuits (small relay, fuse, MCB, HRC, MCCB, ECCB).
3. Familiarization of households Electrical Gadgets (Iron Box, Wet Grinder).
4. Understanding of Domestic and Industrial wiring.
5. Earthing and its significance.
6. Troubleshooting in Electrical Circuits.
7. Study of inverter fed UPS/Emergency lamp.

ELECTRONIC ENGINEERING PRACTICE

1. Identifications symbolic representation of active and passive electronic components
2. Soldering and tracing of electronic circuits and checking its continuity
3. Assembling of A.C. to D.C, D.C to A.C. Circuits in bread Board and Mini project
OUTCOMES:

Students who complete this course

- Should be able to appreciate the practical skills needed even in making of simple objects, assemblies and circuits
- Should be able to attend minor defects especially in items used in day to day life
- Should be aware of the safety aspects involved in using tools and instruments
OBJECTIVES:

- To expose fundamental concepts of computer hardware.
- To implant the basic programming knowledge.
- To identify bugs in the code snippets thereby giving more practice.
- To give coverage on applying logic in programming.
- To focus on solving practical problems based on implementing computer programs.
- To provide the foundation of good programming skills by discussing keys issues to the design.

MODULE I  FUNDAMENTALS OF COMPUTERS  5

Evolution – Generations - Classifications – Applications – Computer organization – Hardware in a typical computer Identification – Booting – Booting error messages - Number system - Number system conversions

MODULE II  BASIC PROGRAMMING AND DEBUGGING  5

Software types – Types of Operating systems - Software development steps – Information technology and internet - The programming tool - Structure of a basic program - Hello world program – Debugging it – Character set – Delimiters – Keywords, identifiers – Constants – Variables — Tools and help features – Comments in a program

MODULE III  INPUT AND OUTPUT  5

Data types - Type conversions - Input/Output: Formatted functions – Unformatted functions – Library functions – Debugging the code – Systems software: Compiler – interpreter- linker – loader - Finding the correct answer given a code snippet and justifying it

MODULE IV  PROBLEM SOLVING  5

MODULE V OPERATORS AND DECISION STATEMENTS

Properties of operators – Priority of operators – Arithmetic relational logical and bitwise operators – If –if else- nested if else- goto- switch case – nested switch case – for loops – nested for loops – while loop – do-while loop – break and continue statement

MODULE VI ARRAYS AND LOOP CONTROL STATEMENTS

Arrays – Initialization – Definition – Characteristics – One dimensional array – Two dimensional arrays - Multi dimensional arrays – Predefined streams - Operation with arrays – Sorting and searching – Structures – Operations on structures

LIST OF EXPERIMENTS:

1. Computer organization –Hardware in a typical computer Identification – Booting - error messages and what it means
2. Types of Operating systems – Windows and Linux
3. Structure of a basic program - Hello world program – Debugging it
4. Data types Type conversions
5. Input/Output: Formatted functions – Unformatted functions – Library functions
6. Properties of operators – Priority of operators – Arithmetic relational logical and bitwise operators
7. If – if else- nested if else- goto- switch case – nested switch case – for loops
8. nested for loops – while loop – do-while loop – break and continue statement
9. Arrays – Operation with arrays
10.Sorting and searching

Total Hours: 60

TEXTBOOKS:

OUTCOMES:

Students who complete this course will be able to:

- Recognize the basic terminology used in computer programming.
- Apply Modular design and logic flow.
- Design programs involving decision structures, loops and functions.
- Identify and correct different types of programming errors, including data validation.
- Realize the dynamics of memory by the use of pointers.
- Build simple real time applications using the programming constructs and algorithms.
OBJECTIVE:
The aim of the course is to

- Train the students in additional areas of Engineering Mathematics, necessary for grooming them into successful engineers. The topics will serve as basic tools for specialized studies in many engineering fields, significantly in fluid mechanics, field theory and communication engineering.

MODULE I  DOUBLE INTEGRALS 7
Double integration – Cartesian and Polar coordinates – change of order of integration – area as a double integral — change of variables between Cartesian and polar coordinates.

MODULE II  TRIPLE INTEGRALS AND SPECIAL FUNCTIONS 7
Triple integration in Cartesian coordinates - change of variables between cartesian, cylindrical and spherical polar coordinates - Beta and Gamma functions.

MODULE III  VECTOR INTEGRATION 7
Line, surface and volume integrals – Green’s, Gauss Divergence and Stoke’s theorems (without proof) – verification and evaluation of integrals using them.

MODULE IV  ANALYTIC FUNCTION 8
Analytic function - Necessary and Sufficient condition (Proof not included) – Cauchy-Riemann equations in polar coordinates - properties of analytic function – determination of analytic function – conformal mapping (w = z+a, az and 1/z) and bilinear transformation.

MODULE V  COMPLEX INTEGRATION 8
Statement and application of Cauchy’s integral theorem – Cauchy’s integral formula – Taylor’s series and Laurent’s series expansion – singularities - classification – residues - Cauchy’s residue theorem – contour integration – Unit circle and semi circular contours (excluding poles on the real axis).
MODULE VI  PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange’s linear equation – Linear partial differential equations of second and higher order with constant coefficients.

Total Hours- 60

TEXT BOOKS:


REFERENCES:


OUTCOMES:

On completion of the course the students will be able to

- Solve integrals of higher orders.
- Apply vector calculus for solving engineering problems.
- Solve complex differentiation and integration problems related to engineering.
- Formulate practical problems in terms of partial differential equations, solve them and physically interpret the results.
OBJECTIVE:

- To familiarize the physical, chemical, electrical and mechanical properties of different Engineering materials.

MODULE I  CONDUCTING MATERIALS  10

Electron ballistics: charged particle, force on charged particles in an electric field, force on charged particles in Magnetic field - Parallel electric and magnetic field - Perpendicular electric and magnetic field - Classical free electron theory of metals – Derivation for electrical conductivity – Merits and drawbacks of classical theory – Quantum free electron theory of metals and its importance (qualitative) – Energy distribution of electrons in metals – Fermi distribution function – Density of energy states and carrier concentration in metals (derivation) – Fermi energy – Classification of solids into conductors, semiconductors and insulators on the basis of band theory.

MODULE II  SEMICONDUCTING MATERIALS  9

Elemental and compound semiconductors – Drift and diffusion current – Intrinsic semiconductors – Carrier concentration (derivation) – Fermi energy – Variation of Fermi energy level with temperature – Mobility and electrical conductivity – Band gap determination – Extrinsic semiconductors – Carrier concentration in n-type and p-type semiconductor (derivation) – Variation of Fermi level with temperature and impurity concentration – Variation of Electrical conductivity with temperature – Hall effect – Experiment and applications of Hall effect.

MODULE III  DIELECTRIC MATERIALS  7


MODULE IV  MAGNETIC MATERIALS  6

MODULE V  SUPERCONDUCTING MATERIALS

Superconductivity - BCS theory - Meissner effect - Critical magnetic field - Type I and Type II superconductors - High temperature superconductors - Applications of superconductors: SQUID and magnetic levitation.

MODULE VI  OPTICAL AND NEW ENGINEERING MATERIALS


Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
On completion of this course, the student will be able to

- choose the correct semi-conductors for electronic devices and display
- use dielectric materials for transformers and capacitors
• use ferromagnetic materials for solid state devices
• apply the concept of super conductivity for Engineering applications
OBJECTIVES:

- To give an overview of the fundamental of sociology.
- To expose how society developed in India, classes and impact.
- To introduce sociological aspects relating to industry.
- To provide some basic concepts on ethics and human rights.
- To stress the role of engineer to the society, environment and sustainability.

MODULE I  FUNDAMENTALS OF SOCIOLOGY 7


MODULE II  SOCIOLOGY IN INDIAN CONTEXT 7

Development – Institutions, classes – women and society – impact of social laws, social change in contemporary India – secularism and communalism – social exclusion and inclusion.

MODULE III  INDUSTRIAL SOCIOLOGY 7

Definition and perspectives – industry in India – social groups in industry, behaviour pattern – group dynamics – focus groups – team – enhancing group behaviour.

MODULE IV  INDUSTRIAL – SOCIETY INTERFACE 8


MODULE V  ETHICS AND HUMAN VALUES 8

Ethics and values – organizational values – personal worth, ethical behavior, professional ethics, whistle blowing, international ethics, corruption.
Quality of life and society – engineer in economic development, technology development – invention, innovation and diffusion – appropriate technology – engineer’s contribution, ecology and environment – sustainability – role of engineers.

Total Hours: 45

REFERENCES:


OUTCOMES:

- Students will have an exposure to the fundamentals and basic concepts of Sociology.
- Students will gain knowledge in Industrial Sociology.
- Students will have gained knowledge about the impact of technology, modernization, globalization and their contribution towards society.
OBJECTIVES:

- To impart knowledge about the basic laws of statics and dynamics and their applications in problem solving
- To acquaint with scalar and vector approaches for representing forces and moments acting on particles and rigid bodies and their equilibrium
- To give an exposure on inertial properties of surfaces and solids
- To provide an understanding on the concept of work energy principle, friction, kinematics of motion and their relationship

MODULE I  VECTOR APPROACH TO MECHANICS 7


MODULE II  EQUILIBRIUM OF PARTICLE 6

Forces in space - Equilibrium of a particle in space - Equivalent systems of forces – Principle of transmissibility – Single equivalent force

MODULE III  EQUILIBRIUM OF RIGID BODY 6

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon’s theorem - Equilibrium of Rigid bodies in two dimensions – Examples

MODULE IV  PROPERTIES OF SURFACES 8

Determination of Areas – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Angle section, Hollow section by using standard formula – second and product moments of plane area – Physical relevance - Rectangle, triangle, circle from integration - section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia.
MODULE V  LAWS OF MOTION


MODULE VI  FRICTION

Introduction to friction- types of friction- Laws of Coloumb friction- Frictional force – simple contact friction – Rolling resistance –ladder friction

Total Hours: 45

REFERENCES:


OUTCOMES:

On completion of this course student:

- Should be able to resolve forces, moments and solve problems using various principles and laws
- Should be able to understand the concept of equilibrium, kinetics and kinematics and capable of formulating the governing equations to practical problems and provide solutions for those equations
OBJECTIVES:

To impart knowledge on

- Basic concepts of electrical circuits and their solutions
- Performance of Electrical machines, speed control and their use as drives.
- Basic knowledge on power system and various methods of power generation through renewable energy sources.
- To understand the concepts of quantum theory of solids and semiconductor materials.
- To provide a basis for understanding the characteristics, operation and limitations of semiconductor devices.

MODULE I  DC AND AC CIRCUITS  9

Circuit Parameters - Sources - Kirchhoff’s laws - Solution of simple circuits.

AC quantities – Phasor representation – Power - Real, Reactive and Apparent Power – Solution of Simple circuits.

Superposition, Thevenin’s, Norton’s and Maximum power transfer theorem - Network solution by Mesh current and Node Voltage method.

MODULE II  ELECTRICAL MACHINES AND DRIVES  8


MODULE III  ELECTRIC POWER SYSTEMS  6

Structure of Power system - Transmission and Distribution schemes - Power Quality – Indian Electricity Rules and Regulations.
MODULE IV  SEMICONDUCTORS

Energy band theory – intrinsic semiconductors- extrinsic semiconductors - Calculation of location of Fermi level and free electron and hole densities in extrinsic semiconductors – N and P type semiconductors- Mobility, drift current and conductivity – Diffusion current – Continuity equation - Hall effect - Calculation of electron and hole densities.

MODULE V  PN JUNCTION AND SPECIAL DIODES


MODULE VI  TRANSISTORS AND AMPLIFIERS

Bipolar junction transistor- CB, CE, CC configuration and characteristics-Comparision- Field effect transistor-Configuration and characteristic-SCR, DIAC, TRIAC, UJT- Characteristics and simple applications-MOSFET: PMOS. NMOS- Structure and characteristics

Total Hours : 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Demonstrate the basics of Electrical circuits and their solution methods.
- Understand the working of machines and their drives.
- Explain the structure of power system and importance of power quality.
- Analyse various methods of Power generation from renewable energy sources.
- Demonstrate working of PN junction diodes and special purpose diodes.
- Explain the characteristics of Transistors both in ideal and non-ideal cases.
OBJECTIVES:

- To study about the modulation techniques.
- To understand about the modulation techniques used for digital data transmission.
- To have the knowledge about the digital communication.
- To study about the spread spectrum and multiple access techniques.

MODULE I  AMPLITUDE MODULATION

Principles of amplitude modulation – AM Waveform, spectrum and bandwidth, Modulation index and Percent modulation, Power distribution; AM modulator and Demodulators, AM transmitters – Low level, high level and Medium Level transmitters, AM receivers – TRF.

MODULE II  ANGLE MODULATION

Principles of Angle modulation – FM and PM, phase deviation and frequency deviation, Modulation Index, phase and frequency modulators and demodulators, frequency spectrum of Angle Modulated waves. Bandwidth requirements, Power distribution and average power; Phase modulators and demodulators, Frequency Modulators and demodulators, Direct FM transmitters, Indirect FM transmitters, FM receivers: FM noise suppression, frequency vs phase modulation.

MODULE III  PULSE MODULATION

Introduction, pulse modulation, Types, PCM – sampling, sampling rate, quantization, Signal to quantization ratio, PCM transmission system; Companding – Analog and digital companding – delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission – ISI, eye pattern.

MODULE IV  DIGITAL COMMUNICATION

Shannon limit for information capacity, Shift Keying techniques, ASK modulators and demodulators, FSK modulators and demodulators, BPSK Transmitter and receiver, QPSK Transmitter and receiver, DPSK.

MODULE V  DATA COMMUNICATION

Introduction, Data Communication circuits, Data Communication codes, Error Control, Serial and parallel interfaces, Data Modems and its types.
Introduction, Pseudo – Noise sequence, DS spread spectrum, FH Spread spectrum, processing gain, FH spread spectrum, multiple access techniques – TDMA and FDMA.

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES
- Apply different types of modulation schemes employed in communication system.
- Interpret the application of digital transmission.
- Compare the advantages and drawbacks of each modulation schemes.
- Analyze the relevant error detection and correction techniques for data transmission.
OBJECTIVES:

- To develop their creative thinking skills and write reviews.
- To train them with the nuances of corporate correspondence.
- To train them in writing official letters, technical reports and proposals.
- To expose them to the writing of Statement of Purpose.

MODULE I  WRITTEN COMMUNICATION  4

Introduction - process of writing – ABC of academic and professional writing – Writing an article.

MODULE II  CREATIVE WRITING  5

Writing stories based on visuals - Preparing an outline for a story - Writing critical reviews on an article / a paper.

MODULE III  CORPORATE CORRESPONDENCE  3

Tone in formal writing – e-mail writing, memo, fax, agenda and minutes writing.

Lab: viewing e-mail etiquette, format and conventions of writing memo.

MODULE IV  OFFICIAL LETTERS  6

Writing Statement of purpose, Letter of Application and Resume – Assessing one’s strengths and weaknesses – peer evaluation.

Lab: Resume writing – Viewing different types – Functional, Chronological - Writing one’s resume using wiki, Letter calling for interview and seeking promotion.

MODULE V  TECHNICAL WRITING I  6


MODULE VI  TECHNICAL WRITING II  6

Writing a technical proposal – Format – cover page, executive summary, timeline chart, budget estimate, drafting, conclusion.
REFERENCES:


OUTCOME:

- On completion of the course, the students will have the ability to write all kinds of formal correspondence like letters, reports and proposals.
OBJECTIVES:

- To understand, simulate and verify Thevenin’s and Norton’s theorem.
- To understand and verify the characteristics of various Electrical Machines.
- To understand the three phase Power Measurement in AC circuits.
- To verify practically, the fundamental characteristics of Electron Devices.

LIST OF EXPERIMENTS:

1. Verification of Thevenin’s theorem and Norton’s theorem using MATLAB.
2. Open circuit characteristics and Load Characteristics of Self Excited DC Generator.
3. Load Test on DC Shunt and DC Series Motor.
4. Load Test on Single Phase Transformer.
5. Load Test on Three Phase Induction Motor.
7. PN Junction Diode characteristics.
8. Zener Diode characteristics.
9. Input and Output characteristics of BJT in CE configuration.
10. Characteristics of JFET.
11. SCR Characteristics.

OUTCOMES:

At the end of the course, the student should be able to:

- Construct and simulate any given simple electric circuits and verify theorems using MATLAB.
- Study and understand the performance of Electrical Machines.
- Measure the three phase power.
- Experimentally understand the characteristics of diodes, BJT’s and FET’s and SCR.
OBJECTIVES:

- To study the characteristics of conducting, semiconducting, dielectric, magnetic and optical materials.

LIST OF EXPERIMENTS:

1. Determination of magnetic field along the axis of a circular coil – Stewart and Gees experiment.
2. Determination of electrical conductivity of a given metal by four point probe method.
3. Determination of Hall coefficient of a given semiconductor material.
5. Determination of dielectric loss of a dielectric material using LCR bridge method.
6. Determination of time constant of an RC circuit by charging and discharging of a capacitor.
7. Determination of magnetic susceptibility of a paramagnetic material using Quincke’s method.
10. Determination of Kerr constant using electro optic modulators.

OUTCOMES:

At the end of the course, the student will be able to

- Know the properties of conducting, semiconducting, dielectric and magnetic materials.
- Know the principle and working of Kerr modulator and Faraday rotator.
OBJECTIVES:
The course aims to

- Develop the skills of the students in the areas of boundary value problems and transform techniques.
- Acquire knowledge on different transforms like Laplace Transform, Fourier Transform and Z Transform.

MODULE I LAPLACE TRANSFORM 8

Laplace transform - Sufficient condition - Transforms of elementary functions - Properties - Transforms of Derivatives and Integrals - Initial and Final Value Theorem - Transform of Periodic functions - Inverse transforms - Convolution Theorem.

MODULE II FOURIER SERIES 7

Dirichlet's conditions - General Fourier series - Odd and even functions - Half-range sine series - Half-range cosine series - Complex form of Fourier Series - Parseval's identity - Harmonic Analysis.

MODULE III BOUNDARY VALUE PROBLEMS 8

Classification of second order quasi linear partial differential equations - Solutions of one dimensional wave equation - One dimensional heat equation - Steady state solution of two-dimensional heat equation (Insulated edges excluded) - Fourier series solutions in Cartesian coordinates.

MODULE IV FOURIER TRANSFORM 7

Fourier integral theorem (without proof) - Fourier transform pair - Sine and Cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

MODULE V Z-TRANSFORM AND DIFFERENCE EQUATIONS 7

Z-transform - Properties - Inverse Z-transform - Convolution theorem - Formation of difference equations.
MODULE VI APPLICATIONS OF TRANSFORMS

Applications of Laplace Transform in solving linear ordinary differential equations
- Second order with constant coefficients, Simultaneous First order equations
- Applications of Z-transform in solving difference equations using Z-transform.

Total Hours - 60

TEXT BOOKS:


REFERENCES:


OUTCOMES:

At the end of the course, the students will be able to

- Solve engineering problems in the area of heat conduction, communication systems, electro-optics and electromagnetic theory using different transforms.
- Solve boundary value problems encountered in engineering practices.
OBJECTIVES:

- To familiarize with Indian Constitution and Governance of our country.
- To apprise on human rights, local and International and redressal mechanism.
- To provide important aspect of corporate laws.
- To give an introduction of important industrial and labour laws of our country.
- To provide an exposure on laws on contracting and arbitration.
- To give an overview on intellectual property related laws.

MODULE I  INDIAN CONSTITUTION  7


MODULE II GOVERNANCE AND POWERS VESTED  7

Union executive, Legislature - Union - State and union territories, Union and state relations, powers vested with parliament and state legislature, emergency provisions - People's Representations Act - Election Commission - Election for parliament and state legislature, Judiciary.

MODULE III HUMAN RIGHTS  7

Human rights - meaning and significance, International law on human rights, Covenant on civil and political rights; Covenant on Economic, social and cultural rights - protocol, UN mechanism and agencies, watch on human rights and enforcement - Role of judiciary and commission, Right to information Act 2005 - Evolution - Concept - Practice.

MODULE IV CORPORATE AND LABOUR LAWS  7

MODULE V  CONTRACTS AND ARBITRATION


MODULE VI  LAWS RELATED TO IPR


Total Hours: 45

REFERENCES:

OUTCOMES:
Students will be

- Familiar with Indian Constitution and Governance of our country, local and International redressal mechanism.
- Familiar with intellectual property related laws.
- Able to apply corporate laws, important industrial and labour laws of our country.
- Able to take up managerial, professional, ethical, social and economic responsibilities.
OBJECTIVES:

- To give the foundation for Object oriented analysis and design of algorithms.
- To convert the object oriented algorithms into programs using Object oriented languages
- To expose to the basics of networking and to write simple networking routines
- To have a study on technologies supporting distributed environment
- To be able to analyze real time scenarios and design object oriented applications
- To give awareness about enterprise applications

MODULE I  PRINCIPLES OF OBJECT ORIENTED PROGRAMMING  7

Object oriented programming paradigm - Basic concepts of object oriented programming - Benefits of OOP - Object-oriented languages - Applications of OOP - Structure of a C++ program- Operator and control structures- Functions.

MODULE I  INTRODUCTION TO JAVA  7


MODULE III  NETWORK PROGRAMMING IN JAVA  8

Sockets - Secure sockets - Custom sockets - UDP datagrams - Multicast sockets -URL classes - Reading Data from the server - Writing data - Configuring the connection-Reading the header- Java Messaging services.

MODULE IV  APPLICATIONS IN DISTRIBUTED ENVIRONMENT  8


MODULE V  MULTI-TIER APPLICATION DEVELOPMENT  8

Server side programming - Servlets - Java Server Pages - Applet to Applet communication - applet to Servlet communication - JDBC - Applications on databases.
Server Side Component Architecture - Introduction to J2EE - Session Beans - Entity Beans - Persistent Entity Beans.

Total Hours: 45

TEXT BOOKS:


REFERENCE:


OUTCOMES:

Students who complete this course will be able to

- Comprehend the object oriented programming design principles
- Write and test object oriented programs for simple applications
- Handle exceptions and implement interfaces using object oriented languages
- Design and implement simple networking solutions
- Make use technologies for developing applications in distributed environment
- Simulate simple enterprise applications
OBJECTIVES:
- To expose the basic concepts of data structures.
- Illustrate the various abstract data types and their applications.
- To express the given data in the form of trees.
- To expose the different types of searching algorithms.
- To introduce the different sorting algorithms.
- To have an overview of the fundamentals of graphs.

MODULE I  INTRODUCTION TO DATA STRUCTURES  7
Data and Information - Data Structure Types - Concept of Data Types - Abstract Data Types - Pointers - Structures - Unions - Arrays - Multidimensional Arrays.

MODULE II  LISTS, STACKS AND QUEUES  7

MODULE III  TREES  8
Basic Terms - Binary Trees - Complete Binary Tree - Search Tree ADT - Binary Search Tree - AVL Trees - Expression Trees - Tree Traversals - B Tree - Threaded Binary Tree.

MODULE IV  SEARCHING AND HASHING  8

MODULE V  SORTING  7
MODULE VI  GRAPHS

Graph fundamentals - Terminologies of Graphs - Graph Representation - Graph Traversals - Topological Sort - Shortest Path Algorithm - Dijkstra's Algorithm - Spanning Trees - Prim's Algorithm - Kruskal's Algorithm - Depth First Search - Breadth First Search - Undirected Graphs - Biconnectivity.

Total Hours: 45

TEXT BOOKS:

REFERENCE:

OUTCOMES:
Students who complete this course will be able to:

- Analyze a given problem and recommend suitable data structure.
- Apply the various searching algorithms for the given data.
- Apply and compare the different sorting algorithms for the given data.
- Represent data of given scenario in trees structures and graph structure.
- Write suitable shortest path algorithm for the given case study.
- Identify and address the challenges of graph, sorting and searching algorithms in real time scenario.
OBJECTIVES:

- To expose Boolean algebra, Boolean functions and realization of functions with basic gates.
- To design combinational and sequential circuits.
- To implement the K-map method for logical operation.
- Use the concepts of state and state transition for analysis and design of sequential circuits.
- Use the functionality of flip-flops for analysis and design of sequential circuits.
- To learn programming in HDL for designing larger systems.

MODULE I  BOOLEAN ALGEBRA AND LOGIC GATES 7

Review of Binary Number Systems - Binary Arithmetic - Binary Codes - Boolean Algebra and Theorems - Boolean Functions - Canonical and standard forms.

MODULE II  GATE-LEVEL MINIMIZATION 8

Logic operations-Digital Logic Gates-The K-Map method-Two variable-Three variable-Four Variable -Product of sums simplification - Don't care conditions-NAND and NOR implementation - Other two-level implementations - Exclusive-OR function-Introduction to HDL.

MODULE III  COMBINATIONAL LOGIC 8


MODULE IV  SYNCHRONOUS SEQUENTIAL LOGIC 8

Introduction-Sequential Circuits - Latches and Flip Flops - Analysis of clocked sequential circuits- Synthesizable HDL models of sequential circuits - State Reduction and State Assignment - Design procedure.
MODULE V  REGISTERS, COUNTERS, MEMORIES  

Registers-Shift Registers -Ripple Counters - Synchronous Counters-Other Counters- HDL for Registers and Counters-Memory and Programmable Logic.

MODULE VI  DESIGN AT THE REGISTER TRANSFER LEVEL  

Introduction-Register Transfer Level Notation-Register transfer level in HDL-ASMs- Sequential Binary multiplier-Control Logic-HDL description of Binary Multiplier-Design with Multiplexers.

Total Hours - 60

TEXT BOOK:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- A student who successfully fulfills the course requirements will have demonstrated:
- Define different number systems, binary addition and subtraction, 2’s complement representation and operations with this representation.
- Apply the different switching algebra theorems and apply them for logic functions.
- Demonstrate the use of Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
- Define the following combinational circuits: buses, encoders/decoders, (de)multiplexers, exclusive-ORs, comparators, arithmetic-logic units; and to be able to build simple applications.
- derive the state-machine analysis or synthesis and to perform simple projects with a few flip-flops.
- Apply the Hardware Design language to design digital circuits.
OBJECTIVES:

- To explain the basic structure, operation of a digital computer and instruction sets.
- To illustrate the basic principles of arithmetic and logic unit.
- To describe the concept of pipelining and data transfer.
- To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchical memory system including cache memories and virtual memory.

MODULE I  BASIC STRUCTURE OF COMPUTERS  7

Functional units - Basic operational concepts - Bus structures - Software performance - Memory locations and addresses - Memory operations - Instruction and instruction sequencing - Addressing modes - Assembly language - Basic I/O operations - Stacks and queues.

MODULE II  ARITHMETIC UNIT  9

Addition and subtraction of signed numbers - Design of fast adders - Multiplication of positive numbers - Signed operand multiplication and fast multiplication - Integer division - Floating point numbers and operations.

MODULE III  BASIC PROCESSING UNIT  7

Fundamental concepts - Execution of a complete instruction - Multiple bus organization - Hardwired control - Micro programmed control.

MODULE IV  PIPELINING  8
Pipelining - Basic concepts - Data hazards - Instruction hazards - Influence on Instruction sets - Data path and control consideration - Superscalar operation.

**MODULE V MEMORY SYSTEM**

Basic concepts - Semiconductor RAMs - ROMs - Speed - size and cost - Cache memories - Performance consideration - Virtual memory- Memory Management requirements - Secondary storage.

**MODULE VI I/O ORGANIZATION**


Total Hours: 45

**TEXT BOOK:**


**REFERENCES:**


**OUTCOMES:**

Students who complete this course will be able to:

- Write assembly language program using various addressing modes.
- Describe the organization of the control unit, Arithmetic and Logical unit, Memory unit and I/O unit.
- Appraise the advantages and disadvantages of the various memory systems.
- Demonstrate the working of central processing unit and RISC and CISC Architecture
- Describe the operations and language f the register transfer, micro operations and input- output organization
- Implement the organization of memory and memory management hardware
OBJECTIVES:

- To help the students acquire efficiency in Spoken English with due importance to Stress, Accent and Pronunciation.
- To hone the listening skills and understand native accent.
- To enable them to make presentations effectively.
- To develop their ability to persuade and convince people to accept a point of view.
- To prepare them for Placement Interviews, Group discussions etc.

MODULE I

i. Oral Communication - Implications in real life and work place situations.
ii. One-minute Presentations (JAM) on concrete and abstract topics that test their creative thinking.
iii. Prepared presentations and extempore presentations.
iv. Group project - presentation on any social issue. The group will have to research on the history of the problem, its cause, impact and outcome hoped for and then make a presentation.
v. Recording presentations and feedback - Peer and faculty evaluation.

MODULE II

Listening to ESL Podcast - Viewing Multimedia - Listening to BBC News - Received Pronunciation (RP)/ VOA/ NDTV - exposure to paralinguistic features.

MODULE III

Developing persuasive skills - Selling a product - Marketing skills - The topics will be on advertising, convincing someone on social issues such as preservation of water, fuel, protection of environment, gender discrimination.
MODULE IV

Debates on pros and cons on topics of relevance like Nuclear Energy, Appropriate Technology, Internet, Social Media. This will be followed by Peer and Faculty feedback.

MODULE V

6

Brainstorming - Think, pair and share activity - Discussion etiquette - Assigning different roles in a GD (Note-taker, Manager, Leader and Reporter) Peer and faculty feedback.

MODULE VI

6

Interview Skills - Assessing one's strengths and weaknesses, SWOC Analysis, Mock interview - Verbal and Non-verbal Communication - Types of Job Interview - Telephone Interview, Stress Interview.

Total Hours: 30

REFERENCES:


OUTCOME:

On completion of the course, the students will have the ability to speak confidently and effectively in Presentations and Group Discussions.
OBJECTIVES:
- To implement the basic concepts of object oriented programming using java.
- Have the ability to write a computer program to solve specified problems.
- Be able to use the Java SDK environment to create, debug and run simple Java programs.
- Be aware of the important topics and principles of software development
- To understand fundamentals of object-oriented programming in classes, invoking methods and functions.
- Learn to create packages, interfaces and threads using java and oops concepts.

LIST OF EXPERIMENTS:
1. Simple java program with Control statements.
2. Getting input from user console.
3. Classes, Object and Constructors.
5. Inheritance.
6. Final variable, method and class.
7. Creating packages.
8. User-defined interfaces.
9. Pre-defined interfaces.
10. Simple and Multiple threads.
11. Exception handling in java.
13. File handling.

Total Hours: 45
OUTCOMES:

Students who complete this course will be able to:

- Differentiate the object-oriented approach from procedural approach in Programming.
- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
- Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
- Demonstrate the use of various OOPs concepts with the help of programs.
- Design and analyze a computer program to solve real world problems based on the object-oriented principles.
- Develop simple GUI interfaces for a computer program to interact with users.
OBJECTIVES:

- To illustrate basic ADTs such as arrays and linked lists.
- To design operations on stacks, queues, trees and graphs.
- To implement the operations on stack, queues, trees and graphs for the given data set.
- To develop algorithms for linear and binary searching.
- Identify and implement the suitable sorting algorithm for the given data.
- To represent the data in the form of graph and design the traversal algorithm for the given scenario.

LIST OF EXPERIMENTS:

1. Study of List ADT: - Simple exercises, implementation of Stacks, Queues, Circular Queues.
2. Study of Singly Linked List: - Operations on Singly Linked List, implementation of Stacks, Queues.
4. Applications of Linked Lists such as Polynomial addition.
5. Applications of Stacks and Queues such as infix to postfix expression conversion and evaluation.
6. Binary tree implementation - Applications such as expression tree traversal (inorder, preorder & postorder).
7. Binary search tree - insertion traversal and deletion operations.
8. Implementation of search algorithms - linear search and Binary Search.
10. Representation of graph and traversal algorithm.

Total Hours: 45
OUTCOMES:

Students who complete this course will be able to:

- Design appropriate data structures to solve a given problem.
- Implement operations on arrays, linked lists, stacks and queues.
- Compare linear and binary search for a given data.
- Suggest and implement a suitable sorting algorithm for the given data.
- Design the graph for the given data and suggest a shortest path for the given scenario.
- Apply data structure to solve real time problems.
OBJECTIVES:

To learn different types of digital logic gates and truth table.

• To expose the design and implementation of circuit diagrams.
• To test the combinational, sequential, synchronous and asynchronous circuits using the concerned IC chips.
• Evaluate and simplify logical functions using Boolean algebra
• Analyze and design combinatorial circuits.
• Analyze and design modular combinatorial logic circuits containing decoders, multiplexers, demultiplexers

LIST OF EXPERIMENTS:

1. Verify the truth table of AND, OR, NOT, EX-OR, gate.
2. Verification of NAND, OR, EX-OR, NOR using 7400 IC.
3. Design a hardware circuit to perform the operation of half &full adder.
4. Design a hardware circuit to perform the operation of full subtractor.
5. Verify the truth table of RS, D, T, JK Flip Flop.
6. Study asynchronous counter in up & down mode.
7. To study multiplexer and demultiplexer.
8. To study decade counter.

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

• Examine the operation of the logic gates.
• Design simple combinational/sequential circuits.
• Apply simple synchronous/asynchronous circuits in real life problems
• Implement functions with NAND-NAND and NOR-NOR logic
• Simplify combinatorial circuits using Karnaugh maps.
• Represent logical functions in Canonical form and with AND, OR, NOT, XOR, NAND, NOR logic gates

SEMESTER IV
OBJECTIVES:
The aim of this course is to

- Expose students to techniques of combinatorics and group theory.
- Familiarize students with graph theory.

MODULE I  PROPOSITIONAL CALCULUS  8

MODULE II  PREDICATE CALCULUS  8

MODULE III  GRAPHS  7
Graphs and graph models - Graph terminology and special types of graphs - Presenting graphs and graph isomorphism - Connectivity - Euler and Hamilton paths.

MODULE IV  GROUPS  7
Algebraic systems - Semi groups and monoids - Groups - Subgroups and homomorphisms - Cosets and Lagrange's theorem.

MODULE V  RINGS AND FIELDS  7
Rings - Some special classes of rings - Subrings - Field and subfields - Ideals - Quotient Rings - Homomorphism.

MODULE VI  LATTICES AND BOOLEAN ALGEBRA  8
Partial ordering - Posets - Lattices as Posets - Properties of lattices - Lattices as algebraic systems - Sub-lattices - Direct product and homomorphism - Special lattices - Boolean algebra.
TEXT BOOKS:


REFERENCES:


OUTCOMES:

At the end of the course, students will be able to

- Test the logic of a program and identify patterns on many levels.
- Solve problems in engineering using graph and group theory.
OBJECTIVES:

- Understand the role of a database management system in an organization.
- Understand basic database concepts, including the structure and operation of the relational data model.
- Construct simple and moderately advanced database queries using Structured Query Language (SQL).
- Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- Design and implement a small database project using Microsoft Access.
- Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, Backup and recovery, and data object locking and protocols.

MODULE I  INTRODUCTION

Introduction - An example - Characteristics of Database approach - Actors on the screen; Workers behind the scene - Advantages of using DBMS approach - A brief history of database applications, when not to use a DBMS - Data models, schemas and instances - Three-schema architecture and data independence - Database languages and interfaces - The database system environment - Centralized and client-server architectures - Classification of Database Management systems.

MODULE II  RELATIONAL MODEL AND RELATIONAL ALGEBRA

Relational Model Concepts; Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions and dealing with constraint violations - SQL Data Definition and Data Types - Specifying basic constraints in SQL - Basic Retrieval queries in SQL - Insert, Delete and Update statements in SQL - Additional features of SQL - More Complex SQL Retrieval Queries: Specifying constraints as Assertion and Trigger - Views (Virtual Tables) in SQL - Schema change statements in SQL. Unary Relational Operations: SELECT and PROJECT - Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION - Additional Relational Operations - Examples of Queries in Relational Algebra - The Tuple Relational Calculus - The Domain Relational Calculus.
MODULE III ENTITY-RELATIONSHIP MODEL

Using High-Level Conceptual Data Models for Database Design - An Example

Database Application - Entity Types, Entity Sets, Attributes and Keys - Relationship types, Relationship Sets, Roles and Structural Constraints - Weak Entity Types - Refining the ER Design - ER Diagrams, Naming Conventions and Design Issues - Relationship types of degree higher than two.

MODULE IV DATABASE DESIGN

Informal Design Guidelines for Relation Schemas - Functional Dependencies - Normal Forms Based on Primary Keys - General Definitions of Second and Third Normal Forms - Boyce-Codd Normal Form.

MODULE V RELATIONAL DATABASE

Properties of Relational Decompositions - Algorithms for Relational Database Schema Design - Multi-valued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form - Inclusion Dependencies - Other Dependencies and Normal Forms.

MODULE VI TRANSACTION MANAGEMENT

The ACID Properties - Transactions and Schedules - Concurrent Execution of Transactions - Lock-Based Concurrency Control - Performance of locking - Transaction support in SQL - Introduction to crash recovery- 2PL, Serializability and Recoverability - Lock Management - Introduction to ARIES - The log - Other recovery-related structures - The write-ahead log protocol - Checkpointing - Recovering from a System Crash - Media Recovery - Other approaches and interaction with concurrency control.

Total Hours: 45

TEXT BOOKS:


REFERENCES:

OUTCOMES:

Students who complete this course will be able to:

- Differentiate database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit.

- Define the terminology, features, classifications, and characteristics embodied in database systems.

- Demonstrate an understanding of the relational data model.

- Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.

- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.

- Use an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database.
OBJECTIVES:

- To know the objectives, functions and architecture of operating systems.
- To understand process management concepts.
- To study the functions of process concurrency and synchronization.
- To provide a knowledge about how the memory management is done with the help of operating systems.
- To learn the techniques for managing the I/O devices and files.
- To illustrate the design and architecture of Linux operating system.

MODULE I  OVERVIEW OF OPERATING SYSTEMS  6


MODULE II  PROCESS MANAGEMENT & SCHEDULING  6


MODULE III  PROCESS SYNCHRONIZATION  6


MODULE IV  MEMORY MANAGEMENT  7

Introduction - Partitions - Paging - Segmentation - Segmentation and paging - Need for virtual memory management - Demand Paging - Page fault and page replacement policies.

MODULE V  I/O MANAGEMENT AND DISK SCHEDULING  10

Module VI Linux Operating System and Architecture:

Introduction to LINUX System, Kernel-Architecture System Concepts-Data Structures, System Call Interface, Processes and Signal, POSIX thread concepts, IPC Mechanism (Pipes, FIFOs, Semaphore, Shared Memory, Message Queues and Sockets) -Memory Management, Interrupt Handling, Timers

Total Hours: 45

Text Book:


References:


Outcomes:

Students who complete this course will be able to:

- State the functioning of operating systems.
- Compare the performance of various process scheduling algorithms.
- Analyze the implementation of processes and problems related to process synchronization.
- Find how to manage the resources like memory, I/O devices and files.
- Compare the functioning of various operating systems.
- Appraise the functioning of the Linux Operating system.
OBJECTIVES:

- To expose students to hardware details of 8-bit and 16-bit microprocessors.
- To provide in depth knowledge about assembly language programming.
- To have a look on programming interface cards.
- To programming with interfacing of microprocessors and microcontrollers.
- To describe 8051 architecture and its programming.
- To outline the simulators/emulator used for implementing real time applications.

MODULE I  8086 ARCHITECTURE

Introduction to 8085 microprocessor- 8086 architecture-Functional diagram - Register organization, Memory segmentation - Programming model- Memory addresses- Physical memory organization- Signal description of 8086-Common function signals- Interrupts of 8086.

MODULE II  INSTRUCTION SET AND ASSEMBLY LANGUAGE


MODULE III  I/O INTERFACE

8255 PPI various mode of operation and interfacing to 8086-Interfacing keyboard-Display-Stepper motor interfacing-D/A and A/D converter.Memory interfacing to 8086-Vector interrupt table-Interrupt service routine.

MODULE IV  COMMUNICATION INTERFACE

Introduction to DOS and BIOS interrupts grated Services Architecture -Serial communication standards-Serial data transfer schemes-8251 USART Architecture and interface.
MODULE V  INTRODUCTION TO MICROCONTROLLER

Overview of 8051 micro controller-Architecture-I/O ports-memory organization-Addressing modes and instruction set of 8051-Simple program- Programming 8051 timers and counters.

MODULE VI  THE AVR RISC MICROCONTROLLER ARCHITECTURE  

Introduction-AVR Family architecture-Register file-The ALU-Memory access and instruction execution-I/O Memory-EEPROM-I/O Ports-Timers-UART-Interrupt structure.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Have in depth knowledge on instruction sets of 8086 and 8051.
- Develop assembly language programs in 8085 and 8086.
- Describe various programming interface devices used for programming.
- Design interfaces for peripheral devices and interfacing to 8085/8086.
- Design and simulate real time applications using simulators and emulators.
- Develop applications using microcontrollers.
OBJECTIVES:

- To summarize the principles and components of programming language design.
- Expound on the compilation process of the language.
- To identify the syntax and semantics for a language.
- To learn the various paradigms of programming languages.
- To expound on the basic data and control structures in programming languages.
- Exemplify the features of a programming language and identify its suitability for the given task.

MODULE I  INTRODUCTION

6


MODULE II  SYNTAX AND SEMANTICS

8

Programming Language Implementation - Compilation and Virtual Machines, programming environment-Formal methods of describing syntax - BNF, EBNF for common programming languages features-Parse trees-Ambiguous grammars-Attribute grammars-Denotational semantics and axiomatic semantics.

MODULE III  DATA TYPES, EXPRESSIONS AND STATEMENTS

9

Primitive, character, user defined, array, associative, record, union, pointer and reference types - Names - Variable-concept of binding- Type checking-Type compatibility- Named constants, Variable initialization- Arithmetic, relational and Boolean expressions-Short circuit evaluation Mixed mode assignment-Assignment Statements-Control Structures - Statement Level, Compound Statements-Selection-Iteration-Unconditional Statements- Guarded command.

MODULE IV  SUBPROGRAMS AND BLOCKS

8

Fundamentals of sub-programs-Scope and lifetime of variable - Static and Dynamic scope- Design issues of subprograms and operations-Local referencing environments-Parameter passing methods-Overloaded sub-programs-Generic sub-programs-Design issues for functions- user defined overloaded operators- Co routines.

MODULE V  ABSTRACT DATA TYPES

7

MODULE VI FUNCTIONAL PROGRAMMING LANGUAGES


Total Hours: 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Distinguish programming language features based on their static and dynamic semantics.
- Master using the appropriate data structure for the given scenario
- Use the correct control structure for the given problem and trace its execution Path
- Trace the lifetime of a given variable and debug it
- Compare and contrast the objected oriented and functional programming paradigms.
- Solve problems using a range of programming paradigms and assess the Effectiveness of each paradigm for a particular problem.
OBJECTIVES:

- The aim of the course is to introduce basic biological concepts to the engineering students to promote cross-breeding of ideas.
- To provide an overview of cell structure and function.
- To give basic idea on biochemistry related to biological aspects.
- To introduce genes, their structure, inheritance and about living organisms.
- To give an understanding on metabolism, respiration, etc.
- To inform students of engineering about the interface of biology and engineering.

MODULE I BASIC OF CELL STRUCTURE AND FUNCTION

Cells as unit of life - Basic chemistry of cell - Physical and chemical principles involved in maintenance of life processes, cell structure and functions - Prokaryotic and Eukaryotic cells, cell wall, plasma membrane, endoplasmic reticulum, nucleus, chromosomes- Cell division - Mitosis, meiosis - Molecules controlling cell cycle.

MODULE II BIOCHEMISTRY

Biomolecules - Introduction - Basic principles of organic chemistry, types of functional groups, chemical nature, pH and biological buffers - Carbohydrates-mono, di, oligo and polysaccharides, lipids- Phospholipids, glycolipids, sphingolipids, cholesterol, steroids, prostaglandins - Aminoacids, peptides, proteins - Structures- Primary, secondary, tertiary and quaternary, glycoproteins, lipoproteins - Nucleic acids - Purines, pyrimidines, nucleoside, nucleotide, RNA, DNA.

MODULE III GENETICS


MODULE IV MICROBIOLOGY

Microbiology - Basis of microbial existence - Microbial diversity - Classification and nomenclature of micro-organisms- Impact of microorganisms on industry, agriculture and
health, industrial microbiology - Primary and secondary screening of micro-organisms, fermentation processes, bioreactors, microbial ecology - Microbial bio-remediation - Epidemiology and public health.

**MODULE V  METABOLISM**  
7

Metabolic processes - Bio-membranes, diffusion, absorption, osmo-regulation, photosynthesis, respiration, dialysis, nutrition, digestion and excretion.

**MODULE VI  BIOLOGY AND ENGINEERS**  
8

Application of biology in engineering - Living things as the solutions (bionics) - Living things as models (biometrics) - Bio-technology - Biomedical engineering - Effect of human action on living things - Right balance - Bioinformatics - Bionanotechnology - Sensors, biosensors, biochips - Ethics in biology.

**Total Hours: 45**

**REFERENCES:**


**OUTCOMES:**

Students who complete this course will be able to:

- Understand the engineering of life processes.
- Capable of pursuing tissue engineering, biomedical engineering and biotechnology at master level programme.
- Apply the knowledge of biology for engineering applications.
OBJECTIVE:

- To enable the students to develop communication skills for verbal communication in the work place.

Topics Outline:

This course is practical oriented one and exercises will be given to the students group users /individually depending upon the aspect considered. The following aspect will form the broad outline content of the syllabi. The exercises will be designed by the faculty member and coordinated by the overall course coordinator.

Lab Activities:

- Introduction: Soft skills definition, examples
- Verbal communication: Case study, communication and discussion
- Prepared speech
- Impromptu speech
- Debate: Case studies - Attitude and Behavior: role play and exploration
- Ability to ask for help - communication and team work
- Manners and etiquette
- Organization and Planning
- Time keeping
- Conduct in workplace
- Conscientiousness
- Work output
- Professionalism
- Motivation
- Ownership of tasks
- Adaptability/flexibility

...
Assessment:

The assessment will be continuous and portfolio based. The students must produce the record of the work done through the course of the semester in the individual classes. The portfolio may consist of a) the individual task outline and activities, b) worked out activities c) Pre-designed sheets which may be provided by the Faculty member. The portfolio will be used by the Faculty member for assessment. The course coordinator in consultation with the course committee shall decide at the beginning of the semester, the number of exercises, method of assessment of each and the weightage for the end semester assessment.

OUTCOMES:

The students should be able to:

- Develop verbal communication skills.
- Debate with other students confidently.
- Communicate effectively their ideas.

Total Hours: 30
OBJECTIVES:

✓ To develop conceptual understanding of database management system

✓ To understand how a real world problem can be mapped to schemas

✓ Able to create database with different types of integrity constraints and use the SQL commands such as DDL, DML, DCL, TCL to access data from database objects.

✓ Able to access and manipulate data using PL/SQL blocks.

✓ To develop understanding of different applications and constructs of SQL PL/SQL

- Able to connect database to front end using JDBC and ODBC driver.

SQL:

1. Creating, altering and dropping tables with integrity constraints.
2. Retrieving and modifying data from a database.
3. Retrieving data from database using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING clause.
4. Use of scalar and aggregate functions.
5. Retrieving data from a database using Equi, Non Equi, Outer and Self Join.
6. Using sub queries, row id and row num for retrieving data.
7. Use of views, indexes and sequences.

PL/SQL:

1. Introduction to PL/SQL, using output from server.
2. Use of implicit & explicit cursors in data handling.
3. Exception handling - Oracle defined and User defined.
4. Use of stored procedures & functions in data manipulation.
5. Use of trigger in data manipulation.

Total Hours: 45
OUTCOMES:

Students who complete this course will be able to:

- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using VB
OBJECTIVES:

- To give basic knowledge about Unix environment
- To train in writing simple system call routines
- To simulate various unix commands and study their functionalities
- To expose to various job scheduling algorithms
- To educate upon Inter Process Communication
- To distinguish between different memory management techniques

LIST OF EXPERIMENTS

1. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
2. Write programs using the I/O system calls of UNIX operating system (open, read, write)
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
5. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
6. Developing Application using Inter Process Communication
7. Implement the Producer - Consumer problem using semaphores (using
UNIX system calls).

8. Implement memory management schemes
9. Implement any file allocation technique (Linked, Indexed or Contiguous)

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:
- Distinguish amongst various operating systems
- Execute system call routines and enumerate their purpose
- Analyze a real world problem and propose suitable scheduling algorithm
- Demonstrate Inter Process Communication in Unix environment
- Recommend suitable memory management technique for a given scenario
- Suggest a solution for synchronization problems
OBJECTIVES:

- To develop an in-depth understanding of the architecture and operation of Microprocessors and Microcontrollers.
- To provide adequate knowledge on assembly language programming for different processors (8085, 8086, 8051).
- To expose the students to hardware details of various programming interfacing devices.
- To develop programs using various operation modes of interfacing devices with processors.
- To simulate the real time application programs using simulators and emulators.
- To implement simple control applications using 8051 microcontroller.

LIST OF EXPERIMENTS

1. Programming with 8085-8-bit/16-bit multiplication/division using repeated addition/subtraction.
2. Programming with 8085-code conversion, decimal arithmetic, bit manipulations.
3. Programming with 8085-matrix multiplication, floating point operations.
4. Programming with 8086-string manipulation, search, find and replace, copy operations, sorting.
5. Using BIOS/DOS calls: keyboard control, display, file manipulation(PC Required).
6. Using BIOS/DOS calls: Disk operations(PC Required).
7. Interfacing with 8085/8086-8255, 8253.
8. Interfacing with 8085/8086-8279, 8251.
9. 8051 Microcontroller based experiments-Simple assembly language programs.
10. 8051 Microcontroller based experiments-Simple control applications.

Total Hours: 45
OUTCOMES:
Students who complete this course will be able to:
- Develop simple programs in arithmetic, input output operations.
- Implement the interfacing of the hardware with peripheral devices/systems.
- Design programs on various programming interface devices with processor.
- Work on with simulators and emulators to implement real time application.
- Develop real time applications using 8051 microcontroller
- Design microprocessor based system for any real time problem
OBJECTIVES:

Demonstrate how an algorithm has been applied in a number of different domains.

- Expound on the good principles of algorithm design
- Illustrate on methods to analyze algorithms and estimate their worst-case and average-case behavior;
- Exemplify knowledge of fundamental data structures and expound on the manner in which these data structures can best be implemented;
- Demonstrate capability to describe formal concepts of measures of complexity and algorithms analysis.
- Demonstrate application of theoretical knowledge of algorithms and data structure in practice

MODULE I  BASIS OF ALGORITHM ANALYSIS  7


MODULE II  GRAPHS  7

Basic Definitions and Applications - Graph Connectivity and Graph Traversal - Implementing Graph Traversal using Queues and Stacks - Testing Bipartiteness: An Application of Breadth-First Search Connectivity in Directed Graphs - Directed Acyclic Graphs and Topological Ordering.

MODULE III  GREEDY ALGORITHMS  8

Implementing Kruskal's Algorithm: The Union-Find Data Structure - Clustering - Huffman Codes and the Problem of Data Compression.

**MODULE IV  DIVIDE AND CONQUER**


**MODULE V  DYNAMIC PROGRAMMING**


**MODULE VI  NP AND COMPUTATIONAL COMPLEXITY**


**TEXT BOOK:**


**REFERENCE:**


**OUTCOMES:**

Students who complete this course will be able to:

- Analyze algorithms and estimate their complexity.
- Describe, apply and analyze the complexity of divide and conquer, greedy, and dynamic programming algorithms.
- Differentiate divide and conquer problems from recursive methods
- Identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate algorithmic design technique for their solution.
Describe the classes P, NP, and NP-Complete and be able to prove that a certain problems are NP-Complete.

Assess the computational complexity for NP hard and NP complete problems

Show how algorithms and data structures are applied in problems in computer science engineering.
OBJECTIVES:

- To introduce the basic concepts of software engineering and software life cycle models.
- To provide an insight into the concepts of modeling and notations of the different UML diagrams.
- To expose the techniques for requirement gathering design and specification.
- To emphasize the importance of testing.
- To state the basic strategy behind planning a project and tracking its progress.
- To learn about the software configuration management

MODULE I  INTRODUCTION TO SOFTWARE ENGINEERING  7

Software engineering concepts- Software engineering development activities-Software life cycle models- Standards for developing life cycle models-Modeling with UML.

MODULE II  REQUIREMENT ELICITATION  7

Introduction- Overview of requirements elicitation- Requirement elicitation concepts- Requirement elicitation activities - Managing requirement elicitation.

MODULE III  ANALYSIS AND SYSTEM DESIGN  8

Overview of Analysis- Analysis concepts- Analysis activities- Managing analysis, System design concepts - System design activities - Managing system design.

MODULE IV  OBJECT DESIGN AND SPECIFYING INTERFACE  9

Overview of object design- Reuse concepts- Reuse activities-Managing reuse-Overview of interface specification- Interface specification concepts- Interface specification activities- Managing object design.
MODULE V  IMPLEMENTATION AND TESTING


MODULE VI  SOFTWARE CONFIGURATION MANAGEMENT

Managing and controlling Changes- Managing and controlling versions- Types of maintenance- Maintenance log and defect reports- Reverse and re-engineering.

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Compare the different life cycle models and select appropriate one for a real time project.
- Illustrate the different UML diagram using various tools.
- Identify the different roles, responsibilities and artifacts produced during the different phases of software development process.
- Analyze the testing, risk and change management strategies.
- Demonstrate the ability to communicate effectively in writing.
- Analyze programming language concepts, particularly object-oriented concepts.
OBJECTIVES:

- To grasp the principles of data communication.
- To introduce the layering concepts in computer networks
- To introduce the functions of each layer
- To give the students experience working in programming teams
- To have knowledge in different applications that use computer networks
- To expose students to emerging technologies and their potential impact.

MODULE I  INTRODUCTION TO COMPUTER NETWORKS  8


MODULE II  LINK LAYER  7


MODULE III  NETWORK LAYER  8


MODULE IV  TRANSPORT LAYER  8

MODULE V  APPLICATION LAYER


MODULE VI  MULTIMEDIA NETWORKING


Total Hours: 45

TEXT BOOK:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Master the terminology and concepts of the OSI reference model and the TCP/IP reference model.
- Describe the concepts of protocols, network interfaces, and performance issues in local area networks and wide area networks.
- Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure.
- Identify deficiencies in existing Networking protocols
- Develop socket programming with TCP and UDP.
- Get the knowledge on how to secure their protocols and Services
OBJECTIVES:

The learning objectives of this course are to:

- Identify the type of problems that can be solved using computation
- Describe the models through which computation can be expressed.
- Enhance students' ability to conduct mathematical proofs for computation.
- Demonstrate the key notions, such as algorithm, computability, decidability, and complexity through problem solving.
- Describe the challenges of theoretical computer science and its contribution to other sciences.

MODULE I  INTRODUCTION TO AUTOMATA  7


MODULE II  FINITE AUTOMATA  9


MODULE III  REGULAR EXPRESSIONS  8

Regular Expressions- Finite Automata and Regular Expressions-Pumping Lemma of regular languages- Properties of regular languages.

MODULE IV  CONTEXT-FREE GRAMMARS AND LANGUAGES  8


MODULE V  PUSH DOWN AUTOMATA  7

Definition of the Pushdown Automaton - The Languages of a PDA
 MODULE VI  TURING MACHINES

The Turing Machine- Programming Techniques for Turing Machines- Extensions to the Basic Turing Machine- Turing Machines and Computers.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Apply mathematical proof to real time computation problem.
- Solve simple problems in RE's, DFA's, NFA's, Turing machines, and Grammars.
- Prove/disprove the basic results of the Theory of Computation.
- Describe the Grammars of Context Free Languages.
- Analyze the core concepts relating to the theory of computation and computational models including (but not limited to) decidability and intractability.
- Develop abstract models to simulate complex systems
OBJECTIVES:

- To give an exposure to principles of management and organizational structures.
- To introduce concepts of operation and material management.
- To provide an understanding of management of human resources.
- To impart some basic knowledge on marketing, pricing and selling.
- To give an overview of accounting and management of finance.

MODULE I  PRINCIPLES OF MANAGEMENT  7

Functions of management - Planning - Organizing - Staffing - Direction - Motivation - Communication - Coordination - Control, organizational structures - Line - Line and staff - Matrix type, functional relationships - Span of control, Management by Objectives (MBO) - Forms of Industrial ownership.

MODULE II  OPERATIONS MANAGEMENT  8

Introduction to operations management - Functions of production/operations management - Types of production, Overview of facility location - Lay out planning, introduction to production planning and control, work study, quality assurance, lean manufacturing and six sigma, plant maintenance and management.

MODULE III  MATERIALS MANAGEMENT  8

Materials Planning - Types of inventory, Purchasing function - Source selection - Negotiation - Ordering, Stores management - Functions - Types of stores - Overview of inventory control, Introduction to newer concepts: MRP-I - MRP-II - ERP - JIT.

MODULE IV  HUMAN RESOURCE MANAGEMENT  7

MODULE V MARKETING MANAGEMENT

Marketing - Concept and definition - Elements of marketing mix - PLC - Steps in new product development - Pricing objectives and methods - Advertising types/media - Steps in personal selling - Sales promotion methods - Distribution channels: functions, types.

MODULE VI FINANCIAL MANAGEMENT


Total Hours: 45

REFERENCES:


OUTCOMES:

After doing the course,

- The students would have gained basic knowledge of the concepts of management and the functions of management.
- The students would have learnt fundamentals of the functional areas of management viz., operations management, materials management, marketing management, human resources management and financial management.
OBJECTIVE:

- To prepare the students for building their competencies and career building skills.

COURSE OUTLINE:

This course is practical oriented one and exercises will be given to the students group users / individually depending upon the aspect considered. The following aspect will form the broad outline content of the syllabi. The exercises will be designed by the faculty member and coordinated by the overall course coordinator.

LAB ACTIVITIES:

- Preparation for the placement
- Group discussions: Do's and Don'ts - handling of Group discussions - What evaluators look for.
- Interview - awareness of facing questions - Do's and Don'ts of personal interview.
- Selection of appropriate field vis-à-vis personality / interest.
- Preparation of Resume-Objectives, profiles vis-à-vis companies requirement.
- Enabling students to prepare for different procedures / levels to enter into any company - books / websites to help for further preparation.
- Technical interview - how to prepare and face it.
- Workplace skills
- Presentation skills
- Oral presentations
- Technical presentations
- Business presentations
- Technical writing
- Interpersonal relationships - with colleagues - clients - understanding one's own behavior - perception by others.
ASSESSMENT:

As the course is practical one, it will be assessed using a portfolio based assessment. The students must in consultation with the Faculty member, plan a portfolio of evidence for the above mentioned activities. The students must develop a résumé or résumés that promote own ability to meet specific job requirements and plan their portfolio in a format appropriate to industry they wish to target. The case studies will contain direct observation of the candidate developing career plans, résumés and skills portfolio, reflect written or oral questioning to assess knowledge and problem-solving activities to assess ability to align career aspirations with realistic career goals. The course coordinator in consultation with the course committee will decide the number of exercises and mark to be awarded for each beside the weightage for the end semester assessment.

Total Hours: 30

OUTCOMES:

Students who complete this course will be able to:

- Develop team work skills.
- Take part effectively in various selection procedures followed by the recruiters.
OBJECTIVES:

- Demonstrate familiarity with major algorithms and the important data structures
- Illustrate, implement and compare fundamental data structures.
- Analyze asymptotic performance of algorithms
- Apply algorithm design paradigms
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

LIST OF EXPERIMENTS

1. Writing a simple program of analyzing the complexity of the algorithm.
2. Comparing of any two searching algorithms with respect to time complexity.
3. Using suitable data structure represent a graph and write algorithm to traverse the graph (BFS, DFS)
4. Design and implement prim's algorithm to construct a minimum spanning tree and analyze the same for its complexity.
5. Design and implement Kruskal's algorithm to construct a minimum spanning tree and analyze the same for its complexity.
6. Using divide and conquer concept design and analyze an algorithm to implement Quick sort.
7. Design and implement an algorithm for Merge sort and compute its time and space complexity.
8. Implement priority queue using heapsort
9. Implement Dijkstra's algorithm using priority queues
10. Implement a backtracking algorithm for Knapsack problem

Total Hours: 45
OUTCOMES:
Students who complete this course will be able to:

- Compute the time and space complexity of the algorithm.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Differentiate search algorithms and explain the situation when the algorithm must be applied.
- Implement various traversing techniques and construct graph and tree from the given data to manipulate the complexity of the algorithm.
- Design and implement various sorting methodologies to analyze the algorithm.
- Compare between different data structures and pick an appropriate data structure for a design situation.
OBJECTIVES:

- To expose software engineering methodologies using CASE tools.
- To explore concepts of UML (Unified Modeling Language).
- To learn how to test the developed software using Rational Rose.
- To review the integration of various components of UML for the developed software.
- To write test cases for various applications.
- To emphasize the importance of a case tool software in software project development.

LIST OF EXPERIMENTS:
The following analysis can be designed for each experiment

1. Problem Analysis – Identify project scope, requirement and Objectives
2. Software Requirement Analysis – It defines the individual Phases of the project.
3. Data Modelling- use case diagrams and activity diagrams, build and test.
4. Class diagrams with the functions defined, sequence diagrams and add interface to class diagrams.
5. Software Development and Debugging.
6. Software Testing Prepare test plan and perform validation testing.
7. Remote computer monitoring (using virtualization tools)
8. Create and launch an app.
10. Platform assignment system for the trains in a railway station
11. E-mail Client system.
13. Design an infrastructure model for large storage of an online selling website.
14. Design laboratory that operate remotely and that’s secured through some i/o devices.
OUTCOMES:

Students who complete this course will be able to:

- Recalls the process to be followed in the software development life cycle.
- Construct Use case diagram, Class diagram, Sequence diagram and collaboration diagram.
- Test the software, memory usage of the software and validate the text box using Rational Rose.
- Design a project using CASE tools for socially relevant and real time problems.
- Manage a project from beginning to end.
- Compare and contrast the fitness of existing CASE Tools to the needs of specific software development context.
OBJECTIVES:

- To expose networking concepts using simple programs
- To illustrate communication between two entities using various constructs
- To emulate client server architecture using different protocols.
- To demonstrate the error handling mechanisms in networks
- To illustrate different routing protocols and algorithms for reliable data transfer.
- To enable a student to design middleware/software on top of the existing network protocols.

LIST OF EXPERIMENTS:

1. Write a socket Program for Echo / Ping / Talk commands.
2. Create a socket (TCP) between two computers and enable file transfer between them.
3. Write a program to implement Remote Command Execution
4. Write a program to implement CRC and Hamming code for error handling.
5. Write a code simulating Sliding Window Protocols.
7. Write a program for File Transfer in client-server architecture using following methods.
   a. USING RS232C
   b. TCP/IP
8. Perform implementation of routing algorithms to select the network path with its optimum and economical during data transfer.
   a. Shortest path routing
   b. Flooding
   c. Link State
   d. Hierarchical

Total Hours: 45
OUTCOMES:

Students who complete this course will be able to:

- Apply basic concept of TCP/IP protocol and implement it.
- Simulate network protocols to check the functionality of different routing algorithms for efficient data transfer without data loss.
- Build error check and control mechanisms in communication.
- Develop simple security mechanisms in the networking applications.
- Build real time application using client server architecture.
- Design applications for communication using the networking paradigms.
OBJECTIVES:

- To expose the usage of ubiquitous computing technology.
- To explore challenges, privacy and security issues faced in ubiquitous devices.
- To illustrate how effectively process sensor data is used in adhoc sensor networks.
- To focus on moving from the graphical user interface to the ubiquitous computing user interface.
- To establish the role of design process, tools and issues in context aware computing.
- To trace how the issues of security, privacy and trust management takes place for pervasive environment.

MODULE I INTRODUCTION TO MOBILE AND PERVERSIVE COMPUTING 8

Founding Contributions to Ubiquitous Computing - Tabs, Pads, and Liveboards - From Distributed Computing to Pervasive Computing - Research Areas that make up pervasive computing - Modern Directions in Ubiquitous Computing.

MODULE II MOBILE AND PERVERSIVE COMPUTING DEVELOPMENT 8


MODULE III WIRELESS ADHOC SENSOR NETWORKS 7

Wireless pervasive network basics- Designing the topology - Analysing the power, receiving signal strength - IEEE 802.11 standard MAC protocols - Wireless Adhoc and sensor network protocol for pervasive computing: AODV, DSR, DSDV, LEACH - Wireless transport layer protocols for pervasive computing: TCP, UDP, Multimedia data protocols: RTP, RTCP.
MODULE IV  INTERFACES FOR UBIQUITOUS COMPUTING

From Graphical User Interfaces to Context Data - Interaction Design - System design - Design patterns - Classes of User Interface - Input Technologies - Interface Usability Metrics.

MODULE V CONTEXT-AWARE COMPUTING


MODULE VI SECURITY, PRIVACY AND TRUST MANAGEMENT

Agents, Control policies, credentials and action types, Trust negotiation and management for Pervasive Computing, Securing Pervasive Computing Environments, Privacy issues, Enhancing privacy for pervasive environments.

Total Hours: 45

TEXT BOOKS:


OUTCOMES:

Students who complete this course will be able to:

- Differentiate pervasive way of computing from everyday computing.
- Demonstrate ubiquitous computing in various devices and real time applications.
- Recognize the knowledge about various sensor network protocols.
- Analyze the working of technologies related to graphical and user interface.
- Illustrate how contexts can help building privacy statements.
- Apply the resolution and techniques to solve the issues in pervasive environments.
OBJECTIVES:

- To enrich the knowledge on need and application of compiler in real time applications.
- To throw light on different steps involved in various phases of a compiler.
- To illustrate various bottom up and top down parsing techniques.
- To study on Lexical analyzer generator, LEX and parser generator, YACC
- To expose the concepts of optimization techniques for code generation.
- To expose the use of different compiler construction and automated tools in developing a new compilers for real time application.

MODULE I  LEXICAL ANALYSIS  6

Language processors - The structure of a Compilers - The evolution of programming languages- The science of building a compiler- Applications of Compiler technology- Programming language basics- Lexical analysis: The Role of Lexical Analyzer- Input Buffering- Specifications of Tokens- Recognition of Tokens.

MODULE II  SYNTAX ANALYSIS  8


MODULE III  SYNTAX-DIRECTED TRANSLATION  8

Syntax-Directed definitions- Evaluation order for SDDs- Applications of Syntax-directed translation- Syntax-directed translation schemes.

MODULE IV  INTERMEDIATE CODE GENERATION  8

Variants of syntax trees- Three-address code- Types and declarations-Translation of expressions- Type checking- Control flow- Back patching- Switch statements- Intermediate code for procedures.
MODULE V  CODE GENERATION AND  RUN TIME ENVIRONMENTS

Issues in the design of Code Generator - The Target language; Addresses in the target code- Basic blocks and Flow graphs - Optimization of basic blocks –
A Simple Code Generator- Run time storage environment- storage organization-stack allocation of space-Access to non local data on the heap management-introduction to garbage collection.

MODULE VI  CODE OPTIMIZATION

Principle sources of optimization- Peephole optimization-introduction to global data flow analysis –compiler construction tools -Study of automated tools.

Total Hours: 45

TEXT BOOK:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:
- Identify the basic steps involved in various phases of compilers.
- Compare and contrast various issues in bottom up and top down parsers.
- Design and develop lexical and syntax analyzer using latest compiler tools.
- Generate intermediate code representation for a given set of program instructions.
- Apply the code and loop optimization techniques in intermediate code generation.
- Acquire knowledge on existing compiler construction and automated tools.
OBJECTIVES:

- To expose to the fundamentals of artificial intelligence
- To have a detailed study on various searching techniques
- To inculcate the ability to represent knowledge using logical reasoning
- To have a detailed study on various learning algorithms
- To give the basic foundation for natural language processing
- To explore the role of artificial intelligence in real world applications

MODULE I  DEFINITION AND RUDIMENTARY METHODS  7


MODULE II  SEARCHING TECHNIQUES  8

Informed search and exploration - Informed search strategies - Heuristic function - Local search algorithms and optimistic problems - Local search in continuous spaces - Online search agents and unknown environments - Constraint satisfaction problems (CSP) - Backtracking search and Local search for CSP - Structure of problems - Adversarial Search - Games - Optimal decisions in games - Alpha - Beta Pruning - Imperfect real-time decision - Games that include an element of chance.

MODULE III  KNOWLEDGE REPRESENTATION  8

First order logic - Representation revisited - Syntax and semantics for first order logic - Using first order logic - Knowledge engineering in first order logic - Inference in First order logic - Prepositional versus first order logic - Unification and lifting - Forward chaining - Backward chaining - Resolution - Knowledge representation - Ontological
Engineering - Categories and objects - Actions - Simulation and events - Mental events and mental objects.

MODULE IV LEARNING


MODULE V APPLICATIONS NATURAL LANGUAGE PROCESSING AND INFORMATION RETRIEVAL


MODULE VI APPLICATIONS - GAMING AI IN THE AND TWENTY FIRST CENTURY

Checkers - From Samuel to Schaeffer - Heuristic methods - Rote learning and Generalization - Chess: programming methods - Contributions of computer chess to Artificial Intelligence - Other Games - AI in the 21st Century.

Total Hours: 45

TEXT BOOK:


REFERENCES:


OUTCOMES:
Students who complete this course will be able to:

- Summarize the fundamentals of artificial intelligence
- Choose and implement appropriate searching algorithms and compare their performances
- Analyze and represent the knowledge for a given scenario
- Design and implement simple learning algorithms
- Assimilate the basic natural language techniques
- Work in teams to propose models for solving real world problems using artificial intelligence
OBJECTIVE:

- To impart the basic scientific knowledge on the environment and human impacts on various elements of environment and assessment tools.

MODULE I  PHYSICAL ENVIRONMENT

Earth’s surface - the Interior of Earth - Plate Tectonics - Composition of the Crust: Rocks - formation & types, Soils - formation & components - Soil profile.


Bioelement cycling - The Oxygen cycles - The carbon cycle - The nitrogen cycle - The phosphorous cycle - The sulfur cycle sodium, potassium & magnesium cycles.

MODULE II  BIOLOGICAL ENVIRONMENT

Cellular basis of life - Prokaryotes & eukaryotes - Cell respiration - Photosynthesis - DNA & RNA - Genetically modified life.


Biological communities - Five major interactions: competition, predation, parasitism, mutualism and commensalism - Concepts of habitat & niche - Natural selection - Species richness & species diversity - Ecological succession & climax.


MODULE III  IMPACTS ON NATURAL RESOURCES & CONSERVATION

Biological resources - Nature & importance - Direct damage - Introduced
species - Habitat degradation, loss and fragmentation - Values of biodiversity - Hotspots of biodiversity, threats to biodiversity- Endangered and endemic species of India- Conservation of biodiversity, in-situ and ex-situ conservation.

Land Utilization - Past patterns of land use - Urban & Industrial development - deforestation, salinisation, soil erosion, and desertification - Modern Agriculture & Impacts.


MODULE IV  IMPACTS ON WATER & AIR AND CONSERVATION 8


Atmospheric pollution - Primary & secondary pollutants - Anthropogenic, xenobiotic, synergism, sources & sink, residence time, levels & impacts of major pollutants - Processes leading to smog, acid rain, global warming, stratospheric ozone depletion. Noise pollution and abatement.

MODULE V  IMPACTS ON ENERGY AND CONSERVATION, ENVIRONMENTAL CRISIS 8

Energy - Renewable and non renewable energy resources -Thermal power plants - Nuclear fuels, fossil fuels, solar energy, wind energy, wave energy, tidal energy, ocean thermal energy, hydropower, geothermal energy, biomass energy.

Environment crisis - State of environment in developed and developing countries- Managing environmental challenges for future - Disaster management, floods, earthquake, cyclone and landslides.

MODULE VI  ENVIRONMENTAL IMPACT ASSESSMENT AND SUSTAINABILITY 5

Environmental Impact Assessment - Impacts: magnitude & significance - Steps in EIA - methods - Precautionary principle & polluter pays principle - Role of NGOs & Public -
Value education - Environment protection act (air, water, wild life) and forest Conservation act.

Concept of Sustainability - Sustainable Development - Gaia Hypothesis - Traditional Knowledge for sustainability.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Gain basic scientific knowledge on the environment.
- Human impacts on various elements of environment and assessment tools.
OBJECTIVE

- To explain the basics of wireless systems.
- To implement pervasive computing constructs from a routing perspective.
- To implement pervasive computing constructs from data management perspective.
- To explain pervasive computing constructs from security and privacy perspective.
- To expose and user fundamentals of programming for mobile devices.
- To apply event-driven programming and graphical user interfaces for mobile devices.

Lab Activities:

- Creating a wireless pervasive network
- Creation of the network
- Designing the topology
- Analysing the power, receiving signal strength
- Implementing and simulating various IEEE 802.11 standard MAC protocols
- Implementing the wireless adhoc and sensor network protocol for pervasive computing
- AODV
- DSR
- DSDV
- LEACH
- Implementing wireless transport layer protocols for pervasive computing
- TCP
- UDP
- Multimedia data protocols
• RTP
• RTCP
• Security protocols for pervasive computing
• Privacy preservation of Data
• Horizontal and vertical partitioning
• Application development
• Mini project (Any one domain)
• Sensor network
• Context awareness
• Privacy
• Security

Total Hours: 45

OUTCOMES:
Students who complete this course will be able to:
• Describe pervasive wireless environment.
• Analyze the pervasive wireless environment from security and privacy perspective.
• Demonstrate the pervasive wireless environment from data management perspective.
• Implement pervasive applications for security and privacy.
• Apply fundamentals of programming for mobile devices.
• Develop graphical user interfaces for mobile devices.
OBJECTIVES:

- To expose the working of lexical analyzer.
- To describe the functioning of syntax analyzer for different context free grammar.
- To illustrate tools like LEX /FLEX and YACC/Bison to design lexical analyzer and produce a parser for a given grammar.
- To introduce concept of code optimization of three address code for different programming statements.
- To show various methods for converting three address code to assembly level program.
- To conceptualize a compiler for a simple language.

LIST OF EXPERIMENTS:

1. Implement a lexical analyzer in "C".
2. Use LEX tool to implement a lexical analyzer.
3. Implement a recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *.
4. Use YACC and LEX to implement a parser for the same grammar as given in problem.
5. Write semantic rules to the YACC program in problem 5 and implement a calculator that takes an expression with digits, + and * and computes and prints its value.
6. Implement the front end of a compiler that generates the three address code for a simple language with: one data type integer, arithmetic operators, relational operators, variable declaration statement, one conditional construct, one iterative construct and assignment statement.
7. Implement the back end of the compiler which takes the three address code generated.
OUTCOMES:
Students who complete this course will be able to:

- To implement lexical analyzer for the given source program.
- To implement syntax analyzer for the given context free grammar.
- To Gain Expertise on lexical analysis and parser tools.
- To generate optimized three address code for different programming statements.
- To convert three address code to assembly level program.
- Design and implement a simple compiler and demonstrate its working.
OBJECTIVES:

- To help demystify the tools in Open source technologies.
- To explain the impact of open source technology in programming.
- To expose students to FOSS environment and introduce them to use open source Packages.
- Version Control System setup and usage using RCS, CVS, SVN
- Set up the complete network interface using ifconfig command like setting gateway, DNS, IP tables, etc
- To develop GUI processing using Python.

Lab Activities:

- Case study: Proprietary Vs Open Source tools
- Mapping from Proprietary tools to Open source tools - An Analysis
- Deploy a LAMP stack in Linux
- Application analysis and comparison
- Create a simple application for text processing regular expression using Java
  - in Linux
- Use grep tool to simulate the same operations
- Compare the impact of using the proprietary tools and specialized open source component
- Simulate the cut command
- Estimate the lines of code in the proprietary tool
- Create an application that uses all the LAMP stack components
- Apache server
- MySQL database
- PHP script must be used to create a simple application and this must be deployed and tested
- GUI processing using Python
- Open source applications for research - Case study
- Take any one application domain like Data mining, Network security
- Run a simple task in that tool
- Deploy it
- Compare the experience with that of a proprietary tool

Social Computing
- Implement the power saving steps in Linux to conserve energy
- Use Power TOP tool to visualize power consumption of a system
- Indic Language computing tools

Total Hours : 45

OUTCOMES:

Students who complete this course will be able to:

- Analyze the differences between the open source model and the commercial proprietary model.
- Expertise on using a variety of open source software.
- Develop and deploy a project based purely on open source tools.
- Implement the power saving steps in Linux to conserve energy.
- Use Power TOP tool to visualize power consumption of a system
- Learn the Indic Language computing tools
OBJECTIVES:

- To explore varied security considerations associated with storage, processing and communication of information.
- To introduce the available cryptographic mechanism.
- To expose different facets of securing information.
- To create awareness of legal and ethical issues associated with information security.
- To demonstrate various aspect of information security management including planning, process, policy, procedure and security model as well as hardware and software technologies to safeguard organizational assets.

MODULE I  INTRODUCTION 7


MODULE II  PRINCIPLES 8


MODULE III  CRYPTOGRAPHY FUNDAMENTALS 7


MODULE IV  OPERATIONS SECURITY AND PHYSICAL SECURITY 8

Operational security overview: identifying critical information, analyzing threats, analyzing vulnerabilities, determining risks, and planning countermeasures - Laws of OPSEC.
Physical security overview - physical security controls and mitigation: deterrent, detective, and preventive measures.

**MODULE V  NETWORK AND OPERATING SYSTEM SECURITY 8**


**MODULE VI APPLICATION SECURITY, LEGAL AND ETHICAL CONSIDERATIONS 7**


Legal and Ethical Aspects: Protecting Programs and Data - Information and the Law - Software Failures - Computer Crime - Privacy - Ethical Issues.

**Total Hours:45**

**TEXTBOOKS:**


**REFERENCE:**


**OUTCOMES:**

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

- Identify the different types of threats to information security.
- Assess the different information security threats and take necessary action using tools.
- Recognize the legal and ethical aspects when taking decisions pertaining to information handling.
- Show how to maintain and protect information system.
- Use current techniques and tools to provide security to information systems.
- Tackle challenging security risks using the knowledge of information security.
OBJECTIVES:

- To illustrate the basic concepts and techniques of Data Mining.
- Interpret the contribution of data warehousing and data mining to the decision support level of organization.
- Categorize and carefully differentiate between situations for applying different data mining techniques.
- Assess the strengths and weaknesses of the data mining algorithms.
- Provide an overview on the data mining environments and application.
- Expound on the concept, structure and major issues of data warehousing.

MODULE I  INTRODUCTION

Introduction - Data warehouse delivery method - System process - typical process flow within a Data warehouse - Data warehousing Components - Building a Data warehouse - Mapping the Data Warehouse to a Multiprocessor Architecture - DBMS Schemas for Decision Support - Data Extraction, Cleanup, and Transformation Tools - Metadata - reporting - Query tools and Applications - Online Analytical Processing (OLAP) - OLAP and Multidimensional Data Analysis.

MODULE II  DATA MINING AND ASSOCIATION RULE

Data Mining: - Data Mining Functionalities - Data Preprocessing - Data Cleaning - Data Integration and Transformation - Data Reduction - Hierarchy Generation - Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods - Mining Various Kinds of Association Rules - Association Mining to Correlation Analysis - Constraint- Based Association Mining.

MODULE III  CLASSIFICATION AND PREDICTION

Classification and Prediction: - Issues Regarding Classification and Prediction - Classification by Decision Tree Introduction - Bayesian Classification - Rule Based Classification - Classification by Back propagation - Support Vector Machines - Associative Classification - Lazy Learners - Other Classification Methods - Prediction - Accuracy and Error Measures - Evaluating the Accuracy of a Classifier or Predictor - Ensemble Methods - Model Section.
MODULE IV  CLUSTER ANALYSIS

Cluster Analysis: - Types of Data in Cluster Analysis - A Categorization of Major Clustering Methods - Partitioning Methods - Hierarchical methods - Density-Based Methods - Grid-Based Methods - Model-Based Clustering Methods - Clustering High-Dimensional Data - Constraint - Based Cluster Analysis - Outlier Analysis.

MODULE V  MULTIDIMENSIONAL ANALYSIS

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects - Spatial Data Mining - Multimedia Data Mining - Text Mining - Mining the World Wide Web.

MODULE VI  MINING ENVIRONMENT - CASE STUDY

Data Mining Environment: Case studies in building business environment, Application of data warehousing and Data mining in Government, National Data ware houses - Case studies.

Total Hours: 45

TEXT BOOKS:


REFERENCES:

OUTCOMES:

Students who complete this course will be able to:

- Evaluate emerging standards for data mining and apply them to practical scenarios.
- Illustrate the issues and challenges in data cleaning and processing with simple examples.
- Perform basic data mining operations and apply standard data mining algorithms for association rule mining, clustering and classification and solve real time problems.
- Explain the issues and challenges in multimedia data mining.
- Show with examples how data mining and warehousing techniques can impact the organizations.
- Review the various latest research activities going on in the field of Data Mining.
OBJECTIVES:

- To expose to the fundamental principles common to the design and implementation of programs that run on two or more interconnected computer systems.
- To describe distributed computing paradigms in the form of abstract models and algorithms.
- To analyze the key issues related to multi-level interoperability across a distributed infrastructure and across multiple heterogeneous resources.
- Illustrate the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of these solutions.
- To interpret how various design principles and features affect software design based on specific application problems.
- To recognize and analyze the failure detection algorithms for fault tolerance and how recovery from failure can be carried out.

MODULE I  DISTRIBUTED COMPUTING PARADIGMS 8


MODULE II  COMMUNICATION 8

Interprocess Communication Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications - Java RMI - Case Study - Message Passing: Fundamental Concept - Features - Issues - Synchronization - Buffering - Message Encoding and Decoding - Process addressing - Failure Handling - Remote Procedure Calls: RPC Model -

MODULE III MEMORY


MODULE IV RESOURCE MANAGEMENT


MODULE V FILE SYSTEMS


MODULE VI NAMING AND SECURITY


Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:
Students who complete this course will be able to:

- Describe the principles underlying the functioning of distributed systems.
- Trace the importance of resource management replication and security in distributed systems.
- Apply algorithms and techniques to distributed system environment.
- Build distributed system environment using various methods, strategies, and techniques presented in the course.
- Improve the performance and reliability of distributed programs analyzing various factors.
- Describe

- Describe and distinguish synchronization and concurrency control for a parallel or distributed computing system.
OBJECTIVES:
- To expose the basics of network communication.
- To develop cryptographic algorithms.
- To provide server client communication.
- To evaluate the performance of various cryptographic algorithms.
- To study and implement simple security algorithm.
- To identify attacks in the network communication.

LIST OF EXPERIMENTS:
1. Using Sniffers for monitoring network communication (Ethereal)
2. Understanding of cryptographic algorithms and implementation of the same in C or C++
3. Using open SSI for web server - browser communication
4. Using GNU PGP
5. Performance evaluation of various cryptographic algorithms
6. Using IPTABLES on Linux and setting the filtering rules
7. Configuring S/MIME for e-mail communication
8. Understanding the buffer overflow and format string attacks
9. Using NMAP for ports monitoring

OUTCOMES:
Students who complete this course will be able to:
- Solve the issues occurs in the network communication through algorithms.
- Design and implement various cryptographic algorithms.
- Implement and analyze the working of simple security algorithm.
- Establish browser and email communication.
- Monitor flow of information in the network
- Identify the vulnerabilities.
OBJECTIVES:
- To show the importance of preprocessing in Data mining and Data warehousing.
- To demonstrate the need for Data Mining and advantages to the business and scientific world.
- To implement Data Mining techniques various scenarios and the scope of their applicability.

LIST OF EXPERIMENTS:
(Can be implemented in any one open source Data mining Tool)

1. To perform various commands given in PL/SQL in Oracle 8.0 (For brushing up.)
2. To perform the correlation analysis between for the given data set.
3. To perform the attribute relevance analysis on the given data.
4. To perform the information gain for a particular attribute in the given data.
5. To perform the experiment to predict the class using the Bayesian classification.
6. To perform various data mining algorithms like
   - clustering,
   - Association rule mining
   - classification

Using the dataset from the UCI repository

Total Hours: 45

OUTCOMES:
Students who complete this course will be able to:
- Collect different types of data apply preprocessing techniques.
- Predict the class of data by suitable data mining techniques.
- Solve real time problems based on data mining concepts using data mining tools.
OBJECTIVES:

- Trace the need for building applications for mobile devices.
- To code, run, and debug a variety of applications in the Mobile devices.

LIST OF EXPERIMENTS

1. To develop basic input/output design
2. To develop Forms in the mobile devices
3. Connect applications to Databases in the device
4. Develop simple multimedia mobile applications
5. Develop Messaging systems
6. Use the Web access for developing applications
7. Establish Client server communication
8. An Application development - Mini project

Total Hours: 45

OUTCOMES:

Students who complete this course will be able to:

- Assess mobile platform technology for the development of mobile applications.
- Interpret the expectations of user in the context of mobile applications
- Design user Interfaces and forms for mobile applications.
- Implement the database connectivity with the mobile application.
- Simulate simple wireless mobile applications.
- Design, develop, test and demonstrate a working application for a mobile device.
LIST OF PROFESSIONAL ELECTIVE COURSES

CSBX01 NETWORK MANAGEMENT  0 0 3

OBJECTIVES:

- To introduce the importance and meaning of Network Management.
- To introduce the methods and instruments for managing the Network.
- To expose the role of SNMP and the protocols used by SNMP.
- Appreciate the need for interoperable network management.
- Introduce the concepts and architecture behind standards based network management.
- Instigate the concepts and terminology associated with SNMP and TMN.
- Describe the Advanced Information Processing Techniques such as Distributed Object Technologies, Software Agents and Internet Technologies used for network management.

PREQUISITES:

- COMPUTER NETWORKS.
- OPERATING SYSTEM.

MODULE I  INTRODUCTION  7


MODULE II  SNMP v1 NETWORK MANAGEMENT  7


MODULE III  SNMP v2 AND v3 MANAGEMENT, REMOTEMONITORING  8

MODULE IV  NETWORK MANAGEMENT TOOLS

System Utilities for management- Network Statistics- MIB Engineering- NMS design
Network Management system-TMN and Application Management.

MODULE V  NETWORK MANAGEMENT APPLICATION

Configuration Management- Fault Management- Performance Management -

MODULE VI  BROADBAND NETWORK MANAGEMENT

WAN- Wired and optical access network- Broadband home networks.

Total Hours: 45

TEXT BOOK:

REFERENCE:

OUTCOMES:

Students who complete this course will be able to:

- Apply SNMP for Managing Network.
- Analyze the relationship of MIB on managed elements
- Acquire the knowledge about network management standards (OSI and TCP/IP)
- Acquire the knowledge about various network management tools and the skill to use them in monitoring a network
- Analyze the challenges faced by Network managers
- Evaluate various commercial network management systems and open network Management systems.
- Analyze and interpret the data provided by an NMS and take suitable actions.
OBJECTIVES:

- To introduce the state-of-the-art in network protocols, architectures and applications.
- To analyze existing network protocols and networks.
- To develop new protocols in networking.
- To expose how networking research is done.
- To investigate novel ideas in the area of Networking via term-long research projects.

PREQUISITES:

COMPUTER NETWORKS

MODULE I  ISDN AND FRAME RELAY


MODULE II  ASYNCHRONOUS TRANSFER MODE


MODULE III  CONGESTION CONTROL AND QOS IN IP NETWORKS


MODULE IV  WDM OPTICAL NETWORKS
Introduction to Optical Networks - Wavelength Division Multiplexing (WDM) –
Introduction to broadcast and select networks - Switch architectures - Channel accessing -
Wavelength routed networks - switch architectures - Routing and wavelength assignment - Virtual topology design - IP over ATM over WDM - IP over WDM.

MODULE V  HIGH SPEED LAN  8

Fast Ethernet - Switched fast Ethernet - Gigabit Ethernet - FDDI: Network configuration -
Physical Interface - Frame transmission and reception.

MODULE VI  SONET  8


Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:
- Solve numerical or analytical problems pertaining to the high-speed networking technologies.
- Evaluate various technologies and identify the most suitable one to meet the given set of requirements for a hypothetical corporate network.
• Develop necessary background to manage projects involving high-speed networking technologies.
OBJECTIVES:

- To cover the fundamental concepts of Graph Theory.
- To provide in depth coverage on Famous problems in Graph Theory.
- To throw light on the applications of Graph theory in computing.

PREQUISITES:
BASIC MATHEMATICAL KNOWLEDGE OF GRAPH

MODULE I  INTRODUCTION  9


MODULE II  TREES AND FUNDAMENTAL CIRCUITS  8

Trees - Some Properties of Trees - Pendant vertices in a Tree - Distance and centers in a Tree. Spanning Trees - Fundamental circuits - Spanning trees in a weighted graph - Application in terms of data structures

MODULE III  CUT SETS AND CUT VERTICES  8

Cut sets - Properties of a cut set - all cut sets in a graph. Fundamental circuits and cut sets - Connectivity and Separability - Relevance of cut sets to computing.

MODULE IV  PLANAR GRAPHS  6

Planar graphs - Kuratowski’s two graphs - Representation of a planar graph - Planar graph application in real life

MODULE V  MATRIX REPRESENTATION OF GRAPHS  8

Connectedness and Components - Spanning tree - Finding all Spanning Trees of a Graph - Cut Vertices and Separability - Directed Circuits - Case studies.

Total Hours: 45

REFERENCES:

1. Narsingh Deo, "Graph Theory with Application to Engineering and Computer Science", PHI, Reprint 2011.

OUTCOMES:

Students who complete this course will be able to:

- Recognize the relevance of graph theory in computer based applications.
- Describe the fundamental concepts of graph theory.
- Apply the basics of graph theory in different real time scenarios.
OBJECTIVES:

- To have an overview of the fundamentals of wireless networking.
- To have a broad overview of the state of mobile ad hoc networking.
- To discuss the issues in designing the routing protocols.
- To have an overview of the architecture model of multicasting protocols.
- To introduce the current and emerging applications of Adhoc Networks.
- To analyze the physical networking and architectural issues of mobile ad hoc networks.

PREQUISITE:
COMPUTER NETWORKS

MODULE I  INTRODUCTION


MODULE II  ROUTING PROTOCOLS

Introduction - Issues in designing a routing protocol for Ad hoc wireless networks - Classifications of routing protocols - Table-Driven routing protocols - Destination Sequenced Distance Vector (DSDV) - Source-Initiated On-Demand approaches - Ad hoc On-Demand Distance Vector Routing (AODV) - Dynamic Source Routing (DSR) - Temporally Ordered Routing Algorithm (TORA) - Zone Routing Protocol (ZRP).

MODULE III  MULTICASTING PROTOCOLS

MODULE IV TRANSPORT LAYER PROTOCOLS


MODULE V ENERGY MANAGEMENT

Introduction - Need for energy management in Ad hoc wireless networks - Classification of energy management schemes - Battery management schemes - Transmission power management schemes - System power management schemes.

MODULE VI QOS AND SECURITY IN MANET


Total Hours: 45

TEXT BOOKS:


REFERENCES:

OUTCOMES:

Students who complete this course will be able to:

- Identify and address the issues in wireless networks
- Identify and address the challenges in Adhoc wireless internet.
- Describe the platform architectures that are suitable for mobile adhoc networks.
- Calculate the power management and energy management in Adhoc wireless Networks.
- Identify the parameters involved in measuring the QoS of Adhoc wireless Networks.
- Analyze the solutions for security threats to ad hoc networks.
OBJECTIVES:

- To learn the basics of wireless sensor network.
- To illustrate the physical layer functions of wireless sensor network architecture.
- To provide a knowledge about various routing protocols under MAC layer of wireless sensor network architecture.
- To study the network layer routing protocols.
- To know the need for localization algorithms for finding the location.
- To find the applications where wireless sensor networks could be used.

PREQUISITES:
COMPUTER NETWORKS

MODULE I INTRODUCTION 6
Challenges and Constraints - Applications - Node architecture – Operating Systems : Tiny OS.

MODULE II PHYSICAL LAYER 6
Basic components - Source Encoding - Channel Encoding - Modulation – Signal Propagation

MODULE III MEDIUM ACCESS CONTROL LAYER 12

MODULE IV NETWORK LAYER 10
MODULE V LOCALIZATION

Ranging techniques - Range based localization - Range free localization

MODULE VI APPLICATIONS

Traffic control - Health care - Pipeline monitoring

Total Hours: 45

REFERENCES


OUTCOMES:

Students who complete this course will be able to:

- State the functionalities of each layer in wireless sensor network architecture.
- Find the application where MAC layer routing protocol and network layer routing protocol being used.
- Decide which localization algorithm could be used for finding the location of a target.
- know how wireless sensor network could be used in remote area applications.
- Find the suitable operating system and simulator for implementing the wireless sensor network.
- Distinguish the difference between various wireless networks.
OBJECTIVES:

- To learn network routing basics and foundations.
- To demonstrate routing in IP networks and router architectures.
- To illustrate the steps involved in various routing algorithms.
- To study the difference between distance vector routing and link state routing.
- To gain knowledge on various issues in routing algorithms.
- To introduce into next generation routing protocol.

PREQUISITES:

COMPUTER NETWORKS

MODULE I  INTRODUCTION TO NETWORKING AND NETWORK ROUTING


MODULE II  ROUTING ALGORITHMS: SHORTEST PATH AND WIDEST PATH

Bellman-Ford Algorithm and the Distance Vector Approach- Dijkstra's Algorithm- Comparison of the Bellman-Ford Algorithm and Dijkstra's Algorithm- Shortest Path Computation with Candidate Path Caching- Widest Path Computation with Candidate Path Caching- Widest Path Algorithm- K- Shortest Paths Algorithm.

MODULE III  ROUTING PROTOCOLS: FRAMEWORK AND PRINCIPLES


MODULE IV  IP ROUTING AND DISTANCE VECTOR PROTOCOL FAMILY

MODULE V  OSPF AND INTEGRATED IS-IS AND ROUTER ARCHITECTURE


MODULE VI  BGP


Total Hours: 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Recall the fundamentals and requirements for packet routing in computer communication networks.
- Compare and contrast the functions of different routing protocols.
- Analyze various issues in existing routing protocols.
- Design an internal architecture, in order to overcome the issues in existing routing protocols.
- Enhance the services of existing routing protocol.
- Build a new routing protocol for real time applications.
CSBX08 CLOUD COMPUTING L T P C
3 0 0 3

OBJECTIVES:

- To introduce the importance of virtualization in distributed computing.
- To learn cloud service models and deployment models.
- To comprehend the technical capabilities and business benefits of cloud computing.
- To collaborate with web based applications.
- To identify security implications in cloud computing.
- To illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon.

PREREQUISITE:

COMPUTER NETWORKS

MODULE I VIRTUALIZATION


MODULE II CLOUD INTRODUCTION - ARCHITECTURAL INFLUENCES


MODULE III CLOUD SCENARIOS AND DEPLOYMENT MODEL

MODULE IV CLOUD ARCHITECTURE MODELS

Cloud architecture: Cloud delivery model - Software as a Service (SaaS): SaaS service providers - Google App Engine, Salesforce.com and google platform - Benefits - Operational benefits - Economic benefits - Evaluating

SaaS - Platform as a Service (PaaS): PaaS service providers - Right Scale - Salesforce.com - Rackspace - Force.com - Services and Benefits - Infrastructure as a Service (IaaS): IaaS service providers - Amazon EC2, GoGrid - Microsoft soft implementation and support - Amazon EC service level agreement - Recent developments - Benefits.

MODULE V CLOUD COLLABORATION


MODULE VI CLOUD SERVICES


Total Hours: 45

TEXT BOOKS:


REFERENCE:


OUTCOMES:

Students who complete this course will be able to:

- Describe the architecture and taxonomy of parallel and distributed computing.
- Explain virtualization and their role in elastic computing.
• Analyze the advantages and disadvantages of Infrastructure, Platform, and Software as a Service (IaaS, PaaS, SaaS) abstractions, and Public and Private Clouds.
• Describe the service oriented architecture and their influences
• Compare different performance metrics for evaluating cloud applications.
• Work with online cloud services and collaborate with online documents and web based applications.
OBJECTIVES:

- To introduce the current architecture and operation of the Internet.
- To give an insight into IPV4 and IPV6 addressing concepts.
- To provide a concise overview of TCP/IP protocol suite.
- To give an emphasis on the TCP congestion control algorithms and strategies used.
- To obtain an in depth knowledge about the timers that governs TCP/IP.
- To outline the tools used for packet analysis.

PREQUISITE:

COMPUTER NETWORKS

MODULE I INTRODUCTION


MODULE II INTERNET PROTOCOL - IPV4


Internet Protocol Datagram Encapsulation and Formatting-IP Datagram Size, Fragmentation and Reassembly - IP Routing and Multicasting.

MODULE III INTERNET PROTOCOL - IPV6 AND SUPPORT

MODULE IV  TRANSMISSION CONTROL PROTOCOL

Introduction to TCP - TCP header and encapsulation-connection establishment and termination-TCP options-path MTU discovery with TCP-TCP state transitions. -Timeout and Retransmission- Setting the Retransmission Timeout-Timer-Based Retransmission-Fast Retransmit- Retransmission with Selective Acknowledgments - Spurious Timeouts and Retransmissions - Packet Reordering and Duplication -Destination Metrics- Repacketization -Attacks Involving TCP Retransmission.

MODULE V  TCP WINDOW MANAGEMENT AND CONGESTION CONTROL


MODULE VI  TCP TIMERS


Total Hours: 45

TEXT BOOKS:


REFERENCES:

OUTCOMES:
Students who complete this course will be able to:

- Apply IP addressing and sub netting concepts.
- Analyze the major networking protocols and select protocols based on the application.
- Compare IPv4 and IPv6 addressing.
- Categorize the different TCP congestion control mechanisms.
- Explore the latest trends in networking including IPV6.
- Analyze the working of TCP/IP using appropriate tools.
OBJECTIVES:

- To introduce the basic of embedded systems.
- To have knowledge about devices, communication buses and protocols.
- To study the procedures for development and testing.
- To provide an outline of performance analysis of embedded system.
- To introduce on Real time Operating system.
- To have a look on basic design using real time operating system.

PREQUISITE:

- MICROPROCESSOR AND MICROCONTROLLER
- DIGITAL SIGNAL PROCESSING

MODULE I  INTRODUCTION TO EMBEDDED SYSTEMS   6

Definitions - Embedded hardware components - Embedded Software - System on Chip(SoC) - VLSI Circuits - Fundamentals of Embedded System Design.

MODULE II  DEVICES, COMMUNICATION BUSES AND PROTOCOLS   8


MODULE III  DEVELOPMENT AND TESTING   8


MODULE IV  PERFORMANCE ANALYSIS OF EMBEDDED SYSTEMS   7

Tasks and Task States - Tasks and Data - Semaphores and Shared Data - Message Queues - Mailboxes and Pipes - Timer Functions - Events - Memory Management - Interrupt Routines in an RTOS Environment.

MODULE VI  BASIC DESIGN USING A REAL-TIME OPERATING SYSTEM 8


Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Possess the basic outline of embedded system.
- In depth knowledge on building blocks of embedded system.
- Apply and examine the embedded programming concepts.
- Analyze a real time scenario, design an embedded system and analyze its
performance.

- Describe real time operating system
- Design real time embedded systems using the concepts of RTOS
OBJECTIVES:

- To attain an insight into the field of hacking and related techniques
- To give a detailed account of various types of system vulnerabilities and their attacking mechanisms.
- To discuss about security tools and testing applications for vulnerability and authentication flaws.

PREQUISITE:

COMPUTER NETWORKS

MODULE I  INTRODUCTION TO HACKING  
Introduction to Hacking-Types of Hacking-Hacking windows - Network hacking-Web hacking - Password hacking.

MODULE II  WEB APPLICATION  
Problem factors - Defense mechanisms - Handling user access - User input-Handling attackers - Managing the application - Web application technologies-The HTTP protocol - Web functionality - Encoding schemes.

MODULE III  VARIOUS ATTACKING MECHANISM  

MODULE IV  VULNERABILITIES  
Module V  Hackers Methodology


Module VI  Case Study

System hacking- Case study: DNS High Jinx- Pwning the internet-Hacking windows- Hacking unix-Infrastructure hacking- Case study: Read It and WEP-Wireless hacking- Application and data hacking-Case study: Session Riding.

Total Hours: 45

Textbooks:


Outcomes:

Students who complete this course will be able to:
- Identify the system vulnerabilities and their hacking mechanism
- Comprehend authentication mechanisms used to test and guard against the vulnerabilities.
- Express detailed insight into various hacking techniques through case studies.
OBJECTIVES:
• To describe the techniques associated with biologically inspired neural networks, genetic algorithms and neuromorphic systems.
• To gain knowledge about adaptive and self-organizing computational systems.
• To analyze how complex and functional high-level phenomena can emerge from low-level interactions.
• To illustrate natural models of the computational processes.
• To derive the computational processes by applying genetic algorithm.
• To discuss natural computational systems that solves some of the real time problems.

PREQUISITE:
- LINEAR PROGRAMMING
- MATHEMATICAL FOUNDATION

MODULE I  LIFE AND INFORMATION
What is Life - The Logical Mechanisms of Life - What is so cool about computation - Universal Computation and Computability - Simulations and Realizations-Imitation of Life - Computational Beauty of Nature (fractals, L-systems, chaos) Bio-inspired computing - Natural computing-Biology through the lens of computer science.

MODULE II  COMPLEX SYSTEMS AND ARTIFICIAL LIFE

MODULE III  EVOLUTIONARY ALGORITHMS

MODULE IV  COLLECTIVE BEHAVIOR AND SWARM INTELLIGENCE

Social Insects, Stigmergy and Swarm Intelligence - Competition and Cooperation - Communication and Multi-Agent simulation - Turing's Tape, Self-Reproduction Collective Intelligence.

**MODULE V IMMUNOCOMPUTING**


**MODULE VI GENETIC ALGORITHMS**


Total Hours: 45

**TEXT BOOKS:**


**REFERENCES:**


**OUTCOMES:**

Students who complete this course will be able to:

- Explore how biological systems exploit natural processes.
- Describe how complex and functional high-level phenomena can emerge from low-level interactions.
- Compare and Contrast of the collective Behavior of the swarm intelligence.
- Design experiments to investigate empirically bio-inspired systems.
- Simulate nature-inspired evolutionary computation, genetic algorithm techniques for solving optimization problems.
- Make use of bio-inspired computing techniques in real time scenario.
OBJECTIVES:

- To expose to types of computer systems and basics of cyber crime
- To have a study on types of forensics
- To educate on evidence collection and preservation
- To classify the various hacking techniques
- To give an overview of varied intrusions and malwares
- To make aware of existing cyber laws set forth by the Government

PREQUISITES:

COMPUTER NETWORKS

MODULE I  INTRODUCTION

Main frame systems, Desktop systems - Multiprocessor systems - Distributed systems - Clustered systems - Real time systems - Hand held Systems. Important Technical Terminologies-Weapons of cyber crime -Types of cyber crime -Credit card and cyber crime-Web hacking.

MODULE II  COMPUTER AND DIGITAL FORENSICS

Computer Forensics and Digital Detective Work-Cell Phone Forensics - Email and Webmail Forensics-Legal Ethical and Testimony Topics-Ethical and Professional Responsibility in Testimony-Computer Forensics and Digital Detective Work.

MODULE III  EVIDENCE

Preparing for evidence collection and preservation- Tools, Environments, Equipment and Certifications, Policies and Procedures-Data, PDA and cell phone forensics.

MODULE IV  FORENSICS EXAMINATION AND HACKING TECHNIQUES

Forensics Examination of computers, digital and electronic media - Operating Systems and data transmission basics for digital investigations-Overview of security threats-Hacking Techniques-Password Cracking-Insecure Network Connection-Email Security-PGP and SMIME.

MODULE V  DETECTING INTRUSIONS MALWARE AND LEGAL ETHICAL
Detecting Intrusions Malware and Fraud-Tracking down those Who Intend to do harm-Fraud and Forensics Accounting Investigation-Legal Ethical and Testimony Topics-Ethical and Professional Responsibility in Testimony.

MODULE VI      CRYPTOGRAPHY AND CYBER LAWS

Cryptography -Futuristic crime- Cyber laws of different countries- Social Networking site bane or boon- Search and seizure.

Total Hours: 45

TEXT BOOKS:

REFERENCE:

OUTCOMES:
Students who complete this course will be able to:

- Distinguish different types of computer systems and related cyber crimes
- Analyze different types of forensics and suggest appropriate course of action
- Critique upon evidence collection and preservation processes
- Study a real-time scenario and propose suitable cyber security measures
- Define ethical and professional responsibility in cyber forensics
- Brief upon cyber laws prevailing across the globe.
OBJECTIVES:

- To serve as an advanced element of learning in the field of wireless communication.
- To throw light on the architecture of different mobile devices.
- To expose the concepts and services of different layers of wireless devices.
- To gain knowledge on different database issues in mobile wireless device.
- To discover the various applications of mobile communication.
- To develop skills of finding solutions and building software for mobile computing applications.

PREQUISITE:
COMPUTER NETWORKS

MODULE I MOBILE COMMUNICATIONS 6

MODULE II MEDIUM ACCESS CONTROL 8
Motivation for a specialized MAC (Hidden and exposed terminals, near and far terminals)- SDMA- FDMA- TDMA- CDMA.

MODULE III MOBILE NETWORK LAYER 8
Mobile IP (Goals- assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations) - Dynamic Host Configuration Protocol (DHCP).

MODULE IV MOBILE TRANSPORT LAYER 8
Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP- Fast retransmit/ fast recovery- Transmission /time-out freezing- Selective retransmission-Transaction oriented TCP.
MODULE V DATABASE ISSUES


MODULE VI MANET

Mobile Ad hoc Networks (MANETs): Overview- Properties of a MANET-Spectrum of MANET applications- Routing and various routing algorithms-Security in MANETs.

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) and J2ME.

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
Students who complete this course will be able to:
- Describe the concept of mobile computing and architecture of mobile communication.
- Compare and contrast the architecture and protocol of various wireless devices.
- Monitor the services at different layers of wireless devices.
- Implement the concepts of mobile computing and compare its performance with conventional wired network applications.
- Provide solutions in real time wireless applications to overcome database issues.
- Apply the concepts of mobile transactions in real time applications.
OBJECTIVES:

- Comprehend the design concepts and principles of IoT
- Understand the role of electronics and embedded computing in IoT
- Attain exposure to varied software and hardware platforms for realization of IoT

PREQUISITE:
COMPUTER NETWORKS.

MODULE I  IoT FUNDAMENTALS AND APPLICATIONS  9

MODULE II  IoT Prototyping Concepts  9

MODULE III  Physical Design  9

MODULE IV  IoT Technology Platforms  9

MODULE V  Software Design Principles  9
IoT Connectivity Considerations – IoT and Cloud Access - REST – MQTT – CoAP – XMPP IOT.

Total Hours: 45
TEXT BOOKS:


REFERENCE:


OUTCOMES:

Students who complete this course will be able to

- Discuss IoT concepts and design principles in detail.
- Design simple IoT devices for different application domains
- Compare and choose appropriate software and hardware platform for realization of IoT devices
OBJECTIVES:

- To learn basic concepts of graph theory
- To have an idea about different models and structure of complex networks
- To study various applications of complex networks
- Introduces the fundamental concepts, principles and methods in the interdisciplinary field of network Science.
- To know the Structure of reaction and protein of interaction networks
- To study about graphic structures of networks, mathematical models of networks

PREQUISITE:

- Computer Networks
- Graph theory

MODULE I  INTRODUCTION

Introduction : Graph theory - scale free processes and fractal structures.

MODULE II  MODELS OF COMPLEX NETWORKS

Models of complex networks - Adjacency relations in networks - Metric and topological structure of the network.

MODULE III  FRAGMENTS OF COMPLEX NETWORKS

Fragments in complex networks - Accounting for all parts of sub graphs - Communicability functions in networks - Centrality measures - Global network invariants.

MODULE IV NETWORK CLASSES

Expansion and network classes - Community structure of networks - Network bipartivity - Random models of networks.

MODULE V  OPTIMIZATION

Genetic networks - Protein residue networks - Protein - Protein interaction networks - Structure of reaction networks.

Total Hours: 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Analyze the basic concepts of complex networks.
- Define various models and optimization procedure for networks.
- Define and calculate basic network graphic metrics.
- Describe structural features of socio-technical networks.
- Relate graphic properties to network functions and evolution.
- Relate local properties to global emerging patterns.
- Explore new angles to explore network collective behaviours.
- Visualize networks to highlight structural and global features.
OBJECTIVES:
- Introduce the new technologies, applications, service and models of mobile commerce.
- To explore the knowledge in management of mobile commerce services.
- Put forth the emerging issues in mobile commerce and management of services.
- Introduce the concept of knowledge management in mobile commerce.
- Explore the modeling of mobile services.
- Apply the knowledge in Quality of Services in mobile application.

PREQUISITE:
- COMPUTER NETWORKS

MODULE I  M-COMMERCE  5
Introduction to m-commerce: Emerging applications - Different players in m-commerce - M-commerce life cycle Mobile financial services - Mobile entertainment services and proactive service management.

MODULE II  MANAGEMENT OF MOBILE COMMERCE SERVICES  8
Content development and distribution to hand-held devices - Content caching, pricing of mobile commerce services.

MODULE III  EMERGING ISSUES IN MOBILE COMMERCE  8
The role of emerging wireless LANs and 3G/4G wireless networks - Personalized content management - Implementation challenges in m-commerce - Futuristic m-commerce services.

MODULE IV  KNOWLEDGE MANAGEMENT IN A MOBILE COMPUTING  8
Knowledge Management in a mobile computing context-Query formation and Information retrieval-Knowledge discovery in mobile business data-Modelling the dynamics of mobile data services markets.

MODULE V  MOBILE MESSAGE AND DATA SERVICES  8
Modelling the dynamics of mobile data services-Short message service and applications-Multimedia message peer-Mobile banking-Agent based secured E-Payment system.
MODULE VI QUALITY OF SERVICE IN MOBILE APPLICATION

Quality of service oriented medium access control for ATM and mobile applications.

Total Hours : 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Trace the M-commerce concepts and technologies.
- Describe the emerging models of developing M-commerce applications.
- Describe the content development and pricing of M-commerce services.
- Apply the knowledge management in mobile commerce.
- List the various applications of mobile messages and data services.
- Analysis the different organizational roles during the development of M-commerce initiatives.
OBJECTIVES:

- To study architecture for application development
- To summarize the importance of SOA in Application Integration
- To Illustrate SOA, Service-Orientation and Web Services.
- To learn web service and SOA related tools
- To explore how to build SOA with Web Services.
- To design service oriented design process.

PREQUISITE:

DISTRIBUTED COMPUTING

MODULE I  INTRODUCTION TO SOA  6


MODULE II  ACTIVITY MANAGEMENT & COMPOSITION  8


MODULE III  MESSAGING AND SECURITY  8


MODULE IV  PRINCIPLES OF SERVICE ORIENTATION  8


MODULE V  SERVICE ORIENTED DESIGN  8

MODULE VI  WS EXTENSIONS & SOA PLATFORMS


Total Hours : 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Describe the Service Orientation principles and business modeling.
- Explore the underlying technology for service design.
- Create design standards for SOA - based solutions.
- Make use of web service principles and techniques, design web services and give a solution for design issues.
- Develop Web services using J2EE and .NET technologies.
- Apply Web Service concepts to real time problems
OBJECTIVES:

- To provide students with conceptual and practical knowledge to develop web applications.
- To expose the students with various modeling activities for web apps.
- To provide an overview on web metrics, quality and Web resource management.
- To gain knowledge on the development of web applications tools and its deployment.
- To address the testing strategies for web applications and security measures involved.
- To get familiarized on the technological issues related to web application development.

PREQUISITE:

OBJECT ORIENTED SOFTWARE ENGINEERING

MODULE I  INTRODUCTION TO WEB ENGINEERING  8


MODULE II  PLANNING, MODELLING AND ANALYSIS OF WEB APPS  8


MODULE III  WEB APPLICATION DESIGN  8


MODULE IV  DEVELOPMENT AND DEPLOYMENT  7

MODULE V TESTING AND CHANGE MANAGEMENT 7


MODULE VI TECHNOLOGIES AND TOOLS 7


Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES: Students who complete this course will be able to:

- Perform analysis modeling and design modeling for web applications.
- Identify candidate tools and technologies for developing web applications.
- Integrate design patterns for the development of web applications.
- Perform modeling and testing for web applications.
- Handle security tools in web environment.
- Identify the various security risks in a Web application.
OBJECTIVES:
- To expose the working of internet technology from the end user’s and developer’s point of view
- Showcase the technologies used in development of web pages
- Highlight the theories and principles underlying effective web page design.
- Outline the processes that process the web content from the developer’s end
- Throw light on proprietary and open source frameworks used in the operation of the web
- Discuss the semantic web technologies and their usage

PREQUISITE:
COMPUTER NETWORKS

MODULE I INTRODUCTION TO INTERNET

MODULE II HTML 5 AND CSS3

MODULE III SCRIPTING LANGUAGES
Basics - Dialogs - Memory Concepts - Arithmetic - Control Structures - Functions - Arrays - Objects - Simple Web Applications - Event Handling

MODULE IV SERVER SIDE PROGRAMMING
Servlets - Deployment of Simple Servlets - Web Server ( Java Web Server / Tomcat / WebLogic) - HTTP GET - HTTP POST - Session Tracking - Cookies-JDBC - N-Tier Applications.

MODULE VI DEVELOPMENT TOOLS AND TECHNOLOGIES


Total Hours: 45

TEXT BOOKS:

REFERENCE:

OUTCOMES:
Students who complete this course will be able to:

- Trace the key developments in the web from the initial era to the current era
- Design web pages according to the end user requirements making use of HTML, style sheets and scripts and also incorporate multimedia support in it.
- Implement a simple web site using the client/server model for various applications and have the capability to test and document the solutions developed.
- Using high-level tools, write a web service client that accesses a commercial web service
- Describe the various tools used in web technology
- Demonstrate competency in selecting an appropriate web technology solution for a given scenario.
OBJECTIVES:

✓ Translate the basic of a “game” into a wide range of conflicts.
✓ Analyze conflict dynamics from the standpoint of rationality.
✓ Evaluate conflict dynamics from the standpoint of the self interests of the “Players”
✓ Integrate increasing analytical skills into increasingly complex conflicts.
✓ Theorize possible and probable strategies where information is incomplete.
✓ Appraise theoretical predictions obtained from Game Theory analyses against real world conflicts.

PREQUISITE:

Theory of Computation
Artificial Intelligence

MODULE I   INTRODUCTION TO GAMING

History of Video games - Games and Society - Game Goals - Game Genres - Gaming Platforms - Time Intervals - Player Modes - Motivations - Rewards - Resolution.

MODULE II  GAME DESIGN

Game Design - Game Writing - Narrative Theory - Story and Character Development - Game play - Creating the Game World - Level Design - Human-Computer Interface design.

MODULE III  GAME PROGRAMMING : LANGUAGES AND ARCHITECTURE


MODULE IV  GRAPHICS, ANIMATION, AI, NETWORK PROGRAMMING

MODULE V AUDIO VISUAL DESIGN AND PRODUCTION


MODULE VI GAME PRODUCTION AND BUSINESS OF GAMES

Game production - Project management - Game industry roles - Economics - Publisher - Developer relationship - Marketing - Intellectual Property rights - Content regulation.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Model competitive real world phenomena using concepts from game theory.
- Discuss the theory which underlies games.
- Possess a set of intermediate level game-theoretic skills which can be applied in real world contexts.
- Review and critically assess literature which deals with game theory and related materials.
- Elucidate the potential or proven relevance of game theory and its impact in many fields of human endeavour which involve conflict of interest between two or more participants.
- Communicate game-theoretic ideas and concepts to non-specialist audiences in a language which is accessible and comprehensible.
OBJECTIVES:

- To give the basic foundation for Big Data Analytics and introducing the various terms and terminologies
- To expose to emerging technologies including open source and cloud environment for Big Data
- To equip with the Big Data processing methodologies
- To provide the MapReduce fundamentals and its relationship to Big Data
- To drive the basics of analytics and its relationship to real time business scenarios
- To identify appropriate tools and technologies for real time applications

PREQUISITE:

DATABASE MANAGEMENT SYSTEM

MODULE I  BIG DATA FUNDAMENTALS  6

Big Data and its Importance - Four V's of Big Data - Drivers for Big Data - Introduction to Big Data Analytics - Big Data Analytics applications.

MODULE II  BIG DATA TECHNOLOGIES  8

Hadoop's Parallel World - Data Discovery - Open source technology for Big Data Analytics - Cloud and Big Data - Predictive Analytics - Crowd Sourcing Analytics - Inter- and Trans-Firewall Analytics.

MODULE III  BIG DATA PROCESSING  7

Data Store Integration - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing- Subdividing Data.

MODULE IV  MAPREDUCE FUNDAMENTALS  9

The Building Blocks of Hadoop MapReduce - Employing Hadoop MapReduce-Creating the components of Hadoop MapReduce jobs - Distributing data processing across server farms -Executing Hadoop MapReduce jobs - Monitoring the progress of job flows -
Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System
Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

MODULE V  ADVANCED ANALYTICS

Real-Time Architecture - Orchestration and Synthesis Using Analytics Engines
Discovery using Data at Rest - Implementation of Big Data Analytics - Big Data
Convergence - Analytics Business Maturity Model.

MODULE VI  TOOLS AND TECHNIQUES

Fundamentals of Pig - Fundamentals of HBase - Fundamentals of Hive - Introduction to
NoSQL - Introduction to Mahout.

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- State the basic concepts, terms and terminologies in Big Data
- Connect emerging technologies in Big Data eco-space
- Apply Big Data processing methodologies
- Deploy MapReduce framework for Big Data analytics
- Recognize real-time business analytics problem
- Choose appropriate tools and technologies for analytical scenarios.
OBJECTIVES:

- To provide the theory behind web services.
- To establish the role of XML in web services.
- To describe the web services.
- To examine the role of different technologies.

PREQUISITE:

- SERVICE ORIENTED ARCHITECTURE

MODULE I WEB SERVICES

Introduction: Web services - SOAP WSDL UDDI-Importance of web services-The evolution of web applications Not just another distributed computing platform - Web services and enterprises.

MODULE II XML FUNDAMENTALS


MODULE III OVERVIEW OF SOAP


MODULE IV UDDI

UDDI at a glance- The UDDI Business registry- UDDI under the covers - Accessing UDDI- How UDDI is playing out.
MODULE V  CONVERSATIONS

Conversations: Overview - Web Services - Web services Conversation Language - WSCL Interface components - The Bar scenario conversations - Relationship between WSCL and WSDL.

MODULE VI  CURRENT STATE

Current Issues: Semantic Web, Role of Meta Data in web content- Architecture of Semantic web- Content Management- Workflow-XLANG- BPEL4WS.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Implement the various forms of XML constructs.
- Describe the role of web services in different applications.
- Validate XML documents with the use of Document Type Definitions and schemas according to industry standards.
OBJECTIVES:

- To describe the role of ontology as a representational and reasoning mechanism in information retrieval
- To provide students with an overview of the main principles and methods underlying the domain of Information Retrieval.
- To introduce the IR principles to locate relevant information on large collections of data
- To evaluate the performance of an information retrieval system.
- To acquire knowledge and experience of the XML programming language.
- To equip students with sound skills to solve computational search problems.

PREQUISITE:

DATA MINING

MODULE I KNOWLEDGE REPRESENTATION 6

Knowledge representation - Basics of Propositional logic- Predicate logic-reasoning using First Order Logic-unification- Forward chaining-Backward chaining-Resolution.

MODULE II ONTOLOGY DEVELOPMENT 7

Description logic-taxonomies-Topic maps-Ontology-Definition-expressing ontology logically-ontology representations-XML-RDF-RDFS-OWL-OIL-Ontology development for specific domain.

MODULE III INFORMATION RETRIEVAL 7

Parallel and distributed IR- Multimedia IR- Data modeling-Query languages-Web Searching Basics-Characterizing the Web-Search Engines-Web crawling and indexes-link analysis.

MODULE IV INFORMATION RETRIEVAL MODELING 9

Information retrieval - Taxonomy-formal characterization-Classical information retrieval-Set theoretic model-Algebraic model-Probabilistic model-Structured text retrieval models-
Models for browsing-Retrieval performance evaluation-Keyword based querying-Pattern matching-Structural queries-Query operations.

**MODULE V  CLASSIFICATION**  
Language models for information retrieval-Text classification, Naïve Bayes-Vector space classification.

**MODULE VI  CLUSTERING**  
Support vector machines and machine learning on documents-Flat clustering-Hierarchical clustering-Case study on cluster analysis.

**REFERENCES:**


**OUTCOMES:**

Students who complete this course will be able to:
- Apply the basic concepts and techniques of Information Retrieval in various related fields.
- Form the ontology for different domains and generate the equivalent representations.
- Use different information retrieval techniques in various application areas.
- Implement retrieval systems for web search tasks.
- Develop skills in problem solving using systematic approaches.
- Analyze the limitations of different information retrieval techniques.

Total Hours: 45
SEMESTER (Elective)

CSBX25   NATURAL LANGUAGE PROCESSING

OBJECTIVES:

- To demonstrate issues and challenges in natural language and the various modules of a typical natural language processing system.
- To expound on natural language parsing and semantics
- To illustrate how language is generated with applications specific focus
- To focus on tagging parts of speech
- Throw light on speech models
- Discuss the applications of NLP

PREQUISITE:
- THEORY OF COMPUTATION
- WEB MINING

MODULE I   INTRODUCTION
Natural Language Processing – Classical approaches – Current trends – Application domains – Societal applications

MODULE II   ANALYSIS

MODULE III   GENERATION
Generated text – Components of Generator – Problems in generation – Text planning – Linguistic component – Story generation

MODULE IV   EMPRIRICAL APPROACHES
Corpus creation – Treebank Annotation - Parts of speech Tagging approaches

MODULE V   SPEECH RECOGNITION
Architectural components – Applications – Speech recognition – Speech recognizers – Applications – Research directions

MODULE VI   APPLICATIONS
Information retrieval – Indexing – IR models – NLP and IR models – Question Answering systems – Information extraction – Sentiment mining – Multi lingual approaches
TEXT BOOKS:

REFERENCES:

OUTCOMES:
Students to complete this course will be able to
- Tokenize and segment natural language using semantic rules and represent them
- Describe the issues and challenges in generating content
- Tag parts of speech and show its application in multiple languages
- Explain how speech recognition works and throw light on the research issues in it
- Explain any two algorithms in current domains of NLP research
- Describe NLP’s importance to the society.
OBJECTIVES:

- To expound on the need for clustering
- To illustrate the current needs of clustering systems
- To illustrate the models used in clustering
- To focus on clustering algorithms in the current and emerging applications of computer science.
- Focus on clustering in different data types like multimedia
- Show how time series data must be handled for effective usage.

MODULE I

INTRODUCTION TO CLUSTERING


MODULE II

CLUSTERING


MODULE III

GRID-BASED CLUSTERING


MODULE IV

CLUSTERING ALGORITHMS

Stream Clustering Algorithms- Big Data Clustering- One-Pass Clustering Algorithms- Randomized Techniques for Clustering Algorithms- Parallel and Distributed Clustering Algorithms- Similarity Measures for Categorical Data- Descriptions of Algorithms. Case study
MODULE V

MULTIMEDIA DATA CLUSTERING

Document Clustering- Modelling a Document- General Purpose Document Clustering- Clustering Long Documents- Clustering Short Documents- Clustering Multimedia Data- Clustering with Image Data- Clustering with Video and Audio Data- Clustering with Multimodal Data Case study.

MODULE VI

APPLICATIONS

Evaluation methods for clustering - Time Series Data Clustering- Online Correlation Based Clustering - Similarity and Distance Measures- Shape Based – Time Series Clustering Techniques-Application-Case study.

L – 45; Total Hours : 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students to complete this course will be able to

- Define clustering in the context of other similar sub-domains like pattern matching and classification
- Apply statistical and probabilistic methods for clustering data.
- Relate the clustering systems with data mining and show how its usage.
- List and explain the methods of clustering used in current and emerging fields of computer science.
- Work with audio, video and text data to derive outcomes that point to trends in the domain.
- Apply time series algorithms for clustering in the context of a real life problem.
OBJECTIVES:

- To establish the role of logic in Knowledge Engineering.
- To illustrate the resolution and reasoning techniques for knowledge interference.
- To show how the classification and inheritance concepts is used in Knowledge Engineering.
- Acquire knowledge on logic and limitations of defaults in Knowledge Engineering.
- Explore the knowledge in fuzzy logic to represent the uncertainty.
- To trace how the reasoning takes place in Knowledge Engineering.

PREREQUISITE:

DATA MINING

MODULE I INTRODUCTION


MODULE II RESOLUTION AND REASONING

Proportional Case - Handling Variables and Qualifies - Dealing with Intractability - Reasoning with Horn Clauses - Procedural Control of Reasoning - Rules in Production - Description Logic - Issues in Engineering - Vivid Knowledge - Beyond Vivid.

MODULE III REPRESENTATION

Object Oriented Representations - Frame Formalism - Structured Descriptions - Meaning and Entailment - Taxonomies and Classification - Inheritance - Networks - Strategies for Defeasible Inheritance - Formal Account of Inheritance Networks.

MODULE IV DEFAULTS

MODULE V  UNCERTAINTY AND EXPRESSIVENESS

Fuzzy Logic - Nonmonotonic Logic - Theories and World - Semiotics - Auto epistemic Logic - Vagueness - Uncertainty and Degrees of Belief - Non-categorical Reasoning - Objective and Subjective Probability.

MODULE VI  ACTIONS AND PLANNING


Total Hours: 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Identify the various techniques to convert knowledge into formal logic statements.
- Apply the resolution and reasoning techniques for knowledge interference.
- Demonstrate the strategies used to represent the Knowledge Engineering process.
- Trace the logic and limitations of defaults in Knowledge Engineering.
- List the limitations of formal logic and apply fuzzy logic to represent uncertainty.
- Describe techniques for planning and reasoning in Knowledge Engineering.
OBJECTIVES:
- To describe the principles of visual thinking.
- To show how the 2D space is mapped.
- Design rules for links and cycles.
- Introduce the importance of predictive modeling.
- To showcase the applications of visualization.
- Create model using semi formal visual language.

PREQUISITE:
MULTIMEDIA AND GRAPHICS

MODULE I VISUAL THINKING

Visual thinking - Visual detail - Top down Vs bottom up process - Implications for design - Steps in visual thinking - Distributed cognition.

MODULE II REPRESENTING KNOWLEDGE


MODULE III MODELING USING A SEMI FORMAL VISUAL LANGUAGE

Basis of the MOT (Modeling using Object types): Schema representation in MOT, Objectives of the representation, Construction Principles - Basic Knowledge Types and Relations - Syntax Rules of the MOT Language: The MOT meta-model, Rules regarding the origin and destination of links - Rules regarding cycles and multiplicity of links - Representing other types of models in MOT.
MODULE IV  STRUCTURING 2D SPACE

Patterns - Pattern processing machinery - Binding process - Texture regions - Patterns channels and attention - Visual pattern queries - Pattern for design - Semantic pattern mappings.

MODULE V  PREDICTIVE MODELING


MODULE VI  CASE STUDIES

Industry specific data mining - Data analysis case study - Credit scoring case study - Data mining non tabular data.

Total Hours: 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

• Relate visual thinking with visualization.
• Relate commonly used artifacts with visualization.
• Able to design effective data visualization for the given data.
• Visualize pattern matching process for a given scenario.
• Apply predictive modeling for the given data.
• Apply visualization to real-life situations.
OBJECTIVES:

- To provide the students with a data based view of marketing decisions.
- To acquire the knowledge for basic business data processing.
- To differentiate relational database and data warehouse modeling concepts.
- To cover concepts and fundamentals of Data Mining for better marketing campaigns and customer management.
- Describe the typical data warehouse lifecycle.
- Relate current trends in data warehousing.

PREQUISITE:
DATA BASE MANAGEMENT SYSTEM

MODULE I  DATA MINING  9

Data Mining: - Data Mining Functionalities - Data Preprocessing - Data Cleaning- Data Integration and Transformation - Data Reduction - Data Discretization and Concept Hierarchy Generation. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods - Mining Various Kinds of Association Rules - Association Mining to Correlation Analysis - Constraint-Based Association Mining.

MODULE II  BUSINESS INTELLIGENCE  8

Effective and timely decisions - Data, information and knowledge - Role of mathematical models - Business intelligence architectures: Cycle of a business intelligence analysis - Enabling factors in business intelligence projects - Development of a business intelligence system - Ethics and business intelligence

MODULE III  DATA ANALYSIS  7

Business focussed data analysis - Top down logical data modelling - Bottom up source data analysis - Data cleansing - Deliverables of data analysis - Importance of data analysis.

MODULE IV  KNOWLEDGE DELIVERY  9
The Business Intelligence User Types- Standard Reports-Interactive Analysis and Ad Hoc Querying- Parameterized Reports and Self-Service Reporting-dimensional analysis-Alerts/Notifications- Visualization: Charts- Graphs-Widgets-Scorecards and Dashboards-Geographic Visualization- Integrated Analytics- Considerations: Optimizing the Presentation for the Right Message.

MODULE V  EFFICIENCY

6

Efficiency measures - The CCR model: Definition of target objectives - Peer groups - Identification of good operating practices: cross efficiency analysis - Virtual inputs and outputs - Other models.

MODULE VI  FUTURE OF BUSINESS INTELLIGENCE

6


Total Hours: 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:
• Analyze the business problems.
• Model the relational database required for an enterprise data warehouse.
• Show how ERP business intelligence can be derived from data warehouses
• Applying Data mining techniques for business intelligence.
• Categorize the various tools and its application in mining data.
• Analyze data to generate information and knowledge that lead to informed decisions for businesses.
OBJECTIVES:

• To give the basic foundation for mining procedures and related techniques.
• To expose to various classification algorithms
• To cluster the data using unsupervised learning algorithms
• To demonstrate different crawling algorithms for web mining
• To generate wrapper rules for data integration on the Web
• To experiment with emerging trends in web mining

PREQUISITE:
DATA BASE MANAGEMENT SYSTEM

MODULE I  MINING FOUNDATION  8

MODULE II  SUPERVISED LEARNING  8

MODULE III  UN-SUPERVISED LEARNING  8
Unsupervised Learning: K-means Clustering - Representation of Clusters - Hierarchical Clustering - Distance functions - Cluster Evaluation.

MODULE IV  WEB MINING AND CRAWLING  7
MODULE V  WRAPPER GENERATION AND INFORMATION INTEGRATION


MODULE VI  EMERGING TRENDS IN WEB MINING


Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES: Students who complete this course will be able to:

- Distinguish the web mining process and apply rule based algorithms
- Analyze and apply suitable classification algorithms
- Choose appropriate clustering algorithms and implement them for the given real time scenario
- Examine the working of web mining crawlers and summarize their features
- Interpret the various wrapper rules and web query interfaces
- Summarize the recent web mining trends and recommend techniques to a given scenario.
OBJECTIVES:

- Depict the issues and challenges in the web publishing domain
- Illustrate the needs of web publishing domain
- Rationalize the need to manage content
- Showcase how web publishing can meet the needs of content management
- Recognize the components of content management and provide various solutions to manage content in web.
- Analyze the information models, content units and apply the content management plans and strategies to meet various application needs.

PREQUISITE:
WEB TECHNOLOGY.

MODULE I  INTRODUCTION TO WEB PUBLISHING  7

Basics of Web Publishing - Introduction to HTML - Introduction to PHP - Adobe Acrobat and PDF - Preparing content and format - Configuring the Servers.

MODULE II  WEB PUBLISHING AND FILEMAKER  9


MODULE III  CONTENT MANAGEMENT BASICS  8


MODULE IV  CONTENT MANAGEMENT SOLUTION  7

Phased Solution Approach - Authoring and Acquiring content - Content Management repository - Assembling and Linking content - Content Delivery - Information Sources.
MODULE V INFORMATION MODELS, TYPES AND CONTENT UNITS

Three-Tier Structure information model - Static Information Models - Dynamic Information Models - Defining Component of the model - Building a Model - Developing information types - Developing Content Units.

MODULE VI CONTENT PLANS AND STRATEGIES

Content Plans for Static Web Sites - Content Plans for Dynamic Web Sites - Developing Single Source strategies - Plan and author for reuse - Staffing - Establish business case for CMS.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Explain the basics principles of web publishing and list the tools used in it with their application use cases
- Given a scenario in web publishing, select an appropriate tool and apply it for effective outcomes
- Describe the need for content management systems
- Design appropriate information models based on the web content.
- Analyze the properties of a content management system and trace its operation
- Develop a design plan for content management system with emphasis on all the aspects using staffing.
OBJECTIVES:

- To introduce the concepts and the role of requirements engineering in software engineering.
- To introduce the different requirements elicitation techniques.
- To describe the processes of requirements elicitation and analysis techniques.
- To consider the rationale in defining requirements and preparing requirements analysis documents.
- To provide an insight into the current techniques, notations, methods, processes and tools used in requirements engineering.
- To provide comprehensive knowledge about the different methods of cost estimation for a software project.

PREQUISITE:

SOFTWARE ENGINEERING

MODULE I INTRODUCTION

The Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management - Requirements elicitation- Requirements analysis documentation-Verifying requirements quality.

MODULE II ANALYSING THE PROBLEM

The five steps in problem analysis- business modeling - Systems engineering of software intensive systems - Understanding user and stakeholders needs-Features of a product or system -Interviewing - Requirements workshops-Brainstorming and Idea reduction-Storyboarding.
MODULE III  REQUIREMENTS MANAGEMENT PRINCIPLES AND PRACTICES  


MODULE IV  DEFINING AND REFINING REQUIREMENTS  


MODULE V  SOFTWARE REQUIREMENTS ANALYSIS  


MODULE VI ANALYSIS TOOLS FOR REQUIREMENT MANAGEMENT  


Total Hours: 45

TEXT BOOKS:

REFERENCES:
OUTCOMES:

Students who complete this course will be able to:

- Analyze the various requirements elicitation methods and select the appropriate one.
- Identify the requirements of a project and document requirements.
- Explore requirement analysis methods and traceability of requirements.
- Demonstrate the notational paradigms that can be applied to requirements.
- Apply methods and tools for requirements management from the development of project.
- Examine the different cost estimation techniques and analyze the estimation factors.
OBJECTIVES:

- To learn the testers role in a Software Development Organization.
- To find defects created by the programmer while developing the software.
- To portray the recent trends in the field of Software testing.
- To explore the different levels and types of testing.
- To have a thorough overview about the test design strategy and review plans.
- To throw light on the importance of test automation.

PREQUISITE:

OBJECT ORIENTED SOFTWARE ENGINEERING

MODULE I  SOFTWARE TESTING - QUALITY STANDARDS

MODULE II  TEST CASE DESIGN
Test Case Design Strategies - Using Black Box Approach to Test Case Design-Random Testing - Requirements based testing - Boundary Value Analysis - Decision tables - Equivalence Class Partitioning - State-based testing - Cause-effect graphing -Error guessing - Compatibility testing - User documentation testing - Domain testing Using White Box Approach to Test design - Test Adequacy Criteria - Static testing vs. structural testing - code functional testing-Coverage and Control Flow Graphs - Covering Code Logic - Paths - Their Role in White-box Based Test Design - Code complexity testing - Evaluating Test Adequacy Criteria.

MODULE III  LEVELS OF TESTING
The Need for Levels of Testing - Unit Test - Unit Test Planning - Designing the Unit Tests - The Test Harness - Running the Unit tests and Recording results - Integration tests - Designing Integration Tests - Integration Test Planning - Scenario testing - Defect bash elimination - System Testing - Acceptance testing - Performance testing - Regression Testing - Internationalization testing - Ad-hoc testing - Alpha, Beta Tests - testing OO systems - Usability and Accessibility - Testing - Configuration testing - Compatibility testing - Testing the documentation - Website testing.

**MODULE IV TEST MANAGEMENT**


**MODULE V CONTROLLING AND MONITORING**

Measurement and Milestones for Controlling and Monitoring - Status Meetings - Reports and Control Issues - Criteria for Test Completion - SCM - Types of reviews - Developing a review program - Components of Review Plans - Reporting review results.

**MODULE VI TEST AUTOMATION**

Software test automation - Skills needed for automation - Scope of automation - Design and architecture for automation - Requirements for a test tool - Challenges in automation - Test metrics and measurements - Project, progress and productivity metrics.

**Total Hours: 45**

**TEXT BOOKS:**


**REFERENCES:**

OUTCOMES:

Students who complete this course will be able to:

- Apply the appropriate testing technique for the developed software.
- Develop various testing design strategies.
- Perform different types of testing given an application.
- List the type of defects in a software application.
- Utilize various software testing tools and automation techniques.
- Test software in a structured and organized way.
OBJECTIVES:

- To provide an insight into the theoretical concepts of automated planning and reasoning techniques
- To expose the strengths and weaknesses of different automated planning and reasoning approaches for software agents
- To highlight concepts and techniques of the agent technology and its standards and to evaluate current software agent systems.
- To introduce the methodology and applications of software agents and multi agent systems.
- To emphasize on co-ordination among autonomous agents.
- To provide an insight into multiagent interactions and approaches to characterize them.

PREQUISITE:

OBJECT ORIENTED SOFTWARE ENGINEERING ARTIFICIAL INTELIGENCE

MODULE I  INTRODUCTION  8

The Vision Thing- Some Views of the Field- Agents as a paradigm for software engineering Agents as a tool for understanding human societies- Research-Ethical-Professional and Legal Issues.

MODULE II  MULTI AGENTS SYSTEM  7


MODULE III  DEDUCTIVE REASONING AGENTS  7

Agents Framework - Agent Reasoning - Agents as Theorem Provers- Agent-oriented programming – Concurrent MetateM

MODULE IV  PRACTICAL REASONING AGENTS  8

MODULE V  REACTIVE AND HYBRID AGENTS


MODULE VI  MULTI-AGENT INTERACTIONS

Utilities and preferences - Multi-agent encounters - Dominant strategies and nash equilibria - Competitive and zero sum interactions - the prisoner's dilemma - Other symmetric 2*2 interactions - Dependence relations in multi-agent systems.

Total Hours: 45

TEXT BOOK:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Analyze agent behavior in variety of environments
- Apply agent modeling techniques to agent based systems.
- Appreciate the trade-offs inherent in the design of agent-based systems.
- Evaluate, design, and implement automated planning and reasoning techniques.
- Investigate strategies used in classic scenarios such as prisoner's dilemma.
- Identify the reactive agents that cause vital changes in the process.
OBJECTIVES:

- To expose the relation between interaction design and users expectations.
- To employ a set of usability engineering methods to refine a designed user-interface.
- To highlight the user interfaces in terms of work context Values and attitudes.
- To address a user-interface using suitable evaluation methodology.
- To acquire the concepts of usability, design principles, guidelines, heuristics and other fundamentals of Human-Computer Interaction.
- To describe the nature of the design process and its relation to other phases of the software development process.

PREQUISITE:
OBJECT ORIENTED PROGRAMMING

MODULE I  INTRODUCTION  7

The importance of the user interface design, importance of user interface, human computer interface-Characteristics of Graphical and web user interface, Graphical User interface, Web user interface, Principles of user interface design.

MODULE II  KNOWING THE USER  7

The user interface design process -Know your user or client, important human characteristic in design, Human consideration in design -Understand the Business function, Human consideration in screen design, Technical consideration in interface design.

MODULE III  SYSTEM MENUS AND NAVIGATION SCHEMES  8

Develop System Menus and Navigation menus-Select the proper kinds of windows-Select the proper device based controls.
MODULE IV  CONTROLS AND WEB PAGES

Select the proper screen based controls-Text for web pages-Provide effective feedback and Guidance and Assistance.

MODULE V  PROVIDE EFFECTIVE INTERNATIONALIZATION

Provide internationalization and Accessibility - Create meaningful graphics, icons and Images-Choose the proper colors.

MODULE VI  TEST, TEST AND RETEST

Organize and layout Windows and Pages - Test, Test and Retest, The purpose and importance of usability testing, kinds of test -Analyze, Modify and Retest.

Total Hours: 45

TEXT BOOK:


REFERENCE:


OUTCOMES:

Students who complete this course will be able to:

- Demonstrate knowledge about some interaction design patterns and their applicability
- Select and execute an appropriate interaction design pattern for a particular user interface situation.
- Use several of the important concepts for interface design (i.e. color and typography) in their designs.
- Analyze users’ needs, usability goals and user experience goals of a small-to-medium-sized software application.
- Implement basic user interface prototypes based on the design process
- Develop and construct suitable user interface for a given scenario
OBJECTIVES:

- An introduction to fundamentals of Pattern recognition.
- The ability to choose an appropriate Pattern classification algorithm for a given pattern recognition problem.
- Attain necessary foundation for efficient implementation of classification and clustering algorithms.
- Exposing the student to the theorem, classifiers used in Navie Bayesian.
- Explain the fundamental principles of Support vector machine.
- Be familiar with the different types and algorithm used for Clustering.

PREQUISITE:
DATABASE MANAGEMENT SYSTEM

MODULE I  PATTERN RECOGNITION OVERVIEW  7

Pattern Recognition - Data Sets - Different Paradigms - Representation - Data Structures - Representation Of Clusters - Proximity Measures - Size Of Patterns - Feature Extraction - Feature Selection - Evaluation Of Clustering - Evaluation Of Classifiers.

MODULE II  NEAREST NEIGHBOUR BASED CLASSIFIER  7

Nearest Neighbor Algorithm - Variants of NN Algorithm - Use of Algorithms - Data Reduction - Prototype Selection.

MODULE III  BAYERS CLASSIFIER  8

Bayes Theorem - Minimum Error Rate Classifier - Estimation of Probabilities - Comparison With The NNC - Naïve Bayes Classifier - Bayesian Belief Network.

MODULE IV  DECISION TREES  8

Introduction - Decision Trees For Pattern Reorganization - Construction of Decision Trees - Splitting At The Nodes - Overfitting And Pruning - Examples Of Decision Tree Induction.
MODULE V  SUPPORT VECTOR MACHINES

Introduction - Learning the Linear Discriminant Function - Neural Networks - SVM for Classification.

MODULE VI  CLUSTERING

Importance of Clustering - Hierarchical Algorithms - Partitional Clustering - Clustering Large Data Sets.

Total Hours: 45

TEXT BOOK:


REFERENCE:


OUTCOMES:

Students who complete this course will be able to:

○ have good knowledge of the issues and challenges faced while doing the Pattern Reorganization.

○ Introduce the nature and inherent difficulties of the pattern recognizing problem

○ Comparatively analyze various pattern recognition algorithms.

○ Select and Develop suitable classification process, features to solve given pattern recognition problem.

○ Summarize, analyze, and relate research in the pattern recognition area verbally and in writing

○ Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.
OBJECTIVES:

- To review the possibilities for integrating blended learning best practices to support student success.
- To provide an overview of our methodology for the public interest, for those who exercise the profession as accountants or auditors and for others who have a general interest in quality assurance methodology. To illustrate why quality is key in all of the testing stages in the Software Development Lifecycle.
- Be able to select suitable testing types and techniques based on the project's focus and the desired outcome.
- Identify, prioritise, plan, create and execute test cases in test management.
- Effectively log and manage identified defects.
- Accurately measure and report the progress of testing.

PREQUISITE:
SOFTWARE ENGINEERING.

MODULE I  INTRODUCTION 5

Concept of quality - Quality and uncertainty - Quality and manufacturing - Quality and services - Historical evolution of quality approaches.

MODULE II  TOTAL QUALITY MANAGEMENT 8

Introduction - Measurements and controls in TQM - Approaches to TQM and quality improvement - Certification and ISO 9000/9004 - Examples and applications - Total Productive Maintenance (TPM) - Reengineering and TQM-Implementation.

MODULE III  TOOLS AND MANAGEMENT OF QUALITY CONTROL 8

Introduction - The tools of TQM - A statistical refresher - The reliability function - Formulation of problems under uncertainty - Examples and applications - Decision rules - Bayes rule and Bayesian decision making.

MODULE IV  INSPECTION AND ACCEPTANCE SAMPLING 8

Introduction - Acceptance sampling - Rectifying inspection - Variables sampling plans - Inspection in a continuous process - Economic inspection sampling.
MODULE V  CONTROL CHARTS

Introduction - Process capability - Constructing control charts - Pre-control - Control charts and the ARL - CUSUM Charts - Interpreting charts - Economic control charts - The practice of control charts.

MODULE VI  STRATEGIC ISSUES AND ECONOMIES OF QUALITY


Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Describe the concept of quality assurance and total quality management.
- Analyze the need for statistics in process control and product evaluation.
- Apply the knowledge of sampling on real-time data.
- Evaluate alternative standards, models and techniques aimed at achieving quality assurance in a variety of software development environments.
- Propose and defend innovative solutions to software quality assurance and measurement problems in the context of various software development environments.
- Critically evaluate leading edge approaches in software development and attendant quality assurance methodologies, presenting the research using Harvard referencing.
OBJECTIVES:

- To illustrate the various software process models and the importance of planning and scheduling.
- To incorporate the need for analyzing the requirement and learn different stages of analysis.
- To design the software and the user interface based on the analysis.
- To distinguish between different testing strategies and learn the importance of configuration management.
- To learn the importance of the role of testing in quality assurance.
- To illustrate the emerging trends and methodologies of software development.

PREQUISITE:
SOFTWARE ENGINEERING

MODULE I PROCESS MODELS 7


MODULE II REQUIREMENT ANALYSIS 7

System engineering hierarchy - Requirement engineering: Tasks, Initiating the process, eliciting requirements, Developing use cases - Negotiating requirements - Validating requirements - Building the analysis models: Concepts - Object Oriented Analysis - Scenario based modeling - Data & control flow oriented model - Class based model - Behavioral model.

MODULE III SOFTWARE DESIGN 8

Design concepts - Design models - Pattern based design - Architectural design - Component level design - Class based and conventional components design - Real-time system design - User interface: Analysis and design.

MODULE IV SOFTWARE TESTING 7

Software testing - Strategies - Issues - Test strategies for conventional and object oriented software - Validation and system testing - Testing tactics: White box testing,
Basis path testing - Control structure testing - Black box testing - Object oriented testing - Testing GUI - Testing Client/Server - Documentation testing.

MODULE V SOFTWARE QUALITY ASSURANCE

Software quality concepts - Quality assurance - Software technical reviews - Formal approach to software quality assurance - Reliability - Quality standards - Software quality assurance plan - Software maintenance - Software configuration management - Reverse engineering and reengineering - CASE tools.

MODULE VI EMERGING STANDARDS, TRENDS AND METHODOLOGIES


Total Hours: 45

TEXTBOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Analyze a software system and elucidate the requirements.
- Design a software system and validate the requirements.
- Apply appropriate testing strategies on it.
• Develop real time systems with quality assurance checks.
• Deploy the software based on the techniques in software configuration management.
• Maintain the developed software based on the emerging trends.
OBJECTIVES:

- To use specific tools and software to produce a graphic product based on the principle of creative art.
- To create a graphic product based on the principle of creative art.
- To introduce the principles of animation and design animated contents.
- To adapt professional workflows into the design process of animation industry.
- To render any objects using shadowing effects.
- To create graphic material using tools and software in line with the industrial norm.

PREQUISITES:

BASIC KNOWLEDGE ON COMPUTER FUNDAMENTALS.

MODULE I  2D PRIMITIVES  8

Output primitives - Line, Circle and Ellipse drawing algorithms - Attributes of output primitives - Two dimensional Geometric transformation - Two dimensional viewing - Line, Polygon, Curve and Text clipping algorithms.

MODULE II  3D CONCEPTS  8

Parallel and Perspective projections - Three dimensional object representation - Polygons, Curved lines, Quadric Surfaces - Visualization of data sets - 3D transformations - Viewing - Visible surface identification.

MODULE III  COLOR MODELS  6


MODULE IV  COMPUTER ANIMATION  7

General Computer Animation, Raster, Key frame - Graphics programming using OPENGL - Basic graphics primitives - Drawing three dimensional objects - Drawing three dimensional scenes.
MODULE V  RENDERING

Introduction to Shading models - Flat and Smooth shading - Adding texture to faces - Adding shadows of objects - Building a camera in a program - Creating shaded objects - Rendering texture - Drawing Shadows.

MODULE VI  FRACTALS

Fractals and Self similarity - Peano curves - Creating image by iterated functions - Mandelbrot sets - Julia Sets - Random Fractals - Overview of Ray Tracing - Intersecting rays with other primitives - Adding Surface texture - Reflections and Transparency - Boolean operations on Objects.

Total Hours: 45

TEXT BOOKS:


REFERENCE:


OUTCOMES:

Students who complete this course will be able to:

- Identify the performance characteristics of advanced computer graphics pipeline.
- Distinguish between generic computer architecture and support for high performance graphics.
- Apply animated contents in any Multimedia projects.
- Design Multimedia content for handheld devices.
- Use OpenGL or any other graphical tools to create and render any object
- Use surface and object modeling techniques to build 3D models
OBJECTIVES:

- To introduce the importance and key concepts of project management.
- To expose the process of planning and controlling the project.
- To introduce the concepts of portfolio project management.
- Method of planning and guiding a project from start to finish
- To introduce and effectively execute all project management processes
- To examine roles and environments and various techniques of planning, evaluation, and control.

PREQUISITE:
SOFTWARE ENGINEERING

MODULE I INTRODUCTION

Project Management: The key to thrive in the Project Management World, Foundation Principles of Project Management, Knowing your key stack holders and winning their cooperation.

MODULE II DEFINING THE PROJECT

Five key document to manage expectation and define success - Risk Management and work Breakdown Structure.

MODULE III THE PLANNING PROCESS

Realistic scheduling - The art and science of accurate estimating - Balancing the trade off among cost, schedule and quality.

MODULE IV CONTROLLING THE PROJECT

Building a high performance project team - Clear communication among project stake holders - Measuring Progress - Solving common project problems.

MODULE V ADVANCE PROJECT MANAGEMENT

Project initiation, Information Technology project success factors - Align project resources with business strategy.

Total Hours: 45

TEXT BOOK:

REFERENCES:

OUTCOMES:
Students who complete this course will be able to:

- Analyze the key concept of project management.
- Manage different projects in their workplace.
- Improve their personal job skill of becoming a valuable project manager in the years ahead.
- Define the terms project and project management.
- Explain the role of the project manager in initiating and completing a project.
- Explain knowledge areas including project integration management, project scope management, project time management, project cost management, project quality management
- Define the terms project and project management.
- Identify the project management process groups including initiating, planning, executing, monitoring and controlling, and closing.
- Explain the role of the project manager in initiating and completing a project.
OBJECTIVES:
- To define and highlight importance of software engineering process models.
- To discuss about the various strengths and weaknesses involved in people ware activities in a software process models.
- To extend software process definitions to address people-related considerations as the key practices in extreme programming.
- To organize the activities in an pattern towards effectiveness, which helps improving the software process.
- To analyze the capabilities of various components involved in process and utilize them in building an effective model.
- To develop process based on the System dynamics modeling method that enables us to build formal computer simulations of complex systems.

PREREQUISITE:
SOFTWARE ENGINEERING

MODULE I  INTRODUCTION  6
Software processes - Software process models - Process activities - Coping with change - The rational unified process.

MODULE II  SOFTWARE PROCESS AND PEOPLEWARE BASICS  7
Software process versus lifecycle - Software process research - Software process modeling - Peopleware - Human competencies - Modeling peopleware in the software process.

MODULE III SOFTWARE PROCESS MODELS  8
Descriptive criteria - Activity oriented models - People oriented models - Activity oriented models.

MODULE IV  CAPABILITIES ORIENTED SOFTWARE PROCESS MODEL  8
Adding capabilities to the software process model - People dimension - Roles dimension - Product dimension - Capabilities based assignment method in action - Benefits of incorporating peoples capabilities into the software process.

MODULE V  SOFTWARE PROCESS DYNAMICS AND  8
SIMULATION

Modeling, Simulation and improvement - Software process simulation with system dynamics - High level software project modeling with system dynamics.

MODULE VI SOFTWARE PROCESS MODELING

Socio-Technical interaction network in free/open source development process - Discovering, modeling and re-enacting open source software development processes - Case study.

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Compare and contrast different software process models.
- Design software based on Component-based development (CBD), Agile and Extreme Programming (XP).
- Analyze the issues and problems of scaling agile development methods to the development of large software systems.
- To acquaint with the project management skills
- Implement CPM and PERT methods in effective project management by planning and scheduling based on costing.
- Master the notion of user-centric viewpoints in system design.
- Develop a model based considering various attributes involved and their impact of changes that affect the entire process.

Total Hours : 45
OBJECTIVES:

- To study in detail software maintenance and how it affects all levels of the software evolution process.
- To impart key issues involved in software maintenance and the best solutions to overcome.
- To provide knowledge on how the object-oriented software and client/server software, corporate education and training programs, creative cost controls, and others affect software maintenance.
- To interpret the importance of reusing and reversing impact the software model.
- To visualize the process of evaluating the quality of a product and enforcing adherence to software product standards and procedures.
- To analyze the product from the customer perspective and customize according to their requirements by reusing than redeveloping.

PREQUISITE:
SOFTWARE ENGINEERING

MODULE I  THE CONTEXT OF MAINTENANCE    7
Introduction to Basic concepts- Maintenance framework -Fundamentals of software change- Limitations and Economic Implications to Software Change-Maintenance process.

MODULE II  UNDERSTANDING OF MAINTENANCE    8
Program understanding-Reverse engineering-Reuse and reusability-Testing-Management and organizational issues.

MODULE III  PROBLEM SOLVING AND QUALITY ASSURANCE    8
Problem Reporting - Problem Resolution- Fix Distribution-Other Forms of Maintenance-Metrics and Measurements - Software Quality Assurance Activities for Maintenance
MODULE IV  KEEPING TRACK OF MAINTENANCE PROCESS


MODULE V  MAINTENANCE TEAMS


MODULE VI  LOOKING TO THE FUTURE

Software maintenance management- Education and training-impact of object oriented technology on software maintenance- Software maintenance resources- The future of software maintenance.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Identify the primary activities of software maintenance.
- Solve the problem involved in a process and ensure the software quality in maintenance.
- Summarize the end-user participation, product functionality, and utilization factors of various components that affect the software maintenance quality.
- State the effects of globalization on the various roles and organization structure and the issues that arise in the teams distributed geographically.
- Identify the mission critical systems built for specific verticals that usually find high priority in the subsequent release and version in a product.
• List out the various ways to measure the ease of the maintenance process, not only to reduce the cost of maintainability but to ascertain whether the maintenance of a specific software product is worthwhile or not.
OBJECTIVES:
- Trace the relationship between design patterns and object orientation principles
- Relate software engineering with software design patterns
- Illustrate the consequences of applying software design patterns to the overall software quality of a system.
- Be able to mix patterns with each other and describe the consequences of mixing patterns on the overall quality of a system.
- Position UML in software design patterns
- Trace the relationship between current and evolving methods of software engineering and design patterns.

PREQUISITE:
SOFTWARE ENGINEERING

MODULE I  THE OBJECT ORIENTED PARADIGM, THE UML  8

MODULE II  INTRODUCTION TO DESIGN PATTERNS  5
Overview - Moving From Architectural To Software Design Patterns – Why Study Design Patterns? - Advantages of Study Design Patterns

MODULE III  THE FACADE PATTERN AND THE STRATEGY PATTERN  8
MODULE IV  BRIDGE PATTERN AND ABSTRACT FACTORY PATTERN


MODULE V  THE PRINCIPLES AND STRATEGIES OF DESIGN PATTERN

The open-closed principle - The principle of designing from context - The principle of encapsulating variation - Abstract classes Vs Interfaces - The principle of healthy skepticism.

MODULE VI  LESSONS FROM DESIGN PATTERNS: FACTORIES

Factories - The universal context revisited - Factories follow guidelines - Limiting the vectors of change - Different roles of factories - Design patterns reviewed-How design patterns encapsulate implementations - Commonality and variability analysis and design patterns - Decomposing a problem domain into responsibilities - Patterns and contextual design - Design patterns and agile coding practices.

Total Hours: 45

TEXT BOOK:

REFERENCES:

OUTCOMES:
Students who complete this course will be able to:

- Explain why design patterns must be studied
- Describe the purpose of design patterns and trace the linkage with object oriented framework
- Recognize common software design patterns and analyze when to apply them.
- Trace the tradeoffs to be made when implementing a design pattern.
- Explain how UML can be used to capture the patterns identified in a system
- Demonstrate the applicability of the design patterns with examples from real life
OBJECTIVES:

- To explain an overview of social networks and its importance.
- To discuss the social network concepts and various methods of analysis.
- To familiarize with the methodological issues connected with social network.
- To identify the pros and cons of different data mining techniques for modeling a given social phenomenon.
- To use mathematical techniques to model and analyze structural and dynamical properties of social networks.
- To expose and train on using various tools and techniques for analyzing and visualizing social media networks.

PREUNIQUE

COMPUTER NETWORKS

MODULE I INTRODUCTION TO SOCIAL NETWORKS

Brief history of Social Network Analysis - Connected World - Networks: Actors, Relations and Attributes - Networks as Information Maps - Networks as Conduits - Leaders and Followers - Psychological foundations of social networks - Basic building Blocks.

MODULE II NETWORK CONCEPTS

Individual Members of the Network - Sociological Questions about Relationships - Whole Social Networks - Distributions - Multiplexity - Roles and Positions - Network Segmentation - Graph Theory - Notations for Social Network Data.

MODULE III SOCIAL NETWORK ANALYSIS

Points, Lines and Density - Centrality and Centralization - Components, Cores and Cliques - Positions, Roles and Clusters - Dimensions and Displays.

MODULE IV METHODOLOGIES

MODULE V  ANALYSIS LEVELS

Actor Level in Complete Networks - Actor Level in Ego Networks - Dyad Level-Triad Level - Subgroups Level - Network Levels - Positions and Roles Analysis.

MODULE VI  TOOLS AND TECHNOLOGIES

Twitter Analytics - Facebook Analytics - Google+ Analytics - Pajek - Network Visualization Tools.

Total Hours: 45

REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Describe the importance of social networks.
- Summarize the theories and concepts of social networks.
- Plan and execute network analytical computations.
- Compare and contrast of the methodologies supported for visualization and measures.
- Solve concrete managerial and consulting problems using social network Analysis.
- Analyze the social networks by applying various methods of analysis, tools and techniques.
OBJECTIVES:

- To have an exposure on distribution models and transaction management on NoSql.
- To learn various NoSQL databases and their features.
- To study concepts relating to storage architecture and databases.
- To expose transaction management and data integrity.
- To work on concepts interfacing with NoSql using the tools.
- To address the issues on databases and its performance tuning.

PREQUISITE:

DATA BASE MANAGEMENT SYSTEM

MODULE I  INTRODUCTION TO NoSQL  7

Definition - Need for NoSQL - Emergence and History of NoSQL - Aggregates-Key/Value Stores - Document Databases - Column Family Stores - Graph Databases - Schemaless Databases - Distribution Models.

MODULE II  MANAGING TRANSACTION AND DATA INTEGRITY  8


MODULE III  STORAGE ARCHITECTURE AND IMPLEMENTATION  8


MODULE IV  NoSQL DATABASES  8

MongoDB - Redis - CouchDB - HBase - Apace Cassandra - Riak - Neo4j - PostgreSQL.

MODULE V  INTERFACING AND INTERACTING WITH NoSQL  8
Storing Data In and Accessing Data from MongoDB - Querying MongoDB - Storing Data In and Accessing Data from Redis - Querying Redis - Storing Data In and Accessing Data from HBase - Querying HBase - Storing Data In and Accessing Data from Apache Cassandra - Querying Apache Cassandra-Language Bindings for NoSQL Stores.

MODULE VI  ADVANCE TOPICS

Google App Engine Data Store - Amazon SimpleDB - MapReduce - Hive - Benchmarking and Performance Tuning.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Address the principles and techniques used under NoSQL.
- Compare the architectural methods and storage techniques used under NoSql.
- Attain knowledge on storage architectures and its implementation.
- Identify the issues related to transactions management.
- Interface NoSQL with tools and retrieve data from NoSql databases.
- Handle the database tools like Mapreduce and Hive.
COURSE OBJECTIVE

- To introduce the fundamentals of parallel Programming.
- To introduce the importance of the underlying architecture.
- To explain the emerging transactional approach to concurrency.

PREQUISITE:

MICROPROCESSOR

COMPUTER ARCHITECTURE

MODULE I  INTRODUCTION


MODULE II  FOUNDATIONS OF SHARED MEMORY


MODULE III  SYNCHRONIZATION

Monitors and Blocking Synchronization – Role of Locking – Concurrent Queues – ABA Problem – Concurrent Stacks and Elimination.

MODULE IV  CONCURRENT DATA STRUCTURES

Counting, Sorting and distributed coordination – Concurrent hashing and Natural Parallelism – Multiprocessor Scheduling and Parallelism - Barriers – Transactional Memory.

MODULE V  PARALLEL PROGRAM DEVELOPMENT

Two n-Body Solvers – Tree Search – Pthreads – OpenMP – MPI

TEXT BOOKS


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

- Write effective multiprocessor programs.
- Apply barriers, all of which are useful for structure concurrent applications
- Demonstrate synchronization and parallelism.
OBJECTIVES:

- To introduce the importance of virtualization in distributed computing.
- To learn the essentials need to build virtualization.
- To illustrate the taxonomy of virtualization.
- Identify security implications in virtualization
- To learn different type of virtualization.
- To comprehend the technical capabilities and business benefits of virtualization.

PREQUISITES:

BASICS OF CLOUD COMPUTING.

MODULE I  INTRODUCTION


MODULE II  VIRTUALIZATION INFRASTRUCTURE BUILDING

Comprehensive Analysis - Planning and Preparation - Preparing Network Layer- Preparing Storage- Prepare Host Servers - Testing Environment.

MODULE III  SERVER VIRTUALIZATION AND VIRTUAL LOADS


MODULE IV  DESKTOP VIRTUALIZATION

Working with system stack - Desktop Management Issues - Available Products- Licensing - Potential scenarios and audiences - Centralized Desktop Virtualization Infrastructures.
MODULE V  APPLICATION VIRTUALIZATION

Application Management Issues - Redesigning Application Management - Benefits of AppV - Compare Application Virtualization Products - Key points on AppV - Integrating Application, Profile and Desktop Virtualization.

MODULE VI  VIRTUALIZATION SECURITY


Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to:

- Explain virtualization and their role in elastic computing.
- Compare the strengths and limitations of virtualization.
- Analyze different types of virtualization with performance metrics.
- Describe the architecture and taxonomy of virtualization.
- Analyze the constraints and techniques in setting up virtualization through its enabling technologies.
- Design virtualization infrastructure solutions and recommendations based on the need.
OBJECTIVES

- To study various Fourier transforms and their application in Digital Filter design.
- To study the design of FIR and IIR Digital filters.
- To expose the concept of quantization noise and its effects in multi-rate signal processing.
- To study the architecture and features of various digital signal processors.

MODULE I  DISCRETE FOURIER TRANSFORM  8

Introduction to Discrete Fourier Transform, Direct computation of DFT, Properties of DFT, Efficient computation of DFT- FFT algorithms - Radix-2FFT algorithms -Decimation in Time, Decimation in Frequency algorithms, Computing Inverse DFT.

MODULE II  DESIGN AND IMPLEMENTATION OF IIR FILTERS  8

Design of Low Pass Butterworth filters, analog to analog transformation - Analog to digital transformation, Bilinear transformation - Prewarping, Impulse invariant transformation.

MODULE III  DESIGN AND IMPLEMENTATION OF FIR FILTERS  8


MODULE IV  FINITE WORD LENGTH EFFECTS  8

Representation of numbers, - Fixed point and binary floating point number representation - Comparison, errors due to truncation and rounding- off, Quantization noise - Derivation for quantization noise power at the input and output of a digital filter, Co-efficient quantization error - Product quantization error, Round-off effects in digital filters, Limit cycle oscillation - Overflow error-Signal scaling.
MODULE V  MULTIRATE DIGITAL SIGNAL PROCESSING

Mathematical description of change of sampling rate - Interpolation and Decimation , Decimation by an integer factor, Interpolation by an integer factor, Sampling rate conversion by a rational factor, Time and frequency domain descriptions - Single, Multi stage, Polyphase structures - Quadrature Mirror Filter banks - Sub-band Coding, few applications using sub-band coding.

MODULE VI  DIGITAL SIGNAL PROCESSORS

Introduction to DSP architecture - Harvard and Von Neumann architecture - Pipelining - Dedicated MAC unit - Advanced addressing modes, Architecture of TMS320C5X and C54X, Overview of instruction set of TMS320C5X and C54X.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

On completion of this course the student will be familiar with the

- Digital signal processing methods.
- Designing & analyzing of digital filters.
- Architecture and features of DSP Processors.
OBJECTIVES:
- Showcase how the need in multimedia has driven the innovation in video analytics
- Illustrate the basic processes involved from the acquisition to the analytics phases
- Expose how the modeling of the content is a key step in all the phases of video analytics
- Depict the relationship between components of the video affects the final output in analytics
- Model the relation between time and analytics
- Showcase the current research domains and applications in video analytics

PREREQUISITE
ALGORITHM ANALYSIS.
KNOWLEDGE IN MATHEMATICS

MODULE I  INTRODUCTION
Introduction to video Analysis - Video Broadcasting- Video Archives- Security and Surveillance - Business and education - Bridging the Semantic Gap - Video Principles - MPEG Standards.

MODULE II  DETECTING SHOT BOUNDARIES IN VIDEO
Shot-Boundary Detection- Feature Extraction - Modeling Prior Information - Modeling Discriminative Information - Bayesian Approach to Decision Module Design.

MODULE III  SEMANTIC SEGMENTATION
Principle of Content Coherence - Video Parsing Based on the Content Coherence Principle - Content Similarity between Clips: Keyframe Comparisons, Video Mosaics, Accompanying text - Audio-Assisted Video Parsing: Sound classification, Analyzing dominant sound source.

MODULE IV  INDEXING AND ABSTRACTION FOR RETRIEVAL
Video Indexing - Content Modeling - Multi-Segment Video Indexing - Video Content Representation for Browsing - Content Preview.

MODULE V  AFFECTIVE VIDEO CONTENT ANALYSIS  8


MODULE VI  CAMERA NETWORKS AND VIDEO ANALYSIS  7

Introduction to Camera Networks - Wide Area Tracking - Distributed Processing in Camera Networks - Object and Activity Recognition - Active Sensing.  
Total Hours : 45

TEXTBOOKS:

REFERENCES:

OUTCOMES:
Students who complete this course will be able to:

- List and explain the video analysis principles
- Trace the key transitions involved in the transformation from analysis to analytics in video domain
- Discuss how shot boundaries can be detected in videos
- Show the techniques of indexing and browsing in videos
- Review and discuss current approaches to high-level visual recognition
- Analyze the real time video by applying segmentation and classification techniques.
- Discuss the applications of video analytics in real life.
OBJECTIVES:

- To introduce the various components of Multimedia.
- To expose the principles of animation and design for developing multimedia applications.
- To adapt professional workflows into the design process of animation industry.
- To effectively create and develop animated content for multimedia projects.
- To develop multimedia content for Hand held devices.
- To develop interactive and animated multimedia content.

PREREQUISITE:

BASIC KNOWLEDGE ON GRAPHICS AND SOUND

MODULE I  INTRODUCTION TO MULTIMEDIA  8

MODULE II IMAGE AND AUDIO FUNDAMENTALS  8

MODULE III VIDEO BASICS FUNDAMENTALS  7
Animation Principles - Techniques - File Formats - Analog Video - Digital Video - Codecs - Format Converters - Shooting and Editing Videos

MODULE IV MULTIMEDIA REQUIREMENTS  8
MODULE V  MULTIMEDIA PROCESS


MODULE VI  MULTIMEDIA TOOLS

Macromedia Flash Introduction - Understanding the Interface - Drawing and Color Tools - Animation Basics - Shape Tweening - Filters and Blends – Motion Tweening - Timeline Effects - Action Scripts - Working with Text, Images, Videos - Integration.

Total Hours: 45

TEXT BOOKS:


OUTCOMES:

Students who complete this course will be able to:

- Identify the basic components, basic hardware and software requirements for multimedia development and playback.
- Apply animation principles in Multimedia application development.
- Identify and describe the function of the general skill sets in the multimedia industry.
- Apply animated contents in any Multimedia projects.
- Design Multimedia content for handheld devices.
- Design and create animation using computerized animation tools.
OBJECTIVES:

- To give an exposure to various environmental hazards and disasters: and various concepts and principles to manage disaster.
- To give exposure to various environmental policies & programs in India for disaster management.

MODULE I   ENVIRONMENTAL HAZARDS  7

Environmental hazards, Environmental Disasters and Environmental stress-Meaning and concepts. Vulnerability and disaster preparedness.

MODULE II  NATURAL DISASTERS  7

Natural hazards and Disasters - Volcanic Eruption, Earthquakes, Tsunamis, Landslides, Cyclones, Lightning, Hailstorms, Floods, Droughts, Cold waves, Heat waves and Fire.

MODULE III  MAN-MADE DISASTERS  7

Man induced hazards & Disasters - Soil Erosion, Chemical hazards, Population Explosion.

MODULE IV  DISASTER MANAGEMENT  8

Emerging approaches in Disaster Management- Preparing hazard zonation maps, Predictability / forecasting & warning, Preparing disaster preparedness plan, Land use zoning, Communication. Disaster resistant house construction, Population reduction in vulnerable areas, Awareness - Rescue training for search & operation at national & regional level - Immediate relief, Assessment surveys, Political, Administrative, Social, Economic, Environmental Aspects.

MODULE V  NATURAL DISASTER REDUCTION & MANAGEMENT  8
Provision of Immediate relief measures to disaster affected people, Prediction of Hazards & Disasters, Measures of adjustment to natural hazards.

**MODULE VI  ENVIRONMENTAL POLICIES & PROGRAMMES IN INDIA  8**

Regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster & Disaster in Hills with particular reference to India. Ecological planning for sustainability & sustainable development in India, Sustainable rural development: A Remedy to Disasters, Role of Panchayats in Disaster mitigations, Environmental policies & programmes in India-Institutions & National Centers for Natural Disaster reduction, Environmental Legislations in India, Awareness, Conservation Movement, Education & training.

**Total Hours: 45**

**REFERENCES:**


**OUTCOMES:**

At the end of the course, the students will

- Achieve sufficient knowledge on the disaster prevention strategy, early warning system, disaster preparedness, response and human resource development.
- Be familiar with the National Policy on Disaster Management.
OBJECTIVES:

- To introduce the basic concepts of Nanoscience relevant to the field of engineering.
- To provide an exposure about the importance of various synthesis method.
- To enrich the knowledge of students in various characterisation techniques.

MODULE I  INTRODUCTION & CLASSIFICATION OF NANOMATERIALS

Definition - Origin of nanotechnology - Difference between bulk and nanomaterials- Top-down and bottom-up processes - Size dependent properties (magnetic, electronic, transport and optical), Classification based on dimensional property - 0D, 1D, 2D and 3D nanostructures – Kubo gap.

MODULE II  TYPES OF NANOMATERIALS

Metal oxides and metal nano particles - Ceramic nano particles - Semi conducting quantum dots - Core-shell quantum dots - Nanocomposites - Micellar nanoparticles.

MODULE III  PRODUCTION OF NANOPARTICLES

Sol-gel, hydrothermal, solvothermal, Plasma Arcing, Electro deposition, RF sputtering, Pulsed laser deposition, Chemical vapour, deposition.

MODULE IV  CARBON BASED NANOMATERIALS


MODULE V  NANOPHOTONICS

Light and nanotechnology, Interaction of light and nanotechnology, Nanoholes and photons, nanoparticles and nanostructures; Nanostructured polymers, Photonic Crystals, Solar cells.

MODULE VI  CHARACTERISATION TECHNIQUES
Basic principles of scanning Electron Microscopy (SEM), Atomic force microscopy (AFM), Scanning tunneling microscopy (STM), Scanning probe microscopy (SPM) and Transmission electron microscopy (TEM), Particle size analyzer, Luminescence techniques.

Total Hours: 45

TEXTBOOKS:


REFERENCES:


OUTCOMES:

At the end of this course, the students will be able to:

- Apply the knowledge of different types of nanomaterials for various engineering applications.
- Acquire the knowledge of various methods of production of nanomaterials.
- Familiarize with various characterization techniques.
OBJECTIVES:

- To describe the system modeling and to derive their transfer function.
- To provide adequate knowledge of time response of systems and steady state error analysis.
- To accord basic knowledge in obtaining the open loop and closed-loop frequency responses of Control systems.

MODULE I  BASIC CONCEPTS AND SYSTEM REPRESENTATION  8

Control System - Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Block diagram reduction techniques – Signal flow graphs.

MODULE II  TIME RESPONSE ANALYSIS AND DESIGN  8


MODULE III FREQUENCY RESPONSE ANALYSIS AND DESIGN  7

Performance specifications - correlation to time domain specifications - bode plots and polar plots – gain and phase margin – constant M and N circles and Nichols chart – all pass and non-minimum phase systems.

MODULE IV STABILITY  8


MODULE V  COMPENSATOR DESIGN  8

Performance criteria – Lag, lead and lag-lead networks – Compensator design using bode plots and root locus technique.
MODULE VI  CONTROL SYSTEM COMPONENTS AND APPLICATION OF
CONTROL SYSTEMS

Synchros – AC servomotors - DC Servo motors - Stepper motors - AC Tacho generator -
DC Tacho generator - Typical applications of control system in industry.

Total Hours : 45

REFERENCES:


OUTCOMES:

At the end of the course, the student is expected to possess knowledge and achieve skills on the following:

• Analyze the basics of Control Systems.
• Ability and skill to carry-out time domain and frequency domain analysis.
• Capable of determining stability of the system using Routh Hurwitz criterion, Root locus and Nyquist criterion.
• Ability to design lag, lead and lag lead compensator networks.
OBJECTIVE:

- To impart knowledge to face challenges, the technology poses for water, energy, and climate change by implementing sustainable design.

MODULE I CONCEPTS OF SUSTAINABLE DEVELOPMENT 7


MODULE II SUSTAINABLE DEVELOPMENT OF SOCIO ECONOMIC SYSTEMS 8


MODULE III FRAME WORK FOR ACHIEVING SUSTAINBAILITY 7

Sustainability indicators- Hurdles to sustainability- Business and Industry – Science and Technology for Sustainable Development- Performance indicators of sustainability and assessment mechanism- Constraints and barriers of Sustainable Development.

MODULE IV GREEN BUILDINGS 8


MODULE V ENERGY CONSERVATION AND EFFICIENCY 7

MODULE VI  GREEN BUILDINGS DESIGN

Elements of Green Buildings Design- Foundation, Electrical, Plumbing, flooring, Decking, roofing, insulation, wall coverings, windows, siding, doors and finishing, LEED certification for Green Buildings, Green Buildings for sustainability.

Total Hours: 45

TEXT BOOK:


REFERENCE:


OUTCOMES:

At the end of the course, the students will be able to

- Explain the relationship between sustainability and emergence of green building practices.
- Address the economic, environmental, and social concerns.
OBJECTIVES:
The course

- Focuses on positioning knowledge as a valuable commodity, embedded in products and in the tacit knowledge of highly mobile individual employees.
- Presents KM as a deliberate and systematic approach to cultivating and sharing an organization's knowledge base.
- Brings out the paradigm in terms of information technology and intellectual capital.

MODULE I KNOWLEDGE MANAGEMENT 6


MODULE II KNOWLEDGE MANAGEMENT SYSTEMS AND MODELS 9


MODULE III CAPTURING KNOWLEDGE AND SHARING 9

Tacit knowledge capture - Explicit knowledge codification - Knowledge taxonomies - Knowledge sharing - Communities - Obstacles to knowledge capture and sharing.

MODULE IV KNOWLEDGE MANAGEMENT TOOLS 9

KM System tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Knowledge capture and creation tools - Content creation tools - Data mining and knowledge discovery - Content management tools - Knowledge sharing and dissemination tools - Group ware and Collaboration tools - Intelligent filtering tools.
MODULE V  KNOWLEDGE APPLICATION

KM at individual level - Knowledge workers - Task analysis and modeling - Knowledge application at group and organizational levels - Knowledge repositories - Knowledge reuse - Case study: e-learning.

MODULE VI  VALUE OF KNOWLEDGE MANAGEMENT


Total Hours: 45

TEXT BOOKS:


OUTCOMES:

Students who complete this course will be able to

- Describe the fundamental concepts in the study of knowledge and its creation, acquisition, representation, dissemination, use and re-use, and management.
- Explains the core concepts, methods, techniques, and tools for computer support of knowledge management.
- Critically evaluate current trends in knowledge management and apply it for e-learning.
OBJECTIVE:

- To impart students knowledge about the basics and applications of various appropriate technologies in the field of civil engineering.

MODULE I  BASICS CONCEPTS

Background, Tools, Choices and Implications, Appropriate Technology Movement (an overview) - Basic design process, basic financial analysis-discounted cash flow, and energy fundamentals.

MODULE II  APPROPRIATE TECHNOLOGY WITH REFERENCE TO BUILDING DESIGN


MODULE III  WATER, HEALTH AND SANITATION MANAGEMENT


MODULE IV  WASTE MANAGEMENT

Types of Waste - Sources - Collections and On-Site Processing – Transferring Stations - Disposal Systems - Recycling.

MODULE V  ENERGY EFFICIENT TECHNIQUES


MODULE VI  TECHNOLOGY POLICY


Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOME:

- At the end of the course, the students will be able to use suitable technologies for various conditions for sustainable development.
OBJECTIVES:

- To introduce the basic principles of systems engineering
- To expose the systems engineering methodology
- To provide a systems viewpoint

MODULE I  INTERDICTION TO SYSTEMS ENGINEERING 8


MODULE II  SYSTEM DEVELOPMENT PROCESS AND MANAGEMENT 8


MODULE III  CONCEPT DEVELOPMENT 8

Need Analysis – Concept Exploration – Performance requirement and validation - Concept selection and validation – systems architecture – Decision making.

MODULE IV  ESTABLISHING ENGINEERING SYSTEMS 8


MODULE V  DECISION SUPPORT TOOLS IN SYSTEMS ENGINEERING 7

Analytical decision support – Statistical influences on system design – System performance analysis – System Reliability, Availability and Maintainability (RAM) – Analysis of Alternatives.

Total Hours: 45

REFERENCES:


OUTCOMES:

At the end of the course the student will have the

- Ability to have systems of view of problems and issues at hand.
- Ability to comprehend systems in their totality and specific.
- Ability to design, build and evaluate simple systems for industrial requirement.
- Ability to analyze systems and strengthen them for performance enhancement.
OBJECTIVES:

- To get acquainted with value analysis and engineering tool for productivity improvement.
- To understand and analyze the theory and methodology of Value Engineering.

MODULE I  VALUE ENGINEERING BASICS

Origin of Value Engineering, Meaning of value, Definition of Value Engineering and Value analysis, Difference between Value analysis and Value Engineering, Types of Value, function - Basic and Secondary functions, concept of cost and worth, creativity In Value Engineering.

MODULE II  VALUE ENGINEERING JOB PLAN AND PROCESS

Seven phases of job plan, FAST Diagram as Value Engineering Tool, Behavioural and organizational aspects of Value Engineering, Ten principles of Value analysis, Benefits of Value Engineering.

MODULE III  ORIENTATION AND INFORMATION PHASES


MODULE IV  FUNCTION ANALYSIS AND CREATIVE PHASES

Creativity - Mental road blocks - Creativity killer phrases. Positive thinking - Ideas stimulators - Creativity techniques - Brainstorming.

MODULE V EVALUATION, INVESTIGATION AND RECOMMENDATION 6


MODULE VI IMPLEMENTATION PHASE AND CASE STUDIES 8


Total Hours: 45

TEXTBOOKS:


REFERENCES:


OUTCOME:

• The student will be able to realize the value of products, processes and implement value analysis to achieve productivity improvement.
OBJECTIVES:

- Introduce methods of optimization to engineering students, including linear programming, network flow algorithms, integer programming, interior point methods, quadratic programming, nonlinear programming, and heuristic methods.
- The goal is to maintain a balance between theory, numerical computation, problem setup for solution by optimization techniques, and applications to engineering systems.

MODULE I  INTRODUCTION

Overview of Optimization techniques for Civil Engineering Problems - Introduction to methods of optimization - Classification of Optimization problems - optimality and convexity - General optimization algorithm - necessary and sufficient conditions for optimality.

MODULE II  LINEAR PROGRAMMING

Introduction to linear programming - a geometric perspective - Standard form in linear programming; basic solutions; fundamental theorem of linear programming - Simplex Algorithm for Solving Linear Programs - Duality; complementary slackness; economic interpretation of the dual;

MODULE III  DYNAMIC PROGRAMMING

Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of optimality; Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP); Discrete versus continuous dynamic programming; Multiple state variables; curse of dimensionality in DP.

MODULE IV  APPLICATIONS
Regression modeling in engineering; industrial blending problems; dynamic optimal control of engineering systems; optimal estimation in environmental engineering - Water resources; production planning in industrial engineering; transportation problem - Heuristic optimization methods: genetic algorithms; ecological engineering application; Minimum cost network flow algorithms; out-of-kilter method; primal-dual methods; Dynamic Programming Applications - Water allocation as a sequential process - Capacity expansion and Reservoir operation.

MODULE V INTEGER PROGRAMMING

Integer programming - applications in optimal irrigation scheduling in agricultural engineering - Interior point optimization methods - affine scaling method.

MODULE VI NON-LINEAR PROGRAMMING

Non-linear programming - Kuhn-Tucker conditions for constrained nonlinear programming problems; necessary and sufficient conditions; quadratic programming; applications.

Total Hours: 45

REFERENCES:


OUTCOMES:

At the end of the course, the students will be able to understand

- Basic theoretical principles in optimization.
- Formulation of optimization models.
- Solution methods in optimization.
- Methods of sensitivity analysis and post processing of results.
- Applications to a wide range of engineering problems.
OBJECTIVES:

- To learn the concepts, techniques, tools for modeling and simulation systems and environments through the use of computers.
- To study the various aspects of discrete dynamic, stochastic systems modeling and conducting experiments with those models on a computer.

MODULE I  INTRODUCTION

Systems – Modelling – types – systems components – Steps in model building-
Simulation Algorithms and Heuristics; Simulation Languages.

MODULE II  RANDOM NUMBERS / VARIATES

Random numbers – methods of generation – random variates for standard distributions like uniform, exponential, Poisson, binomial, normal etc. – Testing of Random variates – Monte Carlo Simulation.

MODULE III  MODELLING PROCESS

Primitive Models : Establishing relationships via physical laws; Establishing relationships via curve fitting; Parameters estimation problems; Elementary state transition models.

MODULE IV  DESIGN OF SIMULATION EXPERIMENTS

Steps on Design of Simulation Experiments – Development of models using of Highlevel language for systems like Queuing, Inventory, Replacement, Production etc., – Model validation and verification, Output analysis.

MODULE V  SIMULATION LANGUAGES

Need for simulation Languages – Comparisons & Selection of Languages – GPSSARENA- EXTEND – Study of any one of the languages.

Total Hours: 45
REFERENCES:


OUTCOMES:

The student should be able to,

- Model and simulate systems and environments through the use of computers.
- Conduct experiments with discrete dynamic, stochastic system models on a computer.
OBJECTIVES:

- To understand the various decision phases in a supply chain
- To be aware of the Supply Chain and its drivers
- To design Supply Chain Network
- To build a aggregate plan in supply chain
- To understand Sourcing Decisions in Supply Chain
- To comprehend the influence of Information technology in Supply Chain

MODULE I  INTRODUCTION TO SUPPLY CHAIN

Understanding Supply Chain - Decision phases - Supply chain performance - Competitive and supply chain strategies - Achieving strategic fit - Expanding strategic scope

MODULE II  SUPPLY CHAIN DRIVERS AND DESIGN

Drivers of supply chain performance – Designing distribution network - Network Design in the Supply Chain - Network design in Uncertain Environment

MODULE III  AGGREGATE PLANNING AND MANAGING SUPPLY, DEMAND AND INVENTORY


MODULE IV  SOURCING AND TRANSPORTATION

Sourcing decision in supply chain - Third and Fourth – Party Logistics providers - Supplier scoring and assessment - Transportation in a Supply Chain – Risk and Trade-offs in transportation design.

MODULE V  INFORMATION TECHNOLOGY IN A SUPPLY CHAIN

Total Hours: 45

REFERENCES:


OUTCOMES:

- After taking up the course the student will be able to brighten his prospects of taking up a career on supply chain management.
- The student decision making capability specific to supply chain issues in an industry is improved.
- The student can plan a well defined execution of supply chain strategy in companies.
- The student will be able to design a optimal distribution network as per the demands of the industry.
- The student can also determine the most favorable transportation plan for a company.
- The student will also be able to bring in company from paper environment to paperless environment.
OBJECTIVES:

- To understand the various principles, practices of TQM to achieve quality.
- To get acquainted with the various statistical tools and approaches for quality control and continuous improvement.
- To get aware of the importance of ISO and Quality Systems.

MODULE I INTRODUCTION

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

MODULE II TQM PRINCIPLES


MODULE III TQM IMPROVEMENT PROCESS


MODULE IV STATISTICAL PROCESS CONTROL (SPC)

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.
MODULE V  TQM TOOLS


MODULE VI  QUALITY SYSTEMS


Total Hours: 45

TEXT BOOK:


REFERENCES:


OUTCOMES:

The student should be able to

- Apply the various statistical tools and approaches for Quality control.
- Achieve continuous process improvement through TQM.
OBJECTIVES:

- To learn the growing demand, supply of energy on global and national levels and the need for renewable energy promotion.
- To understand the basic need for energy conservation and waste heat recovery.
- To learn the important aspects of energy audit and management.
- To get acquainted with the global environmental issues and carbon credits.

MODULE I  GLOBAL AND NATIONAL ENERGY SCENARIO  

Role of energy in economic development, various energy resources - overall energy demand and availability- Energy consumption in various sectors and its changing pattern - Exponential increase in energy consumption and projected future demands. Need for renewable energy.

MODULE II  SOLAR ENERGY  


MODULE III  OTHER RENEWABLE ENERGY SOURCES  

Power from wind – wind turbine working and types, solar thermal power plants – low medium and high power generation, power from wave , tidal, geothermal sources, OTEC system. MHD power plants – working, types, merits and demerits. Energy from biomass.

MODULE IV  COGENERATION, WASTE HEAT RECOVERY AND COMBINED CYCLE PLANTS  


MODULE V  ENERGY CONSERVATION AND MANAGEMENT 7


MODULE VI  GLOBAL ENERGY ISSUES AND CARBON CREDITS 7


Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

The student should be able to

- Realize the global and national energy status and need to switch over to renewable energy technology.
- Energy audit and suggest methodologies for energy savings.
- Utilize the available resources in an optimal way.
- Concern about the global environmental issues & promote carbon credits.
OBJECTIVE:

- To learn about the robots, various components, of Robots, programming and their applications.

MODULE I  INTRODUCTION 8

Definition- Need - Application, Types of robots – Classifications – Configuration, work volume, control loops, controls and intelligence- basic parts - functions – specifications. of robot, degrees of freedoms, end effectors – types, selection

MODULE II  ROBOT DRIVES AND CONTROL 8


MODULE III  ROBOT SENSORS 8


MODULE IV  ROBOT PROGRAMMING & AI TECHNIQUES 7

Types of Programming – Teach pendant programming – Basic concepts in AI techniques – Concept of knowledge representations – Expert system and its components.

MODULE V  ROBOTIC WORK CELLS AND APPLICATIONS OF ROBOTS 7

Robotic cell layouts – Inter locks – Humanoid robots – Micro robots – Application of robots in surgery, Manufacturing industries, space and underwater.

MODULE VI  ROBOT KINEMATICS AND DYNAMICS 7
Forward and inverse Kinematic equations, Denvit – Hartenbers representations
Fundamental problems with D-H representation, differential motion and velocity of
frames - Dynamic equations for sing, double and multiple DOF robots – static force
analysis of robots.

Total Hours: 45

REFERENCES:

   1994.
5. Mikell, P. Groover, Mitchell Weis, Roger, N. Nagel, Nicholas G. Odrey,
   “Industrial Robotics Technology, Programming and Applications”, Mc Graw-
   Hill, Int. 1986.

OUTCOMES:

Students would be able to

- Understand about the robots, its various components.
- Design Robots for industrial applications.
- Do programming for robots and apply them in real time applications.
OBJECTIVES:

- To understand the basics of Cyber Security Standards and Laws.
- To know the legal, ethical and professional issues in Cyber security.
- To understand Cyber Frauds and Abuse and its Security Measures.
- To know the technological aspects of Cyber Security.

MODULE I  FUNDAMENTALS OF CYBER SECURITY  8


MODULE II  TYPES OF THREATS AND SECURITY MEASURES  8


MODULE III  APPLICATION SECURITY  8


MODULE IV  PHYSICAL SECURITY AND FORENSICS  7

Firewalls – Benefits and Limitations – Firewall Types - Components – Server Room Design and Temperature Maintenance – Cyber Terrorism and Military Operation Attacks-

MODULE V  CYBER STALKING & FRAUD


MODULE VI  CYBER SECURITY STANDARDS AND POLICIES


Total Hours: 45

TEXT BOOK:


REFERENCES:


OUTCOMES:

Upon completion of this course, attendees should be able to satisfy the critical need for ensuring Cyber Security in Organizations.

- The students attending this course will be able to analyse the attacks and threats.
- They can also provide solutions with Intrusion Detection systems and Softwares.
- They will have knowledge about Cyber Frauds and Cyber Laws.
OBJECTIVES:

The objective of this course is

- To explore concept of usability engineering in the software development life cycle.
- To create good user interface in a program or a website.
- To learn about human computer interaction with the help of interfaces that has high usability.

MODULE I  INTRODUCTION  6


MODULE II  USER INTERFACES  8

Generation of User Interfaces – Batch Systems, Line Oriented Interfaces, Full Screen Interfaces, Graphical User Interfaces, Next Generation Interfaces, Long Term Trends – Usability Engineering Life Cycle – Interfaces – Data Gathering – Data Analysis Interpretation and Presentation.

MODULE III  INTERACTION DESIGN  8


MODULE IV  USABILITY TESTING  8

MODULE V  USABILITY ASSESSMENT METHODS

Observation, Questionnaires and Interviews, Focus Groups, Logging Actual Use, User Feedback, Usability Methods – Interface Standards - National, International and Vendor Standards, Producing Usable In-House Standards

MODULE VI  USER INTERFACES


Total Hours : 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

Students who complete this course will be able to

- Build effective, flexible and robust user interfaces.
- Translate system requirements into appropriate human/computer interaction sequences.
- Choose mode, media and device for the application requirements.
OBJECTIVE:

- To understand the various safety measures to be taken in different industrial environments.

MODULE I  SAFETY MANAGEMENT 7

Evolution of modern safety concept Safety policy - Safety Organization - line and staff functions for safety - Safety Committee - budgeting for safety, safety education and training.

MODULE II  SAFETY IN MANUFACTURING 7

Safety in metal working - Machine guarding - Safety in welding and gas cutting - Safety in cold forming and hot working of metals - Safety in finishing, inspection and testing - Regulation.

MODULE III  SAFETY IN CONSTRUCTION 8


MODULE IV  ELECTRICAL SAFETY 8


MODULE V  SAFETY IN MATERIAL HANDLING 8
General safety consideration in material handling devices - Ropes, Chains, Sling, Hoops, Clamps, Arresting gears – Prime movers. Ergonomic consideration in material handling, design, installation, operation and maintenance of Conveying equipments, hoisting, traveling and slewing mechanisms. Storage and Retrieval of common goods of shapes and sizes in a general store of a big industry.

MODULE VI  SAFETY EDUCATION AND TRAINING


Total Hours: 45

REFERENCES:


OUTCOMES:

Students would be able to

- Acquire knowledge on various safety Hazards.
- Carry out safety measures for different industrial environments.