Bachelor of Technology
COMPUTER SCIENCE AND ENGINEERING

Revised
Regulations, Curriculum & Syllabus
(for all semesters)
Effective from the academic year 2013-2014
1. Conditions for Admission:

a) Candidates for admission to the first semester of the 8 semester B.Tech Degree programme should be required to have passed:
The Higher Secondary Examination of the (10+2) curriculum (Academic Stream) prescribed by the Government of Tamil Nadu or any other examination equivalent there to with minimum of 45% marks (40% marks for OBC and SC/ST candidates) in aggregate of subjects – Mathematics, Physics and any one of the following optional subjects: Chemistry / Biotechnology/ Computer Science / Biology (Botany & Zoology) or an Examination of any University or Authority recognized by the Executive Council of the Pondicherry University as equivalent thereto.

b) For Lateral entry in to third semester of the eight semester B.Tech programme:
The minimum qualification for admission is a pass in three year diploma or four year sandwich diploma course in engineering / technology from an AICTE approved institution with at least 45% marks (40% marks for OBC and SC/ST candidates) in aggregate in the subjects covered from 3rd to final semester or a pass in B.Sc. degree from a recognized university as defined by UGC with at least 45% marks (40% marks for OBC and SC/ST candidates) and passed XII standard with mathematics as a subject.

Provided that in case of students belonging to B.Sc Stream shall clear the subjects of Engineering Graphics and Engineering Mechanics of the first year Engineering program along with the second year subjects.

Provided further that, the students belonging to B.Sc Stream shall be considered only after filling the supernumerary seats in this category with students belonging to the Diploma stream.

The list of diploma programs approved for admission for each of the degree programs is given in Annexure A.

2. Age Limit :
The candidate should not have completed 21 years of age as on 1st July of the academic year under consideration. For Lateral Entry admission to second year of degree programme, there is no age limit. For SC/ST candidates, the age limit is relaxable by 3 years.

3. Duration of Programme:
The Bachelor of Technology degree programme shall extend over a period of 8 consecutive semesters spread over 4 academic years – two semesters constituting one academic year. The duration of each semester shall normally be 15 weeks excluding examinations.
4. **Eligibility for the award of Degree:**
No candidate shall be eligible for the award of the degree of Bachelor of Technology, unless he/she has undergone the course for a period of 8 semesters (4 academic years) / 6 semesters (3 academic years for Lateral Entry candidates) in the faculty of Engineering and has passed the prescribed examinations in all the semesters.

5. **Branches of Study:**
- Branch I - Civil Engineering
- Branch II - Mechanical Engineering
- Branch III - Electronics & Communication Engineering
- Branch IV - Computer Science & Engineering
- Branch V - Electrical & Electronics Engineering
- Branch VI - Chemical Engineering
- Branch VII - Electronics & Instrumentation Engineering
- Branch VIII - Information Technology
- Branch IX - Instrumentation & Control Engineering
- Branch X - Biomedical Engineering

or any other branches of study as and when offered. The branch allocation shall be ordinarily done at the time of admission of the candidate to the first semester.

6. **Subjects of Study:**
The subjects of study shall include theory and practical courses as given in the curriculum and shall be in accordance with the prescribed syllabus. The subjects of study for the first two semesters shall be common for all branches of study.

7. **Examinations:**
The theory and practical examinations shall comprise continuous assessment throughout the semester in all subjects as well as university examinations conducted by Pondicherry University at the end of the semester (November / December or April / May).

(a) Theory courses for which there is a written paper of 75 marks in the university examination.

The Internal Assessment marks of 25 has to be distributed as 10 marks each for two class tests and 5 marks for class attendance in the particular subject. The distribution of marks for attendance is as follows.

- 5 marks for 95% and above
- 4 marks for 90% and above but below 95%
- 3 marks for 85% and above but below 90%
- 2 marks for 80% and above but below 85%
- 1 mark for 75% and above but below 80%

In total, three tests are to be conducted and the better two are to be considered for assessment.

(b) Practical courses for which there is a university practical examination of 50 marks:

The internal assessment marks of 50 has to be distributed as 20 marks for the periodic practical works and records submitted thereof, 15 marks for an internal practical examination, 5 marks for an internal viva voce, and 10 marks for class attendance in the particular subject. The distribution of marks is as given below.
10 marks for 95% and above
8 marks for 90% and above but below 95%
6 marks for 85% and above but below 90%
4 marks for 80% and above but below 85%
2 marks for 75% and above but below 80%

8. Requirement for appearing for University Examination:

A candidate shall be permitted to appear for university examinations at the end of any semester only if:

i) He / She secures not less than 75% overall attendance arrived at by taking into account the total number of periods in all subjects put together offered by the institution for the semester under consideration.

(Candidates who secure overall attendance greater than 60% and less than 75% have to pay a condonation fee as prescribed by University along with a medical certificate obtained from a medical officer not below the rank of Asst. Director)

ii) He / She earns a progress certificate from the Head of the institution for having satisfactorily completed the course of study in all the subjects pertaining to that semester

iii) His / Her conduct is found to be satisfactory as certified by the Head of the institution.

A candidate who has satisfied the requirement (i) to (iii) shall be deemed to have satisfied the course requirements for the semester.

9. Procedure for completing the course:

A candidate can join the course of study of any semester only at the time of its normal commencement and only if he/she has satisfied the course requirements for the previous semester and further has registered for the university examinations of the previous semester in all the subjects as well as all arrear subjects if any.

However, the entire course should be completed within 14 consecutive semesters (12 consecutive semesters for students admitted under lateral entry).

10. Passing Minimum:

a. A candidate shall be declared to have passed the examination in a subject of study only if he/she secures not less than 50% of the total marks (Internal Assessment plus University examination marks) and not less than 40% of the marks in University examination.

b. A candidate who has been declared “Failed” in a particular subject may reappear for that subject during the subsequent semesters and secure a pass. However, there is a provision for revaluation of failed or passed subjects provided he/she fulfills the following norms for revaluation.

i. Applications for revaluation should be filed within 4 weeks from the date of declaration of results or 15 days from the date of receipt of marks card whichever is earlier.

ii. The candidate should have attended all the college examinations as well as university examinations.
iii. If a candidate has failed in more than four papers in the current university examination, his/her representation for revaluation will not be considered.

iv. The request for revaluation must be made in the format prescribed duly recommended by the Head of the Institution along with the revaluation fee prescribed by the University.

Further the University examination marks obtained in the latest attempt shall alone remain valid in total suppression of the University examination marks obtained by the candidate in earlier attempts.

11. Award of Letter Grades

The assessment of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain points, will be awarded as per the range of total marks (out of 100) obtained by the candidate, as detailed below:

<table>
<thead>
<tr>
<th>Range of Total Marks</th>
<th>Letter Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 to 100</td>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td>80 to 89</td>
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</tr>
<tr>
<td>70 to 79</td>
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<tr>
<td>60 to 69</td>
<td>C</td>
<td>7</td>
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<td>55 to 59</td>
<td>D</td>
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<td>50 to 54</td>
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<tr>
<td>0 to 49</td>
<td>F</td>
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<tr>
<td>Incomplete</td>
<td>FA</td>
<td></td>
</tr>
</tbody>
</table>

‘F’ denotes failure in the course. ‘FA’ denotes absent / detained as per clause 8.

After results are declared, grade sheets will be issued to the students. The grade sheets will contain the following details:

(a) The college in which the candidate has studied.
(b) The list of courses enrolled during the semester and the grades scored.
(c) The Grade Point Average (GPA) for the semester and Cumulative Grade Point Average (CGPA) of all enrolled subjects from first semester onwards.
(d) GPA is the ratio of sum of the products of the number of credits (C) of courses registered and the corresponding grades points (GP) scored in those courses, taken for all the courses and sum of the number of credits of all the courses

\[
GPA = \frac{\sum (C \times GP)}{\sum C}
\]

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. FA grades are to be excluded for calculating GPA and CGPA.

The conversion of CGPA into percentage marks is as given below

\[
\% \text{Marks} = (CGPA - 0.5) \times 10
\]
12. **Award of Class and Rank:**

i) A candidate who satisfies the course requirements for all semesters and who passes all the examinations prescribed for all the eight semesters (six semesters for lateral entry candidates) within a maximum period of 7 years (6 years for lateral entry candidates) reckoned from the commencement of the first semester to which the candidate was admitted shall be declared to have qualified for the award of degree.

ii) A candidate who qualifies for the award of the degree passing in all subjects pertaining to semesters 3 to 8 in his/her first appearance within 6 consecutive semesters (3 academic years) and in addition secures a CGPA of 8.50 and above for the semesters 3 to 8 shall be declared to have passed the examination in **FIRST CLASS with DISTINCTION**.

iii) A candidate who qualifies for the award of the degree by passing in all subjects relating to semesters 3 to 8 within a maximum period of eight semesters after his/her commencement of study in the third semester and in addition secures CGPA not less than 6.5 shall declared to have passed the examination in **FIRST CLASS**.

iv) All other candidates who qualify for the award of degree shall be declared to have passed the examination in **SECOND CLASS**.

v) For the Award of University ranks and Gold Medal for each branch of study, the CGPA secured from 1st to 8th semester alone should be considered and it is mandatory that the candidate should have passed all the subjects from 1st to 8th semester in the first attempt. Rank certificates would be issued to the first ten candidates in each branch of study.

13. **Provision for withdrawal:**

A candidate may, for valid reasons, and on the recommendation of the Head of the Institution be granted permission by the University to withdraw from writing the entire semester examination as one Unit. The withdrawal application shall be valid only if it is made earlier than the commencement of the last theory examination pertaining to that semester. Withdrawal shall be permitted only once during the entire course. Other conditions being satisfactory, candidates who withdraw are also eligible to be awarded **DISTINCTION** whereas they are not eligible to be awarded a rank.

14. **Discontinuation of Course:**

If a candidate wishes to temporarily discontinue the course for valid reasons, he/she shall apply through the Head of the Institution in advance and obtain a written order from the University permitting discontinuance. A candidate after temporary discontinuance may rejoin the course only at the commencement of the semester at which he/she discontinued, provided he/she pays the prescribed fees to the University. The total period of completion of the course reckoned from the commencement of the first semester to which the candidate was admitted shall not in any case exceed 7 years, including of the period of discontinuance.

15. **Revision of Regulations and Curriculum:**

The University may from time to time revise, amend or change the regulations of curriculum and syllabus as and when found necessary.
## ANNEXURE – A

<table>
<thead>
<tr>
<th>B.Tech courses in which admission is sought</th>
<th>Diploma courses eligible for admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td></td>
<td>Civil and Rural Engineering</td>
</tr>
<tr>
<td></td>
<td>Architectural Assistantship</td>
</tr>
<tr>
<td></td>
<td>Architecture</td>
</tr>
<tr>
<td></td>
<td>Agricultural Engineering</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td></td>
<td>Automobile Engineering</td>
</tr>
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<td></td>
<td>Agricultural Engineering</td>
</tr>
<tr>
<td></td>
<td>Mechanical and Rural Engineering</td>
</tr>
<tr>
<td></td>
<td>Refrigeration and Air-conditioning</td>
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<tr>
<td>Electrical and Electronics Engineering</td>
<td>Electrical Engineering</td>
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<tr>
<td>Electronic &amp; Communication Engineering</td>
<td>Electrical and Electronics Engineering</td>
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<tr>
<td>Electronic and Instrumentation Engineering</td>
<td>Instrumentation Engineering / Technology</td>
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<tr>
<td>Instrumentation and Control Engineering</td>
<td>Electronics Engineering</td>
</tr>
<tr>
<td></td>
<td>Medical Electronics</td>
</tr>
<tr>
<td></td>
<td>Instrumentation and Control Engineering</td>
</tr>
<tr>
<td></td>
<td>Applied Electronics</td>
</tr>
<tr>
<td>Bio Medical Engineering</td>
<td>Chemical Engineering</td>
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<td>Chemical Technology</td>
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<tr>
<td></td>
<td>Petrochemical Technology</td>
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<td>Petroleum Engineering</td>
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<tr>
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<td>Ceramic Technology</td>
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<td></td>
<td>Plastic Engineering</td>
</tr>
<tr>
<td></td>
<td>Paper &amp; Pulp Technology / Polymer Technology</td>
</tr>
<tr>
<td>Information Technology</td>
<td>Computer Science and Engineering</td>
</tr>
<tr>
<td>Computer Science &amp; Engineering</td>
<td>Computer Technology</td>
</tr>
<tr>
<td></td>
<td>Electrical and Electronics Engineering</td>
</tr>
<tr>
<td></td>
<td>Electronics &amp; Communication Engineering</td>
</tr>
<tr>
<td></td>
<td>Electronics &amp; Instrumentation Engineering</td>
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<tr>
<td></td>
<td>Instrumentation Engineering / Technology</td>
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<td>Information Technology</td>
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## CURRICULUM & SYLLABUS
### B.Tech (Computer Science & Engineering)

### I Semester

<table>
<thead>
<tr>
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<th>Subjects</th>
<th>Periods</th>
<th>Credits</th>
<th>Marks</th>
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<td>P</td>
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<td>Chemistry</td>
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<td>T104</td>
<td>Basic Electrical and Electronics Engineering</td>
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<tr>
<td>T105</td>
<td>Engineering Thermodynamics</td>
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<td>T106</td>
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### Practical

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<th>Marks</th>
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<td></td>
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<td>T</td>
<td>P</td>
</tr>
<tr>
<td>P101</td>
<td>Computer Programming Lab</td>
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<tr>
<td>P102</td>
<td>Engineering Graphics</td>
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**Total**

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<td><strong>Sub. Code</strong></td>
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<tr>
<td></td>
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<tr>
<td></td>
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<td>P105 Chemistry lab</td>
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<td></td>
<td>P106 Workshop Practice</td>
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<tr>
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<td>P107 NSS / NCC *</td>
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<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>IA</th>
<th>UE</th>
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*To be completed in I and II semesters, under Pass / Fail option only and not counted for CGPA calculation.*
### III Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Name of the Subjects</th>
<th>Periods</th>
<th>Credits</th>
<th>Marks</th>
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<tr>
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<td>MA T31</td>
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<tr>
<td>CS T33</td>
<td>Object Oriented Programming and Design</td>
<td>3</td>
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<td>CS T34</td>
<td>Digital System Design</td>
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<td>CS T35</td>
<td>Data Structures</td>
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<td>CS T36</td>
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<td><strong>Practical</strong></td>
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<tr>
<td>CS P31</td>
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<tr>
<td>CS P32</td>
<td>Data Structures Laboratory</td>
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<td>CS P33</td>
<td>Digital System Design Laboratory</td>
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### IV Semester

<table>
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<th>Name of the Subjects</th>
<th>Periods</th>
<th>Credits</th>
<th>Marks</th>
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<tr>
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<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
</tr>
<tr>
<td><strong>Theory</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>MA T41</td>
<td>Mathematics –IV</td>
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<td>CS T42</td>
<td>Microprocessors and Microcontrollers</td>
<td>3</td>
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</tr>
<tr>
<td>CS T43</td>
<td>Automata Languages and Computations</td>
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<tr>
<td>CS T44</td>
<td>Design and Analysis of Algorithms</td>
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<td>CS T45</td>
<td>Object Oriented Programming</td>
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<td>CS T46</td>
<td>Graphics and Image Processing</td>
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<tr>
<td><strong>Practical</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CS P41</td>
<td>Microprocessors and Microcontrollers Laboratory</td>
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<tr>
<td>CS P42</td>
<td>Design and Analysis of Algorithms Laboratory</td>
<td>-</td>
<td>-</td>
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<tr>
<td>CS P43</td>
<td>Object Oriented Programming Laboratory</td>
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<tr>
<td>SP P44</td>
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* Student is required to secure a pass and no grade will be awarded
### V Semester

<table>
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<th>Periods</th>
<th>Credits</th>
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<tr>
<td>Theory</td>
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</tr>
<tr>
<td>CS T51</td>
<td>Operating Systems</td>
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<tr>
<td>CS T52</td>
<td>Computer Networks</td>
<td>3</td>
<td>1</td>
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</tr>
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<td>CS T53</td>
<td>Database Management Systems</td>
<td>3</td>
<td>1</td>
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<tr>
<td>CS T54</td>
<td>Language Translators</td>
<td>3</td>
<td>1</td>
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<td>CS T55</td>
<td>Software Engineering</td>
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### VI Semester

<table>
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<th>Periods</th>
<th>Credits</th>
<th>Marks</th>
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### VII Semester

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<td>Computer Hardware and Network Trouble Shooting</td>
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<td>Platform Technology</td>
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<td>Engineering Economics and Management</td>
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Electives for Sixth Semester

1. CS E61  Object Oriented Analysis and Design
2. CS E62  Network Design and Management
3. CS E63  E-Business
4. CS E64  Principles of Programming Languages
5. CS E65  Information Theory and Coding Techniques
6. CS E66  Language Technologies
7. CS E67  UNIX Internals
8. CS E68  Data Mining and Warehousing
9. CS E69  SOA and Web Services
10. CS E610  Distributed Computing
11. CS E611  Agile Methodologies
12. CS E612  Application Outsourcing Services

Electives for Seventh Semester

1. CS E71  Software Testing and Quality Assurance
2. CS E72  Advanced Databases
3. CS E73  Client Server Computing
4. CS E74  Real Time Computing and Communication
5. CS E75  Software Architecture
6. CS E76  High Speed Networks
7. CS E77  Network Protocols
8. CS E78  Modeling and Simulation
9. CS E79  Business Process Domains
10. CS E710  Software Project Management
11. CS E711  Natural Language Processing
12. CS E712  Optical Networks

Electives for Eighth Semester

1. CS E81  Intelligent Information Retrieval
2. CS E82  Soft Computing
3. CS E83  Bio Inspired Computing
4. CS E84  Mobile Computing
5. CS E85  Grid Computing
6. CS E86  Agent Technologies
7. CS E87  Bio Informatics
8. CS E88  High Performance Computing
9. CS E89  Wireless Communication Networks
10. CS E810  Big Data Management
11. CS E811  Cloud Computing
12. CS E812  Mobile Application Development
T101 MATHEMATICS – I

OBJECTIVES:

- To introduce the idea of applying calculus concepts to problems in order to find curvature, etc. and to give basic introduction on Beta and Gamma functions.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To introduce effective mathematical tools for the solutions of differential equations that model physical processes.

UNIT I – CALCULUS
Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.

UNIT II – FUNCTIONS OF SEVERAL VARIABLES
Partial derivatives, Total derivatives, Differentiation of implicit functions, Change of variables, Jacobians and their properties, Taylor’s series for functions of two variables, Maxima and minima, Lagrange’s method of undetermined multipliers.

UNIT III – MULTIPLE INTEGRALS AND APPLICATIONS
Multiple Integrals, change of order of integration and change of variables in double integrals (Cartesian to polar). Applications: Areas by double integration and volumes by triple integration (Cartesian and polar).

UNIT IV – DIFFERENTIAL EQUATIONS
Exact equations, First order linear equations, Bernoulli’s equation, orthogonal trajectories, growth, decay and geometrical applications. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type.

UNIT V – DIFFERENTIAL EQUATIONS (Higher order)
Linear differential equations of higher order - with constant coefficients, the operator D, Euler’s linear equation of higher order with variable coefficients, simultaneous linear differential equations, solution by variation of parameters method.
Text Books


Reference Books

T102 PHYSICS

OBJECTIVES:

- To understand the concepts of physics and its significant contributions in the advancement of technology and invention of new products that dramatically transformed modern-day society.
- To expose the students to different areas of physics which have direct relevance and applications to different Engineering disciplines
- To understand the concepts and applications of Ultrasonics, optics and some optical devices, Lasers and Fiber optics, Nuclear energy sources and wave mechanics

Unit I – Acoustics & NDT


Acoustics - Factors affecting Acoustic of Buildings (Reverberation, Loudness, Focusing, Echo, Echelon Effect and Resonance) and their Remedies - Sabine’s formula for Reverberation Time.

Unit II – Optics


Unit III – Lasers & Fiber Optics


Fiber Optics - Principle and Propagation of light in optical fiber – Numerical aperture and acceptance angle – Types of optical fibers (material, refractive index, mode)- applications to sensors and Fibre Optic Communication.

Unit IV – Wave mechanics

Unit V – Nuclear energy source

Text Books

Reference Books
T103 CHEMISTRY

OBJECTIVES

- To know about the importance of Chemistry in Engineering domain
- To understand the chemistry background of industrial process
- To apply chemistry knowledge for engineering disciplines

Unit I - Water


Unit II – Polymers


Unit III - Electrochemical Cells


Unit IV - Corrosion and its Control

Unit V - Phase Rule

Definition and derivation of phase rule. Application to one component system – water and sulfur systems. Thermal analysis, condensed phase rule. Two component systems – Pb-Ag, Cu-Ni, and Mg-Zn systems.

Text books


Reference Books

T104 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

OBJECTIVES

- To understand and gain basic knowledge about magnetic and electrical circuits, single phase and three phase power measurement and the operating principles of stationary and rotating machines.
- To understand the basic operation, functions and applications of PN junction diode, transistor, logic gates and flip flops.
- To gain knowledge on various communication systems and network models and the use of ISDN.

PART A - ELECTRICAL

UNIT – I - DC CIRCUITS


UNIT – II - AC CIRCUITS

Concepts of AC circuits – rms value, average value, form and peak factors – Simple RLC series circuits – Concept of real and reactive power – Power factor - Introduction to three phase system - Power measurement by two wattmeter method.

UNIT – III – ELECTRICAL MACHINES AND POWER PLANTS

Law of Electromagnetic induction, Fleming’s Right & Left hand rule - Principle of DC rotating machine, Single phase transformer and single phase induction motor (Qualitative approach only) - Simple layout of thermal and hydro generation (block diagram approach only).

PART B – ELECTRONICS

UNIT – IV

V-I Characteristics of diode - Half-wave rectifier and Full-wave rectifier – with and without capacitor filter - Transistor - Construction & working - Input and output characteristics of CB and CE configuration - Transistor as an Amplifier - Principle and working of Hartley oscillator and RC phase shift oscillator - Construction and working of JFET & MOSFET.
UNIT – V
Boolean algebra – Reduction of Boolean expressions - De-Morgan’s theorem - Logic
gates -Implementation of Boolean expressions - Flip flops - RS, JK, T and D.
Combinational logic - Half adder, Full adder and Subtractors.
Sequential logic - Ripple counters and shift registers.

UNIT – VI
Model of communication system - Analog and digital - Wired and wireless channel. Block
diagram of various communication systems - Microwave, satellite, optical fiber and
cellular mobile system.
Network model - PAN, LAN, MAN and WAN - Circuit and packet switching - Overview
of ISDN.

Text Books
1. Kothari D P and Nagrath I J, Basic Electrical Engineering, Tata McGraw Hill,
   2009.
2. S.K. Sahdev, Fundamentals of Electrical Engineering and Electronics, Dhanpat Rai
3. Jacob Millman and Christos C. Halkias, “Electronic Devices and Circuits” Tata
   McGraw Hill
   New Delhi, First Edition, 2011

Reference Books
1. R.Muthusubramaniam, S.Salivahanan and K.A. Mureleedharan, “Basic Electrical
2. J.B.Gupta, “A Course in Electrical Power”, Katson Publishing House, New Delhi,
   1993.
3. David. A. Bell, “Electronic Devices and Circuits”, PHI Learning Private Ltd,
4. Donald P Leach, Albert Paul Malvino and Goutam Saha, “Digital Principles and
   Delhi, 2008.
T105 THERMODYNAMICS

OBJECTIVES

- To convey the basics of the thermodynamic principles
- To establish the relationship of these principles to thermal system behaviors
- To develop methodologies for predicting the system behavior
- To establish the importance of laws of thermodynamics applied to energy systems
- To explain the role of refrigeration and heat pump as energy systems
- To develop an intuitive understanding of underlying physical mechanism and a mastery of solving practical problems in real world

Unit I - Basic Concepts and Definitions

Unit II - First Law of Thermodynamics
The concept of work and adiabatic process - First law of thermodynamics - Conservation of Energy principle for closed and open systems - Calculation of work for different processes of expansion of gases

Unit III - Second Law of Thermodynamics
Equilibrium and the second law - Heat engines - Kelvin-Planck statement of second law of thermodynamics - Reversible and irreversible processes - Carnot principle - Clausius inequality- Entropy

Unit IV - Gas Power Cycles
Air standard cycles: The air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Bryton cycles and their efficiencies

Unit V - Refrigeration Cycles and Systems
Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems (only theory) - Gas refrigeration cycle - Absorption refrigeration system – Liquefaction – Solidification (only theory).

Text Books
Reference Books
T106 COMPUTER PROGRAMMING

OBJECTIVES

- To introduce the basics of computers and information technology.
- To educate problem solving techniques.
- To impart programming skills in C language.
- To practice structured programming to solve real life problems.

Unit – I

Unit – II

Unit – III

Unit – IV

Unit – V

Text Books

Reference Books
P101 COMPUTER PROGRAMMING LAB

OBJECTIVES

- To study and understand the use of OS commands
- To gain a hands on experience of compilation and execution of ‘C’ programs

List of Exercises:

1. Study of OS Commands
2. Write a simple C program to find the Area of the triangle.
3. Write a simple C program to find the total and average percentage obtained by a student for 6 subjects.
4. Write a simple C program to read a three digit number and produce output like
   
   1 hundreds
   7 tens
   2 units
   
   for an input of 172.
5. Write a simple C program to check whether a given character is vowel or not using Switch – Case statement.
6. Write a simple C program to print the numbers from 1 to 10 along with their squares.
7. Write a simple C program to find the sum of ‘n’ numbers using for, do – while statements.
8. Write a simple C program to find the factorial of a given number using Functions.
9. Write a simple C program to swap two numbers using call by value and call by reference.
10. Write a simple C program to find the smallest and largest element in an array.
11. Write a simple C program to perform matrix multiplication.
12. Write a simple C program to demonstrate the usage of Local and Global variables.
13. Write a simple C program to perform various string handling functions: strlen, strcpy, strcat, strcmp.
14. Write a simple C program to remove all characters in a string except alphabets.
15. Write a simple C program to find the sum of an integer array using pointers.
16. Write a simple C program to find the Maximum element in an integer array using pointers.
17. Write a simple C program to create student details using Structures.
18. Write a simple C program to display the contents of the file on the monitor screen.
19. Create a File by getting the input from the keyboard and retrieve the contents of the file using file operation commands.
20. Write a simple C program to pass the parameter using command line arguments.
P102 ENGINEERING GRAPHICS

OBJECTIVES

- To convey the basics of engineering drawing
- To explain the importance of an engineering drawing
- To teach different methods of making the drawing
- To establish the importance of projects and developments made in drawing that are used in real systems
- To explain the role of computer aided design _Auto Cad
- To develop an intuitive understanding of underlying significance of using these drawings

Unit 0
Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning.

Unit I

Unit II
Projection of Solids and Sections of Solids.

Unit III
Development of surfaces - Intersection of surfaces (cylinder-cylinder, cylinder-cone).

Unit IV
Isometric projections and Orthographic projections.

Unit V
Computer Aided Drafting: Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands (Auto CAD) for simple shapes - Dimensioning.

Text Books
Reference Books
P103 BASIC ELECTRICAL AND ELECTRONICS LAB

OBJECTIVES

- To get an exposure on the basic electrical tools, applications and precautions
- To gain training on different types of wiring used in domestic and industrial applications.
- To detect and find faults in electrical lamp and ceiling fan
- To get an exposure on the measurements of voltage and phase using CRO, basic operation and applications of devices such as PN junction diode and transistor
- To gain a practical knowledge on the functions and application of basic logic gates and flip flops

ELECTRICAL LAB

List of Experiments

1. Electrical Safety, Precautions, study of tools and accessories.
2. Practices of different joints.
3. Wiring and testing of series and parallel lamp circuits.
4. Staircase wiring.
5. Doctor’s room wiring.
7. Go down wiring.
8. Wiring and testing a ceiling fan and fluorescent lamp circuit.
9. Study of different types of fuses and A.C and D.C meters.

ELECTRONICS LAB

List of Experiments

1. Study of CRO
   (a) Measurement of AC and DC voltages
   (b) Frequency and phase measurements (using Lissajou’s figures)
2. Verification of Kirchoff’s Voltage and Current Laws
Determine the voltage and current in given circuits using Kirchoff’s laws theoretically and verify the laws experimentally.

3. Characteristics and applications of PN junction diode.
   Forward and Reverse characteristics of PN junction diode.
   Application of Diode as Half wave Rectifier – Measurement of ripple factor with and without capacitor filter

4. Frequency Response of RC Coupled Amplifiers
   Determination of frequency response of given RC coupled amplifier - Calculation of bandwidth.

5. Study of Logic Gates
   (a) Verification of Demorgan’s theorems
   (b) Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR, EX-NOR gates and Flipflops - JK, RS, T and D
   (c) Implementation of digital functions using logic gates and Universal gates.
T107 MATHEMATICS – II

OBJECTIVES

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To introduce the concepts of Curl, Divergence and integration of vectors in vector calculus which is needed for many application problems.
- To introduce Laplace transform which is a useful technique in solving many application problems and to solve differential and integral equations.
- To acquaint the students with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic.

UNIT I – MATRICES


UNIT II – VECTOR CALCULUS

Gradient, divergence and curl, their properties and relations. Gauss divergence theorem and Stoke’s theorem (without proof). Simple application problems.

UNIT III – LAPLACE TRANSFORM

Definition, Transforms of elementary functions, properties. Transform of derivatives and integrals. Multiplication by tand division by t. Transform of unit step function, transform of periodic functions. Initial and final value theorems.

UNIT IV – APPLICATIONS OF LAPLACE TRANSFORM


UNIT V – FOURIER TRANSFORM

Fourier Integral theorem (statement only), Fourier transform and its inverse, properties. Fourier sine and cosine transforms, their properties, convolution and Parseval’s identity.
Text books


Reference Books

T108 MATERIAL SCIENCE

OBJECTIVES:

- To understand the importance of Material Science as a subject that revolutionized modern day technologies
- To understand the significance of material science in the development of new materials and devices for all branches of Engineering
- To impart knowledge to the Engineering students about some of the important areas of Materials Science so as to enable them perceive the significant contributions of the subject in Engineering and Technology

Unit I - Crystal structure and Lattice Defects
Lattice defects – Qualitative ideas of point, line, surface and volume defects.

Unit II – Dielectric properties

Unit III – Magnetic Properties

Unit IV – Semiconductors and superconductors
Semiconductors - Derivation of Carrier concentration in intrinsic Semiconductors – Basic ideas of Electrical conductivity in intrinsic and extrinsic semiconductors (without derivations) -temperature dependence of carrier concentration and electrical conductivity in semiconductors (qualitative ideas), Hall effect in Semiconductors -- Application of Hall Effect, Basic Ideas of Compound Semiconductors (II-VI & III-V).
Superconductivity - Basic concepts – transition temperature – Meissener effect – Type I and II superconductors – high temperature superconductors – 123 superconductor – Applications of superconductors.

Unit V – Advanced Materials
Liquid Crystals – Types – Application as Display Devices.
Metallic Glasses – preparation by melt spinning. Twin roller system, properties and applications.
Shape Memory alloys (SMA). Shape memory effect, Properties and applications of SMA Nanomaterials- Nano materials (one, Two & three Dimensional) –Methods of synthesis (PVD, CVD, Laser Ablation, Solgel, Ball-milling Techniques), Properties and applications of nanomaterials. carbon nanotubes– Properties and applications.

Text books

Reference Books
T109 ENVIRONMENTAL SCIENCE

OBJECTIVES

- To know about the environment.
- To understand about environmental pollution.
- To apply the knowledge in understanding various environmental issues and problems.

UNIT I – Environment and Energy Resources


UNIT II - Ecosystem and Biodiversity


UNIT III - Air Pollution

UNIT IV - Water and Land Pollution


UNIT V - Pollution Control and Monitoring

Basic concepts and instrumentation of IR, UV-VIS, atomic absorption spectrometry, Gas Chromatography and Conductometry. Analysis of air pollutants – NO$_x$, CO$_x$, SO$_x$, H$_2$S, Hydrocarbons and particulates.

Text Books:


Reference Books:

T 110 BASIC CIVIL AND MECHANICAL ENGINEERING

OBJECTIVES

- To appreciate the role of civil engineering in daily walks of life.
- To be able to differentiate the types of buildings according to national building code.
- To understand building components and their functions as well as different types of roads, bridges and dams.
- To convey the basic principles of Mechanical Engineering and its relationship to other branches of engineering.
- To explain the concepts of thermal systems used in power plants and narrate the methods of harnessing renewable energies.
- To explain the role of basic manufacturing processes.
- To develop an intuitive understanding of underlying working principles of mechanical machines and systems.

Part-A Civil Engineering

Unit I - Buildings, Building Materials

Buildings: Definition - Classification according to NBC - plinth area, Floor area, carpet area, floor space index - construction materials - stone, brick, cement, cement-mortar, concrete, steel - their properties and uses.

Unit II - Buildings and their components


Unit III - Basic Infrastructure


PART - B Mechanical Engineering

Unit - IV

Internal and external combustion systems:
IC engines – Classification – Working principles - Diesel and petrol engines: two stroke and four stroke engines – Merits and demerits.
Steam generators (Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories – Merits and demerits - Applications.

Unit - V
Power Generation Systems – Convectional and Non-Conventional:
Hydraulic – Thermal – Nuclear power plants – Schemes and layouts (Description Only)
Solar – wind –Geothermal - Wave – Tidal and Ocean Thermal Energy Conversion systems – Basic power plant schemes and layouts (Description only).

Unit - VI
Manufacturing Processes:
Machines – Lathe – Drilling – Bending – Grinding – Shearing (Description only)
Moulding and Metal Joining - Pattern making – Green and dry sand moulding – Arc and Gas welding – Brazing – Soldering (process description only).

Text Books

Reference Books
T 111 ENGINEERING MECHANICS

OBJECTIVES

- To understand the vector and scalar representation of forces and moments, static equilibrium of particles and rigid bodies in two dimensions
- To comprehend the effect of friction on equilibrium
- To understand the laws of motion, the kinematics of motion and the interrelationship and to learn to write the dynamic equilibrium equation
- To emphasize the concepts through solved examples

Unit I - Fundamental of Mechanics

Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon’s theorem, Resultant of force system – Concurrent and non concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, applications in solving the problems on static equilibrium of bodies.

Unit II – Practical application of force system

Structural member: definition, Degree of freedom, concept of free body diagrams, types of supports and reactions, types of loads, Analysis of Trusses-method of joints, method of sections.

Friction: Introduction, Static dry friction, simple contact friction problems, ladders, wedges.

Unit III - Properties of Surfaces

Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia.

Unit IV - Kinematics and Kinetics of Particles


Unit V - Kinematics and Kinetics of Rigid bodies

Plane motion, Absolute motion, Relative motion, translating axes and rotating axes, work and energy, impulse and momentum
Text Books

Reference Books
T112 COMMUNICATIVE ENGLISH

OBJECTIVES

- To improve the LSWR skills of I B.Tech students
- To instill confidence and enable the students to communicate with ease
- To equip the students with the necessary skills and develop their language prowess

Unit I – Basic Communication Theory
Importance of Communication – stages of communication, modes of communication – barriers to communication – strategies for effective communication – Listening: Importance, types, barriers – Developing effective listening skills.

Unit II – Comprehension and Analysis
Comprehension of technical and non-technical material – Skimming, scanning, inferring-Note making and extension of vocabulary, predicting and responding to context-Intensive Reading and Reviewing

Unit III – Writing
Effective sentences, cohesive writing, clarity and conciseness in writing – Introduction to Technical Writing – Better paragraphs, Definitions, Practice in Summary Writing – Four modes of writing – Use of dictionaries, indices, library references – making bibliographical entries with regard to sources from books, journals, internet etc.

Unit IV – Business Writing / Correspondence

Unit V – Oral Communication

Reference Books
OBJECTIVES

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.

List of experiments (Any 10 Experiments)

1. Thermal conductivity – Lee’s DISC
2. Thermal conductivity - Radial flow
3. Spectrometer – Prism or Hollow prism
4. Spectrometer – Transmission grating
5. Spectrometer - Ordinary & Extraordinary rays
6. Newton’s rings
7. Air – wedge
8. Half shade polarimeter – Determination of specific rotatory power
9. Jolly’s experiment – determination of $\alpha$
10. Magnetism: i – h curve
11. Field along the axis of coil carrying current
12. Vibration magnetometer – calculation of magnetic moment & pole strength
13. Laser experiment: wavelength determination using transmission grating, reflection grating (vernier calipers) & particle size determination
14. Determination of optical absorption coefficient of materials using laser
15. Determination of numerical aperture of an optical fiber
16. Electrical conductivity of semiconductor – two probe / four probe method
17. Hall effect in semiconductor
P105 CHEMISTRY LABORATORY

OBJECTIVES

- To gain a practical knowledge of Engineering Chemistry in relevance to Industrial applications

List of experiments (Any 10 Experiments)

1. Determination of dissolved oxygen in water.
2. Determination of total hardness of water by EDTA method.
3. Determination of carbonate and bicarbonate in water.
4. Estimation of chloride content in water.
5. Estimation of magnesium by EDTA.
6. Estimation of acetic acid in vinegar.
7. Estimation of ferrous by permanganometry.
8. Estimation of ferrous and ferric iron in a solution mixture by dichrometry.
10. Estimation of copper in copper sulphate solution.
11. Estimation of calcium by permanganometry.
12. Estimation of iron by colorimetry.

Demonstration Experiments (Any two of the following)

1. Determination of COD of water sample.
2. Determination of lead by conductometry.
3. Percentage composition of sugar solution by viscometry.

Reference:

Laboratory Manual prepared by the Department of Chemistry
P106 WORKSHOP PRACTICE

OBJECTIVES

- To convey the basics of mechanical tools used in engineering
- To establish hands on experience on the working tools
- To develop basic joints and fittings using the hand tools
- To establish the importance of joints and fitting in engineering applications
- To explain the role of basic workshop in engineering
- To develop an intuitive understanding of underlying physical mechanism used in mechanical machines.

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<th>Sl. No.</th>
<th>Trade</th>
<th>List of Exercises</th>
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<tbody>
<tr>
<td>1.</td>
<td>Fitting</td>
<td>Study of tools and Machineries. Exercises on symmetric joints and joints with acute angle.</td>
</tr>
<tr>
<td>2.</td>
<td>Welding</td>
<td>Study of arc and gas welding equipment and tools – Edge preparation – Exercises on lap joint and V Butt joints – Demonstration of gas welding</td>
</tr>
<tr>
<td>4.</td>
<td>Carpentry</td>
<td>Study of tools and Machineries – Exercises on Lap joints and Mortise joints</td>
</tr>
</tbody>
</table>

List of Exercises

I Fitting
1. Study of tools and Machineries
2. Symmetric fitting
3. Acute angle fitting

II Welding
1. Study of arc and gas welding equipment and tools
2. Simple lap welding (Arc)
3. Single V butt welding (Arc)

III Sheet metal work
1. Study of tools and machineries
2. Frustum
3. Waste collection tray

IV Carpentry
1. Study of tools and machineries
2. Half lap joint
3. Corner mortise joint.
Reference Books

NCC/NSS training is compulsory for all the Undergraduate students
1. The above activities will include Practical/field activities/Extension lectures.
2. The above activities shall be carried out outside class hours.
3. In the above activities, the student participation shall be for a minimum period of 45 hours.
4. The above activities will be monitored by the respective faculty incharge and the First Year Coordinator.
5. Pass /Fail will be determined on the basis of participation, attendance, performance and behaviour. If a candidate Fails, he/she has to repeat the course in the subsequent years
6. Pass in this course is mandatory for the award of degree.
III SEMESTER

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<tr>
<th>Subject Code</th>
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<tr>
<td>MA T31</td>
<td>MATHEMATICS III</td>
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**Course Objectives:**

1. To provide the concepts of functions of a complex variable, conformal mapping, complex integration, series expansion of complex functions, Harmonic analysis and Fourier series.
2. To make the students understand and work out problems of constructing analytic functions, conformal mapping, bilinear transformation, contour integration and expanding functions into Fourier series including Harmonic analysis.

**Course Outcomes:**

On successful completion of the module students will be able to:

1. Understand the concepts of function of a complex variable and complex integration and apply these ideas to solve problems occurring in the area of engineering and technology.
2. Expand functions into Fourier series which are very much essential for application in engineering and technology.

**UNIT I**

Function of a complex variable: Continuity, derivative and analytic functions – Necessary conditions – Cauchy-Riemann equations (Cartesian and polar form) and sufficient conditions (excluding proof) – Harmonic and orthogonal properties of analytic function – Construction of analytic functions.

**UNIT II**

Conformal mapping – Simple and standard transformations like \( w = z+c, \ cz, \ z^2, \ e^z, \sin z, \cosh z \) and \( z+1/z \) – Bilinear transformation and cross ratio property (excluding Schwarz-Christoffel transformation). Taylor’s and Laurent’s theorem (without proof) – Series expansion of complex valued functions – classification of singularities.

**UNIT III**

Complex Integration: Cauchy’s integral theorem and its application, Cauchy’s integral formula and problems. Residues and evaluation of residues – Cauchy’s residue theorem – Contour integration: Cauchy’s and Jordan’s Lemma (statement only) – Application of residue theorem to evaluate real integrals – unit circle and semicircular contour (excluding poles on boundaries).

**UNIT IV**


**UNIT V**

Root Mean Square Value – Parseval’s theorem on Fourier Coefficients. Complex form of Fourier series – Harmonic Analysis.

**TOTAL PERIODS: 60**
### Text Books:

### Reference Books:
Subject Code | Subject Name                  | Lectures (Periods) | Tutorial (Periods) | Practical (Periods) |
-------------|-------------------------------|-------------------|-------------------|-------------------|
CS T32       | ELECTRONIC DEVICES AND CIRCUITS | 3                 | 1                 | -                 |

Course Objectives:
1. To introduce the basic principle, operation and applications of electronic devices
2. To understand the concept of biasing and different types of biasing circuits used for BJT, JFET and MOSFET
3. To study the basic models of BJT, JFET and MOSFET
4. To understand the basic concept of feedback and operation of different types of amplifiers and oscillators
5. To understand the characteristics and applications of operational amplifiers

Course Outcomes:
On successful completion of the module students will be able to:
1. Understand the operation and applications of various electronic devices like diodes, UJT, SCR, DIAC and TRIAC
2. Compare the different biasing circuits used for BJT, JFET and MOSFET
3. Analyze the device models of BJT, JFET and MOSFET
4. Comprehend the concepts of feedback and understand the operation of amplifiers and oscillators
5. Understand the characteristics of operational amplifiers and their applications

UNIT I

UNIT II
Biasing and Modeling for BJT and FET: Biasing and operating point, BJT Bias circuits - Fixed-bias, Emitter stabilized bias, Voltage divider bias and DC bias with voltage feedback, FET biasing – Fixed-bias, Self-bias, Voltage-divider bias, MOSFET biasing. Transistor modeling – Important parameters of BJT- $h$- parameter model of BJT (CE only) – Important parameters of JFET, Small signal model of JFET and MOSFET

UNIT III
RC-coupled amplifier, Operation and Frequency response, Power amplifier – Series fed and transformer coupled Class A amplifiers, Class B amplifier, Circuit and Operation, conversion efficiency, amplifier distortion, Class C and D amplifiers. Concept of feedback- Negative and positive feedback, Barkhausenen Criterion - Wien bridge oscillators, Hartley, Colpitts and crystal oscillator - Frequency stability.

UNIT IV
## UNIT V

**Special Devices:** Varactor diode, Tunnel diode, PIN diode, LED, LCD, Seven segment displays, Opto-isolator. UJT - Characteristics and equivalent circuit – intrinsic standoff ratio – UJT relaxation oscillator, SCR - Two transistor model, DIAC and TRIAC - Operation, Characteristics and their applications.

**TOTAL PERIODS:** 60

### Text Books:


### Reference Books:

Subject Code | Subject Name | Lectures (Periods) | Tutorials (Periods) | Practical (Periods) |
--- | --- | --- | --- | --- |
CS T33 | OBJECT ORIENTED PROGRAMMING AND DESIGN | 3 | 1 | - |

Course Objectives:
1. To introduce the object oriented concepts.
2. To learn object oriented programming using C++.
3. To understand the challenges in developing object oriented programming.
4. To design programs using UML concepts.

Course Outcomes:
On successful completion of this course students will be able to:
1. Understand the concepts of Features of object oriented programming.
2. Learn the programming details of object oriented programming.
3. Develop C++ programs for various real time applications.
4. To develop UML design diagrams using OOP concepts.

UNIT – I
Input and output in C++: Limitations of C – Introduction to C++ – Structure of the C++ program – stream classes – formatted and unformatted data – unformatted console I/O operations – Bit fields, Manipulators – Manipulators with multiple parameter
Classes and objects: Defining member functions – rules of inline functions – data hiding or encapsulation – classes – objects and memory – static object – array of objects – objects as function arguments, friend functions, member functions and non-member functions – overloading member functions.

UNIT – II
UNIT - III

**Pointers and arrays:** Pointer to class and object – pointer to derived classes and base classes – accessing private members with pointers – address of object and void pointers – characteristics of arrays – array of classes.

**Memory:** Memory models – The new and delete operators – Heap consumption – Overloading new and delete operators – Execution sequence of constructors and destructors – specifying address of an object – dynamic objects.

**Binding, Polymorphism and Virtual Functions:** Binding in C++ – Pointer to derived class objects – virtual functions – Array of pointers – Abstract classes – Virtual functions in derived classes – constructors and virtual functions – virtual destructors – destructors and virtual functions. Strings - Declaring and initializing string objects – relational operators – Handling string objects – String attributes – Accessing elements of strings – comparing and exchanging and Miscellaneous functions.

UNIT – IV


**Generic Programming with Templates:** Generic Functions - Need of Template – Normal function template – class template with more parameters – Function template with more parameters, overloading of function templates, class template with overloaded operators – class templates and inheritance.

**Exception Handling:** Fundamentals of Exception Handling – Catching Class Types – Using Multiple catch statements – Catching All Exception – Rethrowing Exception – Specifying Exception – Exceptions in constructors and destructors – controlling uncaught Exceptions – Exception and operator overloading –Exception and inheritance –Class Template and Exception handling.

UNIT – V


**TOTAL PERIODS:** 60

**Text Books:**

### Reference Books:

### Websites:
Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
--- | --- | --- | --- | ---
CS T34 | DIGITAL SYSEM DESIGN | 3 | 1 | -

**Course Objectives:**
1. To introduce the fundamentals of digital system design.
2. To lay strong foundation to the combinational and sequential logic.
3. To educate from basic concepts to advanced system design.
4. To impart understanding of the hardware fundamentals of computer design.

**Course Outcomes:**
On successful completion of the module students will be able to:
1. Understand the binary number systems and Boolean algebra.
2. Design combinational logic using only of universal gates, MSI gates and PLDs
3. Design and implement sequential logic circuits of any complexity.
4. Simulate and validate correctness of the digital circuits using VHDL packages.
5. Develop any prototypes using the state of the art reconfigurable devices.

**UNIT – I**


**UNIT – II**


**UNIT – III**


**UNIT – IV**

Reconfigurable Digital Circuits: Types of Memories – Organization of ROM and RAM – Address Decoding – Programmable Logic Devices (PLDs) – Programmable Logic Arrays (PLAs) – Programmable Array Logic (PAL) devices – Field Programmable Gate Arrays (FPGAs) - Combinational Logic implementation using PROMs, PLAs, PALs.
# UNIT – V


**TOTAL PERIODS:** 60

## Text Books:


## Reference Books:


## Websites:

1. NPTEL course on Digital Circuits Design available at http://www.nptel.iitm.ac.in/video.php?subjectId=117106086
2. CPLDS and FPGAs tools available at http://www.xilinx.com
Subject Code | Subject Name          | Lectures (Periods) | Tutorial (Periods) | Practical (Periods) |
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CS T35      | DATA STRUCTURES       | 3                  | 1                  | -                  |

Course Objectives:
1. To acquaint students with data structures used when programming for the storage and manipulation of data.
2. The concept of data abstraction and the problem of building implementations of abstract data types are emphasized.
3. To understand the applications of graph theory in various domains.

Course Outcomes:
On successful completion of the module students will be able to:
1. Selection of relevant data structures and combinations of relevant data structures for the given problems in terms of memory and run time efficiency.
2. Apply data abstraction in solving programming problems.
3. Apply Graph theoretical approaches for solving real-life problems.

UNIT – I

UNIT – II

UNIT – III

UNIT – IV

UNIT – V

TOTAL PERIODS: 60
**Text Books:**

**Reference Books:**

**Website:**
1. http://www.cse.unt.edu
2. http://nptel.ac.in/courses/106102064/
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<td>CS T36</td>
<td>COMPUTER ORGANIZATION AND ARCHITECTURE</td>
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**Course Objectives:**
1. To provide an overview of computer hardware.
2. To give a methodical treatment of machine instructions, addressing techniques, and instruction sequencing.
3. To explain the basics of I/O data transfer synchronization.
4. To understand the common components and organizations used to implement memory and to know the implementation of instruction fetching and execution in a processor.
5. To provide details on use of pipelining and multiple functional units.

**Course Outcomes:**
On successful completion of the module students will be able to:
1. Understand Basics of Computers, Machine Instructions and Programs.
2. Understand the implementation of concepts is done on commercial processors.
3. Gain knowledge regarding the ways for increasing main memory bandwidth.
4. Understands Processor implementation by both hardwired and Microprogrammed control.
5. Understands relation between pipelined execution and instruction set design.

**UNIT – I**
BASIC STRUCTURES OF COMPUTER: Functional Units, Multiprocessors and Multicomputers, Memory Locations and Addresses, Memory operations, Instructions and Instruction Sequencing, Addressing modes, Assembly Language, Basic Input/Output operations, Stacks and Queues, Subroutines, Shift and rotate Instructions, Byte-Sorting program.

**UNIT – II**
The IA-32 Pentium Example: Registers and Addressing, IA-32 Instructions, IA-32 Assembly Language, Program Flow Control, Logic and Shift/Rotate Instructions, I/O Operations, Subroutines, Other Instructions, Program Examples.

**UNIT – III**

**UNIT – IV**
THE MEMORY SYSTEM: Some Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size, and Cost, Cache Memories, Performance Considerations, Virtual memories, Memory Management requirements, Secondary Storage.
## UNIT – V
BASIC PROCESSING UNIT: Some Fundamental Concepts, Execution Of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Microprogrammed Control, PIPELINING: Basic Concepts, Data Hazards, Instruction Hazards, Influence On Instructions Sets, Datapath and Control Considerations, Superscalar Operations, Performance Considerations

**TOTAL PERIODS: 60**

### Text Books:

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<td>ELECTRONIC DEVICES AND CIRCUITSLABORATORY</td>
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**LIST OF EXPERIMENTS**

1. VI characteristics of LED and Zener diodes
2. Application of Diodes - Clippers, Clampers, AND gate and OR gate
3. Input and Output Characteristics of Common Emitter transistor configuration and determination of $h$-parameters
4. Drain characteristics of JFET and determination of Drain resistance, Mutual conductance and Amplification factor
5. VI Characteristics of Silicon Controlled Rectifier and Uni-Junction transistor.
6. Frequency Response of RC-coupled amplifier and determination of input and output impedances
7. Class B push – pull power amplifier
8. Applications of Operational amplifier
   a) Adder and subtractor
   b) Integrator and differentiator
   c) Wien bridge oscillator
9. LC Oscillators - Hartley and Colpitts oscillators
10. Frequency response of second order active low pass and high pass filters
LIST OF EXPERIMENTS

1. Searching algorithms - sequential, binary and Fibonacci search algorithms on an ordered list. Compare the number of key comparisons made during the searches
2. Sorting algorithms: Insertion Sort, Selection Sort, Bubble Sort,
3. Sorting algorithms: Shell Sort, Quick Sort, Heap Sort.
4. Sorting algorithms: Merge Sort, and Radix Sort
5. Sparse matrix representation and find its transpose.
6. Evaluation of arithmetic expression to postfix expression.
7. Queue, circular queue, priority queue, Dequeue.
8. Singly Linked List, Doubly Linked List, Circular Linked List
9. Concatenation of linked lists.
10. Tree traversals
11. Graph traversals
12. Implementation of Dijkstra’s algorithm
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<td>CS P33</td>
<td>DIGITAL DESIGN LABORATORY</td>
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**LIST OF EXPERIMENTS**

1. Verification of DeMorgan’s theorems using basic logic gates.
2. Design and implementation of adders and subtractors.
3. Design and implementation of Carry Look-Ahead Adders.
4. Design and implementation of Parity Generator/Checkers.
5. Design and implementation of Priority encoders using logic gates.
6. Design and implementation of simplified Boolean expressions using Multiplexers.
7. Design and implementation of simplified Boolean expressions using Decoders.
8. Design and implementation of Magnitude Comparators.
9. Study of clocked RS, D, and JK Flip-Flops.
10. Design and implementation of Serial Input Parallel Output (SIPO) and Parallel Input Serial Output (PISO) Shift Registers.
11. Design and implementation of ripple and synchronous counters.
12. Simulation of a combinational logic using HDL.
13. Simulation of a sequential logic using HDL.
15. Implementation of a sequential circuit using PAL/PLA realization.
## IV SEMESTER

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<td>MA T41</td>
<td>MATHEMATICS - IV</td>
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### Course Objectives:
1. Importance of problems in Partial Differential Equations
2. Problem solving techniques of PDE
3. To make the students knowledgeable in the areas of Boundary Value Problems like vibrating string (wave equation), heat equation in one and two dimensions.
4. To acquaint the students with the concepts of Theory of sampling.

### Course Outcomes:
On successful completion of the module students will be able to:
1. Understand the different types of PDE and will be able to solve problems occurring in the area of engineering and technology.
2. Know sampling theory and apply to solve practical problems in engineering and technology.

### UNIT – I
**PARTIAL DIFFERENTIAL EQUATIONS:** Formation by elimination of arbitrary constants and arbitrary functions – General, singular, particular and integrals – Lagrange’s linear first order equation – Higher order differential equations with constant coefficients

### UNIT – II
**PARTIAL DIFFERENTIAL EQUATIONS:** Solution of partial differential equation by the method of separation of variables – Boundary value problems – Fourier series solution – Transverse vibration of an elastic string.

### UNIT – III
**PARTIAL DIFFERENTIAL EQUATIONS:** Fourier series solution for one dimensional heat flow equation – Fourier series solutions for two dimensional heat flow equations under steady state condition – (Cartesian and Polar forms).

### UNIT – IV
**APPLIED STATISTICS:** Curve fitting by the method of least squares – fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large samples test for single proportions, differences of proportions, single mean, difference of means and standard deviations.

### UNIT – V
**APPLIED STATISTICS:** Small samples – Test for single mean, difference of means and correlations of coefficients, test for ratio of variances – Chi-square test for goodness of fit and independence of attributes.

**TOTAL PERIODS: 60**
**Text Books:**

**Reference Books:**
<table>
<thead>
<tr>
<th>Subject Code</th>
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<tr>
<td>CS T42</td>
<td>MICROPROCESSORS AND MICROCONTROLLERS</td>
<td>3</td>
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**Course Objectives:**
1. To understand the architectures and the instruction set of 8085 microprocessor
2. To understand the architectures and the instruction set of 8086 microprocessor
3. To understand the architectures and the instruction set of 8051 microcontroller
4. To learn the assembly language program using 8085, 8086 and 8051 instructions
5. To learn interfacing of microprocessors and microcontrollers with various devices

**Course Outcomes:**
On successful completion of this course students will be able to:
1. Understanding the inner working components of the microprocessor and microcontrollers
2. Developing assembly language program using 8085 instruction set
3. Developing assembly language program using 8086 instruction set
4. Developing assembly language program using 8051 instruction set
5. Developing various I/O programs for 9085, 8086 and 8051

**UNIT – I**

**UNIT – II**
**Intel 8085 Interrupts and DMA:** 8085 Interrupts – Software and Hardware Interrupts – 8259 Programmable Interrupt Controller - Data Transfer Techniques – Synchronous, Asynchronous and Direct Memory Access (DMA) and 8237 DMA Controller- 8253 Programmable Interval Timer.

**UNIT – III**
**Memory & I/O Interfacing:** Types of memory – Memory mapping and addressing – Concept of I/O map – types – I/O decode logic – Interfacing key switches and LEDs – 8279 Keyboard/Display Interface - 8255 Programmable Peripheral Interface – Concept of Serial Communication – 8251 USART – RS232C Interface.

**UNIT – IV**

**UNIT – V**


**TOTAL PERIODS: 60**

**Text Books:**

**Reference Books:**

**Websites:**
<table>
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<td>CS T43</td>
<td>AUTOMATA LANGUAGES AND COMPUTATION</td>
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**Course Objectives:**
1. To understand the foundation of computing
2. To realize the theoretical knowledge behind the computation
3. To understand the construction of formal languages
4. To apply this mathematical model for various computing research environment

**Course Outcomes:**
On successful completion of the module students will be able to:
1. An ability to apply the mathematical methodologies in various research environment
2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
3. An ability to design a system, component, or process using automata.

**UNIT – I**

**Finite Automata and Regular Expressions:** Formal Languages and Regular expressions, Deterministic and Non-Deterministic Finite Automata, Finite Automata with $e$-moves, Equivalence of NFA and DFA, Minimization of finite automata, Two-way finite automata, Moore and Mealy machines, Applications of finite automata.

**UNIT – II**


**UNIT – III**

**Pushdown Automata and Parsing Algorithms:** Pushdown Automata and Context-Free Languages; Top-down parsing and Bottom-up parsing, Properties of CFL, Applications of Pumping Lemma, Closure properties of CFL and decision algorithms.

**UNIT – IV**


**UNIT – V**

**Introduction to Computational Complexity:** Time and Space complexity of TMs – Complexity classes – Introduction to NP-Hardness and NP-Completeness.

**TOTAL PERIODS: 60**
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### Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods) |
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CS T44 | DESIGN AND ANALYSIS OF ALGORITHMS | 3 | 1 | - |

**Course Objectives:**
1. To analyze time and space complexities of algorithms.
2. To acquaint students with algorithm techniques when programming for the storage and manipulation of data.
3. The concept of data abstraction and the problem of building implementations of abstract data types are emphasized.

**Course Outcomes:**
On successful completion of the module students will be able to:
1. Selection of relevant algorithm technique and combinations of relevant data structures for the given problems in terms of memory and run time efficiency.
2. Apply data abstraction in solving programming problems.
3. Capable of categorizing the given problem into NP-Hard or NP-Complete.

### UNIT – I
Algorithms: Definitions and notations: standard notations - asymptotic notations – worst case, best case and average case analysis; big oh, small oh, omega and theta notations; Analysis of Sorting and Searching: Heap, shell, radix, insertion, selection and bubble sort; sequential, binary and Fibonacci search. Recursive algorithms, analysis of non-recursive and recursive algorithms, solving recurrence equations, analyzing control structures.

### UNIT – II

### UNIT – III

### UNIT – IV

### UNIT – V

**TOTAL PERIODS: 60**
### Text Books:

### Reference Books:

### Website:
1. nptel.iitm.ac.in/Algorithms
Subject Code | Subject Name                        | Lectures (Periods) | Tutorial (Periods) | Practical (Periods) |
-------------|-------------------------------------|--------------------|--------------------|--------------------|
CS T45       | OBJECT ORIENTED PROGRAMMING         | 3                  | 1                  | -                  |

Course Objectives:
1. To understand the concepts of object oriented programming
2. To expertise the programming skills through JAVA language
3. To learn internet programming using object oriented approach.

Course Outcomes:
On successful completion of the module students will be able to:
1. An ability to conceptualize the problem in terms of object oriented features
2. An ability to use the OO programming techniques in real time applications.
3. An ability to design and develop a complete object oriented applications

UNIT – I

UNIT – II
Overloading - Inheritance – Files and Stream – Multithreading – Exception Handling

UNIT – III

UNIT – IV
Generics – Collections - Utility Packages –Input Output Packages - Inner Classes - Java Database Connectivity – Java Security

UNIT – V

TOTAL PERIODS: 60

Text Books:
1. Deitel and Deitel, “JAVA How to Program” Prentice Hall, 2006

Reference Books:
### Course Objectives:
1. To learn, develop, design and implement two dimensional graphical structures.
2. To understand the components of Graphics and Image Processing applications.
3. To design innovative applications such as animation.
4. To learn the hardware and software facilities available for Graphics and Image Processing applications.

### Course Outcomes:
On successful completion of this course
1. The students will get acquainted Graphics and Image Processing domains.
2. They will understand the major intricacies of Graphics and Image Processing.
3. They will be able to convert verbal descriptions to images and vice versa.

### UNIT – I

### UNIT – II
**Geometric Display Primitives and Attributes:** Geometric display primitives – Points– Lines and Polygons – Point display method – Line drawing methods.


**Window to view port transformations:** Windowing And Clipping: Point– Lines– Polygons - boundary intersection methods.

### UNIT – III

### UNIT – IV
## UNIT V

**Image Compression:** Compression Models and measures – coding types – Types of Redundancy – Lossless compression algorithms – Lossy compression algorithms – Introduction to compression standards.

**Image Segmentation:** Detection of Discontinuities – Edge Detection – Thresholding – Region Based Segmentation.

**Introduction to Color Image Processing,** **Introduction to Morphological operations.**

**TOTAL PERIODS:** 60

### Text Books:

### Reference Books:

### Website:
1. [http://nptel.ac.in/courses/106106090/](http://nptel.ac.in/courses/106106090/)
2. [http://nptel.ac.in/courses/106105032/](http://nptel.ac.in/courses/106105032/)
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<td>CS P41</td>
<td>MICROPROCESSORS AND MICROCONTROLLERS LABORATORY</td>
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**LIST OF EXPERIMENTS**

**Experiment Using 8085 Microprocessor:**
1. Study of 8085 Microprocessor Trainer Kit
2. 8-bit Arithmetic Operations (Addition, Subtraction, Multiplication and Division)
3. Block Operations (Move, Exchange, Compare, Insert and Delete)
4. Code Conversions
5. Digital Clock simulation
6. Moving Display
7. Serial Communication
8. Interrupt Programming
9. Elevator Simulation
10. Traffic Light Control

**Experiments Using 8086 Microprocessor with MASM**
11. Arithmetic Operations
12. Sorting and Searching

**Experiments Using 8051 Microcontroller**
13. Arithmetic operations
14. ADC & DAC Interfacing
15. Stepper Motor and DC Motor Interface
LIST OF EXPERIMENTS

1. Implementation of binary search using Divide-and-Conquer technique.
2. Implementation of merge sort algorithms using Divide-and-Conquer technique.
7. Implementation of 0/1 Knapsack using Dynamic Programming technique.
10. Implementation of Pre-order, In-order, Post-order traversals using DFS traversal techniques.
11. Implementation of Pre-order, In-order, Post-order traversals using BFS traversal techniques.
12. Implementation of 8 Queens with the design of Backtracking.
13. Implementation of sum of subsets with the design of Backtracking.
15. Implementation of Traveling Salesman problems with Branch-and-Bound technique.
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<th>Subject Code</th>
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<td>OBJECT ORIENTED PROGRAMMING LABORATORY</td>
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**LIST OF EXPERIMENTS**

*Note: All these experiments to be done using C++ and JAVA.*

1. Program to implement classes and objects.
2. Program to implement constructors and destructors with array of objects.
3. Program to demonstrate function overloading.
4. Program to implement different types of inheritances like multiple, Multilevel and hybrid.
5. I/O Program to demonstrate the use of abstract classes.
6. Program to demonstrate I/O streams and functions.
7. Program to perform all possible type conversions.
8. Program to demonstrate exception handling technique.
9. Program to implement networking concepts.
10. Program to implement RMI concepts.
11. Program to implement AWT concepts.
12. Program to implement swing concepts.
13. Program to design and implement applet.
14. Program to design and implement JDBC.
15. Program to design an event handling event for simulating a simple calculator.
V SEMESTER

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<tr>
<th>Subject Code</th>
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<td>CS T51</td>
<td>OPERATING SYSTEMS</td>
<td>3</td>
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Course Objectives:
1. To have an overview of different types of operating systems
2. To know the components of an operating system.
3. To have a thorough knowledge of process management
4. To have a thorough knowledge of storage management
5. To know the concepts of I/O and file systems.

Course Outcomes:
On successful completion of the module students will be able to:
1. Gain the knowledge of different types of operating systems.
2. A clear understanding of program, process and thread.
3. Able to realize the need for Process Synchronization and the various constructs for Process Synchronization.
4. Have an insight into real and virtual memory management techniques.

UNIT – I


UNIT – II


UNIT – III


UNIT – IV


UNIT – V


TOTAL PERIODS: 60
### Text Books:

### Reference Books:

### Website:
1. web.cs.wpi.edu/~cs3013/c07/lectures/Section01-Overview.ppt
3. http://www.cse.iitd.ac.in/~sbansal/os/
Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
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CS T52 | COMPUTER NETWORKS | 3 | 1 | -

Course Objectives:
1. Given an environment, after analyzing the channel characteristics, appropriate channel access mechanism and data link protocols are chosen to design a network.
2. Given an environment, analyzing the network structure and limitations, appropriate routing protocol is chosen to obtain better throughput.
3. Given various load characteristics and network traffic conditions, decide the transport protocols and timers to be used.
4. Given the requirements of the user, an appropriate Internet protocol and proper security options are chosen.

Course Outcomes:
On successful completion of the module, a student should able to:
1. Understand the layer abstraction of any computer network model.
2. Analyze the requirement of various hardware components and software to be developed to establish a network.
3. Analyze the working conditions of a network and able to provide the solutions to improve the performance of the network.

UNIT – I

UNIT – II

UNIT – III

UNIT – IV

UNIT – V

TOTAL PERIODS: 60

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</table>
CS T53  DATABASE MANAGEMENT SYSTEMS  3  1  -

Course Objectives:
1. To solve queries using Query languages
2. To understand normalization concepts
3. To understand concepts of transactions and concurrency control
4. To understand database authorization and recovery concepts
5. To understand indexing and hashing concepts

Course Outcomes:
On successful completion of the module the students will be able to:

1. Classify modern and futuristic database applications based on size and complexity
2. Design a database from an Universe of Discourse, using ER diagrams
3. Map ER model into Relations and to normalize the relations
4. Create a physical database from a design using DDL statements with appropriate key, domain and referential integrity constraints
5. Analyze different ways of writing a query and justify which is the effective and efficient way

UNIT – I
INTRODUCTION: History-purpose-view of Data-Database languages-Data Models-Data Storage and Querying-Transaction management-Database Architecture-Two tier-Three tier-Database users and Authorization.
Relational Algebra-Structure-keys-schema diagrams-Relational operations
Formal Relational Query Languages- Relational Algebra-Tuple Relational calculus-Domain Relational Calculus.

UNIT – II
UNIT – III


UNIT – IV

Query Processing: Measures of Query Cost- Selection Operation- Sorting-Join Operation- Other Operations- Evaluation of Expressions

UNIT – V


Case Studies IBM DB2 Universal Database – My SQL.

TOTAL PERIODS: 60

Text Books:

Reference Books:

Website:
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<td>CS T54</td>
<td>LANGUAGE TRANSLATORS</td>
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**Course Objectives:**

1. To gain basic features of system software (assemblers/loaders/linkers/compilers)
2. To gain knowledge on data structures required for implementation of system software like assemblers/loaders/compilers
3. To understand the design of assemblers.
4. To understand the role of loaders and linkers in Loading, relocation and linking.
5. To understand the various phases of designing a compiler

**Course Outcomes:**

On successful completion of the module students will be able to:

1. An ability to design and implement assemblers for different computer architectures
2. An ability to design and implement loaders
3. An ability to understand the major phases of compilation, particularly lexical analysis, parsing, semantic analysis, and code generation.
4. The ability to use formal attributed grammars for specifying the syntax and semantics of programming languages, and their impact on compiler design.
5. An ability to understand how the machine code translation occurs

**UNIT – I**


**UNIT – II**

*Loaders and Linkers:* Basic loader functions, machine – dependent and machine independent Loader features. Loader design – Linkage editors, dynamic linking and bootstrap loaders.

**UNIT – III**

UNIT – IV


UNIT – V


**TOTAL PERIODS: 60**

**Text Books:**

**Reference Books:**

**Website:**
Subject Code | Subject Name             | Lectures (Periods) | Tutorial (Periods) | Practical (Periods) |
-------------|--------------------------|--------------------|--------------------|--------------------|
CS T55       | SOFTWARE ENGINEERING     | 3                  | 1                  | -                  |

Course Objectives:
1. Identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements.
2. Elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of a software project.
3. Understanding professional, ethical and social responsibility of a software engineer.
4. Participate in design, development, deployment and maintenance of a medium scale software development project.

Course Outcomes:
On successful completion of the module students:
1. Ability to apply basic knowledge and understanding of the analysis, synthesis and design of complex systems.
2. Develop, maintain and evaluate large-scale software systems.
3. Produce efficient, reliable, robust and cost-effective software solutions.

UNIT – I

UNIT – II
### UNIT – III


### UNIT – IV


### UNIT – V


**TOTAL PERIODS:** 60

### TEXT BOOK


### REFERENCE BOOKS


### Website:

2. [http://www.computer.org/portal/web/swebok](http://www.computer.org/portal/web/swebok)
LIST OF EXPERIMENTS

1. Study of basic UNIX/Linux commands
2. Shell Programming.
3. Programs using the following system calls of UNIX/Linux operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
4. Programs using the I/O system calls of UNIX operating system:
   (open, read, write, etc).
5. Simulations of UNIX/Linux commands like ls, grep, etc.
7. Simulation of synchronization problems using Semaphore.
8. Simulation of basic memory management schemes.
10. Simulation of disk scheduling algorithms
11. Simulation of file systems.
12. Develop an application using any RTOS.
LIST OF EXPERIMENTS

1. Implementation of a socket program for Echo/Ping/Talk commands.
2. Creation of a socket between two computers and enable file transfer between them. Using (a.) TCP (b.) UDP
3. Implementation of a program for Remote Command Execution (Two M/Cs may be used).
4. Implementation of a program for CRC and Hamming code for error handling.
5. Writing a code for simulating Sliding Window Protocols.
6. Create a socket for HTTP for web page upload & Download.
7. Write a program for TCP module Implementation.(TCP services).
8. Write a program to implement RCP (Remote Capture Screen).
9. Implementation (using NS2/Glomosim) and Performance evaluation of the following routing protocols:
   a. Shortest path routing
   b. Flooding
   c. Link State
   d. Hierarchical
10. Broadcast /Multicast routing.
11. Implementation of ARP.
12. Throughput comparison between 802.3 and 802.11.
13. Study of Key distribution and Certification schemes.
14. Design of an E-Mail system
15. Implementation of Security Compromise on a Node using NS2 / Glomosim
16. Implementation of Various Traffic Sources using NS2 / Glomosim
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</table>

**LIST OF EXPERIMENTS**

2. Study of SQL: Primitive Data Types – User Defined data Types – Built-in Functions – Parts of Speech of create, alter, drop, select, insert, delete, update, commit, rollback, save point, grant, revoke.
5. Application: Design and develop any two of the following:
   a. Library Information System
   b. Logistics Management System
   c. Students’ Information System
   d. Ticket Reservation System
   e. Hotel Management System
   f. Hospital Management System
   g. Inventory Control
   h. Retail Shop Management
   i. Employee Information System
   j. Payroll System
   k. Any other Similar System
VI SEMESTER

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<td>CS T61</td>
<td>ENTERPRISE SOLUTIONS</td>
<td>3</td>
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Course Objective:
1. To make the students to get familiar with the industry project platforms and to write codes.
2. To learn Systems, Applications, Products.
3. To learn Soft Real-time Business Application Frameworks.

Course Outcomes:
On successful completion of the subject students will be able to:
1. Understand basic concepts of SAP, Oracle, PeopleSoft and Siebel.
2. Write code in SAP, Oracle, PeopleSoft, and Siebel.
3. Ready to cope up with industrial application development.

UNIT – I

UNIT – II

UNIT – III

UNIT – IV
## UNIT – V

**TOTAL PERIODS: 60**

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<tr>
<td>CS T62</td>
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**Course Objectives:**
1. To understand the architecture of embedded processors, microcontrollers and peripheral devices
2. To learn programming the embedded processor in assembly
3. To understand the challenges in developing operating systems for embedded systems
4. To learn programming the embedded systems in high level language such as C

**Course Outcomes:**
On successful completion of this course students will be able to:
1. Understand the concepts of embedded processors with microcontrollers.
2. Learn the programming details of microcontrollers.
3. Develop embedded programs for various embedded processors

**UNIT – I**
Introduction to Embedded Systems - Processor in Embedded System – Other Hardware Units in the Embedded System - Software Embedded into a System - ARM Architecture: ARM Design Philosophy - Registers - Program Status Register - Instruction Pipeline - Interrupts and Vector Table - Architecture Revision - ARM Processor Families.

**UNIT – II**
ARM Programming - Instruction Set - Data Processing Instructions - Addressing Modes - Branch, Load, Store Instructions - PSR Instructions - Conditional Instructions.

**UNIT – III**
Thumb Instruction Set - Register Usage - Other Branch Instructions - Data Processing Instructions - Single-Register and Multi Register Load-Store Instructions - Stack - Software Interrupt Instructions

**UNIT – IV**

**UNIT – V**

**TOTAL PERIODS: 60**
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Subject Code | Subject Name       | Lectures (Periods) | Tutorials (Periods) | Practical (Periods)
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CS T63       | WEB TECHNOLOGY   | 3                 | 1                  | -                

Course Objectives:
1. To learn and program features of web programming languages.
2. To understand the major components of internet and associated protocols.
3. To design an innovative application for web.

Course Outcomes:
On successful completion of this course
1. The students will get acquainted with client side and server side programming languages for web.
2. They will understand the major components and protocols of internet application.
3. They will become capable of designing web services.

UNIT – I


UNIT – II


UNIT – III


UNIT – IV


UNIT – V

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<td><strong>Reference Books:</strong></td>
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<td><strong>Websites:</strong></td>
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</table>
I. ERP
   1. Simple application using any of ERP packages.
   2. ERP solutions related to Business problems, HRM and financial applications.

II. Oracle:
   1. Study and usage of : Primitive Data Types – User Defined data Types – Built-in Functions – DDL, DML, TCL commands CREATE, ALTER, DROP, SELECT, INSERT, DELETE and UPDATE, COMMIT, ROLLBACK, SAVEPOINT, GRANT and REVOKE.
   2. Study of PL/SQL Blocks, Exception Handling, Functions, Procedures, Cursors, Triggers, Packages.
   3. Application : Design and develop any two of the following :
      a) Online Voting system
      b) Railway Ticket reservation system
      c) RTO office - Driving License issuing system
      e) Any other Similar System

III. SAP
   1. Working with structures in SAP
   2. Write programs in ABAP/4 to date and time calculations, processing strings, table controls.
   3. Write a program in ABAP/4 to create and maintain table in SAP.
   4. Forecasting application of a product using SAP.

IV. PeopleSoft : Using PeopleSoft, design and develop
   1. Student Administration
   2. PeopleSoft Based HR/Payroll applications
   3. PeopleSoft Supply Chain Management.

V. Siebel : Using Siebel, design and develop
   1. Any One industry application
   2. Any One CRM applications
LIST OF EXPERIMENTS

The following programs are to be implemented on ARM based Processors/Equivalent.

1. Simple Assembly Program for Addition, Subtraction, Multiplication and Division
2. Simple Assembly Program for System Calls and Interrupts, Loops and Branches
3. Write an Assembly programs to configure and control General Purpose Input/Output (GPIO) port pins.
4. Write an Assembly programs to read digital values from external peripherals and execute them with the Target board.
5. Program to demonstrate Time delay program using built in Timer / Counter feature on IDE environment
6. Program to demonstrate a simple interrupt handler and setting up a timer
7. Program to Interface 8 Bit LED and Switch Interface
8. Program to implement Buzzer Interface on IDE environment Program to Displaying a message in a 2 line x 16 Characters LCD display and verify the result in debug terminal.
9. Program to demonstrate I2C Interface on IDE environment
10. Program to demonstrate I2C Interface – Serial EEPROM
11. Demonstration of Serial communication. Transmission from Kit and reception from PC using Serial Port on IDE environment use debug terminal to trace the program.

Write the following programs to understand the use of RTOS with ARM Processor on IDE Environment using ARM Tool chain and Library:

1. Write an application that creates a task which is scheduled when a button is pressed, which illustrates the use of an event set between an ISR and a task
2. Write an application that Demonstrates the interruptible ISRs(Requires timer to have higher priority than external interrupt button)
3. Write an application that creates a two task to Blinking two different LEDs at different timings
4. Write an application that creates a two task displaying two different messages in LCD display in two lines.
5. Sending messages to mailbox by one task and reading the message from mailbox by another task.
6. Sending message to PC through serial port by three different tasks on priority Basis.
7. Basic Audio Processing on IDE environment.
### Subject Code | Subject Name |
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**LIST OF EXPERIMENTS**

1. Creation of HTML Files
2. Working with Client Side Scripting
   3.1 VBScript
   3.2 JavaScript
3. Configuration of web servers
   4.1 Apache Web Server
   4.2 Internet Information Server (IIS)
4. Working with ActiveX Controls in web documents.
5. Experiments in Java Server Pages
   6.1 Implementing MVC Architecture using Servlets
   6.2 Data Access Programming (using ADO)
   6.3 Session and Application objects
   6.4 File System Management
6. Working with other Server Side Scripting
   7.1 Active Server Pages
   7.2 Java Servlets
   7.3 PHP
7. Developing Web Applications using XML.
8. Experiments in Ajax Programming
9. Developing Web Services
10. Developing any E-commerce application (Mini Project)
VII SEMESTER

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<td>ARTIFICIAL INTELLIGENCE</td>
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Course Objectives:
1. To search and discover intelligent characteristics of existing AI projects, Intelligent agents.
2. To understand different search strategies for a problem.
3. To understand different Knowledge Representation schemes for typical AI problems.
4. To design and implement a typical AI problem to be solved Using Machine Learning Techniques.

Course Outcomes:
On successful completion of this course students will be able to:
1. Capability to develop intelligent systems
2. Apply heuristic concepts to design efficient algorithms that help to attain the goals in satisfactory manner
3. Design applications related to Natural Language Processing and Web applications.

UNIT – I

UNIT – II
Knowledge Representation: Approaches and issues in knowledge representation-Propositional Logic –Predicate logic-Forward and backward reasoning - Unification-Resolution- Weak slot-filler structure – Strong slot-filler structure- Knowledge-Based Agent

UNIT – III

UNIT – IV
Planning and Learning: Planning with state space search-partial order planning-planning graphs-conditional planning-continuous planning-Multi-Agent planning. Forms of learning-inductive learning-learning decision trees-ensemble learning-Neural Net learning and Genetic learning

UNIT – V
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<td>2. <a href="http://www.stanford.edu/class/cs221/">www.stanford.edu/class/cs221/</a></td>
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Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
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CS T72 | COMPUTER HARDWARE & NETWORK TROUBLESHOOTING | 3 | 1 | -

Course Objectives:
To study the fundamentals of PC hardware and Peripherals.
1. To understand the working principles of hardware devices and components.
2. To understand the system resources and their uses.
3. To bridge the gap between the theoretical study of Computer Organization and the practical study of the hardware components in use.
4. To practice the troubleshooting of hardware and network bugs in real life.

Course Outcomes:
On successful completion of the module students will be able to:
1. Map the theoretical concepts of Computer Organization and Microprocessors to the Personal Computer organization.
2. Develop device drivers for any of the existing or new devices that is interfaced.
3. Troubleshoot any kind of systems and networking bugs in practice.

UNIT – I

UNIT – II

UNIT – III
### UNIT – IV

**Input and Output Devices:** Keyboard – Signals and Interface standards – Pointing devices: Mouse - mechanical and optical – Joystick.  
**Video hardware:** Video Display Adaptors – Interfaces – 3D graphics accelerators – LCD and LED monitors - **Printers:** dot matrix – laser jet - ink jet – Pen plotters – BIOS and DOS Interrupt services for I/O devices – Troubleshooting I/O related problems.

### UNIT – V

**PC Diagnostics, Testing & Maintenance:** POST – Boot process – Maintenance tools – Preventive Maintenance.

**TOTAL PERIODS: 60**

### Text Books:

### Reference Books:

### Websites:
1. Scott Mueller’s Upgrading and Repairing PCs discussion forum, Available at http://forum.scottmueller.com  
2. Computer Troubleshooting Guides for Common Errors and Symptoms, Available at http://pcsupport.about.com  
3. BIOS interrupts, Available at http://www.bioscentral.com
Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
--- | --- | --- | --- | ---
CS T73 | PLATFORM TECHNOLOGY | 3 | 1 | -

**Course Objective:**
1. To understand the various types of applications
2. To get expertise in visual programming
3. To understand the functionalities of middleware platform

**Course Outcomes:**
On successful completion of the module students will be able to:
1. An ability to analyze and apply the programming skills in various application development
2. An ability to use the programming techniques, skills, and modern engineering tools necessary for engineering practice.
3. An ability to design and develop a windows and web application.

**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**UNIT – V**

**TOTAL PERIODS: 60**
**Text Books:**

**Websites:**
1. [http://msdn.microsoft.com/en-us/library/vstudio/w0x726c2%28v=vs.100%29.aspx](http://msdn.microsoft.com/en-us/library/vstudio/w0x726c2%28v=vs.100%29.aspx)
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**LIST OF EXPERIMENTS**

1. Executing simple programs using Prolog like Missionaries and cannibals Problem
2. Graph coloring problem
3. Blocks world problem
4. Water Jug Problem using DFS, BFS
5. Heuristic algorithms (A * Algorithm, best first search)
6. Representation of Knowledge using Prepositional Logic and Querying
7. Representation of Knowledge using Predicate Logic and Querying
8. Forward chaining and Backward chaining
9. Unification
10. Minimax algorithm
11. Developing a Spell checker
12. Development of Expert System
LIST OF EXPERIMENTS

1. Assembling of a Personal Computer:
   a. Identifying parts of mother board, power connections and locating other connectors.
   b. Interconnection of disk drive units, keyboard, mouse and monitor.

2. Hard disk partitioning and OS installation:
   a. Partitioning the hard disk using FDISK/Partition Magic/Disk Manager
   b. Installation of Windows 98/XP/2000
   c. Installation of Linux kernel (possibly with dual boot option).

3. Study of In-Circuit Emulator:
   a. The target processor could be 8085/8088/8031 depending on the availability.
   b. Learn the different commands and their usages.

4. Study of Logic Analyser:
   a. Standalone or PC based with multiple channels depending on availability.
   b. Capture important signals and perform timing/state analysis with a known processor/controller environment.

5. Circuit Tracing: Using Multimeter and continuity test mode, to trace a given circuit board and draw the schematic.

6. Interfacing a timer/programmable I/O using PCI bus.

7. Serial Communication: To establish serial communication (RS232C) between a pair of PCs. The program shall be developed using C/C++/MASM with functions provided by BIOS and DOS interrupt services.

8. Parallel port interfacing:
   a. To interface two PCs via ECP and perform file transfer using Direct Cable Connection feature of Windows OS
   b. Interface a seven segment LED/LCD using SPP environment.

9. USB port programming and interfacing:
   To interface ADC, DAC, LED/LCD and push buttons.

10. Troubleshooting printer port problems using Logic Analyzer and multimeter.

11. Troubleshooting serial port problems using Logic Analyzer and multimeter.

12. Troubleshooting USB port problems using Logic Analyzer and multimeter.

13. Troubleshooting PCI bus problems using Logic Analyzer and multimeter.


15. Formatting and partitioning of hard disk using SATA programming.

16. Networking PCs: setting up Wired/ Wireless LANs and troubleshooting

<table>
<thead>
<tr>
<th>Code</th>
<th>PLATFORM TECHNOLOGY LABORATORY</th>
<th>(Periods)</th>
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<tr>
<td>CS P73</td>
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<td>3</td>
</tr>
</tbody>
</table>

**LIST OF EXPERIMENTS**

Programs using C#.NET

1. Classes and Objects, Inheritance, Polymorphism
2. Interfaces, Operator Overloading, Delegates and Events
3. Exception Handling, Multi-Threaded
4. Ado .NET
   - Program using VB .NET
   1. Console & Windows Forms
   2. Layout Managers & Containers
   3. SDI & MDI
4. Database Controls
   - Application any one of the following or similar application using .NET framework
   1. Inventory Control
   2. Retail Shop Management
   3. Employee Information System
   4. Personal Assistant Program
   5. Students’ Information System
   6. Ticket Reservation System
   7. Hotel Management System
   8. Hospital Management System
### VIII SEMESTER

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Lectures (Periods)</th>
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<tr>
<td>CS T81</td>
<td>PROFESSIONAL ETHICS</td>
<td>-</td>
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</tr>
</tbody>
</table>

**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**UNIT – V**
Responsibility towards Environment. International Engineering Professionalism

**TOTAL PERIODS: 60**

**Text Books:**

**Reference Books:**
1. Mike W. Martin, Roland Schinzinger, Ethics in Engineering, Tata MaGraw Hill Education (P) Ltd., 2012
UNIT – I
Micro and Macro Economics and Its applications: Nature and Scope of Economics Science; Micro economics, Macro economics; Concept of Equilibrium; Economic efficiency, Technical efficiency; Demand and Supply concepts, Elasticity of Demand and supply; Determinants of Demand; Fixed cost, variable cost, Average cost, marginal cost, opportunity cost; standard cost; concept of iso-quant; Price of products, Break Even Analysis, Nature and Functions of Money, National Income, GNP and Savings, Inflation and Deflation, Business Cycles. Types and principles of management, Elements of management; planning, organising, staffing, co-ordinating etc, types of (ownership) of a firm.

UNIT – II
Production Management & Marketing Management: Types of Production; process of planning, scheduling, Routing, material control; product concept concepts of productivity, Core concepts of Marketing- Needs, Wants, Demand- Marketing Vs Selling- Products and Markets- Pricing and its related factors- Channels of Distribution- Promotion- Advertising- Market Research- Sales Forecasting.

UNIT – III
Financial Management: Sources of finance, internal and external—preparation of balance sheet and profit and loss statements, Types of accounting and significance of each type, interest formulas and their applications.

UNIT – IV

UNIT – V

TOTAL PERIODS: 60
### Text Books:

### Reference Books:
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<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Lectures (Periods)</th>
<th>Tutorial (Periods)</th>
<th>Practical (Periods)</th>
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<tbody>
<tr>
<td>CS T83</td>
<td>INFORMATION SECURITY</td>
<td>3</td>
<td>1</td>
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</tr>
</tbody>
</table>

**Course Objectives:**
1. To provide an understanding of principal concepts, major issues, technologies and basic approaches in information security.
2. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
3. Gain familiarity with prevalent network and distributed system attacks, defenses against them and forensics to investigate the aftermath.
4. Develop a basic understanding of cryptography, how it has evolved and some key encryption techniques used today.
5. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

**Course Outcomes:**
On successful completion of the module students will be able to:
1. To master information security governance, and related legal and regulatory issues
2. To be familiar with how threats to an organization are discovered, analyzed, and dealt with
3. To be familiar with network security threats and countermeasures
4. To be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)
5. To be familiar with advanced security issues and technologies (such as DDoS attack detection and containment, and anonymous communications.)

**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**
## UNIT – V


**TOTAL PERIODS: 60**

### Text Books:

### Reference Books:

### Website:
4. www.jhuapl.edu/ourwork/nsa/
## Electives for Sixth Semester

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Lectures (Periods)</th>
<th>Tutorials (Periods)</th>
<th>Practical (Periods)</th>
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<tbody>
<tr>
<td>CS E61</td>
<td>OBJECT ORIENTED ANALYSIS AND DESIGN</td>
<td>3</td>
<td>1</td>
<td>-</td>
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</tbody>
</table>

### Course Objectives:
1. To learn the concept of Object Oriented Software Development Process
2. To get acquainted with UML Diagrams
3. To understand Object Oriented Analysis Processes

### Course Outcomes:
1. Understand Object Oriented Software Development Process
2. Gain exposure to Object Oriented Methodologies & UML Diagrams
3. To apply Object Oriented Analysis Processes for projects

---

**UNIT – I**


**UNIT – II**

**UML Diagrams:** Use case diagram – UML class diagram – interaction diagram – state diagram – activity diagram – Requirements for ATM banking system – case study.

**UNIT – III**

**Object Oriented Analysis:** Use case driven Object analysis – approaches for identifying classes – identifying objects, relationships attributes, methods for ATM banking system – Object oriented design process – design axioms.

**UNIT – IV**

**Object Oriented Design:** Designing Classes, methods – access layer object storage and object interoperability – access layer for the ATM banking system. View layer – designing interface objects – prototyping User interface – view layer for the ATM banking system

**UNIT – V**

**Design Patterns:** Design Patterns – Describing design patterns - catalog of design patterns – organizing the catalog – How design patterns solve design problems – How to select a design pattern – How to use a design pattern – creational pattern: Abstract Factory – structural pattern: Adapter – behavioral pattern: Chain of Responsibility.

**TOTAL PERIODS: 60**
| Text Books:                                                                                     |
| 3. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns – elements of reusable object oriented software, Addition Wesley, 1994 |

| Reference Books:                                                                      |

<p>| Websites:                                                                                      |
| 1. <a href="http://www.omg.org">www.omg.org</a>                                                                                   |</p>
<table>
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<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>CS E62</td>
<td>NETWORK DESIGN AND MANAGEMENT</td>
<td>3</td>
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</table>

### Course Objectives:
1. Students will have an understanding of network management architectures and protocols.
2. Students will become comfortable with using the different TCP/IP protocols.
3. Analyze network traffic flow and evaluate its performance.
4. Demonstrate understanding of network management standards, e.g., SNMP.
5. Students will be familiar with a variety of computer network security issues.

### Course Outcomes:
On successful completion of the module students will be able to:
1. Ability to use techniques, skills, and modern networking tools necessary for network analysis, design and management.
2. Ability to identify, formulate and solve network design problems.
3. Ability to analyze and design an enterprise network that meets desired requirements.
4. Design a network for a small business.
5. Evaluate a large network and determine potential problems.

#### UNIT - I
**INTRODUCTION TO NETWORK MANAGEMENT:** Overview of Analysis, Architecture and Design Process - System Methodology, Service methodology, Service Description - Service characteristics - Performance Characteristics - Network supportability - Requirement analysis – User Requirements – Application Requirements – Device Requirements – Network Requirements – Other Requirements - Requirement specification and map.

#### UNIT – II
**REQUIREMENTS ANALYSIS:** Requirement Analysis Process – Gathering and Listing Requirements - Developing service metrics – Characterizing behavior – Developing RMA requirements – Developing delay Requirements - Developing capacity Requirements - Developing supplemental performance Requirements – Requirements mapping – Developing the requirements specification.

#### UNIT - III

#### UNIT – IV
UNIT – V


**TOTAL PERIODS: 60**

**Text Books:**

**Reference Books:**

**Website:**
<table>
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<th>Subject Code</th>
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<th>Tutorial (Periods)</th>
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<tbody>
<tr>
<td>CS E63</td>
<td>E-BUSINESS</td>
<td>3</td>
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**Course Objectives:**

1. To explore both the technical and business-related implications of electronically mediated commerce.
2. To enable the student to trace the development of electronic business from its origins in electronic data interchange to its current growing importance.
3. To explore the potential of electronic business for future development and the development of the ‘Information Society’
4. To introduce the strategic, cultural, legal and ethical issues facing business organizations in their daily use of the Internet.

**Course Outcomes:**

On successful completion of the module, students will be able to:

1. Understand the concepts of e-business, its infrastructure and strategy
2. Appreciate business models for Business to Business (B2B) and Business to Consumer (B2C) e-commerce.
3. Evaluate e-business scenarios and propose appropriate e-business investment strategies
4. Appreciate and understand topics related to e-business such as supply chain management, customer relationship management, change management, E-procurement, and e-marketing.
5. Understand sectoral and regional differences in e-business applications.

**UNIT – I**


**UNIT – II**


**UNIT – III**

UNIT – IV

UNIT – V
**Internet and Website Establishment:** Introduction – Technologies for web servers – Internet tools relevant to Commerce – Internet Applications for Commerce – Internet charges – Internet Access and Architecture – Searching the Internet - Case study.

**TOTAL PERIODS:** 60

**Text Books:**

**Reference Books:**
2. Bruce C. Brown, “How to Use the Internet to Advertise, Promote and Market Your Business or Website with Little or No Money”, Atlantic Publishing Company, 2006.
Subject Code | Subject Name                  | Lectures (Periods) | Tutorials (Periods) | Practical (Periods) |
-------------|-------------------------------|--------------------|---------------------|---------------------|
CS E64       | PRINCIPLES OF PROGRAMMING LANGUAGES | 3                  | 1                   | -                   |

Course Objectives:
1. To understand the constructs of programming language
2. To know the different programming paradigms
3. To associate the specific paradigm and language to solve a problem
4. To learn new programming techniques

Course Outcomes: The student should able to
1. Able to design a programming language
2. Able to write a better programming code by using modern programming technique.
3. Able to choose the programming language for a given problem
4. Able to compare the programming languages on different aspects

UNIT - I

UNIT – II

UNIT – III

UNIT – IV

UNIT - V

TOTAL PERIODS: 60
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<th><strong>Reference Books:</strong></th>
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<tr>
<th><strong>Websites:</strong></th>
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</thead>
<tbody>
<tr>
<td>2. <a href="http://www.dmoz.org/Computers/Programming/Languages/">http://www.dmoz.org/Computers/Programming/Languages/</a></td>
</tr>
</tbody>
</table>
Subject Code | Subject Name                                      | Lectures (Periods) | Tutorial (Periods) | Practical (Periods) |
-------------|--------------------------------------------------|--------------------|--------------------|---------------------|
CS E65       | INFORMATION THEORY & CODING TECHNIQUES            | 3                  | 1                  | -                   |

Course Objectives:
1. To introduce basic concepts of information theory.
2. To study the coding schemes.
3. To design and evaluate encoders and decoders for communication and security.

Course Outcomes:
On successful completion of the module students will be able to:
1. Understand the basics of information theory.
2. Understand the concepts of various coding schemes.
3. Correlate the theory of coding and decoding to the real-life applications.

UNIT – I

UNIT - II

UNIT – III

UNIT - IV

UNIT - V

TOTAL PERIODS: 60

Text Books:

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<th>Reference Books:</th>
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<tr>
<th>Websites:</th>
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<tbody>
<tr>
<td>1. NPTEL lecture on Information Theory and Coding. Available at <a href="http://www.nptel.iitm.ac.in/courses/117101053/">http://www.nptel.iitm.ac.in/courses/117101053/</a></td>
<td></td>
</tr>
<tr>
<td>2. An Introduction to Reed Solomon Codes. Available at <a href="http://www.ece.tamu.edu/~hpfister/courses/ecn604/rspoly.pdf">http://www.ece.tamu.edu/~hpfister/courses/ecn604/rspoly.pdf</a></td>
<td></td>
</tr>
<tr>
<td>3. Forward Error Correction Codes available at <a href="http://www.princeton.edu/~achaney/tmve/.../Forward_error_correction.html">http://www.princeton.edu/~achaney/tmve/.../Forward_error_correction.html</a></td>
<td></td>
</tr>
</tbody>
</table>
CS E66  LANGUAGE TECHNOLOGIES  3    1    -

Course Objectives:
1. To introduce the primary processes of Natural language and the associated applications
2. To understand the NLP processes involved in information retrieval
3. To familiarize the generic issues of Natural language processing.

Course Outcomes:
On successful completion of this course students will be able to:
1. Use appropriate process in application involved Language technologies.
2. Ability to implement the NLP.

UNIT – I

UNIT – II

UNIT – III

UNIT – IV

UNIT – V

TOTAL PERIODS: 60
## Text Books:

## Reference Books:

## Website:
2. http://ltrc.iit.ac.in/
3. www.morganclaypool.com/toc/hlt/1/1
<table>
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<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Lectures (Periods)</th>
<th>Tutorial (Periods)</th>
<th>Practical (Periods)</th>
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<tbody>
<tr>
<td>CS E67</td>
<td>UNIX INTERNALS</td>
<td>3</td>
<td>1</td>
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</tbody>
</table>

**Course Objectives:**
1. To understand the concepts of multi user operating system implementation.
2. Given the requirement one should able to design the necessary file system.
3. If an environment demands a multi process system, one should able to design a proper communication among the various processes.
4. For a multi processor system, one should able to design the necessary modules.

**Course Outcomes:**
On successful completion of the module students will be able to:
1. Understand the implementation details of a multi user operating system.
2. Write system level programs such as file recover, process interaction etc.

**UNIT – I**

**Introduction to the Kernel:**
Architecture of the UNIX operating system – Introduction to the system concepts – Kernel Data Structures; The Buffer Cache: Buffer Headers – Structure – Retrieval of a buffer – Reading and writing disk blocks – Advantages and Disadvantages; Internal Representation of Files: Inode – Structure of a regular file – Directories – Conversion of a pathname to an Inode – Super Block – Inode Assignment – Allocation of disk blocks

**UNIT – II**

**System Calls for the file system:**

**UNIT – III**

**Process Control:**

**UNIT – IV**

**Memory Management Policies:**
Swapping – Demand Paging – A Hybrid System with swapping and demand paging; **The I/O Subsystem:** Driver Interfaces, Disk Drivers, Terminal Drivers, Streams.

**UNIT – V**


**TOTAL PERIODS:** 60

**Text Books:**

**Reference Books:**

**Website:**
1. http://www.ee.surrey.ac.uk/Teaching/Unix/
Course Objectives:
1. Learn to gather and analyze large data sets to gain useful business understanding
2. Describing and demonstrating basic data mining algorithms, methods, and tools.
   Identifying business applications of data mining.
3. To understand the overall architecture of a data warehouse techniques and
   methods for data gathering and data pre-processing.

Course Outcomes:
The student should have the ability to:

1. Plan, acquire, maintain and analyze information system.
2. Learn data mining techniques and methods in integrating & interpreting data sets
3. Improve effectiveness, efficiency and quality for techniques and methods.

UNIT - I
Data Preprocessing, Language, Architectures, Concept Description: Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

UNIT - II

UNIT - III
Classification and Prediction: Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT - IV
### UNIT - V
Data Warehousing: Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation - Data Warehousing to Data Mining - Data warehousing components-building a data warehouse – mapping the data warehouse to an architecture – data extraction - cleanup- transformation tools- metadata – OLAP - Patterns and models - Data visualization principles.

**TOTAL PERIODS: 60**

<table>
<thead>
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<th>Text Books:</th>
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<th>Reference Books:</th>
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</table>
### Course Objectives:
1. To understand the advantages of using XML technology family
2. To analyze the problems associated with tightly coupled distributed software architecture
3. To use Web services as building block in distributed application development
4. To design e-business solutions using SOA and XML based web services

### Course Outcomes:
1. Student will able to write programs using XML families
2. Student will able to develop e-business solutions using SOA approach
3. Students will able to model the business situation using BPEL

#### UNIT – I

#### UNIT – II
Roots of Service Oriented Architecture (SOA) – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation

#### UNIT – III

#### UNIT – IV
SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

#### UNIT – V

**TOTAL PERIODS : 60**
### Text Books:

### Reference Books:

### Websites:
2. http://www.w3schools.com/xml/
3. www.soa.com
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
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<th>Tutorials (Periods)</th>
<th>Practical (Periods)</th>
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<td>CS E610</td>
<td>DISTRIBUTED COMPUTING</td>
<td>3</td>
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</table>

**Course Objectives:**
1. To make the students to understand the collaborative operations of collections of computer systems.
2. To learn design of fault tolerant distributed systems.
3. Learn to provide synchronization primitives.

**Course Outcomes:**
1. Students acquire the skills to develop industry recommended projects as well as research oriented projects
2. Capable of designing a fault tolerant distributed system.
3. Develop novel synchronization algorithms.

**UNIT – I**


**UNIT – II**

*Naming*: Names, Identifiers, and addresses – Flat Naming - Structured Naming – Attribute based Naming.

**UNIT – III**


*Consistency and Replication*: Introduction – Data centric consistency models – Client centric consistency models – Replica management – Consistency protocols.

**UNIT – IV**


**UNIT – V**

Distributed File Systems – Distributed web based systems – Distributed object based systems

**TOTAL PERIODS: 60**

**Text Books:**
2. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns – elements of reusable object oriented software, Addition Wesley, 1994

**Reference Books:**

**Websites:**
1. [http://www.ida.liu.se](http://www.ida.liu.se)
2. [http://www.cis.upenn.edu](http://www.cis.upenn.edu)
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<th>Subject Name</th>
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<th>Tutorial (Periods)</th>
<th>Practical (Periods)</th>
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<tr>
<td>CS E611</td>
<td>AGILE METHODOLOGIES</td>
<td>3</td>
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</table>

**Course Objectives:**
1. To understand the key ideas of agile development, and evidence for its value.
2. To learn the fundamental principles and practices associated with each of the agile development methods: Scrum, eXtreme Programming (XP)
3. To apply the principles and practices of agile software development on a project of interest and relevance to the student

**Course Outcomes:**
On successful completion of the module students will be able to:
1. Describe several agile methods for software development
2. Compare and contrast plan-driven versus agile methods
3. Create and review user stories for system requirements
4. Refactor code and tests to meet changing needs
5. Construct tailored agile processes that best fit the technical and market demands of a modern software project

**UNIT – I**
Iterative and Evolutionary: Definition – comparison - major activities.Agile: Basic concepts - Major activities - available agile methods.Story: Overview-estimated hours remaining.

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**UNIT – V**

**TOTAL PERIODS: 60**

**Text Books:**

**Reference Books:**
Subject Code | Subject Name                | Lectures (Periods) | Tutorial (Periods) | Practical (Periods) |
-------------|-----------------------------|--------------------|--------------------|---------------------|
CS E612      | APPLICATION OUTSOURCING SERVICES | 3                  | 1                  | -                   |

Course Objectives:
1. To explore the knowledge about the ITeS services provided by the outsourcing industries.
2. To learn the objectives of business process outsourcing and its methodologies.
3. To learn to develop intelligent business applications.

Course Outcomes:
On successful completion of the subject students will be able to:
1. Familiar with various outsourcing services and applications of IT industries.
2. Develop application for outsourcing services.
3. Capable to design intelligent applications for enterprises.

UNIT – I

UNIT – II

UNIT – III
Enterprise Integration: Setting Enterprise Integration design objects, Assessing the technology Landscape- legacy systems, Web enabled applications, XML, UML, Agent Technology, Model Driven Architecture, creating business system domain, Integrating with XML, DOM, simple API for XML (SAX), Component based Technology and Enterprise Intelligence. Softwares supports Enterprise Integration: Vitria, TIBCO, MQ Series, Web Sphere and etc.

UNIT – IV
Business Intelligence: Business Intelligence foundation, Bridging the analysis gap, BI case studies, Microsoft Data warehousing framework: SQL server, Data Analyser, Microsoft Business Intelligence accelerator, ETL tooland OLAP: Data Mining techniques and tools, Applications.
## UNIT – V

**Web-Computing:** Introduction, Web – centric architecture, Building Interactive and non –interactive web applications: Web-computing softwares: HTML, CGI, PERL, Servelets, CSS, J2EE, AJAX, JNI, JFC, Web logic and PHP.

**TOTAL PERIODS:** 60

### Text Books:
1. “Become a Business Consultant (2012)” by Craig Coolahan, Marg Archibald, Tag Goulet

### Reference Books:
3. HTML and CSS: Design and Build Websites by Jon duckett.

### Website:
Electives for Seventh Semester

<table>
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<th>Subject Code</th>
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<th>Tutorial (Periods)</th>
<th>Practical (Periods)</th>
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<tbody>
<tr>
<td>CS E71</td>
<td>SOFTWARE TESTING AND QUALITY ASSURANCE</td>
<td>3</td>
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</table>

Course Objectives:
1. Understand the theoretical aspects of software testing
2. Demonstrate the knowledge of the existing testing methods
3. Demonstrate the knowledge of applying testing and analysis methods in software development and maintenance
4. To emphasis on software quality measurement, and quality standards

Course Outcomes:
On successful completion of the module, students will be able to:
1. Understand how to detect, classify, prevent and remove defects
2. Understand how to conduct formal inspections, record and evaluate results of inspections
3. Understand the effectively strategies of testing, the methods and technologies of software testing;
4. Choose appropriate testing strategies and develop test cases
5. Understand about software quality and software quality standards.

UNIT - I

UNIT – II
Testing Types – White Box, Black Box and Grey Box – White box testing techniques - Statement coverage, Branch Coverage, Condition coverage, Decision/Condition coverage, Multiple condition coverage, Dataflow coverage, Mutation testing – Black box testing techniques – Boundary value analysis, Equivalence partitioning, Syntax testing, Finite state testing.

UNIT – III

UNIT – IV

**UNIT – V**


**TOTAL PERIODS: 60**

**Text Books:**


**Reference Books:**

Subject Code | Subject Name            | Lectures (Periods) | Tutorials (Periods) | Practical (Periods) |
-------------|-------------------------|--------------------|---------------------|--------------------|
CS E72       | ADVANCED DATABASES      | 3                  | 1                   | -                  |

**Course Objectives:**

1. To know advanced concepts of database in large scale analytics, derive data maintenance, change schema, and database update.
2. Benchmark Object Databases, deals with uncertainties in advanced concepts of database
3. To explore open issues in database technologies.

**Course Outcomes:**

On successful completion of the module, students will be able to:

1. Understand the advanced concepts in designing of large scale databases.
2. Perform analytics in large scale databases.
3. Pursue research in advanced database concepts.

**UNIT – I**


**UNIT – II**


**UNIT – III**


**UNIT – IV**


**UNIT – V**

**SPATIAL, TEXT AND MULTIMEDIA DATABASES:** Traditional Indexing Methods (Secondary Keys, Spatial Access Methods) – Text Retrieval– Multimedia Indexing – 1D
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<td><strong>TOTAL PERIODS: 60</strong></td>
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<tr>
<td><strong>Text Books:</strong></td>
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<tr>
<td>2. Carlo Zaniolo, Stefano Ceri “Advanced Database Systems”, Morgan</td>
</tr>
<tr>
<td>KauffmannPublishers.</td>
</tr>
<tr>
<td><strong>Reference Books:</strong></td>
</tr>
<tr>
<td>1. Rajesh Narang, “Object Oriented Interfaces and Databases”, Prentice-Hall</td>
</tr>
<tr>
<td>2. Jeffrey A. Hoffer, Mary B. Prescott and Fred R. McFadden, “Modern Database</td>
</tr>
<tr>
<td>3. Ramez Elmasri, Sham Navathe, “Fundamentals of database Systems”, Addison-</td>
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<tr>
<td><strong>Websites:</strong></td>
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<tr>
<td>1. <a href="http://nptel.ac.in/courses/106106093/">http://nptel.ac.in/courses/106106093/</a></td>
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<tr>
<td>2. <a href="https://www.coursera.org/course/bigdata">https://www.coursera.org/course/bigdata</a></td>
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<td>CS E73</td>
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**Course Objectives:**
1. To examine the computing environment that satisfies the organizational needs of processing between workstations and server processes.
2. To expose terminology, concepts and client/server programming techniques.
3. To create an awareness of client server distributed objects.

**Course Outcomes:**
On successful completion of the module students will be able to:
1. Be familiar with the universal client and client server operating systems.
2. Implement the current client/server standards.
3. Identify the role of network administrator and use of SNMP and CMIP.

**UNIT - I**

**UNIT – II**
**Client Server Middleware:** NOS Middleware – Transparency - Global Directory Services - Distributed Time Service - Distributed Security Service - RPC, Messaging and Peer to Peer – Peer to Peer Communication - RPC-Messaging and Queuing (MOM) - MOM Vs RPC-NOS trends.

**UNIT – III**
**SQL Database Server:** Stored Procedure, Triggers and Rules - Database Connectivity Solutions - ODBC – Architecture – Components of ODBC. **Data Warehouse:** Elements - Warehouse Hierarchies - Replication Vs Direct Access – Mechanics of Data Replication – Cleansing and Transforming the Raw Data - EIS/DSS. **Client Server Groupware:** Groupware - Component of Groupware.

**UNIT – IV**
**Client Server Transaction Processing:** ACID properties - Transaction Model - TP Monitor and Operating System - TP Monitor and Transaction Management - TP Monitor Client Server interaction types - Transactional RPCs, Queues and Conversations - TP lite or TP Heavy - TP lite Vs TP Heavy.

**UNIT – V**
**Client Server with Distributed Objects:** Distributed Objects and Components – From - Distributed Objects to Components - CORBA-Distributed objects CORBA style – Object Management Architecture - Intergalactic ORB - Object Services - Common

**TOTAL PERIODS: 60**

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<th><strong>Website:</strong></th>
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Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
--- | --- | --- | --- | ---
CS E74 | REAL-TIME COMPUTING AND COMMUNICATION | 3 | 1 | -

Course Objectives:
1. Introducing the concept of real time and designing the scheduling algorithms for real time systems.
2. Visualizing the real time constraint in designing Operating system.
3. Designing the networks using real time constraint.

Course Outcomes:
On successful completion of the module students will be able to:
2. Gain knowledge about various protocols in Real Time Systems.
3. Handle concurrency control systems.
4. Identify the various issues in RTOS.

UNIT – I


UNIT – II


UNIT - III


UNIT – IV


UNIT – V

# TOTAL PERIODS: 60

## Text Books:

## Reference Books:

## Website:
1. [http://www.ics.uci.edu/~eli/courses/cs244-w12/lecture4-244.ppt](http://www.ics.uci.edu/~eli/courses/cs244-w12/lecture4-244.ppt)
Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
---|---|---|---|---
CS E75 | SOFTWARE ARCHITECTURE | 3 | 1 | -

Course Objectives:
1. To introduce the fundamentals of software architecture.
2. To learn the Software architecture and quality requirements of a software system.
3. To know the fundamental principles and guidelines for software architecture design, architectural styles, patterns, and frameworks.
4. To understand the methods, techniques, and tools for describing software architecture and documenting design rationale.
5. To know the software architecture design, styles and evaluation processes.

Course Outcomes:
On successful completion of the module students will be able to:
1. Analyze Software Engineering problems in terms of architectural thinking
2. Generate architectural alternatives for a problem and select among them
3. Know how to do an assessment of an architecture
4. Describe a software architecture using various documentation approaches and architectural description languages
5. To design and motivate software architecture for large scale software systems

UNIT – I
**Concepts of Design:** Characteristics of design activities – Elements of design – Software quality models and their effects – Quality Attributes – Basic rules of software design – Design process.

UNIT - II

UNIT – III
**Styles in design and design space:** Choices of styles and their combination – Hierarchical styles – Simultaneously heterogeneous style – Locationally heterogeneous style– Theory of design spaces – Design Space of elements – Design Space of Styles.

UNIT – IV

UNIT – V

TOTAL PERIODS: 60
**Text Books:**

**Reference Books:**

**Websites:**
1. [http://www.sci.cmu.edu/architecture](http://www.sci.cmu.edu/architecture)
2. [http://www.softwarearchitectureportal.org](http://www.softwarearchitectureportal.org)
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<tr>
<td>CS E76</td>
<td>HIGH SPEED NETWORKS</td>
<td>3</td>
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**Course Objectives:**
1. To provide the skills and knowledge to understand the various networking technologies that attribute to high speed networks.
2. To make them understand various physical layer implementations required for high speed data transfer.
3. To understand the fundamentals of optical networks and differentiate it from rest of the technologies.

**Course Outcomes:**
On successful completion of the module students will be able to:
1. Students will able to design and analyze various network technologies
2. Enable the students to know physical layer techniques like WDM and high speed network technologies.
3. Efficiently design a high speed networks and evaluate its performance.

**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**UNIT – V**
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.

**TOTAL PERIODS: 60**

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<td>1. <a href="http://www.cse.wustl.edu/~jain">http://www.cse.wustl.edu/~jain</a></td>
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</table>
Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
--- | --- | --- | --- | ---
CS E77 | NETWORK PROTOCOLS | 3 | 1 | -

Course Objective:
1. To ensure that students have better understanding of various Internet protocols.
2. Various standards and protocols will be covered.
3. Able to design, implement, and analyze communication network protocols.

Course Outcomes:
1. Understand the fundamentals of network architecture and protocols.
2. Have the capability of designing and analyzing data transmission protocols and data link control protocols.
3. Have knowledge of various network protocols including TCP/IP, and demonstrate the skills to design and evaluate network protocols.

UNIT – I

UNIT – II
Presentation Layer Protocol: LPP. Session Layer protocols: RPC, SDP. Transport Layer protocols: TCP, UDP, RDP, and RUDP.

UNIT – III

UNIT – IV

UNIT – V
Network Security Protocols: SSH, RADIUS SSL/TLS, Kerberos, IPSec, Voice over IP
TOTAL PERIODS: 60

Text Books:

Reference Books:

Website:
1. http://www.cse.wustl.edu/~jain
Course Objectives:
1. To learn, develop, design and implement state-of-the-art, and technically correct Simulation models.
2. To learn various simulation languages and program using the simulation languages.
3. To develop and execute Simulation models in known computer high level languages.
4. To learn the differences in Simulation approaches.

Course Outcomes:
On successful completion of this course
1. The students will get acquainted with simulation domains.
2. They will understand the major intricacies of of simulation and testing domains.
3. They will be able to convert verbal descriptions to models and programs

UNIT – I

UNIT - II

UNIT – III

UNIT - IV
General Purpose Simulation System Language: GPSS blocks for creation, queue, print, transfer, conditional transfer, Priority, Select, Table, Test, Tabulate Loop, Logic, Gate, etc – Standard Numerical Attributes in GPSS – Transaction parameter – Equivalence declaration – Transaction times – single and matrix Variables in GPSS – Programming in GPSS for simple simulation problems.
UNIT – V

Other Simulation Languages: SIMULALanguage  – SIMULA language structures – file operations – Object oriented concepts in SIMULA – array structures in SIMULA.

SIMSCRIPT  – SIMSCRIPT language notations – SIMSCRIPT language structures – Object oriented Programming and simulation in SIMSCRIPT.

NS3 - Events and Simulator- Callbacks - Implementation details- Object modeln NS3 - Exmaples – Attributes

MATLAB - MATLAB Constructs - Variables - Arithmetic Operations -mathematical and Graphical Functions - Structures - Cell Arrays - MATLAB Programming - MATLAB Editor and Debugger - Projects - Simple Menu - Files - Sorting - Sub-image - Multiple Images

TOTAL PERIODS: 60

TEXT BOOKS:

Reference Books:
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<th>Subject Code</th>
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<tr>
<td>CS E79</td>
<td>BUSINESS PROCESS DOMAINS</td>
<td>3</td>
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</table>

**Course Objectives:**
1. To familiarise with the various Business processes domains
2. To learn how to audit energy usages in various business domains.
3. To learn the security issues in various business domains.

**Course Outcomes:**
On successful completion of the subject students will be able to
1. Understand the concepts and applications of various domains
2. Perform energy audit
3. Provide solutions for secure transactions

**UNIT – I**

**Telecommunications:** The Future - Organizations Involved in Telecommunications - Terminals and Codes - Systems that use Data Transmission - Human-Computer Dialog - Telecommunications Standards - Communications Network Architectures - The Structure of Telecommunications Networks.

**Media:** Print Media – Electronic Media(Radio and Television) – Film Media – Advt.

**Technology:** Engineering and Management - Functions of Technology Management - Managing Technology through the Product Life Cycle

**UNIT – II**

**Financial Services:** Financial System – E-Banking: Transactions(Inter and Intra Banking, Electronic payments) – Securities in E-banking(SSL, digital signatures) – Services provided(ATM, Smart card, ECS) – Insurance - Capital Market Services - Mutual Funds - Leasing and Hire Purchase

**UNIT - III**

**Health and Public Services:** Information Technology in Healthcare and Telemedicine - Professional Health Service Organisations - Organisational & Professional Commitment & its Influence on Health Service Management – Biometric Technologies(RFID, Retina scanning, Facial recognition, Finger print scanning, Hand geometry, Working principles of DNA).

**UNIT – IV**

**Manufacturing:** Manufacturing Operations - Manufacturing Models and Metrics - Introduction to Automation - Industrial Control Systems - Hardware Components for Automation and Process Control - Industrial Robotics - Product Design and CAD/CAM in the Production System

**UNIT – V**


**TOTAL PERIODS: 60**
Text Books:

Reference Books:
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<th>Subject Code</th>
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<tr>
<td>CS E710</td>
<td>SOFTWARE PROJECT MANAGEMENT</td>
<td>3</td>
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**Course Objective:**
1. To learn all process involved during the software development phase
2. To familiarize various software process models.
3. To properly estimate cost, effort and risk factors.

**Course Outcomes:**
1. Students knowing all activity of the software development process.
2. Able to estimate cost and risk of software development.
3. Manage software development effectively.

**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**UNIT – V**
<table>
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<th>TOTAL PERIODS: 60</th>
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**Text Books:**

**Reference Books:**
**Subject Code** | **Subject Name** | **Lectures (Periods)** | **Tutorials (Periods)** | **Practical (Periods)**
--- | --- | --- | --- | ---
CS E711 | NATURAL LANGUAGE PROCESSING | 3 | 1 | -

**Course Objectives:**
1. To tag a given text with basic Language processing features, design an innovative application using NLP components,
2. Implement a rule based system to tackle morphology/syntax of a Language, design a tag set to be used for statistical processing keeping an application in mind
3. Design a Statistical technique for a new application
4. Compare and contrast use of different statistical approaches for different types of applications

**Course Outcomes:**
On successful completion of this course
1. The students will get acquainted with natural language processing and learn how to apply basic algorithms in this field.
2. They will understand the algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics, as well as the resources of natural language data - corpora.
3. They will also grasp basics of knowledge representation, inference, and relations to the artificial intelligence.

**UNIT - I**

**UNIT - II**

**UNIT - III**

**UNIT - IV**
UNIT - V


TOTAL PERIODS: 60

Text Books :


Reference Books:

4. Christopher Manning and Hinrich Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999

Website:

2. http://www.cse.unt.edu/~rada/CSCE5290/
Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
--- | --- | --- | --- | ---
CS E712 | OPTICAL NETWORKS | 3 | 1 | -

**Course Objectives:**
1. To convey the basics of Optical Networks, and limitations in designing the optical networks.
2. Designing network with optical networks.
3. To develop methodologies for designing with Wavelength routed networks.
4. Designing the existing networks like IP, ATM, SONET using the backbone of wavelength routed networks.

**Course Outcomes:**
On successful completion of the module students will be able to:
1. Gain Basic Knowledge about the Optical networks.
2. Understand the concepts of topology and routing algorithms.
3. Get knowledge about the various protection mechanisms of optical layers.
4. Study the next generation optical networks.

**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**UNIT – V**

**TOTAL PERIODS: 60**
### Text Books:

### Reference Books:

### Website:
## Electives for Eighth Semester

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<th>Subject Code</th>
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<th>Lectures (Periods)</th>
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<tr>
<td>CS E81</td>
<td>INTELLIGENT INFORMATION RETRIEVAL</td>
<td>3</td>
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### Course Objectives:

1. To learn concepts of knowledge representation methods, reasoning processes, ontology concepts
2. To understand the ontology representation languages
3. To understand the basic components of information retrieval systems
4. To understand the indexing and querying mechanisms in information retrieval
5. To understand how to discover knowledge using artificial intelligence concepts

### Course Outcomes:

On successful completion of the module students will be able to:

1. An ability to incorporate artificial intelligence concepts in Information retrieval models
2. An ability to design ontology and understand the role of ontologies in Information retrieval system
3. An ability to understand the indexing mechanisms
4. An ability to understand the characteristics of Web search engines

### UNIT – I

**Knowledge Representation:** Knowledge representation - Basics of Prepositional logic – Predicate logic - reasoning using first order logic-unification - forward chaining - backward chaining –resolution - Production rules – frames - semantic networks - scripts.

### UNIT – II


### UNIT – III


### UNIT – IV

## UNIT – V


**TOTAL PERIODS: 60**

### Text Books:

### Reference Books:

### Website:
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<th>Subject Code</th>
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<th>Lectures (Periods)</th>
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<tr>
<td>CS E82</td>
<td>SOFT COMPUTING</td>
<td>3</td>
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**Course Objectives:**
1. To introduce neural networks, explain the process of their construction, training and inferencing from them.
2. To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
3. To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.
4. To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

**Course Outcomes:**
On successful completion of the module students will be able to:
2. Use fuzzy logic and implement the fuzzy sets and operations in fuzzy systems.

**UNIT – I**
Introduction: Introduction to Artificial Neural Networks, Fundamentals of biological neural networks, Basic principles of ANNs, The Perceptron, single layer and many layer perceptrons, Madaline.

**UNIT- II**

**UNIT – III**

**UNIT – IV**

**UNIT – V**
### TOTAL PERIODS: 60

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<th>Text Books:</th>
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<tbody>
<tr>
<td>1. James A. Freeman and David M. Skapura, “Neural Networks Algorithms,</td>
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<td>Wiley India Private Ltd, 2007.</td>
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<tr>
<td>3. Juan Ramon Rabunal, Julian Dorado, “Artificial Neural Networks in Real</td>
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<tr>
<td>2. S. N. Sivanandam, S. Sumathi and S. N. Deepa, “Introduction to Fuzzy</td>
</tr>
<tr>
<td>4. Randy L. Haupt, Sue Ellen Haupt, “Practical Genetic Algorithms”,</td>
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<td>2 Edition, Wiley and Sons, 2004</td>
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<td>2. <a href="http://www.lancet.mit.edu/mbwall/presentations/IntroToGAs">www.lancet.mit.edu/mbwall/presentations/IntroToGAs</a></td>
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<td>3. <a href="http://www.iitk.ac.in/kangal/">www.iitk.ac.in/kangal/</a></td>
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Subject Code | Subject Name          | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
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CS E83       | BIO-INSPIRED COMPUTING| 3                  | 1                  | -                   

Course Objectives:
1. To learn fundamental topics in bio-inspired computing;
2. To understand collective systems such as ACO, PSO, and BCO;
3. To develop skills in biologically inspired algorithm design with an emphasis on solving real world problems;
4. To understand the most appropriate types of algorithms for different data analysis problems and to introduce some of the most appropriate implementation strategies.

Course Outcomes:
On successful completion of the module students will be able to:
1. Familiarity with the basics of several biologically inspired computing paradigms.
2. Exposure to examples of problems that can be addressed by bio-inspired paradigms.
3. Ability to select an appropriate bio-inspired computing method and implement for any application and data set.
4. Theoretical understanding of the differences between the major bio-inspired computing methods.

UNIT – I

UNIT – II

UNIT – III
### UNIT – IV

**Swarm Robotics:** Foraging for food – Clustering of objects – Collective Prey retrieval – Scope of Swarm Robotics – **Social Adaptation of Knowledge:** Particle Swarm – Particle Swarm Optimization (PSO) – Particle Swarms for Dynamic Optimization Problems – Artificial Bee Colony (ABC) Optimization – **Other Swarm Intelligence algorithms:** Fish Swarm – Bacteria foraging – Intelligent Water Drop Algorithms – Applications of biologically inspired algorithms in engineering.

### UNIT – V


**TOTAL PERIODS: 60**

### Text Books:

### Reference Books:

### Website:
Subject Code | Subject Name         | Lectures (Periods) | Tutorial (Periods) | Practical (Periods) |
-------------|----------------------|--------------------|--------------------|--------------------|
CS E84       | Mobile Computing     | 3                  | 1                  | -                  |

Course Objectives:
1. To teach the basics of mobile computing ideas and best practices.
2. To teach the emerging wireless network standards.
3. To introduce the various models and data management concepts of mobile computing.
4. To learn the routing and secure protocols of mobile networking.

Course Outcomes:
On successful completion of the module students will be able to:
1. Gain basic knowledge in mobile computing.
2. Should have a broader knowledge on 3G.
3. Gain the knowledge on emerging wireless network standards.

Syllabus:

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TOTAL PERIODS: 60

Text Books:


### Reference Books:


### Website:


Course Objectives:
1. To understand Grid Architecture
2. To understand different types of grids
3. To know Grid standards
4. To apply grid computing in various areas

Course Outcomes:
The student will be able to
1. Create a Grid Middleware architecture
2. Explain the services offered by grid
3. To utilize grid for various applications

UNIT I          INTRODUCTION

UNIT II         FRAMEWORK

UNIT III        DATA AND KNOWLEDGE GRID

UNIT IV          GRID MIDDLEWARE

UNIT V                      APPLICATIONS

TOTAL PERIODS = 60

Text Books:

Reference Books:


Website:

2. http://gridgroup.tic.hefr.ch/
3. http://digitalcommons.unl.edu/cseconfwork/83
Subject Code | Subject Name | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
---|---|---|---|---
CS E86 | AGENT TECHNOLOGIES | 3 | 1 | -

Course Objectives:
1. To have comprehensive understanding on software agents
2. To introduce the concepts, techniques and applications of software agents.
3. To enables the student to understand the characteristics of the agents, their design and implementation.
4. To introduce about agent communication and negotiation

Course Outcomes:
On successful completion of the module, students will be able to:
1. Describe what an intelligent software agent is and its main characteristics
2. Describe what a multi-agent system is and how it differs from a single agent-based system.
3. Describe agent knowledge representation, and agent communication and coordination mechanisms
4. Describe several different agent architecture tools and frameworks.
5. Describe multi-agent learning, and mobile agent characteristics and applications.

UNIT – I
**Agents Overview:** Software Agent definition – Agents Vs objects – Intelligent Agent – Agent characteristics – Agent Types – Agent Applications – Agent Oriented Software Engineering (AOSE) - Aglets – Mobile agents – Agent frame works – Agent reasoning.

UNIT – II
**Agents Implementation:** Processes – Threads – Daemons – Components – Java Beans – ActiveX – Sockets, RPCs – Distributed computing – Aglets programming – JINI architecture – Actors and agents – Typed and proactive messages.

UNIT – III

UNIT – IV
**Intelligent Software Agents:** Interface Agents – Agent Communication Languages – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile Agent Applications.

UNIT – V

TOTAL PERIODS: 60
**TEXT BOOKS**

**REFERENCES**
1. Stuart Jonathan Russell, Peter Norvig, John F. Canny Contributor, Peter Norvig and John
Course Objectives:
1. To introduce the fundamental concepts in bioinformatics and computational biology.
2. To introduce the computational methods that can be used for querying and manipulating biological data.

Course Outcomes:
On successful completion of the module students will be able to:
1. Extract information from different types of bioinformatics data and perform text- and sequence-based searches.
2. Master computational techniques and diversified bioinformatics tools for processing data using statistical, machine learning and data mining techniques.
3. Analyze processed data with the support of analytical and visualization tools.

UNIT- I
Introduction: Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction, Folding problem, Sequence Analysis, Homology and Analogy

UNIT – II
Protein Information Resources -Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases -Genome Information Resources - DNA sequence databases, specialized genomic resources.

UNIT – III
DNA Sequence analysis - Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases

UNIT - IV
Pair wise alignment techniques - Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching - Multiple sequence alignment, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching

UNIT – V
Analysis packages -Analysis package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.

TOTAL PERIODS: 60
### Text Books:

### Reference Book:

### Website:
1. http://bioinformaticsweb.net/
Subject Code | Subject Name | Lectures (Periods) | Tutorials (Periods) | Practical (Periods)
--- | --- | --- | --- | ---
CS E88 | HIGH PERFORMANCE COMPUTING | 3 | 1 | -

Course Objectives:
1. To understand the architecture of parallel systems and identify the scope for parallelism in present day’s processors.
2. To understand the various parallel programming models and the challenges involved in parallel programming and learn the parallel programming techniques with OpenMP and MPI.
3. To learn high performance search algorithms.

Course Outcomes:
1. Students acquire the skills to implement software effectively and efficiently on parallel hardware platforms such as multi-core processors and processors that use multithreading techniques.
2. Capable to write parallel programs with OpenMP and MPI.
3. Devise new search algorithms.

UNIT – I


The need for parallel computers - models of computation - analyzing algorithms – expressing algorithms.

UNIT – II


Basic Communication Operations: One-to-all broadcast and all-to-one reduction – all-to-all broadcast reduction – all-reduce and prefix-sum operations – scatter and gather – all-to-all personalized communication – circular shift – improving the speed of some communication operations.

UNIT – III

Analytical Modeling of Parallel Programs: Sources of overhead in parallel programs – performance metrics for parallel systems – scalability of parallel systems – minimum execution time and minimum cost-optimal execution time.

Programming using the Message-Passing Paradigm: principles of message-passing programming – the building blocks – MPI – topologies and embedding – overlapping communication with computation – collective communication and computation operations – groups and communicators.
Programming Shared Address Space Platforms: Thread basics – synchronization primitives in Pthreads – controlling thread and synchronization attributes – composite synchronization constructs – tips for designing asynchronous programs – OpenMP.

UNIT – IV

UNIT – V
Dynamic Programming: Overview.

TOTAL PERIODS: 60

Text Books:

Reference Books:
6. MPI Programmer’s Manual

Websites:
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Lectures (Periods)</th>
<th>Tutorial (Periods)</th>
<th>Practical (Periods)</th>
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</thead>
<tbody>
<tr>
<td>CS E89</td>
<td>WIRELESS COMMUNICATION NETWORKS</td>
<td>3</td>
<td>1</td>
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</table>

**Course Objectives:**

1. Learn to model radio signal propagation issues and analyze their impact on communication system performance.
2. Understand how the various signal processing and coding techniques combat channel uncertainties.
3. Understand the techniques of radio spectrum allocation in multi-user systems and their impact on networks capacity.
4. Introduce various wireless systems and standards and basic operation cases.
5. Learn to simulate wireless networks and analyze the simulation results.

**Course Outcomes:**

On successful completion of the module students will be able to:

1. Become familiar with the regulatory environment in which the wireless industry operates.
2. Understand functions and operational principles of the various components of wireless networks, and how the connections are setup and maintained.
3. Understand the concept of frequency reuse, and be able to apply it in design of simple frequency reuse patterns.
4. Realize the complicated nature of wireless propagation and be able to apply simple models to calculate link budget.
5. Understand different modulation schemes and multiple access techniques used in wireless communications.

**UNIT – I**


**UNIT – II**


**UNIT – III**

# UNIT – IV


# UNIT – V

Infrastructure-Based/Cellular Networks

**TOTAL PERIODS: 60**

## Text Books:

## Reference Books:

## Website:
1. [http://compnetworking.about.com/od/wireless/WiFi_Wireless_Networks_and_Technology.htm](http://compnetworking.about.com/od/wireless/WiFi_Wireless_Networks_and_Technology.htm)
2. [http://www.brunel.ac.uk/sed/ece/research/wncc](http://www.brunel.ac.uk/sed/ece/research/wncc)
4. [http://williamstallings.com](http://williamstallings.com)
CS E810  BIG DATA MANAGEMENT  |  3  |  1  |  -

Course Objectives:
1. Understand big data for business intelligence
2. Learn business case studies for big data analytics
3. Understand NoSQL big data management
4. Perform map-reduce analytics using Hadoop and related tools

Course Outcomes:
On successful completion of the module students will be able to:
1. Describe big data and use cases from selected business domains
2. Explain NoSQL big data management
3. Install, configure, and run Hadoop and HDFS
4. Perform map-reduce analytics using Hadoop
5. Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

UNIT – I

UNIT – II

UNIT – III

UNIT – IV
MapReduce Applications: MapReduce workflows – unit tests with MR Unit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN.

UNIT – V
<table>
<thead>
<tr>
<th>TOTAL PERIODS: 60</th>
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<tbody>
<tr>
<td><strong>Text Books:</strong></td>
</tr>
<tr>
<td><strong>Reference Books:</strong></td>
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<tr>
<td><strong>Website:</strong></td>
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<tr>
<td>3. <a href="http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction">http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction</a></td>
</tr>
</tbody>
</table>
Subject      Code | Subject Name               | Lectures (Periods) | Tutorial (Periods) | Practical (Periods)
---|---------------------------|---------------------|-------------------|-------------------
CS E811 | CLOUD COMPUTING           | 3                   | 1                 | -                 

Course Objectives:
1. To impart the principles and paradigm of Cloud Computing
2. To understand the Service Model with reference to Cloud Computing
3. To comprehend the Cloud Computing architecture and implementation
4. To realize the role of Virtualization Technologies
5. To have knowledge on Cloud Computing management and security

Course Outcomes:
On successful completion of the module students will be able to:
1. Describe the concept, evolution, architecture, pros and cons of Cloud Computing.
2. Have knowledge of how hypervisors are used in Virtual Machines.
3. To secure and perform identity management in the Cloud.
4. To access and use the services in the Cloud.

UNIT – I

UNIT – II

UNIT – III

UNIT – IV

UNIT – V
Case-Studies: Using Google Web Services, Using Amazon Web Services, Using Microsoft Cloud Services

TOTAL PERIODS: 60

Text Books:
### Reference Books:


### Website:

1. www.ibm.com/cloud-computing/
2. www.microsoft.com/enterprise/it-trends/cloud-computing/
CS E812  MOBILE APPLICATION DEVELOPMENT

Lectures (Periods): 3
Tutorial (Periods): 1
Practical (Periods): -

Course Objective:
1. To use the Objective-C and Java languages (and associated frameworks) for creating mobile apps on iOS and Android platforms, respectively
2. To learn new mobile app development tools independently
3. Harness Internet service in support of mobile apps, create effective user interfaces for mobile apps and store/retrieve data in support of mobile apps
4. Take advantage of common mobile extras such as GPS, sensors (e.g., accelerometers), etc.

Course Outcomes:
1. Articulate the differences between desktop and mobile applications.
2. Compare and contrast some popular mobile app development tools.

UNIT - I

UNIT – II

UNIT – III

UNIT – IV
UNIT – V
Storyboarding Integration - Programmatic Interface creation - Integrating with core services – Email, Contacts - Data actions – preferences - files and addresses - Camera, WebKit - database with iPhone app - Core Data Integration - Advanced controllers – Navigation controller - Integrating with Core Services – Core Audio - Video - Even Handling - Gesture Recognition - Maps and location - Protocols and Categories - Communication with the Services - Using the Accelerometer - Bluetooth Programming.

TOTAL PERIODS: 60

Text Books:

Reference Books:

Website:
1. www.android.com
2. www.apple.com