OUTCOME BASED EDUCATION
WITH
CHOICE BASED CREDIT SYSTEM

BACHELOR OF TECHNOLOGY
INFORMATION TECHNOLOGY

ACADEMIC REGULATIONS, COURSE STRUCTURE AND
SYLLABI UNDER AUTONOMOUS STATUS

B.Tech Regular Four Year Degree Programme
(for the batches admitted from the academic year 2016-2017)
&
B.Tech (Lateral Entry Scheme)
(for the batches admitted from the academic year 2017-2018)

FAILURE TO READ AND UNDERSTAND THE REGULATIONS
IS NOT AN EXCUSE
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“Take up one idea. Make that one idea your life-think of it, dream of it, live on that idea. Let the brain muscles, nerves, every part of your body be full of that idea and just leave every other idea alone. **This is the way to success**”

*Swami Vivekananda*
PRELIMINARY DEFINITIONS AND NOMENCLATURES

**Academic Council**: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

**Academic Autonomy**: Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

**Academic Year**: It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., (one odd + one even) and one supplementary semester.

**AICTE**: Means All India Council for Technical Education, New Delhi.

**Autonomous Institute**: Means an institute designated as autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University, Hyderabad) and State Government.

**Backlog Course**: A course is considered to be a backlog course if the student has obtained a failure grade (F) in that course.

**Basic Sciences**: The courses offered in the areas of Mathematics, Physics, Chemistry, Biology etc., are considered to be foundational in nature.

**Betterment**: Betterment is a way that contributes towards improvement of the students’ grade in any course(s). It can be done by either (a) re-appearing or (b) re-registering for the course.

**Board of Studies (BOS)**: BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

**Branch**: Means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.

**Certificate course**: It is a course that makes a student gain hands-on expertise and skills required for holistic development in a specific area/field.

**Choice Based Credit System**: The credit based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

**Compulsory course**: Course required to be undertaken for the award of the degree as per the program.

**Commission**: Means University Grants Commission (UGC), New Delhi.

**Continuous Internal Examination**: It is an examination conducted towards sessional assessment.

**Course**: A course is a subject offered by a department for learning in a particular semester.

**Course Outcomes**: The essential skills that need to be acquired by every student through a course.

**Credit**: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

**Credit point**: It is the product of grade point and number of credits for a course.

**Cumulative Grade Point Average (CGPA)**: It is a measure of cumulative performance of a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

**Curriculum**: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.
**Department:** An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff and other resources in the process of study for a degree.

**Detention in a course:** Student who does not obtain minimum prescribed attendance in a course shall be detained in that particular course.

**Dropping from the Semester:** A student who doesn’t want to register for any semester can apply in writing in prescribed format before commencement of that semester.

**Elective Course:** A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

**Evaluation:** Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal assessment and semester end examinations.

**Grade:** It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

**Grade Point:** It is a numerical weight allotted to each letter grade on a 10 - point scale.

**Institute:** Means Institute of Aeronautical Engineering, Hyderabad unless indicated otherwise by the context.

**Massive Open Online Course (MOOC):** MOOC courses inculcate the habit of self learning. MOOC courses would be additional choices in all the elective group courses.

**Pre-requisite:** A course, the knowledge of which is required for registration into higher level course.

**Core:** The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

**Professional Elective:** It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

**Program:** Means, Bachelor of Technology (B.Tech) degree program / PG degree program: M.Tech/ MBA.

**Program Educational Objectives:** The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

**Project work:** It is a design or research based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit based course and is to be planned carefully by the student.

**Re-Appearing:** A student can reappear only in the semester end examination for the theory component of a course, subject to the regulations contained herein.

**Registration:** Process of enrolling into a set of courses in a semester of a Program.

**Regulations:** The regulations, common to all B.Tech programs offered by Institute are designated as “IARE Regulations R-16” and are binding on all the stakeholders.

**Semester:** It is a period of study consisting of 15 to 18 weeks of academic work equivalent to normally 90 working days. The odd Semester starts usually in July and even semester in December.

**Semester End Examinations:** It is an examination conducted for all courses offered in a semester at the end of the semester.

**S/he:** Means “she” and “he” both.

**Student Outcomes:** The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.

**University:** Means the Jawaharlal Nehru Technological University Hyderabad, Hyderabad.

**Withdraw from a Course:** Withdrawing from a course means that a student can drop from a course within the first two weeks of the odd or even semester (deadlines are different for summer sessions). However s/he can choose a substitute course in place of it by exercising the option within 5 working days from the date of withdrawal.
FOREWORD

The autonomy is conferred to Institute of Aeronautical Engineering (IARE), Hyderabad by University Grants Commission (UGC), New Delhi based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like J N T University Hyderabad (JNTUH), Hyderabad and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

IARE is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the institute and recommendations of the JNTUH to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the institute to order to produce a quality engineering graduate to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL
ACADEMIC REGULATIONS

B.Tech. Regular Four Year Degree Programme
(for the batches admitted from the academic year 2016 - 17)
&
B.Tech. (Lateral Entry Scheme)
(for the batches admitted from the academic year 2017 - 18)

For pursuing four year undergraduate Bachelor Degree programme of study in Engineering (B.Tech) offered by Institute of Aeronautical Engineering under Autonomous status and herein after referred to as IARE.

1.0. CHOICE BASED CREDIT SYSTEM

The Indian Higher Education Institutions (HEI’s) are changing from the conventional course structure to Choice Based Credit System (CBCS) along with introduction to semester system at first year itself. The semester system helps in accelerating the teaching-learning process and enables vertical and horizontal mobility in learning.

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a ‘cafeteria’ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

Choice Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of lectures / tutorials / laboratory work / field work / project work / comprehensive Examination / seminars / assignments / alternative assessment tools / presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:
1. Choose electives from a wide range of elective courses offered by the departments.
2. Undergo additional courses of interest.
3. Adopt an interdisciplinary approach in learning.
4. Make the best use of expertise of the available faculty.

2.0 MEDIUM OF INSTRUCTION

The medium of instruction shall be English for all courses, examinations, seminar presentations and project work. The curriculum will comprise courses of study as given in course structure, in accordance with the prescribed syllabi.
3.0 TYPES OF COURSES

Courses in a programme may be of three kinds: **Foundation / Skill, Core and Elective.**

3.1 Foundation / Skill Course:
Foundation courses are the courses based upon the content leads to enhancement of skill and knowledge as well as value based and are aimed at man making education. Skill subjects are those areas in which one needs to develop a set of skills to learn anything at all. They are fundamental to learning any subject.

3.2 Core Course:
There may be a core course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

3.3 Elective Course:
Electives provide breadth of experience in respective branch and applications areas. Elective course is a course which can be chosen from a pool of courses. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline/domain
- Nurturing student’s proficiency/skill.

An elective may be discipline centric (Professional Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an unrelated discipline called as “Open Elective”.

There are six professional elective groups; students can choose not more than two courses from each group. Overall, students can opt for four professional elective courses which suit their project work in consultation with the faculty advisor/mentor. Nevertheless, one course from each of the two open electives has to be selected. A student may also opt for more elective courses in his area of interest.

4.0 SEMESTER STRUCTURE

Each academic year is divided into three semesters, TWO being MAIN SEMESTERS (one odd + one even) and ONE being a SUPPLEMENTARY SEMESTER. Main Semesters are for regular class work. Supplementary Semester is primarily for failed students i.e. registration for a course for the first time is generally not permitted in the supplementary semester. However, the following cases are exempted:

4.1 Students admitted under Lateral Entry Scheme in the subjects ‘Audit Course’, ‘Advanced Programming Lab’ and ‘Value Added Course’.

4.2 Students admitted under Lateral Entry Scheme shall register ‘Environmental Studies’ course in supplementary semester and pass the subject by the end of VI semester for the award of the degree. This is a non-credit and mandatory course for students admitted under Lateral Entry Scheme.

4.3 Students admitted on transfer from JNTU affiliated institutes, Universities and other institutes in the subjects in which they are required to earn credits so as to be on par with regular students as prescribed by concerned ‘Board of Studies’.

4.4 Each main semester shall be of 21 weeks (Table 1) duration and this period includes time for registration of courses, course work, examination preparation and conduct of examinations.
4.5 Each main semester shall have a minimum of 90 working days; out of which number of contact days for teaching / practical are 75 and 15 days for conduct of exams and preparation.

4.6 The supplementary semester shall be a fast track semester consisting of eight weeks and this period includes time for registration of courses, course work, examination preparation, conduct of examinations, assessment and declaration of final results.

4.7 All subjects may not be offered in the supplementary semester. The student has to pay a stipulated fee prescribed by the Institute to register for a course in the supplementary semester. The supplementary semester is provided to help the student in not losing an academic year. It is optional for a student to make use of supplementary semester. **Supplementary semester is a special semester and the student cannot demand it as a matter of right** and will be offered based on availability of faculty and other institute resources.

4.8 The institute may use **supplementary semester** to arrange add-on courses for regular students and / or for deputing them for practical training / FSI. A student can register for a maximum number of 15 credits during a supplementary semester.

4.0.1 The registration for the Summer Semester (May – July) provides an opportunity to students to clear their backlogs (‘F’ grade) or who are prevented from appearing for SEE examinations due to shortage of attendance less than 65% in each course (‘SA’ Grade) in the earlier semesters or the courses which he / she could not register (Drop/Withdraw) for some reason.

Students will not be permitted to register for more than 15 credits (both I and II Semester) in the Summer Semester. Students are required to register for Summer Semester courses are to pay a nominal fee in within the stipulated time.

It will be optional for a student to get registered in the course(s) of Summer Semester; otherwise, he / she can opt to appear directly in supplementary examination. However, if a student gets registered in a course of Summer Semester, then it will be compulsory for a student to fulfil attendance criteria (≥90%) of Summer Semester and he / she will lose option to appear in immediate supplementary examination.

The students who have earlier taken an SEE Examination and register afresh for the Summer Semester will revoke the CIA marks secured by them in their regular/earlier attempt in the same course. Once revoked, the students shall not seek restoration of the CIA marks.

Summer Semester will be at an accelerated pace and will be at double the rate of normal semester e.g. one credit of course shall require two hours/week so that the total contact hours are maintained same as in normal semester.

Instructions and guidelines for the summer semester course:

- A minimum of 36 to 40 hours will be taught by the faculty for every course.
- The students registered and having sufficient percentage of attendance for the course alone will be permitted to write the examination.
- The assessment procedure in a summer semester course will also be similar to the procedure for a regular semester course.
- Student shall register for the Summer Semester as per the schedule given in academic calendar.
- Once registered, students will not be allowed to withdraw from a summer semester.
4.0.2 The academic calendar shown in Table 1 is declared at the beginning of the academic year.

<table>
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<th>Table 1: Academic Calendar</th>
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<tr>
<td><strong>FIRST SEMESTER</strong></td>
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<tr>
<td>(21 weeks)</td>
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<tr>
<td>I Spell Instruction Period</td>
</tr>
<tr>
<td>I Mid Examinations</td>
</tr>
<tr>
<td>II Spell Instruction Period</td>
</tr>
<tr>
<td>II Mid Examinations</td>
</tr>
<tr>
<td>Preparation and Practical Examinations</td>
</tr>
<tr>
<td>Semester End Examinations</td>
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<tr>
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<td></td>
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</tbody>
</table>

5.0 REGISTRATION / DROPPING / WITHDRAWAL

5.1. Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely compulsory for the student to register for courses in time. The registration will be organized departmentally under the supervision of the Head of the Department.

5.2. IN ABSENTIA registration will not be permitted under any circumstance.

5.3. At the time of registration, students should have cleared all the dues of Institute and Hostel in the previous semesters, paid the prescribed fees for the current semester and not been debarred from institute for a specified period on disciplinary or any other ground.

5.4. The student has to normally register for a minimum of 20 credits and may register up to a maximum of 30 credits, in consultation with HOD/faculty mentor. On an average, a student is expected to register for 25 credits.

5.5. Dropping of Courses: Within one week after the last date of first internal assessment test or by the date notified in the academic calendar, the student may in consultation with his / her faculty mentor/adviser, drop one or more courses without prejudice to the minimum number of credits as specified in clause 5.4. The dropped courses are not recorded in the Grade Card. Student must complete the dropped subject by registering in the supplementary semester / forthcoming semester in order to earn the required credits. Student must complete the dropped subject by registering in the supplementary semester / forthcoming semester in order to earn the required credits.

5.6. Withdrawal from Courses: A student is permitted to withdraw from a course by the date notified in the academic calendar. Such withdrawals will be permitted without prejudice to the minimum number of credits as specified in clause 5.4. A student cannot withdraw a course more than once and withdrawal of reregistered subjects is not permitted.

5.7. After Dropping and / or Withdrawal of courses, minimum credits registered shall be 20.
6.0 UNIQUE COURSE IDENTIFICATION CODE

Every course of the B.Tech program will be placed in one of the nine groups of courses as listed in the Table 2. The various courses and their two-letter codes are given below;

<table>
<thead>
<tr>
<th>S. No</th>
<th>Branch</th>
<th>Code</th>
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<tbody>
<tr>
<td>1</td>
<td>Aeronautical Engineering</td>
<td>AE</td>
</tr>
<tr>
<td>2</td>
<td>Computer Science and Engineering</td>
<td>CS</td>
</tr>
<tr>
<td>3</td>
<td>Information Technology</td>
<td>IT</td>
</tr>
<tr>
<td>4</td>
<td>Electronics and Communication Engineering</td>
<td>EC</td>
</tr>
<tr>
<td>5</td>
<td>Electrical and Electronics Engineering</td>
<td>EE</td>
</tr>
<tr>
<td>6</td>
<td>Mechanical Engineering</td>
<td>ME</td>
</tr>
<tr>
<td>7</td>
<td>Civil Engineering</td>
<td>CE</td>
</tr>
<tr>
<td>8</td>
<td>Humanities and Basic Sciences</td>
<td>HS</td>
</tr>
<tr>
<td>9</td>
<td>Miscellaneous</td>
<td>MS</td>
</tr>
</tbody>
</table>

7.0 CURRICULUM AND COURSE STRUCTURE

The curriculum shall comprise Foundation / Skill Courses, Core Courses, Elective Courses, Laboratory Courses, Audit Courses, Mandatory Courses, Comprehensive Examination, Ideation and Product Development, Internship and Project work. The list of elective courses may include subjects from allied disciplines also.

**Contact Periods:** Depending on the complexity and volume of the course, the number of contact periods per week will be assigned. Each Theory and Laboratory course carries credits based on the number of hours/week as follows:

- **Contact classes (Theory):** 1 credit per lecture hour per week, 1 credit per tutorial hour per week.
- **Laboratory Hours (Practical):** 1 credit for 2 Practical hours, 2 credits for 3 or 4 practical hours per week.
- **Project Work:** 1 credit for 4 hours of project work per week.
- **Ideation and Product Development:** 1 credit for 2 hours per week

7.1 Credit distribution for courses offered is shown in Table 3.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Course</th>
<th>Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Theory Course (Core and Foundation)</td>
<td>3/4</td>
<td>3/4</td>
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<tr>
<td>2</td>
<td>Elective Courses</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>MOOC Courses</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Laboratory Courses</td>
<td>2/3</td>
<td>1/2</td>
</tr>
<tr>
<td>5</td>
<td>Audit Course / Mandatory Course</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Comprehensive Examination</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Ideation and Product Development</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Summer Internship</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Full Semester Internship (FSI) Project Work</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>Project Work</td>
<td>-</td>
<td>10</td>
</tr>
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</table>
7.2 Course Structure
Every program of study shall be designed to have 38 - 42 theory courses and 20 - 26 laboratory courses. Every course of the B.Tech program will be placed in one of the eight categories with minimum credits as listed in the Table 4. In addition, a student has to carry out a Ideation and Product Development, project work and comprehensive Examination.

Table 4: Category Wise Distribution of Credits

<table>
<thead>
<tr>
<th>S. No</th>
<th>Category</th>
<th>Subject Area and % of Credits</th>
<th>Average No. of Credits</th>
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<tbody>
<tr>
<td>1</td>
<td>Humanities and Social Sciences (HS), including Management.</td>
<td>HS (05% to 10%)</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Basic Sciences (BS) including Mathematics, Physics and Chemistry.</td>
<td>BS (15% to 20%)</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>Engineering Sciences (ES), including Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering.</td>
<td>ES (15% to 20%)</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>Professional Subjects - Core (PC), relevant to the chosen specialization/branch.</td>
<td>PC (30% to 40%)</td>
<td>96</td>
</tr>
<tr>
<td>5</td>
<td>Professional Subjects - Electives (PE), relevant to the chosen specialization/branch.</td>
<td>PE (10% to 15%)</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>Open Subjects - Electives (OE), from other technical and/or emerging subject areas.</td>
<td>OE (05% to 10%)</td>
<td>06</td>
</tr>
<tr>
<td>7</td>
<td>Project Work or Full Semester Internship, Ideation and Product Development, Comprehensive Examination.</td>
<td>10% to 15%</td>
<td>12 - 18</td>
</tr>
<tr>
<td>8</td>
<td>Mandatory Courses / Audit Courses.</td>
<td>MC / AC</td>
<td>Non-Credit</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>192</strong></td>
</tr>
</tbody>
</table>

7.3 Semester wise course break-up
Following are the TWO models of course structure out of which any student shall choose or will be allotted with one model based on their academic performance.

i. Full Semester Internship (FSI) Model and
ii. Non Full Semester Internship (NFSI) Model.

7.4 For Four year regular program (FSI Model):
In the FSI Model, out of the selected students - half of students shall undergo Full Semester Internship in VII semester and the remaining students in VIII semester. In the Non FSI Model, all the selected students shall carry out the course work and Project work as specified in the course structure. A student who secures a minimum CGPA of 7.5 up to IV semester with no current arrears and maintains the CGPA of 7.5 till VI Semester shall be eligible to opt for FSI.
<table>
<thead>
<tr>
<th>Semester</th>
<th>No. of Theory Courses</th>
<th>No. of Lab Courses</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Semester</td>
<td>5 Foundation</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>II Semester</td>
<td>5 Foundation</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>III Semester</td>
<td>5 + Mandatory Course</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>(2 Core + 3 Foundation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Semester</td>
<td>5 + Audit Course</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>(3 Core + 2 Foundation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V Semester</td>
<td>6 (5 Core +</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>1 Professional Elective)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI Semester</td>
<td>6 (3 Core + 1 Professional Elective + 1 Foundation)</td>
<td>3 + Ideation and Product Development</td>
<td>28</td>
</tr>
<tr>
<td>VII Semester</td>
<td>Full Semester Internship (FSI)</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>VIII Semester</td>
<td>3 (3 Core + 1 Professional Elective)</td>
<td>3 + Comprehensive Examination</td>
<td>21</td>
</tr>
</tbody>
</table>

**Total**

36 (16 Foundation + 16 Core + 3 Professional Electives + 1 Open Elective) + Mandatory Course + Audit course

22 + Comprehensive Examination + Ideation and Product Development + FSI

192

### 7.5 For Four year regular program (Non FSI Model):

<table>
<thead>
<tr>
<th>Semester</th>
<th>No. of Theory Courses</th>
<th>No. of Lab Courses</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Semester</td>
<td>5 Foundation</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>II Semester</td>
<td>5 Foundation</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>III Semester</td>
<td>5 + Mandatory Course</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>(2 Core + 3 Foundation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Semester</td>
<td>5 + Audit Course</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>(3 Core + 2 Foundation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V Semester</td>
<td>6 (4 Core + 1 Skill</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>1 Professional Elective)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI Semester</td>
<td>5 (3 Core + 1 Professional Elective + 1 Open Elective)</td>
<td>3 + Ideation and Product Development</td>
<td>25</td>
</tr>
<tr>
<td>VII Semester</td>
<td>5 (3 Core + 1 Professional Elective + 1 Open Elective)</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>VIII Semester</td>
<td>3 (2 Core + 1 Professional Elective)</td>
<td>Project Work + Comprehensive Examination</td>
<td>20</td>
</tr>
</tbody>
</table>

**Total**

39 (15 Foundation + 01 Skill + 17 Core + 4 Professional Electives + 2 Open Electives) + Mandatory Course + Audit Course

23 + Ideation and Product Development + Comprehensive Examination + Project work

192
7.6 For Three year lateral entry program (FSI Model):

<table>
<thead>
<tr>
<th>Semester</th>
<th>No. of Theory Courses</th>
<th>No. of Lab Courses</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>III Semester</td>
<td>5 + Mandatory Course (2 Core + 3 Foundation)</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>IV Semester</td>
<td>5 + Audit course (3 Core + 2 Foundation)</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>V Semester</td>
<td>6 (5 Core + 1 Professional Elective)</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>VI Semester</td>
<td>6 (3 Core + 1 Professional Elective + 1 Open Elective + 1 Foundation)</td>
<td>3 + Ideation and Product Development</td>
<td>28</td>
</tr>
<tr>
<td>VII Semester</td>
<td><strong>Full Semester Internship (FSI)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIII Semester</td>
<td>4 (3 Core + 1 Professional Elective)</td>
<td>3 + Comprehensive Examination</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td><strong>26 (6 Foundation + 16 Core + 3 Professional Electives + 1 Open Electives) + Mandatory Course + Audit Course</strong></td>
<td><strong>14 + Comprehensive Examination + Ideation and Product Development + FSI</strong></td>
<td><strong>144</strong></td>
</tr>
</tbody>
</table>

7.7 For Three year lateral entry program (Non FSI Model):

<table>
<thead>
<tr>
<th>Semester</th>
<th>No. of Theory Courses</th>
<th>No. of Lab Courses</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>III Semester</td>
<td>5 + Mandatory Course (2 Core + 3 Foundation)</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>IV Semester</td>
<td>5 + Audit course (3 Core + 2 Foundation)</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>V Semester</td>
<td>6 (4 Core + 1 Skill + 1 Professional Elective)</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>VI Semester</td>
<td>5 (3 Core + 1 Professional Elective + 1 Open Elective)</td>
<td>3 + Ideation and Product Development</td>
<td>25</td>
</tr>
<tr>
<td>VII Semester</td>
<td>5 (3 Core + 1 Professional Elective + 1 Open Elective)</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>VIII Semester</td>
<td>3 (2 Core + 1 Professional Elective)</td>
<td>Project Work + Comprehensive Examination</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td><strong>29 (6 Foundation + 17 Core + 4 Professional Electives + 2 Open Electives + 1 Skill) + Mandatory Course + Audit Course</strong></td>
<td><strong>15 + Ideation and Product Development + Comprehensive Examination + Project work</strong></td>
<td><strong>144</strong></td>
</tr>
</tbody>
</table>
### 7.8 Course wise break-up for the total credits (FSI Model):

<table>
<thead>
<tr>
<th>Total Theory Courses (36)</th>
<th>16 @ 4 credits + 11 @ 4 credits + 05 @ 3 credits + 03 @ 3 credits + 01 @ 3 credits</th>
<th>134</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses (16) + Foundation Courses (11+ 5) + Professional Electives (03) + Open Elective (01)</td>
<td>16 @ 2 credits + 08 @ 1 credit</td>
<td>40</td>
</tr>
<tr>
<td>Total Laboratory Courses (16 + 08)</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Comprehensive Examination</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Ideation and Product Development</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Full Semester Internship (FSI)</td>
<td>1 @ 16 credits</td>
<td>16</td>
</tr>
<tr>
<td><strong>TOTAL CREDITS</strong></td>
<td><strong>192</strong></td>
<td></td>
</tr>
</tbody>
</table>

### 7.9 For Four year regular program (Non FSI Model):

<table>
<thead>
<tr>
<th>Total Theory Courses (38)</th>
<th>14 @ 4 credits + 02 @ 3 credits + 11 @ 4 credits + 05 @ 3 credits + 04 @ 3 credits + 02 @ 3 credits + 01 @ 3 credits</th>
<th>142</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses (16) + Foundation Courses (11+ 5) + Professional Electives (04) + Open Electives (02) + Skill (01)</td>
<td>15 @ 2 credits + 08 @ 1 credit</td>
<td>38</td>
</tr>
<tr>
<td>Total Laboratory Courses (15 + 08)</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Comprehensive Examination</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Ideation and Product Development</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Project work</td>
<td>1 @ 10 credits</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL CREDITS</strong></td>
<td><strong>192</strong></td>
<td></td>
</tr>
</tbody>
</table>

### 7.10 For three year lateral entry program (FSI Model):

<table>
<thead>
<tr>
<th>Total Theory Courses (26)</th>
<th>14 @ 4 credits + 02 @ 3 credits + 05 @ 4 credits + 02 @ 3 credits + 03 @ 3 credits + 01 @ 3 credits</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses (16) + Foundation Courses (5+2) + Professional Electives (03) + Open Electives (01)</td>
<td>11 @ 2 credits + 04 @ 1 credit</td>
<td>26</td>
</tr>
<tr>
<td>Total Laboratory Courses (11 + 04)</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Comprehensive Examination</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Ideation and Product Development</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Full Semester Internship</td>
<td>1 @ 16 credits</td>
<td>16</td>
</tr>
<tr>
<td><strong>TOTAL CREDITS</strong></td>
<td><strong>144</strong></td>
<td></td>
</tr>
</tbody>
</table>

### 7.11 For three year lateral entry program (Non FSI Model):

<table>
<thead>
<tr>
<th>Total Theory Courses (28)</th>
<th>14 @ 4 credits + 02 @ 3 credits + 05 @ 4 credits + 01 @ 3 credits + 04 @ 3 credits + 02 @ 3 credits + 01 @ 3 credits</th>
<th>106</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses (16) + Foundation Courses (5+1) + Professional Electives (04) + Open Electives (02) + Skill (01)</td>
<td>11 @ 2 credits + 04 @ 1 credit</td>
<td>26</td>
</tr>
<tr>
<td>Total Laboratory Courses (11 + 04)</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Comprehensive Examination</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Ideation and Product Development</td>
<td>1 @ 1 credit</td>
<td>01</td>
</tr>
<tr>
<td>Project work</td>
<td>1 @ 10 credits</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL CREDITS</strong></td>
<td><strong>144</strong></td>
<td></td>
</tr>
</tbody>
</table>
8.0 EVALUATION METHODOLOGY

8.1 Theory Course:

Each theory course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two sessional examinations or the marks scored in the make-up examination conducted.

8.1.1 Semester End Examination (SEE):

The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into FIVE units and each unit carries equal weightage in terms of marks distribution. The question paper pattern is as follows.

Two full questions with ‘either’ ‘or’ choice will be drawn from each unit. Each question carries 14 marks. There could be a maximum of three sub divisions in a question.

The emphasis on the questions is broadly based on the following criteria:

<table>
<thead>
<tr>
<th>Weightage</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>To test the objectiveness of the concept</td>
</tr>
<tr>
<td>30%</td>
<td>To test the analytical skill of the concept</td>
</tr>
<tr>
<td>20%</td>
<td>To test the application skill of the concept</td>
</tr>
</tbody>
</table>

8.1.2 Continuous Internal Assessment (CIA):

For each theory course the CIA shall be conducted by the faculty/teacher handling the course as given in Table-5. CIA is conducted for a total of 30 marks, with 25 marks for Continuous Internal Examination (CIE) and 05 marks for Quiz / Alternative Assessment Tool (AAT).

Table-5: Assessment pattern for Theory Courses

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>THEORY</th>
<th>TOTAL MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Assessment</td>
<td>CIE Exam (Sessional)</td>
<td>Quiz / AAT</td>
</tr>
<tr>
<td>Max. CIA Marks</td>
<td>25</td>
<td>05</td>
</tr>
</tbody>
</table>

8.1.2.1 Continuous Internal Examination (CIE):

Two CIE exams shall be conducted at the end of the 8th and 17th week of the semester respectively. The CIE exam is conducted for 25 marks of 2 hours duration consisting of two parts. Part–A shall have five compulsory questions of one mark each. In part–B, four out of five questions have to be answered where each question carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams. The valuation and verification of answer scripts of CIE exams shall be completed within a week after the conduct of the Internal Examination.

8.1.2.2 Quiz / Alternative Assessment Tool (AAT)

Two Quiz exams shall be online examination consisting of 20 multiple choice questions and are be answered by choosing the correct answer from a given set of choices (commonly four). Such a question paper shall be useful in the testing of knowledge, skills, application, analysis, evaluation and understanding of the students. Marks shall be awarded considering the average of two quizzes for every course.
In order to encourage innovative methods while delivering a course, the faculty members have been encouraged to use the Alternative Assessment Tool (AAT) in place of two quizzes. This AAT enables faculty to design own assessment patterns during the CIA. However, the usage of AAT is completely optional. The AAT enhances the autonomy (freedom and flexibility) of individual faculty and enables them to create innovative pedagogical practices. If properly applied, the AAT converts the classroom into an effective learning centre. The AAT may include seminars, assignments, term paper, open ended experiments, micro-projects, five minutes video, MOOCs etc.

However, it is mandatory for a faculty to obtain prior permission from the concerned HOD and spell out the teaching/assessment pattern of the AAT prior to commencement of the classes.

8.2 Laboratory Course:

8.2.1 Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment. The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

8.2.2 All the drawing related courses are evaluated in line with laboratory courses. The distribution shall be 30 marks for internal evaluation (20 marks for day–to–day work, and 10 marks for internal tests) and 70 marks for semester end lab examination. There shall be ONE internal test for 10 marks in each semester.

8.3 MOOC Courses:

Meeting with the global requirements, to inculcate the habit of self learning and in compliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives.

8.3.1 The proposed MOOC courses would be additional choices in all the elective groups subject to the availability during the respective semesters and respective departments will declare the list of the courses at the beginning of the semester. Course content for the selected MOOC courses shall be drawn from respective MOOCs links or shall be supplied by the department. Course will be mentored by faculty members and Assessment & Evaluation of the courses shall be done by the department.

8.3.2 There shall be one Mid Continuous Internal Examination (Quiz exam for 30 marks) after 8 weeks of the commencement of the course and semester end examination (Descriptive exam for 70 marks) shall be done along with the other regular courses.

8.3.3 Two credits will be awarded upon successful completion of each MOOC courses. Students need to complete three such MOOC courses to compensate any two elective courses (one open and one professional) having three credits.

8.3.4 Students interested in doing MOOC courses shall register the course title at their department office at the start of the semester against the courses that are announced by the department.
8.4 **Audit Courses (AC) / Mandatory Courses (MC):**

These courses are among the compulsory courses and do not carry any credits.

a) Gender Sensitivity is a mandatory course in III semester for all the students.

b) The student has to choose one audit course at the beginning of IV semester under self study mode. By the end of VI semester, all the students (regular and lateral entry students) shall complete the audit course.

c) The students will have four chances in total to clear the audit / mandatory course. Further, the student has an option to change the audit course in case if s/he is unable to clear the audit course in the first two chances. However, the audit course should be completed by VI semester and its result will be given in the VI semester grade sheet.

d) Audit / Mandatory courses will not carry any credits; but, a pass in each such course after attaining required CIE and SEE requirements during the programme shall be necessary requirement for the student to qualify for the award of Degree. Its result shall be declared with “Satisfactory” or “Not Satisfactory” performance.

8.5 **Value Added Courses:**

The value added courses are audit courses in nature offered through joint ventures with various organizations provide ample scope for the students as well as faculty to keep pace with the latest technologies pertaining to their chosen field of studies. A plenty of value added programs will be proposed by the departments one week before the commencement of classwork. The students are given the option to choose the courses according to their desires and inclinations as they choose the desired items in a cafeteria. The expertise gained through the value added programs should enable them to face the formidable challenges of the future and also assist them in exploring new opportunities. Its result shall be declared with “Satisfactory” or “Not Satisfactory” performance.

8.6 **Comprehensive Examination**

The comprehensive Examination is aimed at assessing the students understanding of various Foundation, Skill and Core courses studied till the end of VII semester and is intended to test the students’ grasp of the chosen field of study.

The Comprehensive Examination consists of two parts. Part A is a written examination and part B is the oral examination. The written examination shall be objective type of one hour duration and shall have 50 marks and is to be conducted by the concerned department under the supervision of Dean Academics. Oral examination shall be conducted by the department and carry 50 marks. The examination shall be conducted during the VIII semester.

8.7 **Ideation and Product Development**

The Ideation and Product Development shall be carried out either during VI semester along with other lab courses by having regular weekly slots. Students will take Ideation and Product Development batch wise and the batches will be divided as per the guidelines issued. The topic of Ideation and Product Development should be so selected that the students are enabled to complete the work in the stipulated time with the available resources in the respective laboratories. The scope of the Ideation and Product Development could be handling part of the consultancy work, maintenance of the existing equipment, development of new experiment setup or can be a prelude to the main project with a specific outcome. Ideation and Product Development report will be evaluated for 100 marks in total. Assessment will be done by the supervisor/guide for 30 marks based on the work and presentation/execution of the Ideation and Product Development. Subdivision for the remaining 70 marks is based on report, presentation,
execution and viva-voce. Evaluation shall be done by a committee comprising the Ideation and Product Development supervisor, Head of the department and an examiner nominated by the Principal from the panel of experts recommended by Chairman, BOS in consultation with Head of the department.

8.8 Project work

In the non-FSI Model, the project work shall be evaluated for 100 marks out of which 30 marks for internal evaluation and 70 marks for semester end evaluation. The project work shall be spread over in VII semester and in VIII semester. The project work shall be somewhat innovative in nature, exploring the research bent of the mind of the student. A project batch shall comprise not more than three students.

At the end of VII semester, students should submit synopsis summarizing the work done in VII semester. The project is expected to be completed by the end of VIII semester. In VII semester, a first mid review is conducted by Project Review Committee (PRC) (on the progress) for 10 marks.

In VIII semester, a second mid review is conducted by PRC (on the progress) for 10 marks. On completion of the project, a third evaluation is conducted for award of internal marks of another 10 marks before the report is submitted, making the total internal marks 30.

The end semester examination shall be based on the report submitted and a viva-voce exam for 70 marks by a committee comprising the Head of the department, project supervisor and an external examiner nominated by the Principal. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

8.9 Full Semester Internship (FSI)

FSI is a full semester internship programme carries 16 credits. During the FSI, student has to spend one full semester in an identified industry / firm / organization and has to carry out the internship as per the stipulated guidelines of that industry / firm / organization and the institute.

Following are the evaluation guidelines:

- Quizzes: 2 times
- Quiz #1 - About the industry profile, weightage: 5%
- Quiz #2 - Technical-project related, weightage: 5%
- Seminars - 2 times (once in six weeks), weightage: 7.5% + 7.5%
- Viva-voce: 2 times (once in six weeks), weightage: 7.5% + 7.5%
- Project Report, weightage: 15%
- Internship Diary, weightage: 5%
- Final Presentation, weightage: 40%

FSI shall be open to all the branches with a ceiling of maximum 10% distributed in both semesters. The selection procedure is:

- Choice of the students
- CGPA (> 7.5) up to IV semester
- Competency Mapping / Allotment
9.0 MAKE-UP EXAMINATION
The make-up examination facility shall be available to students who may have missed to attend CIE exams in one or more courses in a semester for valid genuine reasons. The make-up examination shall have comprehensive online objective type questions. The syllabus for the make-up examination shall be the whole syllabus covered till the end of the semester under consideration and will be conducted at the end of the semester.

10.0 ATTENDANCE REQUIREMENTS AND DETENTION POLICY

10.1 It is desirable for a candidate to put on 100% attendance in each course. In every course (theory/laboratory), student has to maintain a minimum of 75% attendance including the days of attendance in sports, games, NCC and NSS activities to be eligible for appearing in Semester End Examination of the course.

10.2 For cases of medical issues, deficiency of attendance in each course to the extent of 10% may be condoned by the College Academic Committee (CAC) on the recommendation of Head of the department if their attendance is between 75% to 65% in every course, subjected to submission of medical certificates, medical case file and other needful documents to the concerned departments.

10.3 The basis for the calculation of the attendance shall be the period prescribed by the institute by its calendar of events. For late admission, attendance is reckoned from the date of admission to the program. However, in case of a student having less than 65% attendance in any course, s/he shall be detained in the course and in no case such process will be relaxed.

10.4 A candidate shall put in a minimum required attendance at least three (3) theory courses for getting promoted to next higher class / semester. Otherwise, s/he shall be declared detained and has to repeat semester.

10.5 Students whose shortage of attendance is not condoned in any subject are not eligible to write their semester end examination of that courses and their registration shall stand cancelled.

10.6 A prescribed fee shall be payable towards condonation of shortage of attendance.

10.7 A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

10.8 Any student against whom any disciplinary action by the institute is pending shall not be permitted to attend any SEE in that semester.

11.0 CONDUCT OF SEMESTER END EXAMINATIONS AND EVALUATION

11.1 Semester end examination shall be conducted by the Controller of Examinations (COE) by inviting Question Papers from the External Examiners.

11.2 Question papers may be moderated for the coverage of syllabus, pattern of questions by a Semester End Examination Committee chaired by Head of the Department one day before the commencement of semester end examinations. Internal Examiner shall prepare a detailed scheme of valuation.

11.3 The answer papers of semester end examination should be evaluated by the internal examiner immediately after the completion of exam and the award sheet should be submitted to COE in a sealed cover before the same papers are kept for second evaluation by external examiner.
11.4 In case of difference of more than 15% of marks, the answer paper shall be re-evaluated by a third examiner appointed by the Examination Committee and marks awarded by this examiner shall be taken as final.

11.5 COE shall invite 3 - 9 external examiners to evaluate all the end-semester answer scripts on a prescribed date(s). Practical laboratory exams are conducted involving external examiners.

11.6 Examinations Control Committee shall consolidate the marks awarded by internal and external examiners and award grades.

12.0 SCHEME FOR THE AWARD OF GRADE

12.1 A student shall be deemed to have satisfied the minimum academic requirements and earn the credits for each theory course, if s/he secures

i. Not less than 35% marks for each theory course in the semester end examination, and

ii. A minimum of 40% marks for each theory course considering both internal and semester end examination.

12.2 A student shall be deemed to have satisfied the minimum academic requirements and earn the credits for each Lab / Comprehensive Examination / Ideation and Product Development / Project, if s/he secures

i. Not less than 40% marks for each Lab / Comprehensive Examination / Ideation and Product Development / Project course in the semester end examination,

ii. A minimum of 40% marks for each Lab / Comprehensive Examination / Ideation and Product Development / Project course considering both internal and semester end examination.

12.3 If a candidate fails to secure a pass in a particular course, it is mandatory that s/he shall register and reappear for the examination in that course during the next semester when examination is conducted in that course. It is mandatory that s/he should continue to register and reappear for the examination till s/he secures a pass.

13.0 LETTER GRADES AND GRADE POINTS

13.1 Performances of students in each course are expressed in terms of marks as well as in Letter Grades based on absolute grading system. The UGC recommends a 10-point grading system with the following letter grades as given in the Table-6.

Table-6: Grade Points Scale (Absolute Grading)

<table>
<thead>
<tr>
<th>Range of Marks</th>
<th>Grade Point</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 – 90</td>
<td>10</td>
<td>S (Superior)</td>
</tr>
<tr>
<td>89 – 80</td>
<td>9</td>
<td>A+ (Excellent)</td>
</tr>
<tr>
<td>79 – 70</td>
<td>8</td>
<td>A (Very Good)</td>
</tr>
<tr>
<td>69 – 60</td>
<td>7</td>
<td>B+ (Good)</td>
</tr>
<tr>
<td>59 – 50</td>
<td>6</td>
<td>B (Average)</td>
</tr>
<tr>
<td>49 – 40</td>
<td>5</td>
<td>C (Pass)</td>
</tr>
<tr>
<td>Below 40</td>
<td>0</td>
<td>F (Fail)</td>
</tr>
<tr>
<td>Absent</td>
<td>0</td>
<td>AB (Absent)</td>
</tr>
<tr>
<td>Authorized Break of Study</td>
<td>0</td>
<td>ABS</td>
</tr>
</tbody>
</table>
13.2 A student is deemed to have passed and acquired correspondent credits in particular course if s/he obtains any one of the following grades: “S”, “A+”, “A”, “B+”, “B”, “C”.

13.3 A student obtaining Grade F shall be considered Failed and will be required to reappear in the examination.

13.4 For non credit courses, ‘Satisfactory’ or “Not Satisfactory” is indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

13.5 “SA” denotes shortage of attendance (as per item 10) and hence prevention from writing Semester End Examination.

13.6 “W” denotes withdrawal from the exam for the particular course.

13.7 At the end of each semester, the institute issues grade sheet indicating the SGPA and CGPA of the student. However, grade sheet will not be issued to the student if s/he has any outstanding dues.

14.0 COMPUTATION OF SGPA AND CGPA

The UGC recommends to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA). The credit points earned by a student are used for calculating the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA), both of which are important performance indices of the student. SGPA is equal to the sum of all the total points earned by the student in a given semester divided by the number of credits registered by the student in that semester. CGPA gives the sum of all the total points earned in all the previous semesters and the current semester divided by the number of credits registered in all these semesters. Thus,

\[
SGPA = \frac{\sum_{i=1}^{n} (C_i G_i)}{\sum_{i=1}^{n} C_i}
\]

Where, \(C_i\) is the number of credits of the \(i^{th}\) course and \(G_i\) is the grade point scored by the student in the \(i^{th}\) course and \(n\) represent the number of courses in which a student is registered in the concerned semester.

\[
CGPA = \frac{\sum_{j=1}^{m} (C_j S_j)}{\sum_{j=1}^{m} C_j}
\]

Where, \(S_j\) is the SGPA of the \(j^{th}\) semester and \(C_j\) is the total number of credits upto the semester and \(m\) represent the number of semesters completed in which a student registered upto the semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

15.0 ILLUSTRATION OF COMPUTATION OF SGPA AND CGPA

15.1 Illustration for SGPA

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Course Credits</th>
<th>Grade Letter</th>
<th>Grade Point</th>
<th>Credit Point (Credit x Grade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 1</td>
<td>3</td>
<td>A</td>
<td>8</td>
<td>3 x 8 = 24</td>
</tr>
<tr>
<td>Course 2</td>
<td>4</td>
<td>B+</td>
<td>7</td>
<td>4 x 7 = 28</td>
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<tr>
<td>Course 3</td>
<td>3</td>
<td>B</td>
<td>6</td>
<td>3 x 6 = 18</td>
</tr>
<tr>
<td>Course 4</td>
<td>3</td>
<td>S</td>
<td>10</td>
<td>3 x 10 = 30</td>
</tr>
<tr>
<td>Course 5</td>
<td>3</td>
<td>C</td>
<td>5</td>
<td>3 x 5 = 15</td>
</tr>
<tr>
<td>Course 6</td>
<td>4</td>
<td>B</td>
<td>6</td>
<td>4 x 6 = 24</td>
</tr>
</tbody>
</table>

\[\text{Thus, } SGPA = \frac{139}{20} = 6.95\]
15.2 Illustration for CGPA

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Semester 3</th>
<th>Semester 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit: 20</td>
<td>Credit: 22</td>
<td>Credit: 25</td>
<td>Credit: 26</td>
</tr>
<tr>
<td>SGPA: 6.9</td>
<td>SGPA: 7.8</td>
<td>SGPA: 5.6</td>
<td>SGPA: 6.0</td>
</tr>
<tr>
<td>Credit: 22</td>
<td>Credit: 25</td>
<td>Credit: 25</td>
<td>Credit: 26</td>
</tr>
<tr>
<td>SGPA: 7.8</td>
<td>SGPA: 8.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thus, \( CGPA = \frac{20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0}{144} = 6.73 \)

16.0 PHOTOCOPY / REVALUATION

A student, who seeks the re-valuation of the answer script, is directed to apply for the photocopy of his/her semester examination answer paper(s) in the theory course(s), within 2 working days from the declaration of results in the prescribed format to the Controller of Examinations through the Head of the department. On receiving the photocopy, the student can consult with a competent member of faculty and seek the opinion for revaluation. Based on the recommendations, the student can register for the revaluation with prescribed fee. The Controller of Examinations shall arrange for the revaluation and declare the results. Revaluation is not permitted to the courses other than theory courses.

17.0 PROMOTION POLICIES

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 10.

17.1 For students admitted into B.Tech (Regular) program

17.1.1 A student will not be promoted from II semester to III semester unless s/he fulfills the academic requirement of securing 24 credits from I and II semesters examinations, whether or not the candidate takes the examinations.

17.1.2 A student will not be promoted from IV semester to V semester unless s/he fulfills the academic requirement of securing 37 credits upto III semester or 49 credits upto IV semester, from all the examinations, whether or not the candidate takes the examinations.

17.1.3 A student shall be promoted from VI semester to VII semester only if s/he fulfills the academic requirements of securing 62 credits upto V semester or 74 credits upto VI semester from all the examinations, whether or not the candidate takes the examinations.

17.1.4 A student shall register for all the 192 credits and earn all the 192 credits. Marks obtained in all the 192 credits shall be considered for the award of the Grade.

17.2 For students admitted into B.Tech (lateral entry students)

17.2.1 A student will not be promoted from IV semester to V semester unless s/he fulfills the academic requirement of securing 25 credits upto IV semester, from all the examinations, whether or not the candidate takes the examinations.
17.2.2 A student shall be promoted from VI semester to VII semester only if s/he fulfills the academic requirements of securing 38 credits upto V semester or 50 credits upto VI semester from all the examinations, whether or not the candidate takes the examinations.

17.2.3 A student shall register for all the 144 credits and earn all the 144 credits. Marks obtained in all the 144 credits shall be considered for the award of the Grade.

18.0 GRADUATION REQUIREMENTS
The following academic requirements shall be met for the award of the B.Tech degree.

18.1 Student shall register and acquire minimum attendance in all courses and secure 192 credits for regular program and 144 credits for lateral entry program.

18.2 A student of a regular program, who fails to earn 192 credits within eight consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

18.3 A student of a lateral entry program who fails to earn 144 credits within six consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

19.0 BETTERMENT OF MARKS IN THE COURSES ALREADY PASSED
Students who clear all the courses in their first attempt and wish to improve their CGPA shall register and appear for betterment of marks for one course of any theory courses within a period of subsequent two semesters. The improved marks shall be considered for classification / distinction but not for ranking. If there is no improvement, there shall not be any change in the original marks already awarded.

20.0 AWARD OF DEGREE

20.1 Classification of degree will be as follows:

<table>
<thead>
<tr>
<th>CGPA ≥ 7.5</th>
<th>CGPA ≥ 6.5 and &lt; 7.5</th>
<th>CGPA ≥ 5.0 and &lt; 6.5</th>
<th>CGPA ≥ 4.0 and &lt; 5.0</th>
<th>CGPA &lt; 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>First Class</td>
<td>Second Class</td>
<td>Pass Class</td>
<td>Fail</td>
</tr>
</tbody>
</table>

20.2 In order to extend the benefit to the students with one/two backlogs after either VI semester or VIII semester, GRAFTING option is provided to the students enabling their placements and fulfilling graduation requirements. Following are the guidelines for the Grafting:

a. Grafting will be done among the courses within the semester shall draw a maximum of 7 marks from the any one of the cleared courses in the semester and will be grafted to the failed course in the same semester.

b. Students shall be given a choice of grafting only once in the 4 years program, either after VI semester (Option #1) or after VIII semester (Option #2).

c. Option#1: Applicable to students who have maximum of TWO theory courses in V and / or VI semesters.

Option#2: Applicable to students who have maximum of TWO theory courses in VII and / or VIII semesters.
d. Eligibility for grafting:
   i. Prior to the conduct of the supplementary examination after the declaration of VI or VIII semester results.
   ii. S/he must appear in all regular or supplementary examinations as per the provisions laid down in regulations for the courses s/he appeals for grafting.
   iii. The marks obtained by her/him in latest attempt shall be taken into account for grafting of marks in the failed course(s).

20.3 Student, who clears all the courses up to VII semester, shall have a chance to appear for Quick Supplementary Examination to clear the failed courses of VIII semester.

20.4 By the end of VI semester, all the students (regular and lateral entry students) shall complete one of the audit course and mandatory course with acceptable performance.

20.5 In case, a student takes more than one attempt in clearing a course, the final marks secured shall be indicated by * mark in the grade sheet.

All the candidates who register for the semester end examination will be issued grade sheet by the institute. Apart from the semester wise grade sheet, the institute will issue the provisional certificate and consolidated grade sheet subject to the fulfillment of all the academic requirements.

21.0 TEMPORARY BREAK OF STUDY FROM THE PROGRAMME

21.1 A candidate is normally not permitted to break the study. However, if a candidate intends to temporarily discontinue the program in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the program in a later respective semester, s/he shall apply to the Principal in advance. Such application shall be submitted before the last date for payment of examination fee of the semester in question and forwarded through the Head of the department stating the reasons for such withdrawal together with supporting documents and endorsement of his / her parent / guardian.

21.2 The institute shall examine such an application and if it finds the case to be genuine, it may permit the student to temporarily withdraw from the program. Such permission is accorded only to those who do not have any outstanding dues / demand at the College / University level including tuition fees, any other fees, library materials etc.

21.3 The candidate has to rejoin the program after the break from the commencement of the respective semester as and when it is offered.

21.4 The total period for completion of the program reckoned from the commencement of the semester to which the candidate was first admitted shall not exceed the maximum period specified in clause 18.0. The maximum period includes the break period.

21.5 If any candidate is detained for any reason, the period of detention shall not be considered as ‘Break of Study’.

22.0 TERMINATION FROM THE PROGRAM

The admission of a student to the program may be terminated and the student is asked to leave the institute in the following circumstances:

a. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

b. A student shall not be permitted to study any semester more than three times during the entire Program of study.

c. The student fails to satisfy the norms of discipline specified by the institute from time to time.
23.0 WITH-HOLDING OF RESULTS
If the candidate has not paid any dues to the institute / if any case of indiscipline / malpractice is pending against him, the results of the candidate will be withheld. The issue of the degree is liable to be withheld in such cases.

24.0 GRADUATION DAY
The institute shall have its own annual Graduation Day for the award of Degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute. The college shall institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

25.0 DISCIPLINE
Every student is required to observe discipline and decorum both inside and outside the institute and not to indulge in any activity which will tend to bring down the honor of the institute. If a student indulges in malpractice in any of the theory / practical examination, continuous assessment examinations he/she shall be liable for punitive action as prescribed by the Institute from time to time.

26.0 GRIEVANCE REDRESSAL COMMITTEE
The institute shall form a Grievance Redressal Committee for each course in each department with the Course Teacher and the HOD as the members. This Committee shall solve all grievances related to the course under consideration.

27.0 TRANSITORY REGULATIONS
A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the courses in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such courses in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

a) Four Year B.Tech Regular course:
A student who is following Jawaharlal Nehru Technological University (JNTUH) curriculum and detained due to shortage of attendance at the end of the first semester shall join the autonomous batch of first semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUH curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUH for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUH regulations and the credits prescribed for the semester in
which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

b) Three Year B.Tech program under Lateral Entry Scheme:

A student who is following JNTUH curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of third semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUH curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUH for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUH regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

c) Transfer candidates (from non-autonomous college affiliated to JNTUH):

A student who is following JNTUH curriculum, transferred from other college to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in their place as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUH for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester as per the regulations of the college from which he is transferred and the credits prescribed for

d) Transfer candidates (from an autonomous college affiliated to JNTUH):

A student who has secured the required credits upto previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this institute. A student who is transferred from the other autonomous colleges to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester under JNTUH regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.
the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

28.0 REVISION OF REGULATIONS AND CURRICULUM

The Institute from time to time may revise, amend or change the regulations, scheme of examinations and syllabi if found necessary and on approval by the Academic Council and the Governing Body shall come into force and shall be binding on the students, faculty, staff, all authorities of the Institute and others concerned.

FAILURE TO READ AND UNDERSTAND THE REGULATIONS IS NOT AN EXCUSE
## INFORMATION TECHNOLOGY

### COURSE STRUCTURE

#### I SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Subject Area</th>
<th>Category</th>
<th>Periods per week</th>
<th>Credits</th>
<th>Scheme of Examination Max. Marks</th>
</tr>
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<tbody>
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<td></td>
<td><strong>THEORY</strong></td>
<td></td>
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<td>AHS002</td>
<td>Linear Algebra and Ordinary Differential Equations</td>
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<td>3 1 - 4</td>
<td>30 70</td>
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<td>AHS104</td>
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#### II SEMESTER

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<th>Periods per week</th>
<th>Credits</th>
<th>Scheme of Examination Max. Marks</th>
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<tr>
<td></td>
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<td>3 - - 3</td>
<td>30 70</td>
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<tr>
<td>AHS010</td>
<td>Probability and Statistics</td>
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<td>AHS009</td>
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<td>30 70</td>
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<td>Data Structures</td>
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<td>Foundation</td>
<td>3 1 - 4</td>
<td>30 70</td>
<td>100</td>
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<td>AEE001</td>
<td>Fundamentals of Electrical and Electronics Engineering</td>
<td>ES</td>
<td>Foundation</td>
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<td>30 70</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td><strong>PRACTICAL</strong></td>
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<td></td>
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<tr>
<td>AHS101</td>
<td>Communication Skills Laboratory</td>
<td>HS</td>
<td>Foundation</td>
<td>- - 2 1</td>
<td>30 70</td>
<td>100</td>
</tr>
<tr>
<td>ACS102</td>
<td>Data Structures Laboratory</td>
<td>PC</td>
<td>Foundation</td>
<td>- - 3 2</td>
<td>30 70</td>
<td>100</td>
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<tr>
<td>AEE101</td>
<td>Electrical and Electronics Engineering Laboratory</td>
<td>ES</td>
<td>Foundation</td>
<td>- - 3 2</td>
<td>30 70</td>
<td>100</td>
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<tr>
<td>ACS112</td>
<td>Engineering Practice Laboratory</td>
<td>ES</td>
<td>Foundation</td>
<td>- - 2 1</td>
<td>30 70</td>
<td>100</td>
</tr>
<tr>
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| AIT101      | Design and Analysis of Algorithms Laboratory     | PC           | Core           | -    | -   | 3   | 2   | 30  | 70       | 100      |       |
| ACS104      | Database Management Systems Laboratory           | PC           | Foundation     | -    | -   | 3   | 2   | 30  | 70       | 100      |       |
| AEC116      | Digital Logic Design Laboratory                  | PC           | Foundation     | -    | -   | 3   | 2   | 30  | 70       | 100      |       |

**TOTAL**     |                                                  |              |                | 15   | 04  | 09  | 25  | 240 | 560      | 800      |       |

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| ACS103      | Object Oriented Programming through JAVA Laboratory| PC           | Core           | -    | -   | 3   | 2   | 30  | 70       | 100      |       |
| ACS106      | Operating System Laboratory                      | PC           | Foundation     | -    | -   | 3   | 2   | 30  | 70       | 100      |       |
| ACS107      | Software Engineering Laboratory                  | PC           | Core           | -    | -   | 3   | 2   | 30  | 70       | 100      |       |

**TOTAL**     |                                                  |              |                | 15   | 04  | 09  | 25  | 240 | 560      | 800      |       |
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<td>Advanced Databases</td>
</tr>
<tr>
<td>AIT506</td>
<td>Parallel Computing</td>
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<td>AIT507</td>
<td>Distributed Databases</td>
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</table>
## GROUP - IV: SOFTWARE ENGINEERING

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>AIT508</td>
<td>Software Development Methodology</td>
</tr>
<tr>
<td>AIT509</td>
<td>Software Quality Management</td>
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<tr>
<td>AIT510</td>
<td>Software Architecture and Design Patterns</td>
</tr>
<tr>
<td>AIT511</td>
<td>Software Engineering and Estimation</td>
</tr>
<tr>
<td>AIT512</td>
<td>Software Process and Project Management</td>
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<td>AIT513</td>
<td>Component Based Software Engineering</td>
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</table>

## GROUP - V: ARTIFICIAL INTELLIGENCE AND COGNITIVE MODELING

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ACS512</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>ACS513</td>
<td>Soft Computing</td>
</tr>
<tr>
<td>ACS514</td>
<td>Elements of Neural Computation</td>
</tr>
<tr>
<td>ACS515</td>
<td>Computational Intelligence</td>
</tr>
<tr>
<td>ACS516</td>
<td>Intelligent System Design</td>
</tr>
<tr>
<td>ACS517</td>
<td>Natural Language Processing</td>
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## GROUP - VI: CLOUD AND ADVANCED COMPUTING

<table>
<thead>
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<tbody>
<tr>
<td>ACS518</td>
<td>Cloud Infrastructure and Services</td>
</tr>
<tr>
<td>ACS519</td>
<td>Wireless and Mobile Computing</td>
</tr>
<tr>
<td>ACS520</td>
<td>High Performance Computing</td>
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<tr>
<td>AIT514</td>
<td>E-commerce</td>
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<td>AIT515</td>
<td>Web Services</td>
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<td>AIT516</td>
<td>Green Computing</td>
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## OPEN ELECTIVE-I

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>AME551</td>
<td>Elements of Mechanical Engineering</td>
</tr>
<tr>
<td>ACE551</td>
<td>Disaster Management</td>
</tr>
<tr>
<td>ACE552</td>
<td>Geospatial Techniques</td>
</tr>
<tr>
<td>ACS551</td>
<td>Principles of Operating System*</td>
</tr>
<tr>
<td>ACS552</td>
<td>JAVA Programming*</td>
</tr>
<tr>
<td>AEC551</td>
<td>Embedded System Design</td>
</tr>
<tr>
<td>AME552</td>
<td>Introduction to Automobile Engineering</td>
</tr>
<tr>
<td>AME553</td>
<td>Introduction to Robotics</td>
</tr>
<tr>
<td>AAE551</td>
<td>Aerospace Propulsion and Combustion</td>
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</table>

Note: * indicates that subject not offered to the students of Information Technology department.
### OPEN ELECTIVES - II

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>AEC552</td>
<td>Fundamentals of Image Processing</td>
</tr>
<tr>
<td>ACS553</td>
<td>Fundamentals of Database Management Systems*</td>
</tr>
<tr>
<td>AIT551</td>
<td>Basics of Information Security and Cryptography*</td>
</tr>
<tr>
<td>AHS551</td>
<td>Modeling and Simulation</td>
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<tr>
<td>AHS552</td>
<td>Research Methodologies</td>
</tr>
<tr>
<td>AEE551</td>
<td>Energy from Waste</td>
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<tr>
<td>AAE552</td>
<td>Finite Element Analysis</td>
</tr>
<tr>
<td>AME554</td>
<td>Basic Refrigeration and Air-Conditioning</td>
</tr>
<tr>
<td>AAE553</td>
<td>Launch Vehicles and Controls</td>
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</table>

Note: * indicates that subject not offered to the students of Information Technology department.

### AUDIT COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>AHS601</td>
<td>Intellectual Property Rights</td>
</tr>
<tr>
<td>AHS602</td>
<td>Total Quality Management</td>
</tr>
<tr>
<td>AHS603</td>
<td>Professional Ethics and Human Values</td>
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<td>AHS604</td>
<td>Legal Sciences</td>
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<tr>
<td>AHS605</td>
<td>Clinical Psychology</td>
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<td>AHS606</td>
<td>English for Special Purposes</td>
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<td>AHS607</td>
<td>Entrepreneurship</td>
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<td>AHS608</td>
<td>Any Foreign Language</td>
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<td>AHS609</td>
<td>Design History</td>
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<td>AHS017</td>
<td>Gender Sensitivity</td>
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### VALUE ADDED COURSES - I

<table>
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<tr>
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<tbody>
<tr>
<td>ACS801</td>
<td>Angular Java Script</td>
</tr>
<tr>
<td>ACS802</td>
<td>Sales force</td>
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<tr>
<td>ACS803</td>
<td>PEGA</td>
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<td>ACS804</td>
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### VALUE ADDED COURSES - II

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<tbody>
<tr>
<td>ACS805</td>
<td>PHP</td>
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<tr>
<td>ACS806</td>
<td>IoT with Python Programming</td>
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<tr>
<td>ACS807</td>
<td>JMeter</td>
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<tr>
<td>ACS808</td>
<td>R Programming</td>
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</tbody>
</table>
SYLLABUS
(Semesters: I-VIII)
### Objective:
The course should enable the students to:

I. Analyze and solve linear system of equations by using elementary transformations.

II. Apply differential equations on real time applications.

III. Determine the maxima and minima of functions of several variables by using partial differential coefficients.

### Units

#### UNIT-I
**THEORY OF MATRICES**
Classes: 08

Real matrices: Symmetric, skew-symmetric and orthogonal matrices; Complex matrices: Hermitian, Skew-Hermitian and unitary matrices; Elementary row and column transformations, elementary matrix, finding rank of a matrix by reducing to Echelon form and normal form; Finding the inverse of a matrix using elementary row/column transformations: Gauss-Jordan method; Solving of linear system of equations by LU decomposition method.

#### UNIT-II
**LINEAR TRANSFORMATIONS**
Classes: 10

Cayley-Hamilton theorem: Statement, verification, finding inverse and powers of a matrix; Linear dependence and independence of vectors; Linear transformation; Eigen values and Eigen vectors of a matrix; Properties of Eigen values and Eigen vectors of real and complex matrices; Diagonalization of matrix.

#### UNIT-III
**DIFFERENTIAL EQUATIONS OF FIRST ORDER AND THEIR APPLICATIONS**
Classes: 08

Solution of first order linear differential equations by exact, non exact, linear equations; Bernoulli equation.

Applications of first order differential equations: Orthogonal trajectories; Newton’s law of cooling; Law of natural growth and decay.

#### UNIT-IV
**HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS**
Classes: 10

Linear differential equations of second and higher order with constant coefficients, non-homogeneous term of the type \( f(x) = e^{ax}, \sin ax, \cos ax \) and \( f(x) = x^n, e^{ax}, \sin x, \cos x \); Method of variation of parameters; Applications to electrical circuits and simple harmonic motion.

#### UNIT-V
**FUNCTIONS OF SINGLE AND SEVERAL VARIABLES**
Classes: 09

Mean value theorems: Rolle’s theorem, Lagrange’s theorem, Cauchy’s theorem—without proof; Functions of several variables: Partial differentiation, chain rule, total derivative, Euler’s theorem, functional dependence, Jacobian, maxima and minima of functions of two variables without constraints and with constraints; Method of Lagrange multipliers.
### Text Books:


### Reference Books:


### Web References:


### E-Text Books:


### Course Home Page:
I Semester: CSE / ECE / EEE / IT | II Semester: AE / CE / ME

<table>
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Contact Classes: 45
Tutorial Classes: 15
Practical Classes: Nil
Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Enrich the knowledge of solving algebraic, transcendental and differential equation by numerical methods.
II. Apply multiple integration to evaluate mass, area and volume of the plane.
III. Analyze gradient, divergence and curl to evaluate the integration over a vector field.
IV. Understand the Bessels equation to solve them under special conditions with the help of series solutions.

UNIT-I  ROOT FINDING TECHNIQUES AND INTERPOLATION  Classes: 09

Root finding techniques: Solving algebraic and transcendental equations by bisection method, method of false position, Newton-Raphson method; Interpolation: Finite differences, forward differences, backward differences and central differences; Symbolic relations; Newton’s forward interpolation, Newton’s backward interpolation; Gauss forward central difference formula, Gauss backward central difference formula; Interpolation of unequal intervals: Lagrange’s interpolation.

UNIT-II  CURVE FITTING AND NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS  Classes: 08

Fitting a straight line; Second degree curves; Exponential curve, power curve by method of least squares; Taylor’s series method; Step by step methods: Euler’s method, modified Euler’s method and Runge-Kutta method for first order differential equations.

UNIT-III  MULTIPLE INTEGRALS  Classes: 10

Double and triple integrals; Change of order of integration.
Transformation of coordinate system; Finding the area of a region using double integration and volume of a region using triple integration.

UNIT-IV  VECTOR CALCULUS  Classes: 08

Scalar and vector point functions; Gradient, divergence, curl and their related properties; Solenoidal and irrotational vector point functions; Scalar potential function; Laplacian operator; Line integral, surface integral and volume integral; Vector integral theorems: Green’s theorem in a plane, Stoke’s theorem and Gauss divergence theorem without proofs.
### UNIT-V  SPECIAL FUNCTIONS  Classes: 10

Gamma function, properties of gamma function; Ordinary point and regular singular point of differential equations; Series solutions to differential equations around zero, Frobenius method about zero; Bessel’s differential equation: Bessel functions properties, recurrence relations, orthogonality, generating function, trigonometric expansions involving Bessel functions.

#### Text Books:


#### Reference Books:


#### Web References:


#### E-Text Books:


#### Course Home Page:
ENGINEERING PHYSICS

I Semester: CSE / ECE / EEE / IT

<table>
<thead>
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<th>Course Code</th>
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<th>Hours / Week</th>
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</table>

Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Develop strong fundamentals of nanomaterials.
II. Meliorate the knowledge of theoretical and technological aspects of lasers.
III. Correlate principles with applications of the quantum mechanics, dielectric and magnetic materials.
IV. Enrich knowledge in modern engineering materials like semiconductors.

UNIT I  DIELECTRIC AND MAGNETIC PROPERTIES  Classes: 09

Dielectric properties: Basic definitions, electronic, ionic and orientation polarizations-qualitative; Internal field in solids; Magnetic properties: Basic definitions, origin of magnetic moment, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, domain theory of ferro magnetism on the basis of hysteresis curve.

UNIT II  LASERS  Classes: 09

Lasers: Characteristics of lasers, spontaneous and stimulated emission of radiation, metastable state, population inversion, lasing action, Einstein's coefficients, ruby laser, He-Ne laser, semiconductor diode laser and applications of lasers.

UNIT III  NANOMATERIAL  Classes: 09

Nanomaterial: Origin of nanomaterial, nano scale, surface to volume ratio, quantum confinement; Properties of nanomaterials: Physical, chemical, electrical, optical, magnetic and mechanical.
Bottom-up fabrication: Sol-gel; Top-down fabrication: Chemical vapour deposition; Applications of nanomaterials, characterization by XRD, TEM.

UNIT IV  QUANTUM MECHANICS  Classes: 09

Quantum mechanics: Waves and particles, De Broglie hypothesis, matter waves, Heisenberg’s uncertainty principle, Davisson and Germer experiment, Schrodinger’s time independent wave equation, physical significance of the wave function, infinite potential well and its extension to three dimensions.

UNIT V  SEMICONDUCTOR PHYSICS  Classes: 09

Semiconductor physics: Fermi level in intrinsic and extrinsic semiconductors, calculation of carrier concentration in intrinsic and extrinsic semiconductors, energy gap, direct and indirect band gap semiconductors, Hall effect.
Text Books:


Reference Books:


Web References:

2. http://www.thphys.physics.ox.ac.uk

E-Text Books:

1. http://www.peaceone.net/basic/Feynman

Course Home Page:
ENGINEERING CHEMISTRY

I Semester: Common for all Branches

<table>
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<tr>
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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Apply the electrochemical principles in batteries.
II. Understand the fundamentals of corrosion and development of different techniques in corrosion control.
III. Analysis of water for its various parameters and its significance in industrial applications.
IV. Improve the fundamental science and engineering principles relevant to materials.

UNIT-I  ELECTROCHEMISTRY AND BATTERIES  Classes: 10

Electrochemistry: Basic concepts of electrochemistry; Conductance: Specific, equivalent and molar conductance and effect of dilution on conductance; Electrochemical cells: Galvanic cell (daniel cell); Electrode potential; Electrochemical series and its applications; Nernst equation; Types of electrodes: Calomel electrode, quinhydrone electrode; Batteries: Classification of batteries, primary cells (dry cells) and secondary cells (lead-acid battery, Ni-Cd cell), applications of batteries, numerical problems.

UNIT-II  CORROSION AND ITS CONTROL  Classes: 08

Corrosion: Introduction, causes and effects of corrosion; Theories of corrosion: Chemical and electrochemical corrosion with mechanism; Factors affecting the rate of corrosion: Nature of the metal and nature of the environment; Types of corrosion: Waterline and crevice corrosion; Corrosion control methods: Cathodic protection- sacrificial anodic protection and impressed current cathodic protection; Surface coatings: Metallic coatings, methods of application of metallic coatings-hot dipping(galvanizing, tinning), electroplating(copper plating); Organic coatings: Paints, its constituents and their functions.

UNIT-III  WATER TECHNOLOGY  Classes: 09

Water: Sources and impurities of water, hardness of water, expression of hardness-units; Types of hardness: Temporary hardness, permanent hardness and numerical problems; Estimation of temporary and permanent hardness of water by EDTA method; Determination of dissolved oxygen by Winkler’s method; Boiler troubles: Priming, foaming, scales, sludges and caustic embrittlement.

Treatment of water: Internal treatment of boiler feed water- carbonate, calgon and phosphate conditioning, softening of water by Zeolite process and Ion exchange process; Potable water-its specifications, steps involved in the treatment of potable water, sterilization of potable water by chlorination and ozonation, purification of water by reverse osmosis process.

UNIT-IV  MATERIALS CHEMISTRY  Classes: 10

Materials chemistry: Polymers-classification with examples, polymerization-addition, condensation and co-polymerization; Plastics: Thermoplastics and thermosetting plastics; Compounding of plastics; Preparation, properties and applications of polyvinyl chloride, Teflon, Bakelite and Nylon-6, 6; Rubbers: Natural rubber its process and vulcanization; Elastomers: Buna-s and Thiokol rubber; Fibers: Characteristics of fibers, preparation properties and applications of Dacron; Characteristics of fiber reinforced plastics; Cement: Composition of Portland cement, setting and hardening of Portland cement; Lubricants: Classification with examples; Properties: Viscosity, flash, fire, cloud and pour point; Refractories: Characteristics and classification with examples.
**UNIT-V**  
**FUELS AND COMBUSTION**  
Classes: 08

Fuel: Definition, classification of fuels and characteristics of a good fuels; Solid fuels: Coal; Analysis of coal: Proximate and ultimate analysis; Liquid fuels: Petroleum and its refining; Cracking: Fixed bed catalytic cracking; Knocking: Octane and cetane numbers; Gaseous fuels: Composition, characteristics and applications of natural gas, LPG and CNG; Combustion: Calorific value: Gross Calorific Value(GCV) and Net Calorific Value(NCV), calculation of air quantity required for complete combustion of fuel, numerical problems.

**Text Books:**


**Reference Books:**


**Web References:**

1. https://www.tndte.com
2. https://www.nptel.ac.in/downloads
4. https://www.cuiet.info
5. https://www.sbtebihar.gov.in
6. https://www.ritchennai.org

**E-Text Books:**

3. https://www.acs.org/content/acs/en/careers/college-to-career/areas-of-chemistry/polymer-chemistry.html

**Course Home Page:**

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COMPUTER PROGRAMMING

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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Learn adequate knowledge by problem solving techniques.
II. Understand programming skills using the fundamentals and basics of C Language.
III. Improve problem solving skills using arrays, strings, and functions.
IV. Understand the dynamics of memory by pointers.
V. Study files creation process with access permissions.

UNIT-I  INTRODUCTION  Classes: 10
Introduction to computers: Computer systems, computing environments, computer languages, creating and running programs, algorithms, flowcharts; Introduction to C language: History of C, basic structure of C programs, process of compiling and running a C program, C tokens, keywords, identifiers, constants, strings, special symbols, variables, data types; Operators and expressions: Operators, arithmetic, relational and logical, assignment operators, increment and decrement operators, bitwise and conditional operators, special operators, operator precedence and associativity, evaluation of expressions, type conversions in expressions, formatted input and output.

UNIT-II  CONTROL STRUCTURES, ARRAYS AND STRINGS  Classes: 10
Control structures: Decision statements; if and switch statement; Loop control statements: while, for and do while loops, jump statements, break, continue, goto statements; Arrays: Concepts, one dimensional arrays, declaration and initialization of one dimensional arrays, two dimensional arrays, initialization and accessing, multi dimensional arrays; Strings concepts: String handling functions, array of strings.

UNIT-III  FUNCTIONS AND POINTERS  Classes: 09
Functions: Need for user defined functions, function declaration, function prototype, category of functions, inter function communication, function calls, parameter passing mechanisms, recursion, passing arrays to functions, passing strings to functions, storage classes, preprocessor directives.
Pointers: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, pointers and arrays, pointers as functions arguments, functions returning pointers.

UNIT-IV  STRUCTURES AND UNIONS  Classes: 08
Structures and unions: Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, passing structures through pointers, self referential structures, unions, bit fields, typedef, enumerations; Dynamic memory allocation: Basic concepts, library functions.

UNIT-V  FILES  Classes: 08
Files: Streams, basic file operations, file types, file opening modes, file input and output functions, file status functions, file positioning functions, command line arguments.
### Text Books:


### Reference Books:


### Web References:

1. https://www.bfoit.org/itp/Programming.html
2. https://www.khanacademy.org/computing/computer-programming

### E-Text Books:


### MOOC Course


### Course Home Page:
### OBJECTIVES:
The course should enable the students to:

I. Elevate practical knowledge to understand technological aspects of LED, energy gap and solar cell.
II. Enrich real-time application aspect of R-C, magnetic field intensity and numerical aperture of optical fiber.
III. Enlighten the phenomenon of instrumentation, physical properties and preparations.

### LIST OF EXPERIMENTS

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<th>INTRODUCTION TO PHYSICS/CHEMISTRY LABORATORY</th>
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<td>Introduction to physics/chemistry laboratory. Do's and Don'ts in physics/chemistry laboratory.</td>
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<tr>
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<th>PHY: LED AND LASER CHARACTERISTICS, CHE: VOLUMETRIC ANALYSIS</th>
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<tbody>
<tr>
<td>Batch I</td>
<td>Characteristics of LED and LASER.</td>
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<tr>
<td>Batch II</td>
<td>Estimation of hardness of water by EDTA method.</td>
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<tr>
<th>Week-3</th>
<th>CHE: VOLUMETRIC ANALYSIS, PHY: LED AND LASER CHARACTERISTICS</th>
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<tbody>
<tr>
<td>Batch I</td>
<td>Estimation of hardness of water by EDTA method.</td>
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<tr>
<td>Batch II</td>
<td>Characteristics of LED and LASER.</td>
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<thead>
<tr>
<th>Week-4</th>
<th>PHY: STEWART GEE’S METHOD, CHE: INSTRUMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batch I</td>
<td>Magnetic field along the axis of current carrying coil-Stewart and Gee’s method.</td>
</tr>
<tr>
<td>Batch II</td>
<td>Conductometric titration of strong acid vs strong base.</td>
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</table>

<table>
<thead>
<tr>
<th>Week-5</th>
<th>CHE: INSTRUMENTATION, PHY: STEWART GEE’S METHOD</th>
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<tbody>
<tr>
<td>Batch I</td>
<td>Conductometric titration of strong acid vs strong base.</td>
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<tr>
<td>Batch II</td>
<td>Magnetic field along the axis of current carrying coil-Stewart and Gee’s method.</td>
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<thead>
<tr>
<th>Week-6</th>
<th>PHY: SOLAR CELL, CHE: INSTRUMENTATION</th>
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</thead>
<tbody>
<tr>
<td>Batch I</td>
<td>Study of characteristics of solar cell.</td>
</tr>
<tr>
<td>Batch II</td>
<td>Potentiometric titration of strong acid vs strong base.</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Week-7</th>
<th>CHE: INSTRUMENTATION, PHY: SOLAR CELL</th>
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<tbody>
<tr>
<td>Batch I</td>
<td>Potentiometric titration of strong acid vs strong base.</td>
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<tr>
<td>Batch II</td>
<td>Study of characteristics of solar cell.</td>
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<tr>
<td>Week</td>
<td>PHY: R C CIRCUIT, CHE: INSTRUMENTATION</td>
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</table>
|       | Batch I: Time constant of an R C circuit.  
       | Batch II: Determination of $P^H$ of a given solution by $P^H$ meter. |
| Week 9 | CHE: INSTRUMENTATION, PHY: R C CIRCUIT |
|       | Batch I: Determination of $P^H$ of a given solution by $P^H$ meter.  
       | Batch II: Time constant of an R C circuit. |
| Week 10 | PHY: OPTICAL FIBER, CHE: PHYSICAL PROPERTIES |
|       | Batch I: Evaluation of numerical aperture of given fiber.  
       | Batch II: Determination of surface tension and viscosity of lubricants. |
| Week 11 | CHE: PHYSICAL PROPERTIES, PHY: OPTICAL FIBER |
|       | Batch I: Determination of surface tension and viscosity of lubricants.  
       | Batch II: Evaluation of numerical aperture of given fiber. |
| Week 12 | PHY: ENERGY GAP, CHE: PREPARATION OF ORGANIC COMPOUNDS |
|       | Batch I: Estimating energy gap of given semiconductor diode.  
       | Batch II: Preparation of Aspirin and Thiokol rubber. |
| Week 13 | CHE: PREPARATION OF ORGANIC COMPOUNDS, PHY: ENERGY GAP |
|       | Batch I: Preparation of Aspirin and Thiokol rubber.  
       | Batch II: Estimating energy gap of given semiconductor diode. |
| Week 14 | REVISION |
|       | Revision. |

**Reference Books:**


**Web Reference:**

http://www.iare.ac.in

**Course Home Page:**
### LIST OF PHYSICS LABORATORY EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the Component</th>
<th>Qty</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>LED circuit</td>
<td>10</td>
<td>I/P 0-10V DC, Resistors 1kΩ-4kΩ</td>
</tr>
<tr>
<td>2</td>
<td>Digital ammeter</td>
<td>10</td>
<td>Digital Meter DC 0-20mA</td>
</tr>
<tr>
<td>3</td>
<td>Digital voltmeter</td>
<td>10</td>
<td>Digital Meter DC 0-20V</td>
</tr>
<tr>
<td>4</td>
<td>Probes</td>
<td>30</td>
<td>Dia - 4mm</td>
</tr>
<tr>
<td>5</td>
<td>Stewart and Gees’s set</td>
<td>10</td>
<td>Coil 2, 50, 200 turns</td>
</tr>
<tr>
<td>6</td>
<td>DC Ammeter</td>
<td>10</td>
<td>Digital Meter DC 0-20V</td>
</tr>
<tr>
<td>7</td>
<td>Battery eliminator</td>
<td>10</td>
<td>DC 2Amps</td>
</tr>
<tr>
<td>8</td>
<td>Solar cell Kit with panel</td>
<td>10</td>
<td>XL-10</td>
</tr>
<tr>
<td>9</td>
<td>Bulb</td>
<td>20</td>
<td>0 – 100W, 230V</td>
</tr>
<tr>
<td>10</td>
<td>Numerical aperture kit</td>
<td>10</td>
<td>Optical power meter 660nm</td>
</tr>
<tr>
<td>11</td>
<td>RC Circuit</td>
<td>10</td>
<td>I/P 15V, Voltmeter 0-20V, Ammeter 0-2000mA, Resistors 4K7-100KΩ, Capacitors 0.047-2200µF</td>
</tr>
<tr>
<td>12</td>
<td>Stop clock</td>
<td>20</td>
<td>+/- 1s</td>
</tr>
<tr>
<td>13</td>
<td>Energy gap</td>
<td>10</td>
<td>Heating element - 35W, $E_g = 0.2-0.4eV$ I/P 0-10V, Ammeter 0-200µA</td>
</tr>
<tr>
<td>14</td>
<td>Laser diode circuit</td>
<td>10</td>
<td>I/P 0-10V DC, Resistors 1kΩ-4KΩ</td>
</tr>
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</table>

### LIST OF CHEMISTRY LABORATORY EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the Apparatus</th>
<th>Quantity of the apparatus</th>
<th>Total numbers of apparatus required</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Analytical balance</td>
<td>100 gm</td>
<td>04</td>
</tr>
<tr>
<td>2</td>
<td>Beaker</td>
<td>100 ml</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Burette</td>
<td>50 ml</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>Burette Stand</td>
<td>Metal</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Clamps with Boss heads</td>
<td>Metal</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>Conical Flask</td>
<td>250 ml</td>
<td>30</td>
</tr>
<tr>
<td>7</td>
<td>Conductivity cell</td>
<td>K=1</td>
<td>05</td>
</tr>
<tr>
<td>8</td>
<td>Calomel electrode</td>
<td>Glass</td>
<td>06</td>
</tr>
<tr>
<td>9</td>
<td>Digital Potentiometer</td>
<td>EI</td>
<td>05</td>
</tr>
<tr>
<td>10</td>
<td>Digital Conductivity meter</td>
<td>EI</td>
<td>05</td>
</tr>
<tr>
<td>11</td>
<td>Digital electronic balance</td>
<td>RI</td>
<td>01</td>
</tr>
<tr>
<td>12</td>
<td>Distilled water bottle</td>
<td>500 ml</td>
<td>30</td>
</tr>
<tr>
<td>13</td>
<td>Funnel</td>
<td>Small</td>
<td>30</td>
</tr>
<tr>
<td>14</td>
<td>Glass rods</td>
<td>20 cm length</td>
<td>30</td>
</tr>
<tr>
<td>15</td>
<td>Measuring Cylinders</td>
<td>10 ml</td>
<td>10</td>
</tr>
<tr>
<td>16</td>
<td>Oswald Viscometer</td>
<td>Glass</td>
<td>30</td>
</tr>
<tr>
<td>17</td>
<td>Pipette</td>
<td>20 ml</td>
<td>30</td>
</tr>
<tr>
<td>18</td>
<td>Platinum Electrode</td>
<td>PP</td>
<td>05</td>
</tr>
<tr>
<td>19</td>
<td>Porcelain Tiles</td>
<td>White</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>Reagent bottle</td>
<td>250 ml</td>
<td>30</td>
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<tr>
<td>21</td>
<td>Standard Flask</td>
<td>100 ml</td>
<td>30</td>
</tr>
<tr>
<td>22</td>
<td>Stalagmo meter</td>
<td>Glass</td>
<td>30</td>
</tr>
<tr>
<td>23</td>
<td>Digital pH meter</td>
<td>pH 0-14</td>
<td>05</td>
</tr>
</tbody>
</table>
COMPUTER PROGRAMMING LABORATORY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<td>ACS101</td>
<td>Foundation</td>
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<tr>
<td></td>
<td></td>
<td>- - 3 2 30 70 100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: 36  Total Classes: 36

OBJECTIVES:
The course should enable the students to:
I. Formulate problems and implement algorithms using C programming language.
II. Develop programs using decision structures, loops and functions.
III. Learn memory allocation techniques using pointers.
IV. Use structured programming approach for solving computing problems in real world.

LIST OF EXPERIMENTS

Week-1  OPERATORS AND EVALUATION OF EXPRESSIONS

a. Write a C program to check whether a number is even or odd using ternary operator.
b. Write a C program to perform the addition of two numbers without using + operator.
c. Write a C program to evaluate the arithmetic expression \((a + b / c * d - e) * (f - g)\). Read the values a, b, c, d, e, f, g from the standard input device.
d. Write a C program to find the sum of individual digits of a 3 digit number.
e. Write a C program to read the values of x and y and print the results of the following expressions in one line:
   i. \((x + y) / (x - y)\)
   ii. \((x + y)(x - y)\)

Week-2  CONTROL STRUCTURES

a. Write a C program to find the sum of individual digits of a positive integer.
b. A Fibonacci sequence is defined as follows: The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
d. A character is entered through keyboard. Write a C program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol using if-else and switch case. The following table shows the range of ASCII values for various characters.

<table>
<thead>
<tr>
<th>Characters</th>
<th>ASCII values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – Z</td>
<td>65 – 90</td>
</tr>
<tr>
<td>a – z</td>
<td>97 – 122</td>
</tr>
<tr>
<td>0 – 9</td>
<td>48 – 57</td>
</tr>
<tr>
<td>Special symbols</td>
<td>0 – 47, 58 – 64, 91 – 96, 123 – 127</td>
</tr>
</tbody>
</table>

e. If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Write a C program to determine how much profit or
loss incurred in percentage.

<table>
<thead>
<tr>
<th>Week-3</th>
<th>CONTROL STRUCTURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use switch statement).</td>
</tr>
</tbody>
</table>
| b.     | Write a C program to calculate the following sum: 

\[
\text{sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!
\]

| c.     | Write a C program to find the roots of a quadratic equation. |
| d.     | Write a C program to check whether a given 3 digit number is Armstrong number or not. |
| e.     | Write a C program to print the numbers in triangular form:

```
1
1 2
1 2 3
1 2 3 4
```  

<table>
<thead>
<tr>
<th>Week-4</th>
<th>ARRAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Write a C program to find the second largest integer in a list of integers.</td>
</tr>
</tbody>
</table>
| b.     | Write a C program to perform the following: 

i. Addition of two matrices

ii. Multiplication of two matrices |
| c.     | Write a C program to count and display positive, negative, odd and even numbers in an array. |
| d.     | Write a C program to merge two sorted arrays into another array in a sorted order. |
| e.     | Write a C program to find the frequency of a particular number in a list of integers. |

<table>
<thead>
<tr>
<th>Week-5</th>
<th>STRINGS</th>
</tr>
</thead>
</table>
| a.     | Write a C program that uses functions to perform the following operations: 

i. To insert a sub string into a given main string from a given position.

ii. To delete n characters from a given position in a given string. |
| b.     | Write a C program to determine if the given string is a palindrome or not. |
| c.     | Write a C program to find a string within a sentence and replace it with another string. |
| d.     | Write a C program that reads a line of text and counts all occurrence of a particular word. |
| e.     | Write a C program that displays the position or index in the string S where the string T begins, or 1 if S doesn’t contain T. |

<table>
<thead>
<tr>
<th>Week-6</th>
<th>FUNCTIONS</th>
</tr>
</thead>
</table>
| a.     | Write C programs that use both recursive and non-recursive functions 

i. To find the factorial of a given integer.

ii. To find the greatest common divisor of two given integers. |
| b.     | Write C programs that use both recursive and non-recursive functions 

i. To print Fibonacci series.

ii. To solve towers of Hanoi problem. |
| c.     | Write a C program to print the transpose of a given matrix using function. |
| d.     | Write a C program that uses a function to reverse a given string. |

<table>
<thead>
<tr>
<th>Week-7</th>
<th>POINTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Write a C program to concatenate two strings using pointers.</td>
</tr>
<tr>
<td>b.</td>
<td>Write a C program to find the length of string using pointers.</td>
</tr>
<tr>
<td>c.</td>
<td>Write a C program to compare two strings using pointers.</td>
</tr>
<tr>
<td>d.</td>
<td>Write a C program to copy a string from source to destination using pointers.</td>
</tr>
<tr>
<td>e.</td>
<td>Write a C program to reverse a string using pointers.</td>
</tr>
</tbody>
</table>
### Week-8  
**STRUCTURES AND UNIONS**

a. Write a C program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition and subtraction of two complex numbers
   iv. Multiplication of two complex numbers. Note: represent complex number using a structure.

b. Write a C program to compute the monthly pay of 100 employees using each employee’s name, basic pay. The DA is computed as 52% of the basic pay. Gross-salary (basic pay + DA). Print the employees name and gross salary.

c. Create a Book structure containing book_id, title, author name and price. Write a C program to pass a structure as a function argument and print the book details.

d. Create a union containing 6 strings: name, home_address, hostel_address, city, state and zip. Write a C program to display your present address.

e. Write a C program to define a structure named DOB, which contains name, day, month and year. Using the concept of nested structures display your name and date of birth.

### Week-9  
**ADDITIONAL PROGRAMS**

a. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: \(1+x+x^2+x^3+\ldots+ x^n\). For example: if n is 3 and x is 5, then the program computes \(1+5+25+125\). Print x, n, the sum. Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

b. 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s complement of a binary number.

c. Write a C program to convert a Roman numeral to its decimal equivalent. E.g. Roman number CD is equivalent to 400.

### Week-10  
**PREPROCESSOR DIRECTIVES**

a. Define a macro with one parameter to compute the volume of a sphere. Write a C program using this macro to compute the volume for spheres of radius 5, 10 and 15 meters.

b. Define a macro that receives an array and the number of elements in the array as arguments. Write a C program for using this macro to print the elements of the array.

c. Write symbolic constants for the binary arithmetic operators +, -, *, and /. Write a C program to illustrate the use of these symbolic constants.

### Week-11  
**FILES**

a. Write a C program to display the contents of a file.

b. Write a C program to copy the contents of one file to another.

c. Write a C program to reverse the first n characters in a file, where n is given by the user.

d. Two files DATA1 and DATA2 contain sorted lists of integers. Write a C program to merge the contents of two files into a third file DATA i.e., the contents of the first file followed by those of the second are put in the third file.

e. Write a C program to count the no. of characters present in the file.
### COMMAND LINE ARGUMENTS

<table>
<thead>
<tr>
<th>Week-12</th>
<th>COMMAND LINE ARGUMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Write a C program to read arguments at the command line and display it.</td>
</tr>
<tr>
<td>b.</td>
<td>Write a C program to read two numbers at the command line and perform arithmetic operations on it.</td>
</tr>
<tr>
<td>c.</td>
<td>Write a C program to read a file name at the command line and display its contents.</td>
</tr>
</tbody>
</table>

### Reference Books:


### Web References:


### Course Home Page:
COMPUTER AIDED ENGINEERING DRAWING

I Semester: CSE / ECE / EEE / I T

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<tr>
<td></td>
<td></td>
<td>- - 2 1</td>
<td>30 70</td>
<td>100</td>
</tr>
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</table>

Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: 30  Total Classes: 30

OBJECTIVES:
The course should enable the students to:
I. Understand the basic principles of engineering drawing.
II. Understand the construction of scales.
III. Apply the knowledge of interpretation of dimensions of different quadrant projections.
IV. Convert the pictorial views into orthographic views and vice versa.
V. Create intricate details of components through sections and to develop its surfaces.

UNIT-I  INTRODUCTION TO ENGINEERING DRAWING AND AUTOCAD  Classes : 06

Introduction to engineering drawing: Introduction to engineering drawing, drawing instruments and accessories, types of lines, lettering practice and rules of dimensioning, geometrical constructions, basic geometrical shapes; Introduction to AutoCAD familiarization of graphical user interface, toggle functional keys and tool bars; Drawing of closed form entities like line, circle, ellipse, polygon; Lettering and standard drawing templates.

UNIT-II  DRAFTING AND MODELING COMMANDS  Classes : 06

Drafting and modeling commands: Geometric commands, layers, display control command, editing, dimensioning and solid modeling.

UNIT-III  ORTHOGRAPHIC PROJECTION  Classes : 06

Orthographic projection: Principles of orthographic projections, conventions, first and third angle projections.
Projection of points, straight lines, planes and regular solid, prisms, cylinders, pyramids and cones.

UNIT-IV  ISOMETRIC PROJECTIONS  Classes : 06

Isometric projections: Principle of isometric projection, isometric scale, isometric projections and isometric views, isometric projections of solids.

UNIT-V  TRANSFORMATION OF PROJECTIONS  Classes : 06

Transformation of projections: Conversion of isometric views to orthographic views and conversion of orthographic views to isometric views.

Text Books:
**Reference Books:**


**Web References:**

1. http://nptel.ac.in/courses/112103019/
2. http://www.autocad tutorials.net/

**E-Text Book:**

https://books.google.co.in/books?id=VRN7e09Rq0C&pg=PA9&source=gbs_toc_r&cad=4#v=onepage&q&f=false

**Course Home Page:**
COMPUTATIONAL MATHEMATICS LABORATORY

I Semester: CSE / ECE / EEE / IT | II Semester: AE / CE / ME

<table>
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<td></td>
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Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: 24   Total Classes: 24

OBJECTIVES:
The course should enable the students to:
I. Train the students how to approach for solving engineering problems.
II. Understand the concepts of algebra, calculus and numerical solutions using MATLAB software.
III. Enrich the knowledge in MATLAB and can apply for project works.

LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>Week-1</th>
<th>BASIC FEATURES</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>a. Features and uses.</td>
</tr>
<tr>
<td></td>
<td>b. Local environment setup.</td>
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<table>
<thead>
<tr>
<th>Week-2</th>
<th>ALGEBRA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. Solving basic algebraic equations.</td>
</tr>
<tr>
<td></td>
<td>b. Solving system of equations.</td>
</tr>
<tr>
<td></td>
<td>c. Two dimensional plots.</td>
</tr>
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<table>
<thead>
<tr>
<th>Week-3</th>
<th>CALCULUS</th>
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<tbody>
<tr>
<td></td>
<td>a. Calculating limits.</td>
</tr>
<tr>
<td></td>
<td>b. Solving differential equations.</td>
</tr>
<tr>
<td></td>
<td>c. Finding definite integral.</td>
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<table>
<thead>
<tr>
<th>Week-4</th>
<th>MATRICES</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>a. Addition, subtraction and multiplication of matrices.</td>
</tr>
<tr>
<td></td>
<td>b. Transpose of a matrix.</td>
</tr>
<tr>
<td></td>
<td>c. Inverse of a matrix.</td>
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</table>

<table>
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<tr>
<th>Week-5</th>
<th>SYSTEM OF LINEAR EQUATIONS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>a. Rank of a matrix.</td>
</tr>
<tr>
<td></td>
<td>b. Gauss Jordan method.</td>
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<tr>
<td></td>
<td>c. LU decomposition method.</td>
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<table>
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<th>Week-6</th>
<th>LINEAR TRANSFORMATION</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>a. Characteristic equation.</td>
</tr>
<tr>
<td></td>
<td>b. Eigen values.</td>
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<tr>
<td></td>
<td>c. Eigen vectors.</td>
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53 | P a g e
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<th>DIFFERENTIATION AND INTEGRATION</th>
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<tr>
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<td>b. Double integrals.</td>
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<tr>
<td></td>
<td>c. Triple integrals.</td>
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<th>INTERPOLATION AND CURVE FITTING</th>
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</thead>
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<tr>
<td></td>
<td>a. Lagrange polynomial.</td>
</tr>
<tr>
<td></td>
<td>b. Straight line fit.</td>
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<td></td>
<td>c. Polynomial curve fit.</td>
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<thead>
<tr>
<th>Week-9</th>
<th>ROOT FINDING</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>a. Bisection method.</td>
</tr>
<tr>
<td></td>
<td>b. Regula false method.</td>
</tr>
<tr>
<td></td>
<td>c. Newton Raphson method.</td>
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<thead>
<tr>
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<th>NUMERICAL DIFFERENTATION AND INTEGRATION</th>
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<tr>
<td></td>
<td>a. Trapezoidal, Simpson’s method.</td>
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<td>b. Euler method.</td>
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<td>c. Runge Kutta method.</td>
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<tr>
<th>Week-11</th>
<th>3D PLOTTING</th>
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<tbody>
<tr>
<td></td>
<td>a. Line plotting.</td>
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<td>c. Volume plotting.</td>
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<tr>
<th>Week-12</th>
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<td>a. Gradient.</td>
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<td>b. Divergent.</td>
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<td>c. Curl.</td>
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</tbody>
</table>

**Reference Books:**


**Web Reference:**

http://www.iare.ac.in

**Course Home Page:**

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS:

**SOFTWARE:** Microsoft Windows 7 and MATLAB

**HARDWARE:** 30 numbers of Desktop Computer Systems
ENGLISH FOR COMMUNICATION

I Semester: AE / CE / ME | II Semester: CSE / ECE / EEE / IT

<table>
<thead>
<tr>
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<td>Skill</td>
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<td>3 - - 3 30 70 100</td>
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</table>

Contact Classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Communicate in an intelligible English accent and pronunciation.
II. Effectively use the four language skills i.e., Listening, Speaking, Reading and Writing.
III. Develop the art of writing simple English with correct spelling, grammar and punctuation.

UNIT-I LISTENING SKILL Classes: 08
Significance, essentials, barriers and effectiveness of listening; Listening to dialogues, conversation, discussions, monologues; Listening to sounds, silent letters, stressed syllables in English; Listening for the gist of the text, for identifying the topic, general meaning and specific information; Listening for multiple choice questions, positive and negative comments for interpretation.

Note: Instructions in theory and practice in the lab

UNIT-II SPEAKING SKILL Classes: 10
Significance, essentials, barriers and effectiveness of speaking; Simple oral or casual interaction, dialogue, conversation; Debates: Differences between disagreeing and being disagreeable; Brief presentations; Role plays; Generating talks based on visual or written prompts; Addressing a small group or a large formal gathering; Speaking about present, past experiences and future plans; Arguing outs a topic without verbal fights; Paper presentation.

Note: Instructions in theory and practice in the lab

UNIT-III READING SKILL Classes: 09
Techniques of reading: Skimming, scanning, intensive and extensive reading; Reading comprehension: Exercises for multiple choice questions and contextual meaning – Values in Dr. Kalam.

Vocabulary enrichment and grammar exercises based on selective readings: Swami Vivekananda : Chicago Speech, 1893; Passages for intellectual and emotional comments; Reading for the gist of a text, for specific information, for information transfer and interpretation.

UNIT-IV WRITING SKILL Classes: 08
Significance, essentials and effectiveness of writing; Writing emails; Writing paragraphs: Comparing, contrasting, presentations with an introduction, body and conclusion; Writing formal and informal letters: Letter of invitation, accepting, declining, requesting, complaint, seeking information ; Cover letter enclosing a CV.

UNIT-V VOCABULARY AND GRAMMAR Classes: 10
Punctuation, parts of speech, articles, prepositions, tenses, concords, phrasal verbs; Forms of verbs: Regular and irregular, direct and indirect speech, change of voice; prefixes, suffixes, Synonyms, antonyms, one word substitutes, idioms and phrases, technical vocabulary.
### Text Books:


### Reference Books:


### Web References:

1. [http://www.edufind.com](http://www.edufind.com)
2. [http://www.myenglishpages.com](http://www.myenglishpages.com)
3. [http://www.grammar.ccc.commnet.edu](http://www.grammar.ccc.commnet.edu)
4. [http://www.owl.english.purdue.edu](http://www.owl.english.purdue.edu)

### E-Text Books:

3. [https://www.americanenglish.state.gov/files/ae/resource_files/developing_writing.pdf](https://www.americanenglish.state.gov/files/ae/resource_files/developing_writing.pdf)

### Course Home Page:
PROBABILITY AND STATISTICS

II Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
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<td>3 1 - 4 30</td>
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<td>100</td>
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</table>

Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Enrich the knowledge of probability on single random variables and probability distributions.
II. Apply the concept of correlation and regression to find covariance.
III. Analyze the given data for appropriate test of hypothesis.

UNIT-I SINGLE RANDOM VARIABLES AND PROBABILITY DISTRIBUTION  Classes: 09
Random variables: Basic definitions, discrete and continuous random variables; Probability distribution: Probability mass function and probability density functions; Mathematical expectation; Binomial distribution, Poisson distribution and normal distribution.

UNIT-II MULTIPLE RANDOM VARIABLES  Classes: 09
Joint probability distributions, joint probability mass, density function, marginal probability mass, density functions; Correlation: Coefficient of correlation, the rank correlation; Regression: Regression coefficient, the lines of regression, multiple correlation and regression.

UNIT-III SAMPLING DISTRIBUTION AND TESTING OF HYPOTHESIS  Classes: 09
Sampling: Definitions of population, sampling, statistic, parameter; Types of sampling, expected values of sample mean and variance, sampling distribution, standard error, sampling distribution of means and sampling distribution of variance.
Estimation: Point estimation, interval estimations; Testing of hypothesis: Null hypothesis, alternate hypothesis, type I and type II errors, critical region, confidence interval, level of significance. One sided test, two sided test.

UNIT-IV LARGE SAMPLE TESTS  Classes: 09
Test of hypothesis for single mean and significance difference between two sample means, tests of significance difference between sample proportion and population proportion and difference between two sample proportions.

UNIT-V SMALL SAMPLE TESTS AND ANOVA  Classes: 09
Small sample tests: Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples. Snedecor’s F-distribution and its properties; Test of equality of two population variances Chi-square distribution and it’s properties; Test of equality of two population variances Chi-square distribution, it’s properties, Chi-square test of goodness of fit; ANOVA: Analysis of variance, one way classification, two way classification.
### Text Books:


### Reference Books:


### Web References:

3. [http://www.sosmath.com](http://www.sosmath.com)
4. [http://www.mathworld.wolfram.com](http://www.mathworld.wolfram.com)

### E-Text Books:


### Course Home Page:
# ENVIRONMENTAL STUDIES

## II Semester: Common for all Branches

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Hours / Week</th>
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</table>

- **Contact Classes:** 45
- **Tutorial Classes:** Nil
- **Practical Classes:** Nil
- **Total Classes:** 45

### OBJECTIVES:
The course should enable the students to:
I. Analyze the interrelationship between living organism and environment.
II. Understand the importance of environment by assessing its impact on the human world.
III. Enrich the knowledge on themes of biodiversity, natural resources, pollution control and waste management.

### UNIT-I
**ENVIRONMENT AND ECOSYSTEMS**

Classes: 08

Environment: Definition, scope and importance of environment, need for public awareness; Ecosystem: Definition, scope and importance of ecosystem, classification, structure and function of an ecosystem, food chains, food web and ecological pyramids, flow of energy; Biogeochemical cycles; Biomagnifications.

### UNIT-II
**NATURAL RESOURCES**

Classes: 08

Natural resources: Classification of resources, living and nonliving resources; Water resources: Use and over utilization of surface and ground water, floods and droughts, dams, benefits and problems; Mineral resources: Use and exploitation; Land resources; Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

### UNIT-III
**BIODIVERSITY AND BIOTIC RESOURCES**

Classes: 10

Biodiversity and biotic resources: Introduction, definition, genetic, species and ecosystem diversity; Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and optional values; India as a mega diversity nation; Hot spots of biodiversity.

Threats to biodiversity: Habitat loss, poaching of wildlife, human-wildlife conflicts; Conservation of biodiversity: In situ and ex situ conservation; National biodiversity act.

### UNIT-IV
**ENVIRONMENTAL POLLUTION, POLLUTION CONTROL TECHNOLOGIES AND GLOBAL ENVIRONMENTAL PROBLEMS**

Classes: 10

Environmental pollution: Definition, causes and effects of air pollution, water pollution, soil pollution, noise pollution; Solid waste: Municipal solid waste management, composition and characteristics of e-waste and its management; Pollution control technologies: Waste water treatment methods, primary, secondary and tertiary; Concepts of bioremediation; Global environmental problems and global efforts: Climate change, ozone depletion, ozone depleting substances, deforestation and desertification; International conventions / protocols: Earth summit, Kyoto protocol and Montreal protocol.

### UNIT-V
**ENVIRONMENTAL LEGISLATIONS AND SUSTAINABLE DEVELOPMENT**

Classes: 09

Environmental legislations: Environmental protection act, act1981, water act, forest act, wild life act, municipal solid waste management and handling rules, biomedical waste management and handling rules2016, hazardous waste management and handling rules, Environmental impact assessment(EIA); Towards sustainable future: Concept of sustainable development, population and its explosion, crazy consumerism, environmental education, urban sprawl, concept of green building.
Text Books:


Reference Books:


Web References:

1. https://www.elsevier.com
2. https://www.libguides.lib.msu.edu
5. https://www.istl.org
8. https://www.nptel.ac.in

E-Text Books:


Course Home Page:
# DATA STRUCTURES

**II Semester: CSE / ECE / EEE / IT**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
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</table>

Contact Classes: 45  
Tutorial Classes: 15  
Practical Classes: Nil  
Total Classes: 60

**OBJECTIVES:**

The course should enable the students to:
I. Learn the basic techniques of algorithm analysis.
II. Demonstrate several searching and sorting algorithms.
III. Implementation of linear data structure mechanisms.
IV. Demonstrate various tree and graph traversal algorithms.
V. Analyze and choose appropriate data structure to solve problems in real world.

## UNIT-I  
**INTRODUCTION TO DATA STRUCTURES, SEARCHING AND SORTING**  
Classes: 10

Basic concepts: Introduction to data structures, classification of data structures, operations on data structures, abstract data type, algorithms, different approaches to design an algorithm, recursive algorithms; Searching techniques: Linear search, binary search and Fibonacci search; Sorting techniques: Bubble sort, selection sort, insertion sort, quick sort, merge sort, and comparison of sorting algorithms.

## UNIT-II  
**LINEAR DATA STRUCTURES**  
Classes: 10

Stacks: Primitive operations, implementation of stacks using Arrays, applications of stacks arithmetic expression conversion and evaluation; Queues: Primitive operations; Implementation of queues using Array, applications of linear queue, circular queue and double ended queue (deque).

## UNIT-III  
**LINKED LISTS**  
Classes: 09

Linked lists: Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation.

Types of linked lists: Circular linked lists, doubly linked lists;  
Linked list representation and operations of Stack, linked list representation and operations of queue.

## UNIT-IV  
**NON LINEAR DATA STRUCTURES**  
Classes: 08

Trees: Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, tree variants, application of trees; Graphs: Basic concept, graph terminology, graph implementation, graph traversals, Application of graphs, Priority Queue.

## UNIT-V  
**BINARY TREES AND HASHING**  
Classes: 08

Binary search trees: Binary search trees, properties and operations; Balanced search trees: AVL trees;  
Introduction to M-Way search trees, B trees; Hashing and collision: Introduction, hash tables, hash functions, collisions, applications of hashing.

**Text Books:**

### Reference Books:


### Web References:

1. [http://www.tutorialspoint.com/data_structures_algorithms](http://www.tutorialspoint.com/data_structures_algorithms)
4. [https://www.coursera.org/specializations/data-structures-algorithms](https://www.coursera.org/specializations/data-structures-algorithms)

### E-Text Books:


### Course Home Page:
II Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
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</table>

Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Discuss various circuit elements and apply KCL, KVL to analyze electrical networks.
II. Apply network analysis techniques to solve electrical circuits.
III. Understand single phase and three phase AC circuits and evaluate power and power factor.
IV. Illustrate the application of semiconductor diodes as half wave and full wave rectifier.
V. Classify BJT characteristics.

UNIT-I  ELECTRIC CIRCUIT ELEMENTS  Classes: 10
Electrical circuit elements: Voltage and current sources, linear, non linear, active and passive elements, inductor current and capacitor voltage continuity, Kirchhoff’s laws, elements in series and parallel, superposition in linear circuits, controlled sources, energy and power in elements, energy in mutual inductor and constraint on mutual inductance.

UNIT-II  NETWORK ANALYSIS AND THEOREMS  Classes: 07
Network analysis: Nodal analysis with independent and dependant sources, modified nodal analysis, mesh analysis, notion of network graph, nodes, trees, twigs, links, co-tree, independent sets of branch currents and voltages; Network theorems: Voltage shift theorem, zero current theorem, Tellegen’s theorem, reciprocity, substitution theorem, Thevenin’s and Norton’s theorems, pushing a voltage source through a node, splitting a current source, compensation theorem, maximum power transfer theorem.

UNIT-III  AC CIRCUITS  Classes: 11
RLC circuits: Natural, step and sinusoidal steady state responses, series and parallel RLC circuits.
AC signal measurement: Complex, apparent, active and reactive power, power factor; Introduction to three phase supply: Three phase circuits, star-delta transformations, balance and unbalanced three phase load, power measurement, two wattmeter method.

UNIT-IV  SEMICONDUCTOR DIODE AND APPLICATIONS  Classes: 09
P-N diode, symbol, V-I characteristics, half wave rectifier, full wave rectifier, bridge rectifier and filters, diode as a switch, Zener diode as a voltage regulator.

UNIT-V  BIPOLAR JUNCTION TRANSISTOR AND APPLICATIONS  Classes: 08
DC characteristics, CE, CB, CC configurations, biasing, load line, Transistor as an amplifier.

Text Books:

Reference Books:


Web References:

1. http://www.nptel.ac.in/Courses/117106108
3. http://www.textofvideo.nptel.iitm.ac.in

E-Text Books:

1. http://www.textbooksonline.tn.nic.in
3. http://www.ktustudents.in

Course Home Page:
COMMUNICATION SKILLS LABORATORY

I Semester: AE / CE / ME | II Semester: CSE / ECE / EEE / IT

<table>
<thead>
<tr>
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Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: 24  Total Classes: 24

OBJECTIVES:
The course enables the students to:
I. Improve their ability to listen and comprehend a given text.
II. Upgrade the fluency and acquire a functional knowledge of English Language.
III. Enrich thought process by viewing a problem through multiple angles.

LIST OF EXPERIMENTS

**Week-1** LISTENING SKILL
a. Listening to conversations and interviews of famous personalities in various fields, listening practice related to the TV talk shows, news.
b. Listening for specific information, listening for summarizing information.

**Week-2** LISTENING SKILL
a. Listening to films of short duration and monologues for taking notes, listening to answer multiple choice questions.
b. Listening to telephonic conversations; Listening to native Indian, British and American speakers to analyze intercultural differences.

**Week-3** SPEAKING SKILL
a. Functions of English Language; Introduction to phonetics, exercises on pronunciation, symbols of phonetics.
b. Speaking exercises involving the use of stress and intonation, improving pronunciation through tongue twisters.
c. Tips on how to develop fluency, body language and communication; Introducing oneself: Talking about yourself others, leave taking.

**Week-4** SPEAKING SKILL
a. Just a minute (JAM) sessions, public speaking, situational conversation/role-play.
b. Greetings for different occasions with feedback preferably through video recording; Speaking about present, past experiences and future plans; Acting as a compere and news reader.

**Week-5** READING SKILL
a. Reading anecdotes to predict the content, reading for interpretation.
b. Suggested reading: Short stories and poem; Critical reading.
<table>
<thead>
<tr>
<th>Week</th>
<th>READING SKILL</th>
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</table>
| Week-6     | a. Reading for information transfer; Reading newspaper and magazine articles, memos, letters, notices and minutes for critical commentary.  
b. Reading selective autobiographies. |
| Week-7     | a. Reading brochures, advertisements, pamphlets for improved presentation.  
b. Reading comprehension exercises with critical and analytical questions based on context. |
| Week-8     | a. Writing messages, leaflets, notice; Writing tasks; Flashcard.  
b. Filling gaps while listening short stories. |
| Week-9     | a. Write a slogan related to the image.  
b. Write a short story of 6-10 lines based on the hints given. |
| Week-10    | a. Writing a short story on their own; Writing a review on: Video clippings on inspirational speeches.  
b. Writing a review on short films, advertisements, recipe and recently watched film. |
| Week-11    | a. Practice in preparing thinking blocks to decode diagrammatical representations into English words, expressions, idioms, proverbs.  
b. Argumentative skills; Debates. |
| Week-12    | a. Inculcating interest in English using thinking blocks.  
b. Making pictures and improvising diagrams to form English words, phrases and proverbs. |

**Reference Books:**


**Web References:**

1. http://learnenglish.britishcouncil.org

**Course Home Page:**
## DATA STRUCTURES LABORATORY

### II Semester: CSE / ECE / EEE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
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**Contact Classes: Nil**  
**Tutorial Classes: Nil**  
**Practical Classes: 36**  
**Total Classes: 36**

### OBJECTIVES:

**The course should enable the students to:**

I. Implement linear and non linear data structures.
II. Analyze various algorithms based on their time complexity.
III. Choose appropriate data structure and algorithm design method for a specific application.
IV. Identify suitable data structure to solve various computing problems.

### LIST OF EXPERIMENTS

#### Week-1  SEARCHING TECHNIQUES

Write C programs for implementing the following searching techniques.

a. Linear search.
b. Binary search.
c. Fibonacci search.

#### Week-2  SORTING TECHNIQUES

Write C programs for implementing the following sorting techniques to arrange a list of integers in ascending order.

a. Bubble sort.
b. Insertion sort.
c. Selection sort.

#### Week-3  SORTING TECHNIQUES

Write C programs for implementing the following sorting techniques to arrange a list of integers in ascending order.

a. Quick sort.
b. Merge sort.

#### Week-4  IMPLEMENTATION OF STACK AND QUEUE

Write C programs to

a. Design and implement Stack and its operations using Arrays.
b. Design and implement Queue and its operations using Arrays.

#### Week-5  APPLICATIONS OF STACK

Write C programs for the following:

a. Uses Stack operations to convert infix expression into postfix expression.
b. Uses Stack operations for evaluating the postfix expression.

#### Week-6  IMPLEMENTATION OF SINGLE LINKED LIST

Write C programs for the following:

a. Uses functions to perform the following operations on single linked list.
   (i) Creation  (ii) insertion  (iii) deletion  (iv) traversal
b. To store a polynomial expression in memory using linked list.
<table>
<thead>
<tr>
<th>Week-7</th>
<th>IMPLEMENTATION OF CIRCULAR SINGLE LINKED LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write C programs for the following:</td>
<td></td>
</tr>
<tr>
<td>Uses functions to perform the following operations on Circular linked list.</td>
<td></td>
</tr>
<tr>
<td>(i) Creation (ii) insertion (iii) deletion (iv) traversal</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-8</th>
<th>IMPLEMENTATION OF DOUBLE LINKED LIST</th>
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</thead>
<tbody>
<tr>
<td>Write C programs for the following:</td>
<td></td>
</tr>
<tr>
<td>Uses functions to perform the following operations on double linked list.</td>
<td></td>
</tr>
<tr>
<td>(i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-9</th>
<th>IMPLEMENTATION OF STACK USING LINKED LIST</th>
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</thead>
<tbody>
<tr>
<td>Write C programs to implement stack using linked list.</td>
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</table>

<table>
<thead>
<tr>
<th>Week-10</th>
<th>IMPLEMENTATION OF QUEUE USING LINKED LIST</th>
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<tbody>
<tr>
<td>Write C programs to implement queue using linked list.</td>
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<table>
<thead>
<tr>
<th>Week-11</th>
<th>GRAPH TRAVERSAL TECHNIQUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write C programs to implement the following graph traversal algorithms:</td>
<td></td>
</tr>
<tr>
<td>a. Depth first search.</td>
<td></td>
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<tr>
<td>b. Breadth first search.</td>
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<table>
<thead>
<tr>
<th>Week-12</th>
<th>IMPLEMENTATION OF BINARY SEARCH TREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write a C program that uses functions to perform the following:</td>
<td></td>
</tr>
<tr>
<td>a. Create a binary search tree.</td>
<td></td>
</tr>
<tr>
<td>b. Traverse the above binary search tree recursively in pre-order, post-order and in-order.</td>
<td></td>
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<tr>
<td>c. Count the number of nodes in the binary search tree.</td>
<td></td>
</tr>
</tbody>
</table>

**Reference Books:**


**Web References:**


**Course Home Page:**
# ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

## II Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<td>3 2 30 70 100</td>
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</tbody>
</table>

Contact Classes: Nil

Tutorial Classes: Nil

Practical Classes: 39

Total Classes: 39

### OBJECTIVES:

The course should enable the students to:

I. Analyze basic electrical circuits by implementing different circuits.
II. Apply circuit theorems to evaluate the behavior of electrical circuits.
III. Gain knowledge on semiconductor devices like diode and transistor.
IV. Interpret different transistor configurations.

### LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>Week</th>
<th>Experiment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KIRCHOFF’S LAWS</td>
<td>Verification of Kirchhoff’s current law and voltage law.</td>
</tr>
<tr>
<td>2</td>
<td>SUPERPOSITION THEOREM</td>
<td>Illustration of superposition principle to the electrical network.</td>
</tr>
<tr>
<td>3</td>
<td>THEVENIN’S THEOREM</td>
<td>Obtain the equivalent circuit of the given electrical network using Thevenin’s theorem.</td>
</tr>
<tr>
<td>4</td>
<td>NORTON’S THEOREM</td>
<td>Verification of Norton’s theorem and obtain the equivalent circuit.</td>
</tr>
<tr>
<td>5</td>
<td>MAXIMUM POWER TRANSFER THEOREM</td>
<td>Design of load resistor for maximum power transfer.</td>
</tr>
<tr>
<td>6</td>
<td>KVL AND KCL</td>
<td>Verification of KVL and KCL using digital simulation.</td>
</tr>
<tr>
<td>7</td>
<td>DIGITAL SIMULATION OF THEOREMS</td>
<td>Superposition theorem and Thevenins theorem using digital simulation.</td>
</tr>
<tr>
<td>8</td>
<td>NORTON’S THEOREM AND MAXIMUM POWER TRANSFER THEOREM</td>
<td>Norton’s theorem and maximum power transfer theorem using digital simulation.</td>
</tr>
<tr>
<td>9</td>
<td>P-N JUNCTION DIODE</td>
<td>Volt Ampere characteristics of p-n junction diode.</td>
</tr>
<tr>
<td>Week-10</td>
<td>ZENER DIODE</td>
<td></td>
</tr>
<tr>
<td>---------</td>
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<td></td>
</tr>
<tr>
<td>Zener Diode VI Characteristics</td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Week-11</th>
<th>RECTIFIERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application of diode as Half wave rectifier and Full wave rectifier.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-12</th>
<th>COMMON BASE TRANSISTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verify the characteristics of common base transistor.</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Week-13</th>
<th>COMMON EMITTER TRANSISTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verify the characteristics of common emitter transistor.</td>
<td></td>
</tr>
</tbody>
</table>

**Reference Books:**


**Web References:**

1. http://www.ee.iitkgp.ac.in
2. http://www.citchennai.edu.in

**Course Home Page:**
ENGINEERING PRACTICE LABORATORY

II Semester: CSE / ECE / EEE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credit</th>
<th>Maximum Marks</th>
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</thead>
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<tr>
<td>ACS112</td>
<td>Foundation</td>
<td>L  T  P</td>
<td>C</td>
<td>CIA SEE</td>
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<tr>
<td></td>
<td></td>
<td>-  -  2</td>
<td>1</td>
<td>30 70 100</td>
</tr>
</tbody>
</table>

Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: 32  Total Classes: 32

OBJECTIVES:
The course should enable the students to:
I. Understand the fundamental concepts of computer networking.
II. Design blogs and view the Skype installation.
III. Prepare productivity tools like word processors, spreadsheets, presentations.
IV. Develop models using fitting, carpentry and Tin-Smithy trades.
V. Demonstrate the process of house wiring for connecting and controlling home appliances.
VI. Illustrate metal joining arc welding process, plumbing, and power tools.

LIST OF EXPERIMENTS

WEEK-1  NETWORK DEVICES
1 Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.
2 Study of following Network Devices in Detail
   • Repeater
   • Hub
   • Switch
   • Bridge
   • Router
   • Gate Way

WEEK-2  IP ADDRESS
1 Study of network IP Classification of IP address, Subnetting, Supernetting.
2 Connect the computers in Local Area Network.
3 Study of basic network command and Network configuration commands.

WEEK-3  PACKET TRACER
1 Configure a Network topology using packet tracer software.
2 Configure a Network using Distance Vector Routing protocol(RIP).
3 Configure Network using Link State Vector Routing protocol(OSPF).

WEEK-4  BLOG CREATION, SKYPE INSTALLATION AND CYBER HYGIENE
Creating blogs import the data into blogs, blog templates, blog design. Skype installation and usages of Skype. Install antivirus software; Configure their personal firewall and windows update on their computer.

WEEK-5  LATEX
To create project certificate, Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in LaTeX.
<table>
<thead>
<tr>
<th>WEEK</th>
<th>COURSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>LATEX</td>
</tr>
<tr>
<td></td>
<td>Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check and Track Changes using LaTeX.</td>
</tr>
<tr>
<td>7</td>
<td>LATEX</td>
</tr>
<tr>
<td></td>
<td>Mathematical expressions, Subscripts and superscripts, Brackets and Parentheses, Fractions and Binomials, Aligning Equations, Operators, Spacing in math mode, Integrals, sums and limits, Display style in math mode, List of Greek letters and math symbols, Mathematical fonts.</td>
</tr>
<tr>
<td>8</td>
<td>LATEX</td>
</tr>
<tr>
<td></td>
<td>Producing Simple Documents, a LaTeX Input File and Ordinary Text using LaTeX.</td>
</tr>
<tr>
<td>9</td>
<td>LATEX</td>
</tr>
<tr>
<td></td>
<td>Prepare class timetable and student marks list using LaTex.</td>
</tr>
<tr>
<td>10</td>
<td>SHARE LATEX</td>
</tr>
<tr>
<td></td>
<td>Create your first ShareLaTeX document, Uploading a project, Copying a project, Creating a project from a template, Including images in ShareLaTeX.</td>
</tr>
<tr>
<td>11</td>
<td>SHARE LATEX</td>
</tr>
<tr>
<td></td>
<td>Exporting your work from ShareLaTeX, Using bibliographies in ShareLaTeX, Sharing your work with others, Debugging Compilation timeout errors, Code Check.</td>
</tr>
<tr>
<td>12</td>
<td>HOUSE WIRING</td>
</tr>
<tr>
<td></td>
<td>Power point, light fitting and switches, television, home theater.</td>
</tr>
<tr>
<td>13</td>
<td>CARPENTRY</td>
</tr>
<tr>
<td></td>
<td>Study of tools and joints; Practice in planning, chiseling, marking and sawing; Joints: Cross joint, T joint, Dove tail joint.</td>
</tr>
<tr>
<td>14</td>
<td>SOLDERING</td>
</tr>
<tr>
<td></td>
<td>Electronic components (PCB’S), resistance soldering, desoldering, and soldering effects.</td>
</tr>
<tr>
<td>15</td>
<td>FITTING</td>
</tr>
<tr>
<td></td>
<td>Study of tools, practice in filing, cutting, drilling and tapping; Male and female joints, stepped joints.</td>
</tr>
<tr>
<td>16</td>
<td>ELECTRICAL WINDING</td>
</tr>
<tr>
<td></td>
<td>Lap winding, wave winding and design of transformer.</td>
</tr>
</tbody>
</table>

**Reference Books:**


**Web References:**

1. http://www.cl.cam.ac.uk/teaching/1011/CompFunds
# DESIGN AND ANALYSIS OF ALGORITHMS

## III Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIT001</td>
<td>Core</td>
<td>L T P C CIA SEE Total</td>
<td>3 - 3 30 70 100</td>
<td></td>
</tr>
</tbody>
</table>

Contact Classes: 45  
Tutorial Classes: Nil  
Practical Classes: Nil  
Total Classes: 45

**OBJECTIVES:**  
The course should enable the students to:  
I. Assess how the choice of data structures and algorithm design methods impacts the performance of programs.  
II. Solve problems using data structures such as binary search trees, and graphs and writing programs for these solutions.  
III. Choose the appropriate data structure and algorithm design method for a specified application.  
IV. Solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, and branch and bound and writing programs for these solutions.

## UNIT-I  
**INTRODUCTION**  
Classes: 9

Algorithm: Pseudo code for expressing algorithms; Performance analysis: Space complexity, time complexity; Asymptotic notations: Big O notation, omega notation, theta notation and little o notation, probabilistic analysis, amortized complexity; Divide and Conquer: General method, binary search, quick sort, merge sort, Strassen’s matrix multiplication.

## UNIT-II  
**SEARCHING AND TRAVERSAL TECHNIQUES**  
Classes: 8

Disjoint set operations, union and find algorithms; Efficient non recursive binary tree traversal algorithms, spanning trees; Graph traversals: Breadth first search, depth first search, connected components, biconnected components.

## UNIT-III  
**GREEDY METHOD AND DYNAMIC PROGRAMMING**  
Classes: 10

Greedy method: The general method, job sequencing with deadlines, knapsack problem, minimum cost spanning trees, single source shortest paths.  
Dynamic programming: The general method, matrix chain multiplication optimal binary search trees, 0/1 knapsack problem, single source shortest paths, all pairs shortest paths problem, the travelling salesperson problem.

## UNIT-IV  
**BACKTRACKING AND BRANCH AND BOUND**  
Classes: 9

Backtracking: The general method, the 8 queens problem, sum of subsets problem, graph coloring, Hamiltonian cycles; Branch and bound: The general method, 0/1 knapsack problem, least cost branch and bound solution, first in first out branch and bound solution, travelling salesperson problem.

## UNIT-V  
**NP-HARD AND NP-COMPLETE PROBLEMS**  
Classes: 9

Basic concepts: Non-deterministic algorithms, the classes NP - Hard and NP, NP Hard problems, clique decision problem, chromatic number decision problem, Cook's theorem.
<table>
<thead>
<tr>
<th><strong>Text Books:</strong></th>
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<table>
<thead>
<tr>
<th><strong>Reference Books:</strong></th>
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<tr>
<th><strong>Web References:</strong></th>
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<tr>
<th><strong>E-Text Books:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. <a href="https://drive.google.com/file/d/0B_Y1VbyboEDBTDVxVXpVbnk4TVE/edit?pref=2&amp;pli=1">https://drive.google.com/file/d/0B_Y1VbyboEDBTDVxVXpVbnk4TVE/edit?pref=2&amp;pli=1</a></td>
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</table>

<table>
<thead>
<tr>
<th><strong>MOOC Courses:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <a href="https://www.coursera.org/learn/algorithm-design-analysis">https://www.coursera.org/learn/algorithm-design-analysis</a></td>
</tr>
<tr>
<td>3. <a href="https://www.onlinecourses.nptel.ac.in/noc16_cs04/preview">https://www.onlinecourses.nptel.ac.in/noc16_cs04/preview</a></td>
</tr>
</tbody>
</table>

**Course Home Page:**
OBJECTIVES:
The course should enable the students to:
I. Analyze and explore uses of logic functions for building digital logic circuits
II. Explore the Combinational logic circuits.
III. Examine the operation of sequential (synchronous and asynchronous) circuits.
IV. Know the concepts of basic memory system.

UNIT-I  NUMBERS SYSTEMS AND CODES Classes:08
Review of number systems; number base conversion; Binary arithmetic: Binary weighted and non-weighted codes; Complements: Signed binary numbers; Error Detection and Correcting Codes; Binary logic.

UNIT-II  BOOLEAN ALGEBRA AND GATE LEVEL MINIMIZATION Classes:10
Postulates and theorems; representation of switching functions; SOP and POS forms; Canonical forms; Digital logic gates; Karnaugh Maps; Minimization using three variable; four variable; five variable K-Maps; Don’t Care Conditions; NAND and NOR implementation; Other Two-Level Implementation; Exclusive – OR function.

UNIT-III  DESIGN OF COMBINATIONAL CIRCUITS Classes: 08
Combinational Circuits: Analysis and Design Procedure; Binary adder and subtractors; Carry Look-ahead adder; Binary multiplier; Magnitude comparator; BCD adder; Decoders; Encoders; Multiplexers; Demultiplexer.

UNIT-IV  DESIGN OF SEQUENTIAL CIRCUITS Classes: 10
Combinational Vs Sequential Circuits ; Latches, Flip Flops: RS flip flop, JK flip flop, T flip flop, D flip flop, Master-Slave Flip flop, Flip Flops excitation functions; Conversion of one flip flop to another flip flop; Shift Registers; Design of Asynchronous and Synchronous circuits; State Table, State diagram, State Reduction and State Assignment for Mealy and Moore Machines.

UNIT-V  MEMORY Classes: 09
Random access memory; Types of ROM; Memory decoding; Address and Data bus; Sequential memory; Cache memory; Programmable logic arrays; Memory hierarchy in terms of capacity and access time.

Text Book:
### Reference Books:


### Web References:


### E-Text Books:

1. https://drive.google.com/file/d/0B4ChICvNGHlfN2NmODE1NjAtZWI5Zi00MmU0LWliYmQtOTU3ZGUyMzAwODc1/view

### Course Home Page:
DISCRETE MATHEMATICAL STRUCTURES

III Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHS013</td>
<td>Foundation</td>
<td>L T P C CIA SEE Total</td>
<td>3 1 - 4 30 70 100</td>
<td></td>
</tr>
</tbody>
</table>

**OBJECTIVES:**
The course should enable the students to:
I. Describe the logical and mathematical foundations and study abstract models of computation.
II. Illustrate the limitations of predicate logic.
III. Define modern algebra for constructing and writing mathematical proofs.
IV. Solve the practical examples of sets, functions, relations and recurrence relations.
V. Recognize the patterns that arise in graph problems and apply the knowledge for constructing the trees and spanning trees.

**UNIT-I**  MATHEMATICAL LOGIC AND PREDICATES   

Mathematical logic: Statements and notations, connectives, well-formed formulas, truth tables, tautology, equivalence implication; Normal forms: Disjunctive normal forms, conjunctive normal forms, principle disjunctive normal forms, principle conjunctive normal forms; Predicate calculus: Predicative logic, statement functions, variables and quantifiers, free and bound variables, rules of inference, consistency, proof of contradiction, automatic theorem proving.

**UNIT-II**  RELATIONS, FUNCTIONS AND LATTICES   

Relations: Properties of binary relations, equivalence, transitive closure, compatibility and partial ordering relations, lattices, Hasse diagram; Functions: Inverse function, composition of functions, recursive functions; Lattices: Lattices as partially ordered sets; Definition and examples, properties of lattices, lattices as algebraic systems, sub lattices, direct product and homomorphism, some special lattices.

**UNIT-III**  ALGEBRAIC STRUCTURES AND COMBINATORICS   

Algebraic structures: Algebraic systems, examples and general properties, semi groups and monoids, groups, sub groups, homomorphism, isomorphism, rings.

Combinatoric: The fundamental counting principles, permutations, disarrangements, combinations, permutations and combinations with repetitions, the binomial theorem, multinomial theorem, generalized inclusion exclusion principle.

**UNIT-IV**  RECURRENCE RELATION   

Recurrence relation: Generating functions, function of sequences calculating coefficient of generating function, recurrence relations, solving recurrence relation by substitution and generating functions, characteristics roots solution of homogeneous recurrence relation.

**UNIT-V**  GRAPHS AND TREES   

Graphs: Basic concepts of graphs, computer representation of graphs, isomorphic graphs, Euler graphs, Hamiltonian graphs, planar graphs, graph coloring, digraphs, directed acyclic graphs, weighted digraphs, region graph, depth first search, breadth first search, chromatic numbers; Trees: Trees, spanning trees, minimal spanning trees; Kruskal’s and Prim’s algorithms.
### Text Books:


### Reference Books:


### Web References:

1. [http://www.web.stanford.edu/class/cs103x](http://www.web.stanford.edu/class/cs103x)
2. [http://www.cs.odu.edu/~cs381/cs381content/web_course.html](http://www.cs.odu.edu/~cs381/cs381content/web_course.html)
5. [http://www.nptel.ac.in/courses/106106094/](http://www.nptel.ac.in/courses/106106094/)

### E-Text Books:

1. [https://people.eecs.berkeley.edu/~daw/teaching/cs70-s05/](https://people.eecs.berkeley.edu/~daw/teaching/cs70-s05/)

### Course Home Page:
DATABASE MANAGEMENT SYSTEMS

III Semester: IT | IV Semester: CSE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
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<tr>
<td>ACS005</td>
<td>Foundation</td>
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<td>1</td>
<td>-</td>
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</tbody>
</table>

Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Understand the role of database management system in an organization and learn the database concepts.
II. Design databases using data modeling and data normalization techniques.
III. Construct database queries using relational algebra and calculus.
IV. Understand the concept of a database transaction and related database facilities.
V. Learn how to evaluate set of queries in query processing.

UNIT-I  CONCEPTUAL MODELING  Classes: 10
Introduction to file and database systems: Database system structure, data models, introduction to network and hierarchical models, ER model, relational model.

UNIT-II  RELATIONAL APPROACH  Classes: 08
Relational algebra and calculus: Relational algebra, selection and projection, set operations, renaming, joins, division, examples of algebra queries, relational calculus, tuple relational calculus, domain relational calculus, expressive power of algebra and calculus.

UNIT-III  BASIC SQL QUERY  Classes: 10
SQL data definition; Queries in SQL: updates, views, integrity and security, relational database design.
Functional dependencies and normalization for relational databases up to five normal forms.

UNIT-IV  TRANSACTION MANAGEMENT  Classes: 09
Transaction processing: Introduction, need for concurrency control, desirable properties of transaction, schedule and recoverability, serializability and schedules, concurrency control: Types of locks: Two phases locking, deadlock, time stamp based concurrency control, recovery techniques, concepts, immediate update, deferred update, shadow paging.

UNIT-V  DATA STORAGE AND QUERY PROCESSING  Classes: 08
Record storage and primary file organization, secondary storage devices, operations on files, heap file, sorted files, hashing techniques, and index structures for files; Different types of indexes, B tree, B+ tree, query processing.

Text Book:
### Reference Books:


### Web References:

1. [https://www.youtube.com/results?search_query=DBMS+online+classes](https://www.youtube.com/results?search_query=DBMS+online+classes)
2. [http://www.t3schools.in/dbms/](http://www.t3schools.in/dbms/)

### E-Text Books:


### Course Home Page:
## III Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
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<th>Credits</th>
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<td>Core</td>
<td>L T P C CIA SEE</td>
<td>3 1 - 4</td>
<td>30 70 100</td>
</tr>
</tbody>
</table>

Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

### OBJECTIVES:
The course should enable the students to:
I. Understand the organization and architecture of computer systems and electronic computers.
II. Study the assembly language program execution, instruction format and instruction cycle.
III. Design a simple computer using hardwired and micro programmed control methods.
IV. Study the basic components of computer systems besides the computer arithmetic.
V. Understand input-output organization, memory organization and management, and pipelining.

### UNIT-I  INTRODUCTION TO COMPUTER ORGANIZATION  Classes:08
Basic computer organization, CPU organization, memory subsystem organization and interfacing, input or output subsystem organization and interfacing, a simple computer levels of programming languages, assembly language instructions, instruction set architecture design, a simple instruction set architecture.

### UNIT-II  ORGANIZATION OF A COMPUTER  Classes:10
Register transfer: Register transfer language, register transfer, bus and memory transfers, arithmetic micro operations, logic micro operations, shift micro operations; Control unit: Control memory, address sequencing, micro program example, and design of control unit.

### UNIT-III  CPU AND COMPUTER ARITHMETIC  Classes: 08
CPU design: Instruction cycle, data representation, memory reference instructions, input-output, and interrupt, addressing modes, data transfer and manipulation, program control.

Computer arithmetic: Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.

### UNIT-IV  INPUT-OUTPUT ORGANIZATION AND MEMORY ORGANIZATION  Classes: 10
Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory; Input or output organization: Input or output Interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access.

### UNIT-V  MULTI PROCESSORS  Classes: 09
Pipeline: Parallel processing, pipelining-arithmetic pipeline, instruction pipeline; Multiprocessors: Characteristics of multiprocessors, inter connection structures, inter processor arbitration, inter processor communication and synchronization.

### Text Books:
**Reference Books:**


**Web References:**


**E-Text Books:**


**Course Home Page:**
### OBJECTIVES:
The course should enable the students to:
I. Learn how to analyze a problem and design the solution for the problem.
II. Design and implement efficient algorithms for a specified application.
III. Strengthen the ability to identify and apply the suitable algorithm for the given real world problem.

### LIST OF EXPERIMENTS

#### Week-1  QUICK SORT
Sort a given set of elements using the quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of $n$, the number of elements in the $1^{st}$ to be sorted and plot a graph of the time taken versus $n$. The elements can be read from a file or can be generated using the random number generator.

#### Week-2  MERGE SORT
Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of $n$, the number of elements in the list to be sorted and plot a graph of the time taken versus $n$. The elements can be read from a file or can be generated using the random number generator.

#### Week-3  WARSHALL’S ALGORITHM
a. Obtain the Topological ordering of vertices in a given digraph.

![Graph Diagram]

b. Compute the transitive closure of a given directed graph using Warshall's algorithm.

#### Week-4  KNAPSACK PROBLEM
Implement 0/1 Knapsack problem using Dynamic Programming.
<table>
<thead>
<tr>
<th>Week-5</th>
<th>SHORTEST PATHS ALGORITHM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra’s algorithm.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-6</th>
<th>MINIMUM COST SPANNING TREE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal’s algorithm.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-7</th>
<th>TREE TRAVERSALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perform various tree traversal algorithms for a given tree.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-8</th>
<th>GRAPH TRAVERSALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. Print all the nodes reachable from a given starting node in a digraph using BFS method.</td>
</tr>
</tbody>
</table>
b. Check whether a given graph is connected or not using DFS method.

<table>
<thead>
<tr>
<th>Week-9</th>
<th>SUM OF SUB SETS PROBLEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find a subset of a given set ( S = { s_1, s_2, \ldots, s_n } ) of ( n ) positive integers whose sum is equal to a given positive integer ( d ). For example, if ( S = {1, 2, 5, 6, 8} ) and ( d = 9 ) there are two solutions ( {1, 2, 6} ) and ( {1, 8} ). A suitable message is to be displayed if the given problem instance doesn't have a solution.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-10</th>
<th>TRAVELLING SALES PERSON PROBLEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implement any scheme to find the optimal solution for the Traveling Sales Person problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-11</th>
<th>MINIMUM COST SPANNING TREE</th>
</tr>
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<tbody>
<tr>
<td>Find Minimum Cost Spanning Tree of a given undirected graph using Prim’s algorithm.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-12</th>
<th>ALL PAIRS SHORTEST PATHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implement All-Pairs Shortest Paths Problem using Floyd’s algorithm.</td>
<td></td>
</tr>
</tbody>
</table>
Implement N Queen's problem using Back Tracking.

Reference Books:

Web References:

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE: C Programming Compiler

HARDWARE: Desktop Computer Systems: 36 nos
### DATABASE MANAGEMENT SYSTEMS LABORATORY

#### III Semester: IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
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<td>-</td>
<td>-</td>
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</table>

**Contact Classes:** Nil  
**Tutorial Classes:** Nil  
**Practical Classes:** 36  
**Total Classes:** 36

**OBJECTIVES:**  
The course should enable the students to:  
I. Implement the basic knowledge of SQL queries and relational algebra.  
II. Construct database models for different database applications.  
III. Apply normalization techniques for refining of databases.  
IV. Practice various triggers, procedures, and cursors using PL/SQL.

#### LIST OF EXPERIMENTS

**Week-1**  
**CREATION OF TABLES**

1. Create a table called Employee with the following structure.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empno</td>
<td>Number</td>
</tr>
<tr>
<td>Ename</td>
<td>Varchar2(20)</td>
</tr>
<tr>
<td>Job</td>
<td>Varchar2(20)</td>
</tr>
<tr>
<td>Mgr</td>
<td>Number</td>
</tr>
<tr>
<td>Sal</td>
<td>Number</td>
</tr>
</tbody>
</table>

a. Add a column commission with domain to the Employee table.  
b. Insert any five records into the table.  
c. Update the column details of job  
d. Rename the column of Employ table using alter command.  
e. Delete the employee whose empno is 19.

2. Create department table with the following structure.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deptno</td>
<td>Number</td>
</tr>
<tr>
<td>Deptname</td>
<td>Varchar2(20)</td>
</tr>
<tr>
<td>location</td>
<td>Varchar2(20)</td>
</tr>
</tbody>
</table>

a. Add column designation to the department table.  
b. Insert values into the table.  
c. List the records of emp table grouped by deptno.  
d. Update the record where deptno is 9.  
e. Delete any column data from the table.
3. Create a table called Customer table

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cust name</td>
<td>Varchar2(20)</td>
</tr>
<tr>
<td>Cust street</td>
<td>Varchar2(20)</td>
</tr>
<tr>
<td>Cust city</td>
<td>Varchar2(20)</td>
</tr>
</tbody>
</table>

a. Insert records into the table.  
b. Add salary column to the table.  
c. Alter the table column domain.  
d. Drop salary column of the customer table.  
e. Delete the rows of customer table whose cust_city is ‘hyd’.

4. Create a table called branch table

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branch name</td>
<td>Varchar2(20)</td>
</tr>
<tr>
<td>Branch city</td>
<td>Varchar2(20)</td>
</tr>
<tr>
<td>asserts</td>
<td>Number</td>
</tr>
</tbody>
</table>

a. Increase the size of data type for asserts to the branch.  
b. Add and drop a column to the branch table.  
c. Insert values to the table.  
d. Update the branch name column  
e. Delete any two columns from the table

5. Create a table called sailor table

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sid</td>
<td>Number</td>
</tr>
<tr>
<td>Sname</td>
<td>Varchar2(20)</td>
</tr>
<tr>
<td>rating</td>
<td>Varchar2(20)</td>
</tr>
</tbody>
</table>

a. Add column age to the sailor table.  
b. Insert values into the sailor table.  
c. Delete the row with rating > 8.  
d. Update the column details of sailor.  
e. Insert null values into the table.

6. Create a table called reserves table

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat id</td>
<td>Integer</td>
</tr>
<tr>
<td>sid</td>
<td>Integer</td>
</tr>
<tr>
<td>day</td>
<td>Integer</td>
</tr>
</tbody>
</table>

a. Insert values into the reserves table.  
b. Add column time to the reserves table.  
c. Alter the column day data type to date.  
d. Drop the column time in the table.  
e. Delete the row of the table with some condition.
### Week -2
#### QUERIES USING DDL AND DML

1. a. Create a user and grant all permissions to the user.
   b. Insert the any three records in the employee table and use rollback. Check the result.
   c. Add primary key constraint and not null constraint to the employee table.
   d. Insert null values to the employee table and verify the result.
2. a. Create a user and grant all permissions to the user.
   b. Insert values in the department table and use commit.
   c. Add constraints like unique and not null to the department table.
   d. Insert repeated values and null values into the table.
3. a. Create a user and grant all permissions to the user.
   b. Insert values into the table and use commit.
   c. Delete any three records in the department table and use rollback.
   d. Add constraint primary key and foreign key to the table.
4. a. Create a user and grant all permissions to the user.
   b. Insert records in the sailor table and use commit.
   c. Add save point after insertion of records and verify save point.
   d. Add constraints not null and primary key to the sailor table.
5. a. Create a user and grant all permissions to the user.
   b. Use revoke command to remove user permissions.
   c. Change password of the user created.
   d. Add constraint foreign key and not null.
6. a. Create a user and grant all permissions to the user.
   b. Update the table reserves and use savepoint and rollback.
   c. Add constraint primary key, foreign key and not null to the reserves table.
   d. Delete constraint not null to the table column.

### Week -3
#### QUERIES USING AGGREGATE FUNCTIONS

1. a. By using the group by clause, display the enames who belongs to deptno 10 along with average salary.
   b. Display lowest paid employee details under each department.
   c. Display number of employees working in each department and their department number.
   d. Using built in functions, display number of employees working in each department and their department name from dept table. Insert deptname to dept table and insert deptname for each row, do the required thing specified above.
   e. List all employees which start with either B or C.
   f. Display only these ename of employee where the maximum salary is greater than or equal to 5000.
2. a. Calculate the average salary for each different job.
   b. Show the average salary of each job excluding manager.
   c. Show the average salary for all departments employing more than three people.
   d. Display employees who earn more than the lowest salary in department 30
   e. Show that value returned by sign (n) function.
   f. How many days between day of birth to current date.
3. a. Show that two substring as single string.
   b. List all employee names, salary and 15% rise in salary.
   c. Display lowest paid emp details under each manager
   d. Display the average monthly salary bill for each deptno.
   e. Show the average salary for all departments employing more than two people.
   f. By using the group by clause, display the eid who belongs to deptno 05 along with average salary.
4. a. Count the number of employees in department 20
   b. Find the minimum salary earned by clerk.
   c. Find minimum, maximum, average salary of all employees.
   d. List the minimum and maximum salaries for each job type.
   e. List the employee names in descending order.
   f. List the employee id, names in ascending order by empid.

5. a. Find the sids, names of sailors who have reserved all boats called “INTERLAKE”
   b. Find the age of youngest sailor who is eligible to vote for each rating level with at least two such sailors.
   c. Find the sname, bid and reservation date for each reservation.
   d. Find the ages of sailors whose name begin and end with B and has at least 3 characters.
   e. List in alphabetic order all sailors who have reserved red boat.
   f. Find the age of youngest sailor for each rating level.

6. a. List the Vendors who have delivered products within 6 months from order date.
   b. Display the Vendor details who have supplied both Assembled and Sub parts.
   c. Display the Sub parts by grouping the Vendor type (Local or Non Local).
   d. Display the Vendor details in ascending order.
   e. Display the Sub part which costs more than any of the Assembled parts.
   f. Display the second maximum cost Assembled part.

---

Week - 4  PROGRAMS ON PL/SQL

1. a. Write a PL/SQL program to swap two numbers.
   b. Write a PL/SQL program to find the largest of three numbers.

2. a. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
   b. Write a PL/SQL program to find the sum of digits in a given number.

3. a. Write a PL/SQL program to display the number in reverse order.
   b. Write a PL/SQL program to check whether the given number is prime or not.

4. a. Write a PL/SQL program to find the factorial of a given number.
   b. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius and area.

5. a. Write a PL/SQL program to accept a string and remove the vowels from the string. When ‘hello’ passed to the program it should display ‘Hll’ removing e and o from the world Hello).
   b. Write a PL/SQL program to accept a number and a divisor. Make sure the divisor is less than or equal to 10. Else display an error message. Otherwise Display the remainder in words.

---

Week - 5  PROCEDURES AND FUNCTIONS

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.

2. Accept year as parameter and write a Function to return the total net salary spent for a given year.

3. Create a function to find the factorial of a given number and hence find NCR.

4. Write a PL/SQL block o pint prime Fibonacci series using local functions.

5. Create a procedure to find the lucky number of a given birth date.

6. Create function to the reverse of given number.

---

Week-6  TRIGGERS

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values:
CUSTOMERS table:

<table>
<thead>
<tr>
<th>ID</th>
<th>NAME</th>
<th>AGE</th>
<th>ADDRESS</th>
<th>SALARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alive</td>
<td>24</td>
<td>Khammam</td>
<td>2000</td>
</tr>
<tr>
<td>2</td>
<td>Bob</td>
<td>27</td>
<td>Kadappa</td>
<td>3000</td>
</tr>
<tr>
<td>3</td>
<td>Catri</td>
<td>25</td>
<td>Guntur</td>
<td>4000</td>
</tr>
<tr>
<td>4</td>
<td>Dena</td>
<td>28</td>
<td>Hyderabad</td>
<td>5000</td>
</tr>
<tr>
<td>5</td>
<td>Eeshwar</td>
<td>27</td>
<td>Kurnool</td>
<td>6000</td>
</tr>
<tr>
<td>6</td>
<td>Farooq</td>
<td>28</td>
<td>Nellur</td>
<td>7000</td>
</tr>
</tbody>
</table>

2. Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database.

**Passenger** (Passport_id INTEGER PRIMARY KEY, Name VARCHAR (50) Not NULL, Age INTEGER Not NULL, Sex Char, Address VARCHAR (50) Not NULL);

a. Write a Insert Trigger to check the Passport_id is exactly six digits or not.
b. Write a trigger on passenger to display messages ‘1 Record is inserted’, ‘1 record is deleted’, ‘1 record is updated’ when insertion, deletion and updation are done on passenger respectively.

3. Insert row in employee table using Triggers. Every trigger is created with name any trigger have same name must be replaced by new name. These triggers can raised before insert, update or delete rows on data base. The main difference between a trigger and a stored procedure is that the former is attached to a table and is only fired when an INSERT, UPDATE or DELETE occurs.

4. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.

5. Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called delete_emp and also record user who has deleted the record and date and time of delete.

6. Create a transparent audit system for a table CUST_MSTR. The system must keep track of the records that are being deleted or updated.

### Week -7 PROCEDURES

1. Create the procedure for palindrome of given number.
2. Create the procedure for GCD: Program should load two registers with two Numbers and then apply the logic for GCD of two numbers. GCD of two numbers is performed by dividing the greater number by the smaller number till the remainder is zero. If it is zero, the divisor is the GCD if not the remainder and the divisors of the previous division are the new set of two numbers. The process is repeated by dividing greater of the two numbers by the smaller number till the remainder is zero and GCD is found.
3. Write the PL/SQL programs to create the procedure for factorial of given number.
4. Write the PL/SQL programs to create the procedure to find sum of N natural number.
5. Write the PL/SQL programs to create the procedure to find Fibonacci series.
6. Write the PL/SQL programs to create the procedure to check the given number is perfect or not.

### Week -8 CURSORS

1. Write a PL/SQL block that will display the name, deptno, salary of fist highest paid employees.
2. Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction in case the item id is not present in the item master table then the record is inserted in the item master table.
3. Write a PL/SQL block that will display the employee details along with salary using cursors.
4. To write a Cursor to display the list of employees who are working as a Managers or Analyst.
5. To write a Cursor to display the list of employees who are working as a Managers or Analyst.
6. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the ‘employee’ table are updated. If none of the employee’s salary are updated we get a message 'None of the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in ‘employee’ table.

<table>
<thead>
<tr>
<th>Week -9</th>
<th>CASE STUDY: BOOK PUBLISHING COMPANY</th>
</tr>
</thead>
</table>
| A publishing company produces scientific publishing books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications. A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with an editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject for the above case study, do the following:
1. Analyze the data required.
2. Normalize the attributes.
   Create the logical data model using E-R diagrams. |

<table>
<thead>
<tr>
<th>Week -10</th>
<th>CASE STUDY GENERAL HOSPITAL</th>
</tr>
</thead>
</table>
| A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do the following:
1. Analyze the data required.
2. Normalize the attributes.
   Create the logical data model using E-R diagrams. |

<table>
<thead>
<tr>
<th>Week -11</th>
<th>CASE STUDY: CAR RENTAL COMPANY</th>
</tr>
</thead>
</table>
| A database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephone number, driving license, number about each customer are kept in the database. For the above case study, do the following:
1. Analyze the data required.
2. Normalize the attributes.
   Create the logical data model using E-R diagrams. |
A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre-requisites modules and some degree programmes have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degrees they read for, and their past performance i.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.
4. Comprehend the data given in the case study by creating respective tables with primary keys and foreign keys wherever required.
5. Insert values into the tables created (Be vigilant about Master-Slave tables).
6. Display the Students who have taken M.Sc course.
7. Display the Module code and Number of Modules taught by each Lecturer.
8. Retrieve the Lecturer names who are not Module Leaders.
9. Display the Department name which offers ‘English’ module.
10. Retrieve the Prerequisite Courses offered by every Department (with Department names).
11. Present the Lecturer ID and Name who teaches ‘Mathematics’.
12. Discover the number of years a Module is taught.
13. List out all the Faculties who work for ‘Statistics’ Department.
14. List out the number of Modules taught by each Module Leader.
15. List out the number of Modules taught by a particular Lecturer.
16. Create a view which contains the fields of both Department and Module tables. (Hint- The fields like Module code, title, credit, Department code and its name).
17. Update the credits of all the prerequisite courses to 5. Delete the Module ‘History’ from the Module table.

Reference Books:

Web References:
1. http://www.sage.virtual-labs.ac.in/home/pub/1/

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Desktop Computer Systems 36 nos

SOFTWARE: Oracle RDBMS
### DIGITAL LOGIC DESIGN LABORATORY

#### III Semester: IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
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<th>Credits</th>
<th>Maximum Marks</th>
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<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>

Contact Classes: Nil  
Tutorial Classes: Nil  
Practical Classes: 36  
Total Classes: 36

#### OBJECTIVES:
The course should enable the students to:
I. Build the concept of digital and binary system.
II. Design and analyze the combinational logic circuits.
III. Design and analyze the sequential logic circuits.

#### LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>Week</th>
<th>Experiment</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>STUDY OF LOGIC GATES.</td>
</tr>
<tr>
<td></td>
<td>To study and verify the truth table of logic gates</td>
</tr>
<tr>
<td>2</td>
<td>ADDERS AND SUBTRACTORS</td>
</tr>
<tr>
<td></td>
<td>Design and implementation of adders and subtractions using logic gates.</td>
</tr>
<tr>
<td>3</td>
<td>BCD TO EXCESS-3 CODE CONVERTER</td>
</tr>
<tr>
<td></td>
<td>Design and implementation of BCD to Excess-3 code using IC 7483.</td>
</tr>
<tr>
<td>4</td>
<td>BINARY TO GRAY CODE CONVERTER</td>
</tr>
<tr>
<td></td>
<td>Design and implementation of binary to gray code using logic gates.</td>
</tr>
<tr>
<td>5</td>
<td>MULTIPLEXER AND DEMULTIPLEXER</td>
</tr>
<tr>
<td></td>
<td>Design and implementation of 2-bit magnitude comparator using logic gates, 8-bit magnitude comparator using IC 7485</td>
</tr>
<tr>
<td>6</td>
<td>COMPARATORS</td>
</tr>
<tr>
<td></td>
<td>Design and implementation of 16-bit odd/even parity checker/ generator using IC 74180.</td>
</tr>
<tr>
<td>7</td>
<td>ENCODER AND DECODER</td>
</tr>
<tr>
<td></td>
<td>Design and implementation of encoder and decoder using logic gates and study of IC 7445 and IC 74147.</td>
</tr>
<tr>
<td>8</td>
<td>FLIPFLOPS</td>
</tr>
<tr>
<td></td>
<td>Implementation of flip-flops using logic gates.</td>
</tr>
<tr>
<td>9</td>
<td>SHIFT REGISTER</td>
</tr>
<tr>
<td></td>
<td>Implementation of shift register using IC 7495.</td>
</tr>
</tbody>
</table>
Week-10  STUDY OF ASYNCHRONOUS AND SYNCHRONOUS COUNTER
Implementation of asynchronous and synchronous counter using IC7476.

Week-11  PRESETTABLE 4-BIT BINARY UP/DOWN COUNTER
Design and implementation of up/down counter using IC74193.

Week-12  STUDY OF BCD COUNTER
Design and implementation of BCD counter using IC7490.

Reference Books:

Web References:

Course Home Page:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the Equipment</th>
<th>Range</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>IC TRAINER KIT</td>
<td>----</td>
</tr>
<tr>
<td>2</td>
<td>LOGIC GATE ICS</td>
<td>IC 7400, 7402, 7404, 7406, IC 7408, 7432, 7486</td>
</tr>
<tr>
<td>3</td>
<td>REGULATED POWER SUPPLY</td>
<td>0-30 V</td>
</tr>
<tr>
<td>4</td>
<td>PATCH CORDS</td>
<td>----</td>
</tr>
<tr>
<td>5</td>
<td>IC’S</td>
<td>IC 7483, 7485, 74180, 7411, 7476</td>
</tr>
</tbody>
</table>
OBJECT ORIENTED PROGRAMMING THROUGH JAVA

IV Semester: IT | III Semester: CSE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<tbody>
<tr>
<td>ACS003</td>
<td>Foundation</td>
<td>L  T  P  C  CIA  SEE  Total</td>
<td>3  1  -  4  30  70  100</td>
<td></td>
</tr>
</tbody>
</table>

Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Understand fundamentals of object-oriented terminology and programming concepts in java.
II. Acquire basics of how to translate solution problem into object oriented form.
III. Develop programs in java for solving simple applications.
IV. Design and implement simple program that use exceptions and multithreads.

UNIT-I  OOP CONCEPTS AND JAVA PROGRAMMING

OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object oriented programming paradigm; Java programming: History of java, comments data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, jump statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, exploring string class.

UNIT-II  INHERITANCE, INTERFACES AND PACKAGES

Inheritance: Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: Dynamic binding, method overriding, abstract classes and methods; Interface: Interfaces vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface; Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

UNIT-III  EXCEPTION HANDLING AND MULTI THREADING

Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.

UNIT-IV  FILES, AND CONNECTING TO DATABASE

Files: Streams; byte streams, character stream, text input/output, binary input/output, random access file operations, file management using file class; Connecting to Database: Connecting to a database, querying a database and processing the results, updating data with JDBC.
## UNIT-V GUI PROGRAMMING AND APPLETS

<table>
<thead>
<tr>
<th>Classes: 09</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUI programming with Java: The AWT class hierarchy, introduction to swing, swing Vs AWT, hierarchy for swing components, containers, JFrame, JApplet, JDialog, Jpanel, overview of some swing components – JButton, JLabel, JTextField, JTextArea, simple applications; Layout manager types – border, grid and flow. Applets: Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets.</td>
</tr>
</tbody>
</table>

### Text Books:


### Reference Books:


### Web References:


### E-Text Books:


### Course Home Page:
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<tbody>
<tr>
<td>ACS007</td>
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</tbody>
</table>

Contact Classes: 45  
Tutorial Classes: 15  
Practical Classes: Nil  
Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Understand the functionalities of main components in operating systems.
II. Analyze the algorithms used in memory and process management.
III. Understand the clock synchronization protocols
IV. Interpret the concepts of input and output storage for file management.

UNIT-I  INTRODUCTION  Classes: 10
Operating systems objectives and functions: Computer system architecture, operating systems structure, operating systems operations; Evolution of operating systems: Simple batch, multi programmed, time shared, personal computer, parallel distributed systems, real time systems, special purpose systems, operating system services, user operating systems interface; Systems calls: Types of systems calls, system programs, protection and security, operating system design and implementation, operating systems structure, virtual machines.

UNIT-II  PROCESS AND CPU SCHEDULING, PROCESS COORDINATION  Classes: 10
Process concepts: The process, process state, process control block, threads; Process scheduling: Scheduling queues, schedulers, context switch, preemptive scheduling, dispatcher, scheduling criteria, scheduling algorithms, multiple processor scheduling; Real time scheduling; Thread scheduling; Case studies Linux windows; Process synchronization, the critical section problem; Peterson’s solution, synchronization hardware, semaphores and classic problems of synchronization, monitors.

UNIT-III  MEMORY MANAGEMENT AND VIRTUAL MEMORY  Classes: 08
Logical and physical address space: Swapping, contiguous memory allocation, paging, structure of page table.
Segmentation: Segmentation with paging, virtual memory, demand paging; Performance of demand paging: Page replacement, page replacement algorithms, allocation of frames, thrashing.

UNIT-IV  FILE SYSTEM INTERFACE, MASS-STORAGE STRUCTURE  Classes: 09
The concept of a file, access methods, directory structure, file system mounting, file sharing, protection, file system structure, file system implementation, allocation methods, free space management, directory implementation, efficiency and performance; Overview of mass storage structure: Disk structure, disk attachment, disk scheduling, disk management, swap space management; Dynamic memory allocation: Basic concepts; Library functions.

UNIT-V  DEADLOCKS, PROTECTION  Classes: 08
System model: Deadlock characterization, methods of handling deadlocks, deadlock prevention, deadlock avoidance, dead lock detection and recovery form deadlock system protection, goals of protection, principles of protection, domain of protection, access matrix, implementation of access matrix, access control, revocation of access rights, capability based systems, language based protection.
### Text Books:


### Reference Books:


### Web References:

1. www.smartzworld.com/notes/operatingsystems
2. www.scoopworld.in
3. www.technofest2u.blogspot.com

### E-Text Books:


### Course Home Page:
SOFTWARE ENGINEERING

IV Semester: IT | V Semester: CSE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<tbody>
<tr>
<td>ACS008</td>
<td>Core</td>
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</tbody>
</table>

Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Learn how to elicitate requirements and develop software life cycles.
II. Understand the design considerations for enterprise integration and deployment.
III. Analyze quality assurance techniques and testing methodologies.
IV. Prepare a project plan for a software project that includes estimates of size and effort, a schedule, resource allocation, configuration control, and project risk.

UNIT-I SOFTWARE PROCESS AND PROJECT MANAGEMENT  Classes: 08

Introduction to software engineering, software process, perspective and specialized process models; Software project management: Estimation: LOC and FP based estimation, COCOMO model; Project scheduling: Scheduling, earned value analysis, risk management

UNIT-II REQUIREMENTS ANALYSIS AND SPECIFICATION  Classes: 09

Software requirements: Functional and nonfunctional, user requirements, system requirements, software requirements document; Requirement engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management; Classical analysis: Structured system analysis, petri nets, data dictionary.

UNIT-III SOFTWARE DESIGN  Classes: 09

Design process: Design concepts, design mode, design heuristic, architectural design architectural styles, architectural design, and architectural mapping using data flow.
User interface design: Interface analysis, interface design; Component level design: Designing class based components, traditional components.

UNIT-IV TESTING AND IMPLEMENTATION  Classes: 10

Software testing fundamentals: Internal and external views of testing, white box testing, basis path testing, control structure testing, black box testing, regression testing, unit testing, integration testing, validation testing, system testing and debugging; Software implementation techniques: Coding practices, refactoring.

UNIT-V PROJECT MANAGEMENT  Classes: 09

Estimation: FP based, LOC based, make/buy decision; COCOMO II: Planning, project plan, planning process, RFP risk management, identification, projection; RMMM: Scheduling and tracking, relationship between people and effort, task set and network, scheduling; EVA: Process and project metrics.
Text Books:


Reference Books:


Web References:


E-Text Books:


Course Home Page:
THEORY OF COMPUTATION

IV Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
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<td>AIT002</td>
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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Introduce and study abstract, mathematical models of computation and use them to solve computational problems.
II. Understand the relationship between formal languages in Chomsky's hierarchy and different machines.
III. Analyze and explain the behavior of push-down automata.
IV. Understand the limits and capacities of Turing’s machines to recognize languages.

UNIT-I  FINITE AUTOMATA
Classes: 09
Fundamentals: Alphabet, strings, language, operations; Introduction to finite automata: The central concepts of automata theory, deterministic finite automata, nondeterministic finite automata, an application of finite automata, finite automata with epsilon transitions; Finite automata with output: Moore and Melay machines.

UNIT-II  REGULAR LANGUAGES
Classes: 09
Regular sets, regular expressions, identity rules, constructing finite automata for a given regular expressions, conversion of finite automata to regular expressions, pumping lemma of regular sets, closure properties of regular sets (proofs not required), regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and finite automata, inter conversion.

UNIT-III  CONTEXT FREE GRAMMARS
Classes: 10
Context free grammars and languages: Context free grammar, derivation trees, sentential forms, right most and leftmost derivation of strings, applications.
Ambiguity in context free grammars, minimization of context free grammars, Chomsky normal form, Greibach normal form, pumping lemma for context free languages, enumeration of properties of context free language (proofs omitted).

UNIT-IV  PUSHDOWN AUTOMATA
Classes: 08
Pushdown automata, definition, model, acceptance of context free language, acceptance by final state and acceptance by empty stack and its equivalence, equivalence of context free language and pushdown automata, inter conversion; (Proofs not required); Introduction to deterministic context free languages and deterministic pushdown automata.

UNIT-V  TURING MACHINE
Classes: 09
Turing machine: Turing machine, definition, model, design of Turing machine, computable functions, recursively enumerable languages, Church's hypothesis, counter machine, types of Turing machines (proofs not required), linear bounded automata and context sensitive language, Chomsky hierarchy of languages.
<table>
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<th>Text Book:</th>
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<th>Reference Books:</th>
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<tr>
<th>Web References:</th>
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<tr>
<td>2. <a href="https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf">https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf</a></td>
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<th>E-Text Books:</th>
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<tr>
<td><a href="https://freefundkenotes.files.wordpress.com/2014/02/toc-klp-mishra.pdf">https://freefundkenotes.files.wordpress.com/2014/02/toc-klp-mishra.pdf</a></td>
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<th>MOOC Courses:</th>
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<tr>
<td>1. <a href="http://nptel.ac.in/courses/111103016/">http://nptel.ac.in/courses/111103016/</a></td>
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<tr>
<td>2. <a href="http://nptel.ac.in/courses/106106049/">http://nptel.ac.in/courses/106106049/</a></td>
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<th>Course Home Page:</th>
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### COMPUTER NETWORKS

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<tr>
<th>IV Semester: CSE / IT</th>
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<td>AIT003</td>
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</table>

**Contact Classes: 45**  **Tutorial Classes: 15**  **Practical Classes: Nil**  **Total Classes: 60**

**OBJECTIVES:**

The course should enable the students to:

I. Develop an understanding of modern network architectures from a design and performance perspective.
II. Understand the basics and challenges of network communication.
III. Provide an opportunity to do network programming using TCP/IP.
IV. Understand the operation of the protocols that are used inside the Internet.

**UNIT-I**  **INTRODUCTION TO PHYSICAL LAYER**  **Classes: 9**

Introduction: Networks, network types, internet history, standards and administration; Network models: Protocol layering, TCP/IP protocol suite, the OSI model; Introduction to physical layer: Data and signals, transmission impairment, data rate limits, performance; Transmission media: Introduction, guided media, unguided media; Switching: Introduction, circuit switched networks, packet switching.

**UNIT-II**  **INTRODUCTION TO DATA LINK LAYER**  **Classes: 8**

Introduction: Link layer addressing; Error detection and correction: Cyclic codes, checksum, forward error correction; Data link control: DLC services, data link layer protocols, HDLC, point to point protocol, media access control: Random access, controlled access, channelization, connecting devices and virtual LAN: Connecting devices, virtual LAN.

**UNIT-III**  **THE NETWORK LAYER**  **Classes: 10**

Network layer design issues, routing algorithms, congestion control algorithms, quality of service, and internetworking.


**UNIT-IV**  **THE TRANSPORT LAYER**  **Classes: 09**


**UNIT-V**  **INTRODUCTION TO APPLICATION LAYER**  **Classes: 09**

Introduction, client server programming, WWW (World Wide Web) and HTTP (Hyper Text Transfer Protocol), FTP (File Transfer Protocol), E-mail, telnet, secure shell, DNS(Domain Naming System), SNMP (Simple Network Management Protocol).
### Text Books:


### Reference Books:


### Web References:

1. [http://computer.howstuffworks.com/computer-networking-channel.htm](http://computer.howstuffworks.com/computer-networking-channel.htm)
2. [http://www.ietf.org](http://www.ietf.org)

### E-Text Books:

1. [http://www.freebookcentre.net/networking-books-download/Lecture-Notes-on-Computer-Networks.html](http://www.freebookcentre.net/networking-books-download/Lecture-Notes-on-Computer-Networks.html)

### MOOC Course


### Course Home Page:
OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY

IV Semester: IT  | III Semester: CSE

<table>
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<tr>
<th>Course Code</th>
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<th>Maximum Marks</th>
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</tbody>
</table>

Contact Classes: Nil  | Tutorial Classes: Nil  | Practical Classes: 39  | Total Classes: 39

OBJECTIVES:
The course will enable the students to:
I. Practice object-oriented programs and build java applications.
II. Implement java programs for establishing interfaces.
III. Implement sample programs for developing reusable software components.
IV. Create database connectivity in java and implement GUI applications.

LIST OF EXPERIMENTS

Week-1  | BASIC PROGRAMS
---------|------------------
a. Try debug step by step with small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
b. Write a java program that prints all real solutions to the quadratic equation \( ax^2 + bx + c = 0 \). Read in \( a, b, c \) and use the quadratic formula.
c. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non recursive functions.

Week-2  | MATRICES, OVERLOADING, OVERRIDING
---------|----------------------------------
a. Write a java program to multiply two given matrices.
b. Write a java program to implement method overloading and constructors overloading.
c. Write a java program to implement method overriding.

Week-3  | PALINDROME, ABSTRACT CLASS
---------|-------------------------------
a. Write a java program to check whether a given string is palindrome.
b. Write a java program for sorting a given list of names in ascending order.
c. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

Week-4  | INTERFACE
---------|------------------
Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.
<table>
<thead>
<tr>
<th>Week-5</th>
<th>MULTITHREADING</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.</td>
<td></td>
</tr>
<tr>
<td>b. Write a java program that correct implements of producer consumer program.</td>
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</table>

<table>
<thead>
<tr>
<th>Week-6</th>
<th>FILES</th>
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</thead>
<tbody>
<tr>
<td>a. Write a java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.</td>
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<tr>
<td>b. Write a java program that displays the number of characters, lines and words in a text file.</td>
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<tr>
<td>c. Write a java program that reads a file and displays the file on the screen with line number before each line.</td>
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<thead>
<tr>
<th>Week-7</th>
<th>FILES</th>
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</thead>
<tbody>
<tr>
<td>a. Suppose that table named table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using labels in grid layout.</td>
<td></td>
</tr>
<tr>
<td>b. Write a java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.</td>
<td></td>
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</table>

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<thead>
<tr>
<th>Week-8</th>
<th>JAVA PROGRAM WITH DATABASE</th>
</tr>
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<tbody>
<tr>
<td>a. Write a java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (/t). It takes a name or phone number as input and prints the corresponding other value from the hash table. Hint: Use hash tables.</td>
<td></td>
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<tr>
<td>b. Implement the above program with database instead of a text file.</td>
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<tr>
<th>Week-9</th>
<th>FILES</th>
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<tbody>
<tr>
<td>a. Write a java program that takes tab separated data (one record per line) from a text file and insert them into a database.</td>
<td></td>
</tr>
<tr>
<td>b. Write a java program that prints the metadata of a given table.</td>
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</table>

<table>
<thead>
<tr>
<th>Week-10</th>
<th>TRAFFIC LIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write a java program that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with “STOP” or “READY” or ”GO” should appear above the buttons in selected color. Initially, there is no message shown.</td>
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</table>

<table>
<thead>
<tr>
<th>Week-11</th>
<th>MOUSE EVENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Write a java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes.</td>
<td></td>
</tr>
<tr>
<td>b. Write a java program to demonstrate the key event handlers.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Week-12</th>
<th>CALCULATOR</th>
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<tbody>
<tr>
<td>Write a java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*, % operations. Add a text field to display the result. Handle any possible exception like divided by zero.</td>
<td></td>
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</table>
**Week-13**  
**APPLET**

<p>| | |</p>
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<tbody>
<tr>
<td>a.</td>
<td>Develop an applet that displays a simple message.</td>
</tr>
<tr>
<td>b.</td>
<td>Develop an applet that receives an integer in one text field and computes its factorial value and returns it in another text field, when the button named “compute” is clicked.</td>
</tr>
</tbody>
</table>

**Reference Books:**


**Web References:**

1. [http://vlab.co.in/ba_labs_all.php?id=2](http://vlab.co.in/ba_labs_all.php?id=2)  
2. [http://www.javatpoint.com/java-programs](http://www.javatpoint.com/java-programs)  

**Course Home Page:**

**SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:**

**SOFTWARE:** Java Development Kit (Open source)  
**HARDWARE:** Desktop Computer Systems: 36 nos
OBJECTIVES:
The course should enable the students to:
I. Implement the scheduling algorithms of operating system.
II. Practice the methodologies of file organization techniques.
III. Construct memory management techniques for analyzing memory utilization.
IV. Apply the techniques of deadlock avoidance and prevention in resource utilization.

LIST OF EXPERIMENTS

Week-1 | CPU SCHEDULING ALGORITHMS
---|---
Simulate the following CPU scheduling algorithms
1. FCFS
2. SJF

Week-2 | CPU SCHEDULING ALGORITHMS
---|---
Simulate the following CPU scheduling algorithms
1. Priority
2. Round robin

Week-3 | FILE ALLOCATION STRATEGIES
---|---
Simulate all file allocation strategies
1. Sequential
2. Indexed
3. Linked

Week-4 | MVT AND MFT
---|---
Simulate MVT and MFT

Week-5 | FILE ORGANIZATION TECHNIQUES
---|---
Simulate file organization techniques
1. Single level
2. Two level

Week-6 | FILE ORGANIZATION TECHNIQUES
---|---
Simulate file organization techniques
1. Hierarchical
2. DAG
<table>
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<tr>
<th>Week-7</th>
<th>BANKERS ALGORITHM</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Simulate Bankers algorithm for dead lock avoidance.</td>
</tr>
<tr>
<td>Week-8</td>
<td>BANKERS ALGORITHM</td>
</tr>
<tr>
<td></td>
<td>Simulate Bankers algorithm for dead lock prevention.</td>
</tr>
<tr>
<td>Week-9</td>
<td>PAGE REPLACEMENT ALGORITHM</td>
</tr>
<tr>
<td></td>
<td>Simulate page replacement algorithm: FIFO</td>
</tr>
<tr>
<td>Week-10</td>
<td>PAGE REPLACEMENT ALGORITHM</td>
</tr>
<tr>
<td></td>
<td>Simulate page replacement algorithm: LRU</td>
</tr>
<tr>
<td>Week-11</td>
<td>PAGE REPLACEMENT ALGORITHM</td>
</tr>
<tr>
<td></td>
<td>Simulate page replacement algorithm: LFU</td>
</tr>
<tr>
<td>Week-12</td>
<td>PAGING TECHNIQUE</td>
</tr>
<tr>
<td></td>
<td>Simulate paging technique of memory management.</td>
</tr>
</tbody>
</table>

**Reference Books:**


**Web References:**

1. http://vlab.co.in/ba_labs_all.php?id=2

**Course Home Page:**

**SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:**

**SOFTWARE:** C Programming compiler (Open Source)

**HARDWARE:** Desktop Computer Systems: 36 nos
### OBJECTIVES:

The course should enable the students to:

I. Select suitable software development process model for the given scenario.
II. Classify the requirements and prepare software requirement documents for analyzing the projects.
III. Understand the different design techniques and their implementation.
IV. Apply various testing methodologies for validating design models.

#### Week-1  
**ROLE OF SOFTWARE**

**Background:** Software has made the world a global village today. The impact of software spans across almost all aspect of human life. All organizations, Institutions and companies are leveraging the potentials of software in automating the critical functions and eliminating manual interventions. Software is also a predominant area for trade and export especially for the countries like India. Domains like health care, Airlines, financial Services, Insurance, retails, Education, and many more have exploited software and still there a lot of the scope for software to create impact and add values in multiple dimensions.

**Problem Description:** In the context of this background, identify the areas (or application or systems) how software has been leveraged extensively in the following domains

1. Health Care
2. Airlines
3. Banking Insurance
4. Retail
5. Education

#### Week-2  
**SOFTWARE CRISIS**

**Background:** In the early years of computers applications, the focus of the development and innovation were on hardware. Software was largely views as an afterthought. Computer programming was an art. Programmers did not follow any disciplined or formalized approaches. This way of doing things was adequate for a while, until the sophisticated of computer applications outgrow. Software soon took over and more functions which were done manually. A software houses begin to develop for widespread distribution. Software development projects produced thousands of source program statement. With the increase in the size and complexity of the software, following situation resulted is collectively termed as software crisis.

1. Time Slippage
2. Cost Slippage
3. Failure at customer Site
4. Intractable Error after delivery

**Problem Description:** In the context of this background, for each of the scenario mentioned below, identify the most appropriate problem related to software crisis and mention the same in the table provided.

**Scenario A:** Railways reservation software was delivered to the customer and was installed in one of the metro station at 12.00 AM (mid-night) as per the plan. The system worked quite fine till the next day...
12.00 PM (noon). The system crashed at 12.00 PM and the railways authorities could not continue using software for reservation till 02.00 M. It took two hours to fix the defect in the software in the software.

**Scenario B:** A polar satellite launch vehicle was scheduled for the launch on August 15th. The auto-pilot of the rocket to be delivered for integration of the rocket on may 15th. The design and development of the software for the auto-pilot more effort because of which the auto-pilot was delivered for the integration on June 15th (delayed by a month). The rocket was launched on Sep 15th (delayed by a month).

**Scenario C:** Software for financial systems was delivered to the customer. Customer informed the development team about a mal-function in the system. As the software was huge and complex, the development team could not identify the defect in the software.

**Scenario D:** Due to the defect in the software for the baggage handling system. There was also of & 2M of revenues for the airport authorities.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Situation (as given A to D)</th>
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<tbody>
<tr>
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<td>C</td>
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<tr>
<td>D</td>
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</table>

**Week-3 REQUIREMENT DEVELOPMENT**

**Background:** Requirement engineering produces a specification of what a system should do. The intention of requirement engineering is to provide a clear definition of requirement of the systems. This phase is a very important phase because, if the customer requirements are not clearly understood, the ambiguity can get into the other phase of the development. To avoid such issues, requirement has to be elicited using the right elicitation techniques, to be analyzed effectively, specified clearly and verified thoroughly. All activities are collectively termed as requirement development activities.

**Problem Description:** Identify the requirement development activities associated with each of the following scenarios,

a. Joe is creating an online survey questionnaire for requesting user feedback on the desired features of the application to be developed.
b. Mark is preparing a formal document which includes all of the desired features identified by the survey.
c. Jack identified an incomplete requirement statement
d. Jones is identifying all security related requirement and separating them from the performance related requirements
e. Merlin a team member is sent to client to observe the business case and collect typical user requirements
f. Leo is team member is working on requirement and ensuring that requirement collected should not be vague and unclear.
g. Lee is conducting a facilitated meeting with the stakeholder to capture the requirements.
h. Amit a team member is distributing questionnaires to stack holder for gathering user requirements.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Requirement Development Activities</th>
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<tbody>
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<td>A</td>
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<td>B</td>
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<td>H</td>
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</tr>
</tbody>
</table>
A. **Background:** Functional requirements (FRs) specify the software functionality that the developer must build into the product to enable users accomplish their tasks, thereby satisfying the business requirements. Nonfunctional requirement as the name suggest, are those requirements which are not directly concerned with the specific functions delivered by the system. Many non-functional requirements (NFRs) related to the system as a whole rather than to individual functional requirements. While failure to meet an individual functional may degrade the system, failure to meet a non-functional system requirement may make whole system unusable. NFR’s are of di
terliability requirements etc.

Problem Description: Classify the following requirement by selecting the appropriate option.

1. ATM machine shall validate PIN of the user during login along with bio-metric verification.
2. “Peak transaction-20,000calls inVolume(s)abushyhour,average duration 20 Secs, grade of services 99.98%.
3. “Brahe System sounds the alarm Shallfor10seconds at frequency of 100H when the brake is applied”.
4. “Mean Time Failure (MTTF) to -There should be no more than three Severity-1 outage per month”.

B. **Background:** Software requirements specification formally captures the requirements of the software to be developed. Hence it is important that requirements are free from defects like incorrect or conflicting requirements.

Problem Description: Identify the requirements in the given SRS(Premium University Placement Portal) for following issues,

1. Incorrect requirements
2. Ambiguous requirements
3. Missing requirements
4. Conflicting requirements
5. Incomplete requirements

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**Week-5**  
**SOFTWARE DESIGN PRINCIPLES**

**Background:** A good object oriented design not only meets the specified requirements but also addresses implicit requirements. There are five design principles which address most of the implicit requirements:

1. Abstraction: Focus on solving a problem by considering the relevant details and ignoring the irrelevant
2. Encapsulation: Wrapping the internal details, thereby making these details inaccessible. Encapsulation separates interface and implementation, specifying only the public interface to the clients, hiding the details of implementation.
3. Decomposition and Modularization: Dividing the problem into smaller, independent, interactive subtasks for placing different functionalities in different components
4. Coupling & Cohesion: Coupling is the degree to which modules are dependent on each other. Cohesion is the degree to which a module has a single, well defined task or responsibility. A good design is one with loose coupling and strong cohesion.
5. Sufficiency, Completeness and Primitiveness: Design should ensure the completeness and sufficiency with respect to the given specifications in a very simple way as possible.

**Problem Description:** Which of the following design principle(s) have been violated in the following scenarios?

1. Abstraction
2. Decomposition and Modularization
3. Coupling & Cohesion
4. Encapsulation  
5. Sufficiency, Completeness and Primitiveness  
6. All  

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Principle Being Violated</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Important information of a module is directly accessible by other modules.</td>
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<tr>
<td>2</td>
<td>Too many global variables in the program after implementing design</td>
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<td>3</td>
<td>Code breaks in unexpected places</td>
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<td>4</td>
<td>Unfulfilled requirements in the code after the design has been implemented</td>
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<td>5</td>
<td>Cyclic dependencies among classes</td>
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<td>6</td>
<td>Huge class doing too many unrelated operations</td>
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<td>7</td>
<td>Several unrelated functionalities/tasks are carried out by a single module</td>
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<td>8</td>
<td>All data of all classes in public</td>
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<tr>
<td>9</td>
<td>Design resulting in spaghetti code</td>
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<tr>
<td>10</td>
<td>An algorithm documented as part of design is not understandable by the programmers</td>
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</table>

**Week-6 INTEGRATION TESTING**

**Background:** Integration testing is carried out after the completion of unit testing and before the software is delivered for system testing. In top down integration testing, dummy stubs are required for bottom level modules. Similarly in bottom up testing, dummy drivers are required for top level modules.

**Problem Description:** Consider the scenario of development of software for Travel Management System (TMS) is in progress. The TMS software has 3 major modules namely Ticket_Booking_Module, Hotel_Booking_Module and Taxi_Booking_Module. The Ticket_Booking_Module has 3 sub-modules namely Enquiry_Module, Booking_Module and Update_Module. The enquiry module uses Date_Validation_Unit, Ticket_Validation_Unit and Place_Validation_Unit.

In the context of the given scenario, identify the usage of stub or driver for the following situations.

1. Except the Ticket_Validation_Unit, the coding and unit testing of all other modules, sub-modules and units of TMS are completed. The top-down integration is in progress for the TMS software. To carry out the integration testing, which among the following is necessary?
   A Stub for Ticket_Validation_Unit, A Driver For Ticket_Validation_Unit, A Stub for Enquiry_Module A Driver for Enquiry_Module, A Stub For Ticket_Booking_Module, A Driver For Ticket_Booking_Module

2. The coding and unit testing of all the module, sub-modules and units of TMS are completed except the Update_Module (coding and testing for Edit_Module, Cancel_Module and View_Module are also completed). The bottom-up integration is to be started for the TMS software. Mention any stub or driver needed to carry out the integration testing?

3. Except the Taxi_Booking_Module, the coding and unit testing of all other modules, sub-modules and units of TMS are completed. The top-down integration is to be started for the TMS software. Mention any stub or driver needed to carry out the integration testing.
**Week-7**

**PERFORMANCE TESTING**

**Background:** Performance testing tests the non-functional requirements of the system. The different types of performance testing are load testing, stress testing, endurance testing and spike testing.

**Problem Description:** Identify the type of performance testing for the following:

1. A space craft is expected to function for nearly 8 years in space. The orbit control system of the spacecraft is a real-time embedded system. Before the launch, the embedded software is to be tested to ensure that it is capable of working for 8 years in the space. Identify the suitable performance testing category to be carried out to ensure that the space craft will be functioning for 8 years in the space as required.

2. Global Education Centre (GEC) at Infosys Mysore provides the training for fresh entrants. GEC uses an automated tool for conducting objective type test for the trainees. At a time, a maximum of 2000 trainees are expected to take the test. Before the tool is deployed, testing of the tool was carried out to ensure that it is capable of supporting 2000 simultaneous users. Indicate the performance testing category?

3. A university uses its web based portal for publishing the results of the students. When the results of an examination were announced on the website recently on a pre-planned date, the web site crashed. Which type of performance testing should have been done during web-site development to avoid this unpleasant situation?

4. During unexpected terrorist attack, one of the popular websites crashed as many people logged into the web-site in a short span of time to know the consequences of terrorist attack and for immediate guidelines from the security personnel. After analyzing the situation, the maintenance team of that website came to know that it was the consequences of unexpected load on the system which had never happened previously. Which type of performance testing should have been done during web-site development to avoid this unpleasant situation?

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Performance Testing Type</th>
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<tbody>
<tr>
<td>Scenario 1</td>
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<td>Scenario 2</td>
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<td>Scenario 3</td>
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<td>Scenario 4</td>
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</table>
### Week-8  
**RE﻿G﻿R﻿E﻿S﻿S﻿I﻿O﻿N﻿  T﻿E﻿S﻿T﻿I﻿N﻿G**

**Background:** Enhancements are introduction of new features to the software and might be released in different versions. Whenever a version is released, regression testing should be done on the system to ensure that the existing features have not been disturbed.

**Problem Description:** Consider the scenario of development of software for Travel Management System (TMS) discussed in previous assignment. TMS has been developed by Infosys and released to its customer Advance Travel Solutions Ltd. (ATSL). Integration testing, system testing and acceptance testing were carried out before releasing the final build to the customer. However, as per the customer feedback during the first month of usage of the software, some minor changes are required in the Enquiry Module of the TMS. The customer has approached Infosys with the minor changes for upgrading the software. The development team of Infosys has incorporated. Those changes, and delivered the software to testing team to test the upgraded software. Which among the following statement is true?

- a. Since minor changes are there, integration of the Enquiry Module and quick system testing on Enquiry module should be done.
- b. The incorporation of minor changes would have introduced new bugs into other modules, so regression testing should be carried out.
- c. Since the acceptance testing is already carried out, it is enough if the team performs sanity testing on the Enquire module.
- d. No need of testing any module.

### Week-9  
**SOFTWARE METRICS**

**Background:** There are some metrics which are fundamental and the rest can be derived from these. Examples of basic (fundamental) measures are size, effort, defect, and schedule. If the fundamental measures are known, then we can derive others. For example if size and effort are known, we can get Productivity (=size/effort). If the total numbers of defects are known we can get the Quality (=defect/size) and so on.

**Problem Description:** Online loan system has two modules for the two basic services, namely Car loan service and House loan service. The two modules have been named as Car_Loan_Module and House_Loan_Module. Car_Loan_Module has 2000 lines of uncommented source code. House_Loan_Module has 3000 lines of uncommented source code. Car_Loan_Module was completely implemented by Mike. House_Loan_Module was completely implemented by John. Mike took 100 person hours to implement Car_Loan_Module. John took 200 person hours to implement House_Loan_Module. Mike’s module had 5 had 6 defects. With respect to the context given, which among the following is an INCORRECT statement?

Choose one:

1. John’s quality is better than Mike.
2. John’s productivity is more than Mike.
3. John introduced more defects than Mike.
4. John’s effort is more than Mike.

**Reference Books:**

Web References:
1. www.tutorialspoint.com
2. www.webopedia.com
3. http://vlabs.iitkgp.ernet.in/se/

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

**HARDWARE:** Intel Desktop Systems: 36 nos

**SOFTWARE:** Borland together, LATEX.
WEB TECHNOLOGIES

V Semester: IT | IV Semester: CSE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
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<th>Credits</th>
<th>Maximum Marks</th>
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<td>4</td>
<td>30  70  100</td>
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Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Design static and dynamic webpages using HTML, CSS and Java Script.
II. Apply tools to retrieve the information from the database.
III. Understand a well formed XML schemas for developing web applications
IV. Design and implement web services from the server and client side.

UNIT-I  INTRODUCTION TO WEB TECHNOLOGIES  Classes: 10
Introduction to html, fundamentals of HTML elements, document body, text, hyperlink, lists, tables, Color and Images, frames, cascading style Sheets: Introduction, defining your own styles, properties and values in styles, style sheets, formatting blocks, and layers; JavaScript: JavaScript basics, variables, string manipulation, mathematical functions, statements, operators, arrays and functions.

UNIT-II  OBJECTS IN JAVASCRIPT AND XML  Classes: 08
Objects in JavaScript: Data and objects in JavaScript, regular expressions, exception handling, built-in objects, events; Dynamic HTML with JavaScript: Data validation, opening a new window, Rollover buttons, moving images, multiple pages in a single download, floating logos; XML: Basics XML, document type definition, xml schemas, Document Object Model, presenting XML.

UNIT-III  SERVLETS AND JSP  Classes: 08
Servlet: Lifecycle of a Servlet, a simple Servlet, the servlet API, the Javax.servlet package, reading Servlet parameters, the javax.servlet. HTTP package, Handling HTTP requests and responses, using cookies and sessions.

JSP: The anatomy of a JSP page, JSP processing, declarations, directives, expressions, code snippets, implicit objects, using beans in JSP pages, connecting to database in JSP.

UNIT-IV  INTRODUCTION TO PHP  Classes: 10
Introduction to PHP: Basics of PHP, downloading, installing, configuring PHP, programming in a web environment and the anatomy of a PHP page; Overview of PHP data types and concepts: Variables and data types, operators, expressions and statements, strings, arrays and functions.

UNIT-V  PHP AND DATABASE ACCESS  Classes: 09
PHP and database access: Basic database concepts, connecting to a MySQL database, retrieving and displaying results, modifying, updating and deleting data; MVC architecture: PHP and other web technologies: PHP and XML, PHP and AJAX.

Text Books:
### Reference Books:

### Web References:
1. https://www.vidyarthiplus.com/vp/thread-16509.html#.WFzQvVMrLDc
2. http://www.bdu.ac.in/centers/uic/docs/courseware/NME2-Notes/Unit1.pdf

### E-Text Books:

### Course Home Page:
# OBJECT ORIENTED ANALYSIS AND DESIGN

**V Semester : IT**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
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<tr>
<td>Contact Classes: 45</td>
<td>Tutorial Classes: 15</td>
<td>Practical Classes: Nil</td>
<td>Total Classes: 60</td>
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</table>

**OBJECTIVES:**
The course should enable the students to:

I. Develop the skills to analyze and design object-oriented problems.
II. Create design patterns to solve problems based on object oriented concepts.
III. Understand the various processes and techniques for building object-oriented software systems.
IV. Prepare unified modeling techniques for case studies.

**UNIT-I**  
**STRUCTURAL MODELLING**  
Classes: 10

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, architecture, software development life cycle; Classes, relationships, common mechanisms and diagrams.

**UNIT-II**  
**ADVANCED BEHAVIORAL MODELING**  
Classes: 08

Advanced classes, advanced relationships, interfaces, types and roles, packages, terms, concepts, modeling techniques for class and object diagrams; Interactions: Interaction diagrams; Use cases: Use case diagrams, activity diagrams.

**UNIT-III**  
**ARCHITECTURAL MODELING**  
Classes: 08

Events and signals, state machines, processes and threads, time and space.
State chart diagrams, component diagrams, deployment diagrams.

**UNIT-IV**  
**DESIGN PATTERN**  
Classes: 09

GRASP: Designing objects with responsibilities, creator, information expert, low coupling, high cohesion, design patterns, creational, factory method, structural, bridge, adaptor, behavioral, strategy.

**UNIT-V**  
**APPLYING DESIGN PATTERNS**  
Classes: 10

System sequence diagrams, relation between sequence diagrams and use case logical architecture and UML package diagram, logical architecture refinement; Case study: The next gen POS system, inception, use case modeling, relating use cases, include, extend and generalization, domain models, domain model refinement.

**Text Books:**

### Reference Books:


### Web References:

2. https://www.utdallas.edu/~chung/OOAD/M03_1_StructuralDiagrams.ppt

### E-Text Books:

1. https://www.utdallas.edu/UML2.0/Rumbaugh

### Course Home Page:
OBJECTIVES:
The course should enable the students to:
I. Apply the principles in the theory of computation to the various stages in the design of compilers.
II. Explain the phases of the compilation process and able to describe the purpose and operation of each phase.
III. Analyze problems related to the stages in the translation process.
IV. Exercise and reinforce prior programming knowledge with a non-trivial programming project to construct a compiler.

UNIT-I
INTRODUCTION TO COMPILERS AND PARSING
Classes: 08
Introduction to compilers: Definition of compiler, interpreter and its differences, the phases of a compiler, role of lexical analyzer, regular expressions, finite automata, from regular expressions to finite automata, pass and phases of translation, bootstrapping, LEX-lexical analyzer generator; Parsing: Parsing, role of parser, context free grammar, derivations, parse trees, ambiguity, elimination of left recursion, left factoring, eliminating ambiguity from dangling-else grammar, classes of parsing, top-down parsing: backtracking, recursive-descent parsing, predictive parsers, LL(1) grammars.

UNIT-II
BOTTOM-UP PARSING
Classes: 09
Bottom-up parsing: Definition of bottom-up parsing, handles, handle pruning, stack implementation of shift-reduce parsing, conflicts during shift-reduce parsing, LR grammars, LR parsers-simple LR, canonical LR and Look Ahead LR parsers, error recovery in parsing, parsing ambiguous grammars, YACC-automatic parser generator.

UNIT-III
SYNTAX-DIRECTED TRANSLATION AND INTERMEDIATE CODE GENERATION
Classes: 10
Syntax-directed translation: Syntax directed definition, construction of syntax trees, S-attributed and L-attributed definitions, translation schemes, emitting a translation.
Intermediate code generation: Intermediate forms of source programs– abstract syntax tree, polish notation and three address code, types of three address statements and its implementation, syntax directed translation into three-address code, translation of simple statements, Boolean expressions and flow-of-control statements.

UNIT-IV
TYPE CHECKING AND RUN TIME ENVIRONMENT
Classes: 09
Type checking: Definition of type checking, type expressions, type systems, static and dynamic checking of types, specification of a simple type checker, equivalence of type expressions, type conversions, overloading of functions and operators; Run time environments: Source language issues, Storage organization, storage-allocation strategies, access to nonlocal names, parameter passing, symbol tables, and language facilities for dynamic storage allocation.
<table>
<thead>
<tr>
<th>UNIT-V</th>
<th>CODE OPTIMIZATION AND CODE GENERATOR</th>
<th>Classes: 09</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Code optimization: Organization of code optimizer, basic blocks and flow graphs, optimization of basic blocks, the principal sources of optimization, the dag representation of basic block, global data flow analysis; Code generator: Machine dependent code generation, object code forms, the target machine, a simple code generator, register allocation and assignment, peephole optimization.</td>
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<td><strong>Text Book:</strong></td>
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<td><strong>Course Home Page:</strong></td>
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OPTIMIZATION TECHNIQUES

V Semester: CSE / IT / EEE

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<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
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<td>2 1 - 3 30 70 100</td>
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</tbody>
</table>

Contact Classes: 30  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Learn fundamentals of linear programming through optimization.
II. Understand and apply optimization techniques to industrial applications.
III. Apply the dynamic programming and quadratic approximation to electrical and electronic problems and applications.

UNIT-I  LINEAR PROGRAMMING  Classes: 09
Definition, characteristics and phases, types of models, operations research models, applications, linear programming problem formulation, graphical solution, simplex method; Artificial variables techniques: Two-phase method, Big-M method.

UNIT-II  TRANSPORTATION AND ASSIGNMENT PROBLEMS  Classes: 09

UNIT-III  SEQUENCING AND THEORY OF GAMES  Classes: 09
Sequencing: Introduction, flow-shop sequencing, n jobs through two machines, n jobs through three machines, job shop sequencing, two jobs through m machines. Theory of games: Introduction, terminology, solution of games with saddle points and without saddle points, 2 x 2 games, dominance principle, m x 2 and 2 x n games, graphical method.

UNIT-IV  DYNAMIC PROGRAMMING  Classes: 09
Introduction: Terminology, Bellman’s principle of optimality, applications of dynamic programming shortest path problem, linear programming problem.

UNIT-V  QUADRATIC APPROXIMATION  Classes: 09

Text Books:
**Reference Books:**


**Web References:**

1. http://www2.informs.org/Resources/

**E-Text Books:**


**Course Home Page:**
## BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

### V Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
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Contact Classes: 30  
Tutorial Classes: 15  
Practical Classes: Nil  
Total Classes: 45

### OBJECTIVES:
The course should enable the students to:
I. Understand the market dynamics namely demand elasticity of demand and pricing in different market structures.
II. Analyze how capital budgeting decisions are carried out for selecting the best investment proposal.
III. Learn how organizations make important investment and financing decisions.
IV. Analyze a company’s financial statements and come to a reasoned conclusion about the financial situation of the company.
V. Acquire the basics of how to analyze and interpret the financial statements through ratio analysis.

### UNIT-I  INTRODUCTION AND DEMAND ANALYSIS
Classes: 07

Definition, nature and scope of business economics; Demand analysis; Demand determinants, law of demand and its exceptions; Elasticity of demand: Definition, types, measurement and significance of elasticity of demand, demand forecasting, factors governing demand forecasting.

### UNIT-II  PRODUCTION AND COST ANALYSIS
Classes: 10

Production function; Isoquants and isocosts, MRTS, least cost combination of inputs, Cobb-Dougles production function, internal and external economies of scale, cost analysis; Cost concepts: Break even analysis (BEA), determination of break-even point (simple problems), managerial significance.

### UNIT-III  MARKETS AND NEW ECONOMIC ENVIRONMENT
Classes: 08

Types of competition and markets, features of perfect competition, monopoly and monopolistic competition, price-output determination in case of perfect competition and monopoly business.

Features and evaluation of different forms of business organizations: Sole proprietorship, partnership, joint stock company, public enterprises and their types.

### UNIT-IV  CAPITAL BUDGETING
Classes: 10

Capital and its significance, types of capital, estimation of fixed and working capital requirements, methods and sources of raising capital, capital budgeting: features of capital budgeting proposals; Methods of capital budgeting: payback period, accounting rate of return(ARR), net present value method and internal rate of return method (simple problems).

### UNIT-V  INTRODUCTION TO FINANCIAL ACCOUNTING & FINANCIAL ANALYSIS
Classes: 10

Financial accounting objectives, functions, importance; Accounting concepts and accounting conventions -double-entry book keeping, journal, ledger, trial balance; Final accounts: Trading account, profit and loss account and balance sheet with simple adjustments; Financial analysis: Analysis and interpretation of liquidity ratios, activity ratios, capital structure ratios and profitability ratios (simple problems), Du Pont chart.
**Text Books:**


**Reference Books:**


**Web References:**

4. https://www.gvpce.ac.in/syllabi/Managerial_Economics_and_financial_analysis

**E-Text Book:**

1. https://books.google.co.in/books/about/Managerial_economics_and_financial_analysis.html
3. http://all4ryou.blogspot.in/2012/06/mefa-managerial-economics_and_financial_analysis
4. http://books.google.com/books/about/Managerial_economics_and_financial_analysis.html

**Course Home Page:**
## RESEARCH AND CONTENT DEVELOPMENT

### V Semester: AE / CSE / IT / ECE / EEE / MECH

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<tr>
<td>AHS106</td>
<td>Skill</td>
<td>L T P C CIA SEE Total</td>
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|          |          |             |         |               |
|          |          | - - 2 1 30 70 100 |         |               |

### OBJECTIVES:
The course should enable the students to:

I. Gain a practical understanding of the various methodological tools used for social scientific research.

II. Learn the ethical, political, and pragmatic issues involved in the research process.

III. Improve their ability to develop technical writing.

IV. Identify the overall process of designing a research study from its inception to its report.

<table>
<thead>
<tr>
<th>Week - 1, 2, 3</th>
<th>LATEX FOR DOCUMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check and Track Changes using LaTeX; Mathematical expressions, Subscripts and superscripts, brackets and parentheses, fractions and binomials, aligning equations, operators, spacing in math mode, integrals, sums and limits, display style in math mode, list of Greek letters and math symbols, mathematical fonts; Prepare class timetable and student marks list using LaTeX;</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week - 4</th>
<th>RESEARCH FORMULATION AND DESIGN</th>
</tr>
</thead>
</table>
| 1. Topic/Title Selection for Research and Problem Statement  
2. Title Selection and / or Methodology Formulation  
3. Finalization of tentative Methodology |

<table>
<thead>
<tr>
<th>Week - 5</th>
<th>DATA COLLECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Preparation: Data Generation (simulated data) or Collection of Real Data – Part: I</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week - 6</th>
<th>DATA COLLECTION AND SAMPLING DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Preparation: Data Generation (simulated data) or Collection of Real Data – Part: II</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week – 7</th>
<th>IMPLEMENTATION</th>
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</thead>
<tbody>
<tr>
<td>Implementation of Methodology on the Data and discussion of results - Part: I</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week – 8</th>
<th>IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of Methodology on the Data and discussion of results - Part: II</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week – 9</th>
<th>IMPLEMENTATION OF METHODOLOGY</th>
</tr>
</thead>
</table>
| 1. Block diagram / flowchart of Methodology or Algorithm  
2. Testing of Methodology / algorithm, discussion of Results |

<table>
<thead>
<tr>
<th>Week – 10</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of Methodology / Algorithm, Discussion or Results and conclusion</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week – 11</th>
<th>PLAGIARISM ANALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation / Paper formatting of Review / Research Article – Part: I (Plagiarism analysis)</td>
<td></td>
</tr>
</tbody>
</table>
Week – 12  |  DOCUMENTATION

Documentation / Paper formatting of Review / Research Article – Part: II (Paper ready for submission)

### Text Books:


### Reference Book:


### Web References:

2. https://www.mit.edu/me-ugoffice/communication/technical-writing

### E-Text Books:

1. www.ebooksgo.org/
2. www.e-booksdirectory.com
## OBJECTIVES:

The course should enable the students to:

I. Demonstrate the ability to retrieve data from a database and present it in a web page.

II. Demonstrate competency using FTP to transfer web pages to a server.

III. Construct pages that meet guidelines for efficient download and needs of an identified audience.

IV. Evaluate the functions of specific types of web pages in relationship to an entire web site.

V. Create web pages that meet accessibility needs of those with physical disabilities and the effects of CSS in web page creation.

## LIST OF EXPERIMENTS

### Week 1

**INSTALLATIONS**

Installation of XAMPP and WAMP servers.

### Week 2

**HTML**

1. Create a table to show your class time table.
2. Use tables to provide layout to your HTML page describing your college infrastructure.
3. Use `<span>` and `<div>` tags to provide a layout to the above page instead of a table layout.

### Week 3

**HTML**

1. Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.
2. Embed Audio and Video into your HTML web page.

### Week 4

**HTML**

1. Create a webpage with HTML describing your department use paragraph and list tags.
2. Apply various colors to suitably distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags.
3. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.
4. Insert an image and create a link such that clicking on image takes user to other page.
5. Change the background color of the page; At the bottom create a link to take user to the top of the page.

### Week 5

**HTML**

Develop static pages (using only HTML) of an online book store, the pages should resemble: www.amazon.com, the website should consist the following pages, home page, registration and user login, user profile page, books catalog, shopping cart, payment by credit card, order confirmation.
<table>
<thead>
<tr>
<th>Week -6</th>
<th>CASCADING STYLE SHEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write an HTML page that contains a selection box with a list of 5 countries, when the user selects a country, its capital should be printed next to the list; Add CSS to customize the properties of the font of the capital (color, bold and font size).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week -7</th>
<th>CASCADING STYLE SHEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Let your visitors change the style sheet on your web site, this script will let your visitors choose between five style sheets, which can create yourself or use the one’s included.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week -8</th>
<th>JAVASCRIPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Write a Java Script program to test the first character of a string is uppercase or not.</td>
<td></td>
</tr>
<tr>
<td>2. Write a pattern that matches e-mail addresses.</td>
<td></td>
</tr>
<tr>
<td>3. Write a Java Script function to print an integer with commas as thousands separators.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week -9</th>
<th>JAVASCRIPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Write a Java Script program to sort a list of elements using quick sort.</td>
<td></td>
</tr>
<tr>
<td>2. Write a Java Script for loop that will iterate from 0 to 15 for each iteration, it will check if the current number is odd or even, and display a message to the screen.</td>
<td></td>
</tr>
<tr>
<td>3. Write a Java Script function which will take an array of numbers stored and find the second lowest and second greatest numbers, respectively.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week -10</th>
<th>JAVASCRIPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Write a Java Script program which compute, the average marks of the following students then this average is used to determine the corresponding grade.</td>
<td></td>
</tr>
<tr>
<td>2. Write a Java Script program to sum the multiples of 3 and 5 under 1000.</td>
<td></td>
</tr>
<tr>
<td>3. To design the scientific calculator and make event for each button using java script.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week -11</th>
<th>PHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A simple calculator web application that takes two numbers and an operator (+, -, /, *, and %) from an HTML page and returns the result page with the operation performed on the operands.</td>
<td></td>
</tr>
<tr>
<td>2. Write php program how to send mail using PHP.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week -12</th>
<th>PHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Write php program to convert a string, lower to upper case and upper case to lower case or capital case.</td>
<td></td>
</tr>
<tr>
<td>2. Write php program to change image automatically using switch case.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week -13</th>
<th>PHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Write php program to calculate current age without using any pre-define function.</td>
<td></td>
</tr>
<tr>
<td>2. Write php program to upload image to the server using html and PHP.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week -14</th>
<th>PHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Write php program to upload registration form into database.</td>
<td></td>
</tr>
<tr>
<td>2. Write php program to display the registration form from the database.</td>
<td></td>
</tr>
</tbody>
</table>
**Week-15 | PHP**

1. Write php program to update the registration form present in database.
2. Write php program to delete the registration form from database

**Reference Books:**


**Web References:**

1. http://www.scoopworld.in
2. http://www.sxecw.edu.in

**Course Home Page:**

**SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:**

**HARDWARE:** Desktop Computer Systems: 36 nos

**SOFTWARE:** Application Software: XAMPP Server, WAMP 3.0.6.
CASE TOOLS LABORATORY

V Semester: IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<td>3</td>
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</table>

Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: 36  Total Classes: 36

OBJECTIVES:
The course should enable the students to:
I. Understand the concept of modeling and mechanism involved in UML.
II. Learn the classes and different types of relationships in classes, objects and terms related to diagrams.
III. Examine fundamental object-oriented analysis and design techniques.
IV. Apply design patterns for viewing a system as a set of procedures.
V. Prepare case studies for analyzing modeling techniques.

LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>Week-1</th>
<th>INTRODUCTION TO UML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Of UML</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Week-2</th>
<th>ON LINE PURCHASE SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a UML model for On line Purchase System</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-3</th>
<th>LIBRARY MANAGEMENT SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a UML model for Library Management System</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-4</th>
<th>E-TICKETING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a UML model for E-Ticketing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-5</th>
<th>QUIZ SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a UML model for Quiz System</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-6</th>
<th>STUDENT MARK ANALYZING SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a UML model for Student Mark Analyzing System</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Week-7</th>
<th>E-MAIL CLIENT SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a UML model for E-Mail Client System</td>
<td></td>
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<thead>
<tr>
<th>Week-8</th>
<th>TELEPHONE PHONE DIALING</th>
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</thead>
<tbody>
<tr>
<td>Create a UML model for Telephone Phone Dialing</td>
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<tr>
<td>Week</td>
<td>POINT OF SALE</td>
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</tr>
<tr>
<td>Week-9</td>
<td>Create a UML model for Point of sale</td>
</tr>
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<table>
<thead>
<tr>
<th>Week-10</th>
<th>WORKING COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week-10</td>
<td>Create a UML model for a Working Company</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-11</th>
<th>ATM TRANSACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week-11</td>
<td>Create a system to design Bank ATM Transactions and generate code by using MS-Access as back end and VB as the front end.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-12</th>
<th>STUDENT MARK ANALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week-12</td>
<td>Create a system to design Student mark analysis system and generate code by using MS-Access as back end and VB as the front end.</td>
</tr>
</tbody>
</table>

**Reference Books:**


**Web References:**

1. www.uml.org
2. www.holub.com/goodies/uml/
3. www.uml-diagrams.org/
4. https://www.utdallas.edu/.../UML.../Rumbaugh--UML_2.0_Reference_C...

**Course Home Page:**

**SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:**

**HARDWARE:** Desktop Computer Systems: 36 (nos)

**SOFTWARE:** Application Software: Rational Rose
## MICROPROCESSORS INTERFACING AND APPLICATIONS

### VI Semester: IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
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**Contact Classes: 45**  **Tutorial Classes: 15**  **Practical Classes: Nil**  **Total Classes: 60**

### OBJECTIVES:
The course should enable the students to:

I. Understand the concept of microprocessor and familiarize the architecture of 8085 and 8086 processor.
II. Analyze the assembly language programming using 8086 microprocessor.
III. Develop the knowledge of microprocessor based systems and interfacing techniques.
IV. Understand the concept of Interrupts and their significance in 8086.
V. Impart the basic concepts of serial and parallel bus standards.
VI. Understand the basic concept of advanced processor architectures.

### UNIT-I  OVER OF 8086 MICROPROCESSOR  Classes: 08

Introduction to 8085 microprocessor. RISC and CISC processors, architecture of 8086 microprocessor, special functions of general purpose register, 8086 flag register and function of 8086 flags, addressing modes of 8086, instruction set of 8086, assembler directives.

### UNIT-II  8086 AEESMBLY LANGUAGE PROGRAMMING  Classes: 09

Minimum mode and maximum mode of operation, timing diagram, Assembly language programs: Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

### UNIT-III  8255 PROGRAMMABLE PERIPHERAL INTERFACE (PPI)  Classes: 09

Various modes of 8255 operation and interfacing to 8086; Interfacing keyboard, displays, 8279 Stepper motor and actuators, digital to analog and analog to digital converter interfacing.

Interrupt structure of 8086: Interrupt structure of 8086, Vector interrupt table, interrupt service routines; Introduction to DOS and BIOS interrupts, need for DMA, DMA data transfer method, interfacing with 8237/8257;

### UNIT-IV  SERIAL DATA TRANSFER SCHEMES  Classes: 10

Asynchronous and synchronous data transfer schemes, 8251 USART architecture and interfacing; TTL to RS 232C and RS232C to TTL conversion; Sample program of serial data transfer; Introduction to high speed serial communications standards, USB.

### UNIT-V  ADVANCED MICROPROCESSORS  Classes: 09

80286 microprocessor: Architecture, registers (Real/Protected mode), privilege levels, descriptor cache, memory access in GDT and LDT, multitasking, addressing modes; Flag register 80386: Architecture, register organization, memory access in protected mode, paging; 80486: Only the technical features.
**Text Books:**


**Reference Books:**


**Web References:**

1. [http://www.daenotes.com/electronics/digital-electronics/Intel-8085-8-bitmicroprocessor# axzz2I19y U Se7I](http://www.daenotes.com/electronics/digital-electronics/Intel-8085-8-bitmicroprocessor# axzz2I19y U Se7I)
3. [https://www.smar](https://www.smar)tworld.com/notes/microprocessors-and-microcontrollers-mpmc/

**E-Text Books:**

2. [http://engineersevanigam.blogspot.in/2013/07/microprocessors-and-interfacing-by.html](http://engineersevanigam.blogspot.in/2013/07/microprocessors-and-interfacing-by.html)
OBJECTIVES:
The course should enable the students to:
I. Familiarize students with the Linux environment, and able to run commands on a standard Linux
   operating system.
II. Provide the skills needed to develop and customize Linux shell programs and to make effective use of
    a wide range of standard Linux programming and development tools.
III. Able to write moderate C programs utilizing common system calls.
IV. Develop the skills necessary for system programming and inter and intra process communication
    programming.

UNIT I | INTRODUCTION AND LINUX UTILITIES | Classes: 10

Introduction to Linux operating system: History of Linux, features of Linux, architecture of unix/linux,
Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities,
Networking commands, Filters, Text processing utilities and Backup utilities; Sed: Scripts, operation,
addresses, commands; Awk: Execution, fields and records scripts, operation, patterns, actions,
applications; Working with the Bourne again shell(bash): Introduction, shell responsibilities, pipes and
input Redirection, output redirection, here documents, running a shell script, the shell as a programming
language, shell meta characters, file name substitution, shell variables, command substitution, shell
commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script
examples, interrupt processing, functions, debugging shell scripts.

UNIT II | FILES AND DIRECTORIES SYSTEM CALLS | Classes: 08

Files and Directories: File Concept, File types, File System Structure, File metadata- Inodes, kernel
support for files, n, file System calls for file I/O operations- open, create, read, write, close, lseek,dup2,
file status information- stat family, file and record locking- fcntl function, permission- chmod, fchmod,
file ownership- chown, lchown, fchown, links- soft links & hard links- symlink, link, ulink. Directories:
creating, removing and changing directories- mkdir, rmdir, chdir, obtaining current working directory-
getcwd, directory contents, scanning directories- opendir, readdir, closedir, rewind dir functions.

UNIT III | PROCESS AND SIGNALS | Classes: 10

Process – Process concept, Layout of a C program, image in main memory, process environment-
environment list, environment variables, getenv, setenv, Kernel support for process, process
identification, process control - process creation, replacing a process image, waiting for a process, process
termination, zombie process, orphan process, system call interface for process management- fork, vfork,
exit, wait, waitpid, exec family, process groups, sessions & controlling terminal, differences between
threads & processes.

Signals– Introduction to signals, Signal generation and handling, Kernel support for signals, Signal
function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions.
**UNIT-IV** | **INTERPROCESS COMMUNICATION**
---|---
Interprocess Communication: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, Pipes- creation, IPC between related processes using unnamed pipes, FIFOs- creation, IPC between unrelated processes using FIFOs(named pipes), differences between unnamed and named pipes, popen & pclose library functions. Message Queues- Kernel support for messages, APIs for message queues, client/server example. Semaphores-Kernel support for semaphores, APIs for semaphores, file locking with Semaphores.

**UNIT-V** | **SHARED MEMORY AND SOCKETS**
---|---
Shared Memory- Kernel support for shared memory, APIs for shared memory, shared memory example. Sockets: Introduction to Berkeley Sockets, IPC over a network, client/server model, Socket Address structures (UNIX domain & internet domain), Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs- single client/server connection, Multiple simultaneous clients, Socket options - setsockopt and fcntl system calls, Comparison of IPC Mechanisms.

**Text Books:**

**Reference Books:**
1. T. Chan, “Unix System Programming using C++”, PHI.

**Web References:**
1. [https://www.edx.org/course/introduction-linux-linuxfoundationx-lfs101x-0](https://www.edx.org/course/introduction-linux-linuxfoundationx-lfs101x-0)
2. [http://www.tutorialspoint.com/listtutorials/linux/1](http://www.tutorialspoint.com/listtutorials/linux/1)

**E-Text Books:**

**MOOC Course**
1. [https://training.linuxfoundation.org/free-linux-training](https://training.linuxfoundation.org/free-linux-training)

**Course Home Page:**
DATA WAREHOUSING AND DATA MINING

VI Semester: CSE | IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<td></td>
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<td>3 1 - 4</td>
<td>30 70</td>
<td>100</td>
</tr>
</tbody>
</table>

Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes:60

OBJECTIVES:
The course should enable the students to:
I. Understand data warehouse and online analytical processing technology for data mining.
II. Make mining association rules in large databases, do classification and prediction with different techniques.
III. Conceptualize the architecture of a data warehouse and the need for pre-processing.
IV. Develop and understand data mining applications and trends of data mining.
V. Analyze the major techniques of preprocessing for different types of data.

UNIT-I  DATAWAREHOUSING  Classes: 08
Introduction to Data warehouse, A Multi dimensional data model- Star, Snow flake and Fact constellation schemas, Measures, Concept hierarchy, Data warehouse architecture- A three tier Data warehouse architecture, types of OLAP servers, Data warehouse Implementation, Data Marts, Differences between OLAT and OLTP

UNIT-II  DATA MINING  Classes: 10
Introduction, What is Data Mining, Definition, Knowledge Discovery in Data (KDD), Kinds of data bases, Data mining functionalities, Classification of data mining systems, Data mining task primitives, Data Preprocessing: Data cleaning, Data integration and transformation, Data reduction, Data discritization and Concept hierarchy

UNIT-III  ASSOCIATION RULE MINING  Classes: 10
Association Rules: Problem Definition, Frequent item set generation, The APRIORI Principle, support and confidence measures, association rule generation; APRIORI algorithm.
FP-Growth Algorithms, Compact Representation of Frequent item Set-Maximal Frequent item set, closed frequent item set.

UNIT-IV  CLASSIFICATION AND PREDICTION  Classes: 10
Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT-V  CLUSTERING  Classes: 07
Types of data, categorization of major clustering methods, K-means partitioning methods, hierarchical methods, density based methods, grid based methods, model based clustering methods, outlier analysis.
Mining Complex Types of Data: Multi dimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.
# Text Books:


# Reference Books:


# Web References:

1. http://www.anderson.ucla.edu
2. https://www.smartzworld.com
3. http://iiscs.wssu.edu

# E-Text Books:


# MOOC Course

https://3ca1513rbm.wordpress.com

# Course Home Page:
IDEATION AND PRODUCT DEVELOPMENT

VI Semester: Common for all branches

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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Contact Classes: Tutorial Classes: Practical Classes: 28 Total Classes: 28

OBJECTIVES:
The course should enable the students:

I. To develop next generation Entrepreneurs and Creative Leaders to resolve live challenges.
II. To understand about the future needs of industries.
III. To transform innovative ideas into successful businesses.
IV. To use a range of creative thinking tools to develop Out of the Box Ideas.
V. To develop Breakthrough Innovators and Dynamic Thinkers.

Syllabus

- Successful team formation and management
- Introduction to user-centred design
- Ideation and use of personas and POVs
- Need finding
- Embedded Microcontrollers for consumer products
- Human factors in engineering design
- Critical Experience and Critical Function Prototyping
- Dark Horse and ‘Funky’ prototyping
- Rapid prototyping and manufacturing
- Design for manufacture
- User testing
- Use of video/electronic media for communication
- Start-ups and entrepreneurship
- Intellectual Property

Text Books:

VI Semester: IT | V Semester: CSE

<table>
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<th>Category</th>
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<td>SEE</td>
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<td></td>
<td></td>
<td>-  -  3  2</td>
<td>30</td>
<td>70</td>
</tr>
</tbody>
</table>

Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: 42  Total Classes: 42

OBJECTIVES:
The course will enable the students to:
I. Developing of assembly level programs and provide the basics of the microprocessors.
II. Provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems.
III. Understand various interfacing circuits necessary for various applications.

LIST OF EXPERIMENTS

Week-1  DESIGN A PROGRAM USING MASM & 8086 MICROPROCESSOR
Design and develop an assembly language program using 8086 microprocessor and to show the following aspects.
- Programming
- Execution
- Debugging
To demonstrate win 862 software and Trainer kit for 8086 microprocessor.

Week-2  8 AND 16 BIT ARITHMETIC OPERATIONS
- d. Write an ALP program to perform 8 Bit arithmetic operations using MASM software and 8086.
- e. Write an ALP program to perform 16 Bit arithmetic operations using MASM software and 8086.

Week-3  PALINDROME, ABSTRACT CLASS
- a. Write an ALP program to perform multi byte addition and subtraction
- b. Write an ALP program to perform 3*3 matrix multiplication and addition

Week-4  PROGRAMS TO SORT NUMBERS
- a. Write an ALP program to perform ascending order using 8086
- b. Write an ALP program to perform descending order using 8086

Week-5  PROGRAMS TO LCM & HCF NUMBERS
- a. Write an ALP program to find the LCM & HCF of given numbers.
- b. Write an ALP program to find square and cube of a given numbers.

Week-6  PROGRAMS FOR STRING MANIPULATIONS OPERATIONS
- a. Write an ALP program to insert or delete a byte in the given string.
- b. Write an ALP program to search a number/character in a given string.

Week-7  PROGRAMS FOR STRING MANIPULATIONS OPERATIONS
- a. Write an ALP program to move a block of data from one memory location to the other.
- b. Write an ALP program for reverse of a given string.
<table>
<thead>
<tr>
<th>Week 8</th>
<th>PROGRAMS FOR STRING MANIPULATIONS OPERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Write an ALP program to find the number of even and odd numbers in the given string.</td>
</tr>
<tr>
<td>b.</td>
<td>Write an ALP program to generate a Fibonacci series.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 9</th>
<th>CODE CONVERSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Write an ALP program to convert packed BCD to Unpacked BCD.</td>
</tr>
<tr>
<td>b.</td>
<td>Write an ALP program to convert packed BCD to ASCII.</td>
</tr>
<tr>
<td>c.</td>
<td>Write an ALP program to convert hexadecimal to ASCII.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 10</th>
<th>INTERFACING ADC &amp; DAC DEVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Write an ALP program to convert analog to digital using 8086.</td>
</tr>
<tr>
<td>b.</td>
<td>Write an ALP program to convert digital to analog using 8086.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 11</th>
<th>GENERATE SQUARE, SINE &amp; TRIANGLE WAVES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Write an ALP program to generate Saw tooth and staircase wave forms.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 12</th>
<th>INTERFACING STEPPER MOTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Write an ALP program to rotate stepper motor in clockwise direction.</td>
</tr>
<tr>
<td>b.</td>
<td>Write an ALP program to rotate stepper motor in anti clockwise direction.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 13</th>
<th>PARALLEL AND SERIAL COMMUNICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Parallel communication between two microprocessors using 8255.</td>
</tr>
<tr>
<td>b.</td>
<td>Serial communication between two microprocessor kits using 8251.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week 14</th>
<th>INTERFACING TRAFFIC LIGHT CONTROLLER AND TONE GENERATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Write a program to interface traffic light controller.</td>
</tr>
<tr>
<td>b.</td>
<td>Write an ALP program to interface tone generator.</td>
</tr>
</tbody>
</table>

**Reference Books:**


**Web References:**

1. http://nptel.ac.in/courses/106108100/

**Course Home Page:**

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS

**HARDWARE:** Desktop Computer Systems: 36 (nos)

**SOFTWARE:** Application Software: MASM, Keil µVision Tools
**LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the Equipment</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regulated Power Supply</td>
<td>0-5V &amp; 12V DC</td>
</tr>
<tr>
<td>2</td>
<td>DSRO</td>
<td>0-20 MHz</td>
</tr>
<tr>
<td>3</td>
<td>8086 Trainer Kits with keyboard</td>
<td>43 No’s</td>
</tr>
<tr>
<td>4</td>
<td>8051 Trainer kits with keyboard</td>
<td>40 No’s</td>
</tr>
<tr>
<td>5</td>
<td>Serial Interface cable</td>
<td>45 No’s</td>
</tr>
<tr>
<td>6</td>
<td>Stepper Motors</td>
<td>45 No’s</td>
</tr>
<tr>
<td>7</td>
<td>A/D Device</td>
<td>14 No’s</td>
</tr>
<tr>
<td>8</td>
<td>A/D and Dual D/A Devices</td>
<td>27 No’s</td>
</tr>
<tr>
<td>9</td>
<td>Dual D/A Devices</td>
<td>14 No’s</td>
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<tr>
<td>10</td>
<td>PPI 8255</td>
<td>12 No’s</td>
</tr>
<tr>
<td>11</td>
<td>USART 8251</td>
<td>7 No’s</td>
</tr>
<tr>
<td>12</td>
<td>Keyboard/ Seven segment controller</td>
<td>7 No’s</td>
</tr>
<tr>
<td>13</td>
<td>Traffic Light Controller</td>
<td>3 No’s</td>
</tr>
<tr>
<td>14</td>
<td>RTC/ Tone generator</td>
<td>3 No’s</td>
</tr>
<tr>
<td>15</td>
<td>Elevator</td>
<td>2 No’s</td>
</tr>
<tr>
<td>16</td>
<td>SRAM and DRAM</td>
<td>2 No’s</td>
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<tr>
<td>17</td>
<td>DMA Controller</td>
<td>1 No’s</td>
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<tr>
<td>18</td>
<td>LCD Display</td>
<td>40 No’s</td>
</tr>
<tr>
<td>19</td>
<td>Timer/Counter, UART and Interrupt</td>
<td>44 No’s</td>
</tr>
<tr>
<td>20</td>
<td>Keyboard</td>
<td>40 No’s</td>
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LINUX INTERNALS LABORATORY

<table>
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<tr>
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<th>Category</th>
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<td>-  -  3  2</td>
<td>30</td>
<td>70  100</td>
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</table>

Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: 36  Total Classes: 36

OBJECTIVES:
The course should enable the students to:
I. Familiar with the Linux command-line environment.
II. Understand system administration processes by providing a hands-on experience.
III. Understand Process management and inter-process communications techniques.

LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>Week-1</th>
<th>BASIC COMMANDS I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Study and Practice on various commands like man, passwd, tty, script, clear, date, cal, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who, w.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-2</th>
<th>BASIC COMMANDS II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Study and Practice on various commands like cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Week-3</th>
<th>SHELL PROGRAMMING I</th>
</tr>
</thead>
</table>
|            | a) Write a Shell Program to print all .txt files and .c files.  
|            | b) Write a Shell program to move a set of files to a specified directory.  
|            | c) Write a Shell program to display all the users who are currently logged in after a specified time.  
|            | d) Write a Shell Program to wish the user based on the login time. |

<table>
<thead>
<tr>
<th>Week-4</th>
<th>SHELL PROGRAMMING II</th>
</tr>
</thead>
</table>
|            | a) Write a Shell program to pass a message to a group of members, individual member and all.  
|            | b) Write a Shell program to count the number of words in a file.  
|            | c) Write a Shell program to calculate the factorial of a given number.  
|            | d) Write a Shell program to generate Fibonacci series. |

<table>
<thead>
<tr>
<th>Week-5</th>
<th>SIMULATING COMMANDS I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) Simulate cat command  b) Simulate cp command</td>
</tr>
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<thead>
<tr>
<th>Week-6</th>
<th>SIMULATING COMMANDS II</th>
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<tbody>
<tr>
<td></td>
<td>a) Simulate tail command  b) Simulate head command</td>
</tr>
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<th>Week-7</th>
<th>SIMULATING COMMANDS III</th>
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<tbody>
<tr>
<td></td>
<td>a) Simulate mv command  b) Simulate nl command</td>
</tr>
<tr>
<td>Week 8</td>
<td>SIGNAL HANDLING</td>
</tr>
<tr>
<td>--------</td>
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<tr>
<td></td>
<td>Write a program to handle the signals like SIGINT, SIGDFL, SIGIGN</td>
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<table>
<thead>
<tr>
<th>Week 9</th>
<th>INTERPROCESS COMMUNICATIONS I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Implement the following IPC forms</td>
</tr>
<tr>
<td></td>
<td>a) FIFO b) PIPE</td>
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<tr>
<th>Week 10</th>
<th>MESSAGE QUEUES</th>
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<tbody>
<tr>
<td>1.</td>
<td>Write a C program (sender.c) to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.</td>
</tr>
<tr>
<td>2.</td>
<td>Write a C program (receiver.c) that receives the messages (from the above message queue as specified and displays them.</td>
</tr>
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<table>
<thead>
<tr>
<th>Week 11</th>
<th>SHARED MEMORY</th>
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<tbody>
<tr>
<td></td>
<td>Implement shared memory form of IPC.</td>
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<table>
<thead>
<tr>
<th>Week 12</th>
<th>SOCKET PROGRAMMING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Write client and server programs (using c) for interaction between server and client processes using TCP Elementary functions.</td>
</tr>
<tr>
<td>2.</td>
<td>Write client and server programs (using c) for interaction between server and client processes using UDP Elementary functions.</td>
</tr>
</tbody>
</table>

**Reference Books:**


**Web References:**

4. http://cse09-iith.virtual-labs.ac.in/

**Course Home Page:**

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

**HARDWARE:** Desktop Computer Systems: 36 nos

**SOFTWARE:** System Software: Linux Operating System
DATAWAREHOUSING AND DATAMINING LABORATORY

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**OBJECTIVES:**

The course should enable the students to:
I. Explore on data mining features.
II. Create and perform preprocessing on new and existing datasets.
III. Generate association rules on transactional data.
IV. Build the data models by using various classification and clustering algorithms.
V. Analyze the data models accuracy by varying the sample size.

**LIST OF EXPERIMENTS**

**WEEK-1 ** MATRIX OPERATIONS
Introduction to Python libraries for Data Mining : NumPy, SciPy, Pandas, Matplotlib, Scikit-Learn
Write a Python program to do the following operations:
Library: NumPy
a) Create multi-dimensional arrays and find its shape and dimension
b) Create a matrix full of zeros and ones
c) Reshape and flatten data in the array
d) Append data vertically and horizontally
e) Apply indexing and slicing on array
f) Use statistical functions on array - Min, Max, Mean, Median and Standard Deviation

**WEEK-2 ** LINEAR ALGEBRA ON MATRICES
Write a Python program to do the following operations:
Library: NumPy
a) Dot and matrix product of two arrays
b) Compute the Eigen values of a matrix
c) Solve a linear matrix equation such as 3 * x^0 + x^1 = 9, x^0 + 2 * x^1 = 8
d) Compute the multiplicative inverse of a matrix
e) Compute the rank of a matrix
f) Compute the determinant of an array

**WEEK-3 ** UNDERSTANDING DATA
Write a Python program to do the following operations:
Data set: brain_size.csv
Library: Pandas
a) Loading data from CSV file
b) Compute the basic statistics of given data - shape, no. of columns, mean
c) Splitting a data frame on values of categorical variables
d) Visualize data using Scatter plot

**WEEK-4 ** CORRELATION MATRIX
Write a python program to load the dataset and understand the input data
Dataset : Pima Indians Diabetes Dataset
Library : Scipy
a) Load data, describe the given data and identify missing, outlier data items
b) Find correlation among all attributes
c) Visualize correlation matrix
WEEK -5 | DATA PREPROCESSING – HANDLING MISSING VALUES
Write a python program to impute missing values with various techniques on given dataset.
a) Remove rows/ attributes
b) Replace with mean or mode
c) Write a python program to Perform transformation of data using Discretization (Binning) and normalization (MinMaxScaler or MaxAbsScaler) on given dataset.

WEEK -6 | ASSOCIATION RULE MINING - APRIORI
Write a python program to find rules that describe associations by using Apriori algorithm between different products given as 7500 transactions at a French retail store.
Libraries: NumPy, SciPy, Matplotlib, Pandas
Dataset: https://drive.google.com/file/d/1y5DYn0dGoSbC22xowBq2dpo6h1JxcTQ/view?usp=sharing
a) Display top 5 rows of data
b) Find the rules with min_confidence : .2, min_support= 0.0045, min_lift=3, min_length=2

WEEK -7 | CLASSIFICATION – LOGISTIC REGRESSION
Classification of Bank Marketing Data
The data is related with direct marketing campaigns of a Portuguese banking institution. The marketing campaigns were based on phone calls. Often, more than one contact to the same client was required, in order to access if the product (bank term deposit) would be (‘yes’) or not (‘no’) subscribed. The dataset provides the bank customers’ information. It includes 41,188 records and 21 fields. The classification goal is to predict whether the client will subscribe (1/0) to a term deposit (variable y).
Libraries: Pandas, NumPy, Sklearn, Seaborn
Write a python program to
a) Explore data and visualize each attribute
b) Predict the test set results and find the accuracy of the model
c) Visualize the confusion matrix
d) Compute precision, recall, F-measure and support

WEEK-8 | CLASSIFICATION - KNN
Dataset: The data set consists of 50 samples from each of three species of Iris: Iris setosa, Iris virginica and Iris versicolor. Four features were measured from each sample: the length and the width of the sepal and petals, in centimetres.
Libraries: import numpy as np
Write a python program to
a) Calculate Euclidean Distance. b) Get Nearest Neighbors c) Make Predictions.

WEEK-9 | CLASSIFICATION - DECISION TREES
Write a python program
a) to build a decision tree classifier to determine the kind of flower by using given dimensions.
b) training with various split measures( Gini index, Entropy and Information Gain)
c)Compare the accuracy

WEEK -10 | CLUSTERING – K-MEANS
Predicting the titanic survive groups:
The sinking of the RMS Titanic is one of the most infamous shipwrecks in history. On April 15, 1912, during her maiden voyage, the Titanic sank after colliding with an iceberg, killing 1502 out of 2224 passengers and crew. This sensational tragedy shocked the international community and led to better safety regulations for ships. One of the reasons that the shipwreck led to such loss of life was that there were not enough lifeboats for the passengers and crew. Although there was some element of luck involved in surviving the sinking, some groups of people were more likely to survive than others, such as women, children, and the upper-class.
Libraries: Pandas, NumPy, Sklearn, Seaborn, Matplotlib
Write a python program
a) to perform preprocessing
b) to perform clustering using k-means algorithm to cluster the records into two i.e. the ones who survived and the ones who did not.
Predicting Loan Defaulters:
A bank is concerned about the potential for loans not to be repaid. If previous loan default data can be used to predict which potential customers are liable to have problems repaying loans, these "bad risk" customers can either be declined a loan or offered alternative products.
Dataset: The stream named bayes_bankloan.str, which references the data file named bankloan.sav. These files are available from the Demos directory of any IBM® SPSS® Modeler installation and can be accessed from the IBM SPSS Modeler program group on the Windows Start menu. The bayes_bankloan.str file is in the streams directory.
   a) Build Bayesian network model using existing loan default data
   b) Visualize Tree Augmented Naïve Bayes model
   a) Predict potential future defaulters, and looks at three different Bayesian network model types (TAN, Markov, Markov-FS) to establish the better predicting model.

A wide dataset is one with a large number of predictors, such as might be encountered in the field of bioinformatics (the application of information technology to biochemical and biological data). A medical researcher has obtained a dataset containing characteristics of a number of human cell samples extracted from patients who were believed to be at risk of developing cancer. Analysis of the original data showed that many of the characteristics differed significantly between benign and malignant samples.
Dataset: The stream named svm_cancer.str, available in the Demos folder under the streams subfolder. The data file is cell_samples.data. The dataset consists of several hundred human cell sample records, each of which contains the values of a set of cell characteristics.
   a) Develop an SVM model that can use the values of these cell characteristics in samples from other patients to give an early indication of whether their samples might be benign or malignant.
   Hint: Refer UCI Machine Learning Repository for data set.

References:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 24 STUDENTS:

HARDWARE:
Intel Desktop Systems: 24 Nos

SOFTWARE:
Application Software: Python, IBM SPSS Modeler - CLEMENTINE
CLOUD COMPUTING

VII Semester: IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<td>Core</td>
<td>L T P C CIE SEE Total</td>
<td>3 1 - 4 30 70 100</td>
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Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

OBJECTIVES:
The course should enable the students to:

I. Provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.

II. Enable students exploring some important cloud computing driven commercial systems such as GoogleApps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

III. Expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

IV. Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.

UNIT-I  SYSTEM MODELING, CLUSTERING AND VIRTUALIZATION  Classes: 09

Scalable computing over the Internet, Technologies for network based systems, System models for distributed and cloud computing, Software environments for distributed systems and clouds, Performance, security and energy efficiency.

UNIT-II  VIRTUAL MACHINES AND VIRTUALIZATION OF CLUSTERS AND DATA CENTERS  Classes: 09

Implementation levels of virtualization, Virtualization tools, structures and mechanisms, Virtualization of CPU, Memory and I/O devices, Virtual clusters and resource management, Virtualization for data center automation.

UNIT-III CLOUD PLATFORM ARCHITECTURE  Classes: 09

Cloud computing and service models, Architectural design of compute and storage clouds, Public cloud platforms, Inter-cloud resource management.

Cloud security and trust management, Service Oriented Architecture (SOA), Message-oriented middleware architecture.

UNIT-IV  CLOUD PROGRAMMING AND SOFTWARE ENVIRONMENTS  Classes: 09

Features of Cloud and grid platforms, Parallel and distributed programming paradigms, Programming support of Google App Engine, Programming on Amazon AWS and MS Azure, Emerging cloud software environments.

UNIT-V  CLOUD RESOURCE MANAGEMENT AND SCHEDULING  Classes: 09

Policies and mechanisms for resource management applications of control theory to task scheduling in a cloud, Stability of a two level resource allocation architecture, Feedback controls based on dynamic thresholds, Coordination of specialized autonomic performance managers, Resource Bundling.
### Text Books:


### Reference Books:


### Web References:


### E-Text Books:


### MOOC Course:

2. [http://www.coursera.org/specialization/cloud-computing](http://www.coursera.org/specialization/cloud-computing)

### Course Home Page:
SOFTWARE TESTING METHODOLOGY

VII Semester: CSE/IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
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</tbody>
</table>

Contact Classes: 45  Tutorial Classes: 15  Practical Classes: Nil  Total Classes: 60

OBJECTIVES:
The course should enable the students to:
I. Understand the concept of software testing objectives, process criteria, strategies and methods.
II. Demonstrate various software testing issues and solutions in software like unit test, integration, regression and system testing.
III. Demonstrate the techniques and skills on how to use modern software testing tools to support software testing projects.
IV. Understand important concepts of complexity metrics and object oriented metrics.

UNIT-I  INTRODUCTION TO TESTING  Classes: 10
Introduction: Purpose of testing, dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow graphs and path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II  TRANSACTION FLOW TESTING  Classes: 08
Transaction flow testing: Transaction flows, transaction flow testing techniques, dataflow testing, basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III  LEVELS OF TESTING  Classes: 09
Domain testing: Domains and paths, nice and ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.
Logic based testing: Overview, decision tables, path expressions, kv charts, and specifications.

UNIT-IV  PATH PRODUCTS  Classes: 08
Paths, path products and regular expressions: Path products and path expression, reduction procedure, applications, regular expressions and flow anomaly detection.

UNIT-V  TRANSITION TESTING  Classes: 10
State, state graphs and transition testing: State graphs, good and bad state graphs, state testing, testability tips.

Text Book:

Reference Books:
<table>
<thead>
<tr>
<th>Web References:</th>
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</table>

<table>
<thead>
<tr>
<th>E-Text Books:</th>
</tr>
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<tbody>
<tr>
<td>4. <a href="https://onlinecourses.nptel.ac.in/noc16_cs16/preview">https://onlinecourses.nptel.ac.in/noc16_cs16/preview</a></td>
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<table>
<thead>
<tr>
<th>MOOC Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. <a href="https://www.utest.com/search-result/tag/Test%20Cycles">https://www.utest.com/search-result/tag/Test%20Cycles</a></td>
</tr>
<tr>
<td>3. <a href="https://www.edureka.co/software-testing">https://www.edureka.co/software-testing</a></td>
</tr>
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</table>

<table>
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<tr>
<th>Course Home Page:</th>
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BIG DATA AND BUSINESS ANALYTICS

VII Semester: CSE / IT

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Contact Classes: 45  
Tutorial Classes: 15  
Practical Classes: Nil  
Total Classes: 60

COURSE OBJECTIVES:
The course should enable the students to:
I. Optimize business decisions and create competitive advantage with Big data analytics  
II. Understand several key big data technologies used for storage, analysis and manipulation of data.  
III. Recognize the key concepts of Hadoop framework, map reduce.  
IV. Demonstrate the concepts in Hadoop for application development.

UNIT-I  
INTRODUCTION TO BIG DATA  
Classes: 08
Introduction to Big data: Characteristics of Data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, Traditional Business Intelligence (BI) versus Big Data. Big data analytics: Classification of Analytics, Importance and challenges facing big data, Terminologies Used in Big Data Environments, The Big Data Technology Landscape.

UNIT-II  
INTRODUCTION TO HADOOP  
Classes: 09
Introducing Hadoop, RDBMS versus Hadoop, Distributed Computing Challenges, History and overview of Hadoop, Use Case of Hadoop, Hadoop Distributors, Processing Data with Hadoop, Interacting with Hadoop Ecosystem.

UNIT-III  
THE HADOOP DISTRIBUTED FILESYSTEM  
Classes: 09

UNIT-IV  
UNDERSTANDING MAP REDUCE FUNDAMENTALS  
Classes: 09
Map Reduce Framework: Exploring the features of Map Reduce, Working of Map Reduce, Exploring Map and Reduce Functions, Techniques to optimize Map Reduce jobs, Uses of Map Reduce. Controlling MapReduce Execution with InputFormat, Reading Data with custom RecordReader-,Reader, Writer, Combiner, Partitioners, Map Reduce Phases, Developing simple MapReduce Application.

UNIT-V  
INTRODUCTION TO PIG and HIVE  
Classes: 10
Introducing Pig: Pig architecture, Benefits, Installing Pig, Properties of Pig, Running Pig. Getting started with Pig Latin, Working with operators in Pig, Working with functions in Pig. Introducing Hive: Getting started with Hive, Hive Services, Data types in Hive, Built-in functions in Hive, Hive DDL.

Text Books:
### Reference Books:


### Web References:

3. https://www.webopedia.com

### E-Text Books:

1. https://www.books.google.co.in/books?id=rkWPojgeM8C&printsec=frontcover&dq=HIGH+PERFORMANCE+COMPUTING.

### Course Home Page:
### CLOUD APPLICATION DEVELOPMENT LABORATORY

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Contact Classes: Nil  
Tutorial Classes: Nil  
Practical Classes: 45  
Total Classes: 45

**OBJECTIVES:**
**The course should enable the students to:**
I. Learn to run virtual machines of different configuration.
II. Develop Big Data application using Hadoop.
III. Exposed to tool kits for cloud environment.
IV. Developing web services/Applications in cloud framework.

### LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>Week-1</th>
<th>VIRTUALIZATION</th>
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<tbody>
<tr>
<td></td>
<td>Install Oracle Virtual box and create two VMs on your laptop.</td>
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<tr>
<th>Week-2</th>
<th>VIRTUALIZATION</th>
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<tr>
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<td>Install Turbo C in guest OS and execute C program.</td>
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<tr>
<th>Week-3</th>
<th>VIRTUALIZATION</th>
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<tr>
<td></td>
<td>Test ping command to test the communication between the guest OS and Host OS.</td>
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<tr>
<th>Week-4</th>
<th>HADOOP</th>
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<tr>
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<td>Install Hadoop single node setup.</td>
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<tr>
<th>Week-5</th>
<th>HADOOP</th>
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<tbody>
<tr>
<td></td>
<td>Develop a simple hadoop application called Word Count. It counts the number of occurrences of each word in a given input set.</td>
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<thead>
<tr>
<th>Week-6</th>
<th>HADOOP</th>
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<tbody>
<tr>
<td></td>
<td>Develop hadoop application to count no of characters, no of words and each character frequency.</td>
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<thead>
<tr>
<th>Week-7</th>
<th>HADOOP</th>
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<tbody>
<tr>
<td></td>
<td>Develop hadoop application to process given data and produce results such as finding the year of maximum usage, year of minimum usage.</td>
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<tr>
<td>Week</td>
<td>Topic</td>
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<td>Week-8</td>
<td>HADOOP</td>
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<td>Week-9</td>
<td>CLOUD PROGRAMMING</td>
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<td>Week-10</td>
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<td>Week-11</td>
<td>CLOUD PROGRAMMING</td>
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<td>Week-13</td>
<td>CLOUD PROGRAMMING</td>
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<td>Week-14</td>
<td>WINDOWS AZURE</td>
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<tr>
<td>Week-15</td>
<td>PIPES</td>
</tr>
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</table>

**Reference Books**

```markdown
# Software and Hardware Requirements

## Hardware:
Standalone desktops with internet facility: 36 nos.

## Software:
Globus Toolkit or equivalent Eucalyptus or Open Nebula.

---

### Web References:

3. [https://aws.amazon.com/](https://aws.amazon.com/)
5. [https://cloud.google.com/appengine/docs/java/gettingstarted/creating-guestbook](https://cloud.google.com/appengine/docs/java/gettingstarted/creating-guestbook)
6. [https://www.google.co.in/?gfe_rd=cr&ei=SZIJWOOnIaxqTDyrewCw&gws_rd=ssl#q=yahoopipes+mashuptutorial](https://www.google.co.in/?gfe_rd=cr&ei=SZIJWOOnIaxqTDyrewCw&gws_rd=ssl#q=yahoopipes+mashuptutorial).

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Course Home Page:
SOFTWARE TESTING METHODOLOGY LABORATORY

VII Semester: CSE / IT

<table>
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<th>Course Code</th>
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</table>

Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: 36  Total Classes: 36

OBJECTIVES:
The course should enable the students to:
I. Learn the importance of web testing tool and bug tracking tool.
II. Develop test case and test plan document for banking application.
III. Learn to write system specifications of any application and report various bugs in it.
IV. Use automated functional testing tool like Quick Test Professional.

LIST OF EXPERIMENTS

Week-1  CONSTRUCTS
Write programs in C language to demonstrate the working of the following constructs:
a) while  b) switch  c) for  d) if-else  e) do-while

Week-2  SYSTEM SPECIFICATIONS
a. Study the system specifications of ATM system and report various bugs in it.
b. Study the system specifications of banking application and report various bugs in it.

Week-3  TEST CASES
a. Write the test cases for ATM system.
b. Write the test cases for banking application.

Week-4  TEST PLAN
Create a test plan document for any application (e.g. Library management system).

Week-5  TESTING TOOL
Study of any testing tool (e.g. Win runner).

Week-6  SELENIUM
Study of web testing tool (e.g. Selenium).

Week-7  BUG TRACKING TOOL
Study of bug tracking tool (e.g. Bugzilla).
<table>
<thead>
<tr>
<th>Week</th>
<th>Study Area</th>
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</thead>
<tbody>
<tr>
<td>8</td>
<td><strong>BUGBIT</strong></td>
</tr>
<tr>
<td></td>
<td>Study of bug tracking tool (e.g. Bugbit).</td>
</tr>
<tr>
<td>9</td>
<td><strong>TEST MANAGEMENT TOOL</strong></td>
</tr>
<tr>
<td></td>
<td>Study of any test management tool (e.g. Testdirector).</td>
</tr>
<tr>
<td>10</td>
<td><strong>OPEN SOURCE TESTING TOOL</strong></td>
</tr>
<tr>
<td></td>
<td>Study of any Open Source Testing Tool (e.g. Test Link).</td>
</tr>
<tr>
<td>11</td>
<td><strong>AUTOMATED FUNCTIONAL TESTING TOOL</strong></td>
</tr>
<tr>
<td></td>
<td>Study of QTP (Quick Test Professional) automated functional testing tool.</td>
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<tr>
<td>12</td>
<td><strong>INTROSPECTION OF MATRIX MULTIPLICATION</strong></td>
</tr>
<tr>
<td></td>
<td>A program written in C language for matrix multiplication fails, introspect the causes for its failure and write down the possible reasons for its failure.</td>
</tr>
</tbody>
</table>

**Reference Books:**


**Web References:**

1. https://www.bugzilla.org/about/
2. http://www.seleniumhq.org/docs/01_introducing_selenium.jsp

**Course Home Page:**

**SOFTWARE AND HARDWARE REQUIREMENTS FOR 36 STUDENTS:**

**HARDWARE:** 36 numbers of Intel Desktop Computers with 4 GB RAM.

**SOFTWARE:** Application Software: Win runner, Selenium, Bugzilla, Bugbit, Testdirector, Testlink (Open Source)
OBJECTIVES:
The course should enable the students to:
I. Optimize business decisions and create competitive advantage with Big Data analytics.
II. Practice java concepts required for developing map reduce programs.
III. Impart the architectural concepts of Hadoop and introducing map reduce paradigm.
IV. Practice programming tools PIG and HIVE in Hadoop eco system.
V. Implement best practices for Hadoop development.

LIST OF EXPERIMENTS

Week-1  INSTALL VMWARE
Installation of VMWare to setup the Hadoop environment and its ecosystems.

Week-2  HADOOP MODES
a. Perform setting up and Installing Hadoop in its three operating modes.
   i. Standalone.
   ii. Pseudo distributed.
   iii. Fully distributed.
b. Use web based tools to monitor your Hadoop setup.

Week-3  USING LINUX OPERATING SYSTEM
Implementing the basic commands of LINUX Operating System – File/Directory creation, deletion, update operations.

Week-4  FILE MANAGEMENT IN HADOOP
Implement the following file management tasks in Hadoop:
   i. Adding files and directories
   ii. Retrieving files
   iii. Deleting files
Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies the minto HDFS using one of the above command line utilities.

Week-5  MAPREDUCE PROGRAM 1
Run a basic word count Map Reduce program to understand Map Reduce Paradigm.
<table>
<thead>
<tr>
<th>Week</th>
<th>MAPREDUCE PROGRAM 2</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Write a Map Reduce program that mines weather data.</td>
</tr>
<tr>
<td></td>
<td>Hint: Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented.</td>
</tr>
</tbody>
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<tr>
<th>Week</th>
<th>MAPREDUCE PROGRAM 3</th>
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<tbody>
<tr>
<td></td>
<td>Implement matrix multiplication with Hadoop Map Reduce.</td>
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<tr>
<th>Week</th>
<th>MAPREDUCE PROGRAM 4</th>
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<tbody>
<tr>
<td></td>
<td>Write a Map Reduce program that makes the dataset to be compressed.</td>
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<thead>
<tr>
<th>Week</th>
<th>MAPREDUCE PROGRAM 5</th>
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<tbody>
<tr>
<td></td>
<td>Write a Map Reduce program to run sorting techniques to the relevant data.</td>
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<thead>
<tr>
<th>Week</th>
<th>PIG LATIN LANGUAGE - PIG</th>
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<tbody>
<tr>
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<td>Installation of PIG.</td>
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<thead>
<tr>
<th>Week</th>
<th>PIG COMMANDS</th>
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<tbody>
<tr>
<td></td>
<td>Write Pig Latin scripts sort, group, join, project, and filter your data.</td>
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<tr>
<th>Week</th>
<th>PIG LATIN MODES</th>
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<tbody>
<tr>
<td></td>
<td>Implement the Pig Latin scripts in two different modes: Local mode and HDFS mode and run the different scripts and UDF’s.</td>
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<tr>
<th>Week</th>
<th>PIG PROGRAM</th>
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<tbody>
<tr>
<td></td>
<td>Run the Pig Latin Scripts to find a max temp for each and every year.</td>
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<tr>
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<tbody>
<tr>
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<td>Installation of HIVE.</td>
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<table>
<thead>
<tr>
<th>Week</th>
<th>HIVE OPERATIONS</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Use Hive to create, alter, and drop databases, tables, views, functions, and indexes.</td>
</tr>
</tbody>
</table>

**Reference Books:**

**Web References:**
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Pig latin: http://pig.apache.org/docs/r0.7.0/tutorial.html

**Course Home Page:**

**SOFTWARE AND HARDWARE REQUIREMENTS FOR 36 STUDENTS:**

**HARDWARE:** Desktop Computers with 4 GB RAM 36 nos.

**SOFTWARE:** VMWare, HADOOP.
OBJECTIVES:
The course should enable the students to:
I. Learn the basic categories of threats to computers and networks.
II. Understand various cryptographic algorithms and be familiar with public-key cryptography.
III. Apply authentication functions for providing effective security.
IV. Analyze the application protocols to provide web security.
V. Discuss the place of ethics in the information security area.

UNIT-I  ATTACKS ON COMPUTERS AND COMPUTER SECURITY  Classes: 08
Attacks on computers and computer security: Introduction, the need for security, security approaches, principles of security, types of security attacks, security services, security mechanism, a model for network security; Cryptography concepts and techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT-II  SYMMETRIC KEY CIPHERS  Classes: 10
Symmetric key ciphers: Block cipher principles and algorithms (DES, AES, Blowfish), differential and linear cryptanalysis, block cipher modes of operation, stream ciphers, RC4 location, and placement of encryption function, key distribution; Asymmetric key ciphers: Principles of public key cryptosystems, algorithms (RSA Diffie-Hellman, ECC) key distribution.

UNIT-III  MESSAGE AUTHENTICATION ALGORITHM AND HASH FUNCTIONS  Classes: 08
Message authentication algorithm and hash functions: Authentication requirements, functions, message, authentication codes, hash functions, secure hash algorithm, whirlpool, HMAC, CMAC, digital signatures, knapsack algorithm.

Authentication application: Kerberos, X.509 authentication service, public – key infrastructure, biometric authentication.

UNIT-IV  E-MAIL SECURITY  Classes: 10
E-mail Security: Pretty Good Privacy; S/MIMI IP Security: IP security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management.

UNIT-V  WEB SECURITY  Classes: 09
Web security: Web security considerations, secure socket layer and transport layer security, secure electronic transaction intruders; Virus and firewalls: Intruders, intrusion detection password management, virus and related threats, countermeasures, firewall design principles; Types of firewalls Case Studies on Cryptography and security: Secure inter-branch payment transactions, cross site scripting vulnerability, virtual electronics.
### Text Books:


### Reference Books:


### Web References:

2. https://books.google.co.in/books/about/Cryptography_Network_Security_Sie_2E.html?id=Kokjwdf0E7QC
3. https://books.google.co.in/books/about/Information_Security.html?id=Bh45pU0_E_4C

### E-Text Books:

1. https://books.google.co.in/books/about/Information_Security.html

### Course Home Page:
# MACHINE LEARNING

## VIII Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
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</table>

**Contact Classes: 45**  
**Tutorial Classes: Nil**  
**Practical Classes: Nil**  
**Total Classes: 45**

## OBJECTIVES:
The course should enable the students to:

I. Apply knowledge of computing and mathematics appropriate to the discipline.
II. Illustrate the concepts of machine learning and related algorithms.
III. Understand the dimensionality problems using linear discriminants.
IV. Study various statistical models for analyzing the data.
V. Learn clustering algorithms for unlabeled data.

## UNIT-I  
**TYPES OF MACHINE LEARNING**

- Concept learning: Introduction, version spaces and the candidate elimination algorithm; Learning with trees: Constructing decision trees, CART, classification example.

## UNIT-II  
**LINEAR DISCRIMINANTS**

- Perceptron (MLP): Going forwards, backwards, MLP in practices, deriving back; Propagation support vector Machines: Optimal separation, kernels.

## UNIT-III  
**BASIC STATISTICS**

- Averages, variance and covariance, the Gaussian; The bias-variance tradeoff Bayesian learning: Introduction, Bayes theorem, Bayes optimal classifier, naïve Bayes classifier.

- Graphical models: Bayesian networks, approximate inference, making Bayesian networks, hidden Markov models, the forward algorithm.

## UNIT-IV  
**EVOLUTIONARY LEARNING**

- Genetic Algorithms, genetic operators; Genetic programming; Ensemble learning: Boosting, bagging; Dimensionality reduction: Linear discriminate analysis, principal component analysis (JAX-RPC).

## UNIT-V  
**CLUSTERING**

- Similarity and distance measures, outliers, hierarchical methods, partitional algorithms, clustering large databases, clustering with categorical attributes, comparison.

## Text Books:

**Reference Books:**


**Web References:**

1. Http://ww.udemy.com/MachineLearning/Online_Course

**E-Text Books:**


**Course Home Page:**
C# AND .NET FRAMEWORK

1 Group: CSE / IT

<table>
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<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
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Contact Classes: 45
Tutorial Classes: Nil
Practical Classes: Nil
Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the syntax of basic C# programming constructs.
II. Create and use new types (enumerations, classes, and structures), and understand the differences between reference types and value types.
III. Implement custom collection classes that support enumeration.
IV. Explore on dynamic languages for creating web applications.

UNIT-I INTRODUCING TO C#  Classes: 10
Introducing C# and the .NET platform: The philosophy of .NET, the .NET solution, building blocks of the .NET platform (the CLR, CTS, and CLS), an overview of .NET assemblies, understanding the CTS, CLS, and CLR, the assembly / namespace / type distinction, exploring an assembly using ildasm.exe, exploring an assembly using reflector, the platform independent nature of .NET; Building C# application: The role of the .NET framework 4.0 SDK, building C# applications using csc.exe, building .NET applications using notepad++, building .NET applications using C# development, building .NET applications using visual C# 2010 express, building .NET applications using visual studio 2010.

UNIT-II CORE C# PROGRAMMING  Classes: 09
Core C# programming constructs part - I: The anatomy of simple C# program, environment class, the system, Console class, system data types and C# shorthand notation, working with string data, narrowing and widening data type local variables, C# iteration constructs, decision constructs and the relational / equality operators; Core programming constructs part-II: Methods and parameter modifiers, understanding C# arrays, understanding the enum type, understanding the structure type, understanding value types and reference types, understanding C# nullable type.

UNIT-III UNDERSTANDING INHERITANCE AND POLYMORPHISM  Classes: 08
Inheritance: The basic mechanics of inheritance, revising visual studio class diagrams, defining the pillars of OOP, the first pillar, the second pillar of OOP, the third pillar of OOP, understanding base class / derived class casting rules, the master parent class.

Understanding structured exception handling: ODE to errors, bugs, and exceptions, the role of .NET exception handling, the simplest possible example, configuring the state of an exception, types of exceptions, processing multiple exceptions.

UNIT-IV DElegates AND EVENTS WITH .NET ASSEMBLIES  Classes: 08
Delegates and events: Understanding the .NET delegate type, defining a delegate type in C#, the system multicast delegate and system, delegate base classes, the simple possible delegate example, sending object state notification using delegates; Programming with .NET assemblies: Configuring .NET assemblies, defining custom namespaces, the role of .NET assemblies, understanding the format of a .NET assembly,
building and consuming a single-file assembly, building and consuming a multi file assembly, understanding private assembly, understanding shared assembly, consuming a shared assembly, configuring shared assemblies, understanding publisher policy assemblies, understanding the <codebase> element, the system, configuration namespace.

<table>
<thead>
<tr>
<th>UNIT-V</th>
<th>ADO.NET PROGRAMMING WITH C#</th>
<th>Classes: 10</th>
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</thead>
<tbody>
<tr>
<td>ADO.NET part - I: The connected layer, a high-level definition of ADO.NET, understanding ADO.NET data provider, additional ADO.NET namespaces, the types of the system, data, namespace, abstracting data providers using interfaces, creating the auto lot database, the ADO.NET data provider factory model, understanding the connected layer of ADO.NET, working with data readers, building a reusable data access library, creating a console UI-based front end, understanding database transactions; ADO.NET part - II: Disconnected layer understanding the disconnected layer of ADO.NET, understanding the role of the dataset, working with data columns, working with data rows, working with data tables, binding with data adapters, adding disconnected functionality to autolotdal.dll, multi tabled dataset objects and data relationships, the windows forms database code into a class library, programming with LINQ to dataset.</td>
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</tr>
</tbody>
</table>

**Text Books:**


**Reference Books:**


**Web References:**

1. https://www.cs.colorado.edu/~kena/classes/5448/

**E-Text Books:**


**Course Home Page:**
# ADVANCED JAVA PROGRAMMING

<table>
<thead>
<tr>
<th>Course Code</th>
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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

## OBJECTIVES:
The course should enable the students to:
I. Practice object-oriented programs and build java applications.
II. Implement java programs for establishing interfaces.
III. Implement sample programs for developing reusable software components.
IV. Create database connectivity in java and implement GUI applications.

## UNIT-I
### INTRODUCTION TO ADVANCED JAVA
Classes: 09
Introduction: advanced GUI, Graphics, and JavaBeans, web services, enterprise java, enterprise Case study, XML; Advanced swing graphical user interface components: Introduction, web browser Using JEditorPane and JToolBar, swing applications, JSplitPane and JTabbedPane, multiple-document interfaces, drag and drop, internationalization, accessibility, internet and World Wide Web resources.

## UNIT-II
### MVC, GRAPHICS AND JSP
Classes: 09
Model-View-Controller: Introduction, Model-View-Controller architecture, observable class and observer interface, JList, JTable, JTree; Graphics programming with java 2D and java 3D: 2D API, 3D API; JavaBeans Component Model: Introduction, using beans in Foret for java community edition, preparing a class to be a JavaBean, creating a JavaBean: Java archive files, JavaBean properties, bound; Properties, Indexed properties and custom events, customizing JavaBeans for BuilderTools.

## UNIT-III
### SECURITY AND JAVA DATABASE CONNECTIVITY
Classes: 09

## UNIT-IV
### JAVA WIRELESS APPLICATIONS DEVELOPMENT AND J2ME
Classes: 09
Introduction: Welcome servlet overview, Tip test servlet overview, Java 2 micro edition, Tip test MIDlet Overview; Session EJBs and distributed transactions: Introduction, EJB overview, session beans, EJB transactions, internet and World Wide Web Resources.

## UNIT-V
### APPLICATION SERVERS AND JAVA SPACES
Classes: 09
Introduction, J2EE specification and benefits, commercial application servers, deploying the dietel bookstore on BEFA Web logic, deploying the dietel bookstore on IBM Web sphere, internet and world wide web resources; Java Spaces: Introduction, Java Spaces service properties, java Space service, discovering the Java Space service, Java Space interface, method snapshot; Java Management Extension(JMX): Introduction, installation, Case Study, internet and World Wide Web Resources.
**Text Books:**


**Reference Books:**


**Web References:**

1. [http://engineeringppt.blogspot.in/2010/01/advance-java-web-technology.html](http://engineeringppt.blogspot.in/2010/01/advance-java-web-technology.html)

**E-Text Books:**


**Course Home Page:**
OBJECTIVES:
The course should enable the students to:
I. Understand the concept of micro-architectural design of processors.
II. Analyze performance improvement and power savings in current processors.
III. Study the different multiprocessor architectures and related issues.
IV. Improve the knowledge on performance issues of memory and I/O systems.

UNIT-I  FUNDAMENTALS OF COMPUTER DESIGN  Classes: 08
Fundamentals of computer design: Defining computer architecture, trends in technology, power in integrated circuits and cost, measuring and reporting performance, quantitative principles of computer design; Instruction set principles: Classifying ISA, design issues.

UNIT-II  INSTRUCTION -LEVEL PARALLELISM  Classes: 09
ILP concepts: Pipelining overview, compiler techniques for exposing ILP; Dynamic branch prediction; Dynamic scheduling; Multiple instructions issue; Hardware based speculation; Static scheduling; Limitations of ILP; Case studies of contemporary microprocessors.

UNIT-III  DATA-LEVEL PARALLELISM  Classes: 09
ILP software approach: Compiler techniques, static branch protection, VLIW approach, hardware support for more ILP at compile time, hardware verses software solutions.
Multivector and SIMD computers: Vector processing principles, multivector multiprocessors, compound vector processing, SIMD computer organizations, the connection machine CM-5; Loop level parallelism.

UNIT-IV  MEMORY AND I/O  Classes: 09
Introduction; cache performance: Reducing cache miss penalty and miss rate, Reducing hit time, Main memory and performance, Memory technology; Types of storage devices: Buses, RAID, Reliability, availability and dependability; Virtual memory; I/O performance measures: Designing an I/O system.

UNIT-V  MULTIPROCESSORS AND THREAD -LEVEL PARALLELISM  Classes: 10
Introduction; Symmetric shared-memory architectures; Performance of Symmetric shared-memory architectures; Distributed shared memory and directory-based coherence; Basics of synchronization; Models of memory consistency; Multithreading.

Text Books:
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<tr>
<td>1. <a href="http://www.annaunivedu.in/2012/09/cs2354-advanced-computer-architecture.html#ixzz4NWBtPL5E">http://www.annaunivedu.in/2012/09/cs2354-advanced-computer-architecture.html#ixzz4NWBtPL5E</a></td>
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<td>3. <a href="https://docs.google.com/document/d/1Th4xOMyiGt5uY5fHXaLGAr4ALnaxuQop4LbZWHXPrOg">https://docs.google.com/document/d/1Th4xOMyiGt5uY5fHXaLGAr4ALnaxuQop4LbZWHXPrOg</a></td>
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**Course Home Page:**
ADVANCED OPERATING SYSTEM

I Group: CSE/IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the fundamentals of operating systems.
II. Gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols.
III. Gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols.
IV. Know the components and management aspects of real time, mobile operating systems.

UNIT-I  PROCESS SYNCHRONIZATION  Classes: 10
Overview: Introduction why advanced operating systems, synchronization mechanisms; Processes and threads: Process scheduling; Deadlocks: Detection, prevention and recovery; Models of resources; Memory management techniques.

UNIT-II  DISTRIBUTED OPERATING SYSTEMS  Classes: 10
Introduction, issues in distributed operating system; Architecture; Communication networks; Communication primitives: message passing mode, remote procedure calls, design issues in RPC;

UNIT-III  DISTRIBUTED RESOURCE MANAGEMENT  Classes: 09
Distributed file systems; Design issues; Distributed shared memory algorithms for implementing distributed shared memory; Issues in load distributing.
Scheduling algorithms; Synchronous and asynchronous check pointing and recovery; Fault tolerance, two phase commit protocol, non blocking commit protocol; Security and protection.

UNIT-IV  REAL TIME AND MOBILE OPERATING SYSTEMS  Classes: 08
Basic model of real time systems: Characteristics, applications of real time systems; Real time task scheduling; Handling resource sharing; Mobile operating systems: Micro kernel design; Client server resource access; Processes and threads; Memory management.

UNIT-V  CASE STUDIES  Classes: 08
Linux system: Design principles; Kernel modules; Process management scheduling; Memory management; Input output management; File system; Interprocess communication; IoS and android: Architecture and sdk framework; Media layer, services layer, core os layer.

Text Books:
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<td>2. lib.ewubd.edu/vufind/Record/3488/TOC.</td>
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<th><strong>E-Text Books:</strong></th>
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<tr>
<td>1. <a href="https://groups.google.com/d/msg/me-cse-2013-batch/.../q_R5aHACK3kJ">https://groups.google.com/d/msg/me-cse-2013-batch/.../q_R5aHACK3kJ</a>.</td>
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<th><strong>MOOC Course</strong></th>
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| **Course Home Page:** |
PARALLEL PROGRAMMING USING CUDA

I Group: CSE/IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the concepts parallel computers, data and temporal parallelism.
II. Learn structures of parallel computers.
III. Understand the concepts of operating systems for parallel computers.
IV. Understand parallel computing platform and application interface (CUDA).
V. Learn parallel programming with CUDA C.

UNIT-I  INTRODUCTION  Classes: 10
Why do we need high speed computing, how do we increase the speed of computers, history of parallel computers; Solving problems in parallelism: Utilizing temporal parallelism, utilizing data parallelism, comparison of temporal and data parallel processing, data parallel processing with specialized processors.

UNIT-II  STRUCTURE OF PARALLEL COMPUTERS  Classes: 10
Structure of parallel computers: A generalized structure of a parallel computer; Classification of parallel computers; Vector computers, a typical vector super computer; Array processors; Shared memory parallel computers, distributed shared memory parallel computers, message passing parallel computers.

UNIT-III  OPERATING SYSTEMS FOR PARALLEL COMPUTERS  Classes: 09
Operating systems for parallel computers: Resource management; Process management, process synchronization, inter process communication.
Memory management; Input/output (disk arrays), basics of performance evaluation, performance measurement tools.

UNIT-IV  COMPUTER UNIFIED DEVICE ARCHITECTURE  Classes: 08
Computer unified device architecture: The age of parallel processing; The rise of GPU computing, CUDA, applications of CUDA, development environment; CUDA enabled graphics processors, Nvidia device driver, CUDA development tool kit, standard C compiler.

UNIT-V  CUDA C  Classes: 08
CUDA C: Introduction to CUDA C, first program, querying devices, using device properties, parallel programming in CUDA C; CUDA parallel programming summing vectors program.

Text Books:
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| **Course Home Page:** |
MULTICORE ARCHITECTURES

I Group: CSE / IT

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Contact classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the recent trends in the field of computer architecture and identify performance related parameters.
II. Identify the need for parallel processing in real time case studies.
III. Expose on the problems related to multistage Interconnection networks.
IV. Explore on requirements of warehouse scale and embedded architectures.

UNIT-I FUNDAMENTALS OF QUANTITATIVE DESIGN AND ANALYSIS Classes: 09

Classes of computers, trends in technology, power, energy and cost, dependability, measuring, reporting and summarizing performance, quantitative principles of computer design, classes of parallelism, ILP, DLP, TLP and RLP, multithreading, SMT and CMP architectures, limitations of single core processors, the multi core era, case studies of multi core architectures.

UNIT-II DLP IN VECTOR, SIMD AND GPU ARCHITECTURES Classes: 09

Vector architecture, SIMD instruction set extensions for multimedia, graphics processing units, detecting and enhancing loop level parallelism, case studies.

UNIT-III TLP AND MULTIPROCESSORS Classes: 09

Symmetric and distributed shared memory architectures, cache coherence issues, performance issues, synchronization issues, models of memory consistency.

Interconnection networks: Buses, crossbar and multi-stage interconnection networks.

UNIT-IV RLP AND DLP IN WAREHOUSE-SCALE ARCHITECTURES Classes: 09

Programming models and workloads for warehouse-scale computers, architectures for warehouse-scale computing, physical infrastructure and costs, cloud computing, case studies.

UNIT-V ARCHITECTURES FOR EMBEDDED SYSTEMS Classes: 09

Features and requirements of embedded systems signal processing and embedded applications, the digital signal processor, embedded multiprocessors, case studies.

Text Books:
### Reference Books:


### Web References:


### E-Text Books:

1. https://www.crcpress.com

### Course Home Page:
II Group: CSE / IT

Course Code   Category   Hours / Week          Credits   Maximum Marks
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ACS505        Elective   L 3  T  -  P  -  C  3  CIA  30  SEE  70  Total  100

Contact Classes: 45   Tutorial Classes: Nil   Practical Classes: Nil   Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the fundamentals of security related to database system.
II. Identify the security mechanisms to solve the problems.
III. Learn the essentials of secure software design.
IV. Understand various types of attacks and intruder detection system.
V. Identify the secure database model for new generations.

UNIT-I INTRODUCTION AND SECURITY MODEL-I  Classes: 10
Introduction to databases security problems in databases security controls conclusions; Security models:
Introduction access matrix model; Take-grant model; Acten model; PN model; Hartson and Hsiao's Model;
Fernandez's model Bussolati and Martella's model for distributed databases.

UNIT-II SECURITY MODEL-II AND SECURITY MECHANISMS  Classes: 09
Security models 2: Bell and LaPadula's model; Bib’s model; Dion's model; Sea view model; Jajodia and Sandhu's model;
The lattice model for the flow control conclusion; Security mechanisms: User identification / authentication;
Memory protection; Resource protection; Control flow mechanisms isolation security functionalities in some operating systems;
Trusted computer system evaluation criteria.

UNIT-III SECURITY SOFTWARE DESIGN  Classes: 08
Introduction: A methodological approach to security software design; Secure operating system.
Design secure DBMS; Design security packages database security design.

UNIT-IV STATISTICAL DATABASE PROTECTION AND INTRUSION DETECTION SYSTEMS  Classes: 09
Discovery introduction statistics concepts and definitions; Types of attacks; Inference controls evaluation criteria for control comparison;
Introduction IDES system; RETISS system; ASES system.

UNIT-V MODELS FOR THE PROTECTION OF NEW GENERATION DATABASE SYSTEMS-1&DATABASE SYSTEMS-2  Classes: 09
Models for the protection of new generation database Systems-1: A model for the protection of frame based systems;
A model for the protection of object-oriented systems: SORION model for the protection of object-oriented databases;
modes for the protection of new generation database systems-2: The Orion model, Jajodia and Kogan's model;
A model for the protection of active databases conclusions.

Text Books:
### Reference Books:


### Web References:

2. [https://docs.oracle.com/cd/B19306_01/network.102/b14266/apdvntro.htm#DBSEG12000](https://docs.oracle.com/cd/B19306_01/network.102/b14266/apdvntro.htm#DBSEG12000)
3. [http://www.cse.msu.edu](http://www.cse.msu.edu)
4. [http://cms.gcg11.ac.in/](http://cms.gcg11.ac.in/)

### E-Text Books:


### Course Home Page:
# CYBER SECURITY

## II Group: CSE/IT

<table>
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<th>Tutorial Classes: Nil</th>
<th>Practical Classes: Nil</th>
<th>Total Classes: 45</th>
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### OBJECTIVES:

The course should enable the students to:

I. Understand the core information assurance principles in n-tier web applications.
II. Identify the key components of cyber security network architecture.
III. Study on digital certificates, signatures and digital forensics for cyber crime investigation.
IV. Determine the elements of web hacking, cyber crime investigation process and tools.

### UNIT-I  INTRODUCTION

A web security forensic lesson, web languages, introduction to different web attacks, overview of n-tier web applications; Web servers: Apache, IIS, database servers.

### UNIT-II  REVIEW OF COMPUTER SECURITY AND CYBER CRIMES ISSUES

Public key cryptography, RSA, online shopping, payment gateways, unauthorized access to computers, computer intrusions, white collar crimes, viruses and malicious code, internet hacking and cracking, virus attacks, pornography, software piracy, intellectual property, mail bombs, exploitation, stalking and obscenity in internet, digital laws and legislation, law enforcement roles and responses.

### UNIT-III  WEB HACKING BASICS AND INVESTIGATION

Web hacking basics HTTP and HTTPS URL, web under the cover overview of java security reading the HTML source, applet security, servlets security, symmetric and asymmetric encryptions, network security basics, firewalls and IDS.


### UNIT-IV  DIGITAL CERTIFICATES AND DIGITAL FORENSICS

Digital certificates, hashing, message digest, and digital signatures; Digital forensics: Introduction to digital forensics, forensic software and hardware, analysis and advanced tools, forensic technology and practices.

### UNIT-V  SECURING DATABASES, LAWS AND ACTS

Basics, secure JDBC, securing large applications, cyber graffiti; Laws and acts: Laws and ethics, digital evidence controls, evidence handling procedures; Basics of Indian Evidence Act IPC and CRPC: Electronic communication privacy act, legal policies.

### Text Books:

**Reference Books:**


**Web References:**


**E-Text Books:**

2. https://www.coursera.org/specializations/cyber-security

**Course Home Page:**
NETWORK PROGRAMMING AND MANAGEMENT

II Group: CSE / IT

<table>
<thead>
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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The student should be able to:
I. Understand the basic concepts of connection oriented communication over network.
II. Study the concepts of multiplexing in client server environment.
III. Explore on functions and protocols needed for connection less communication over networks.
IV. Understand the management concepts and practical issues of simple network management protocols.

UNIT-I  ELEMENTARY TCP SOCKETS  Classes: 08
Introduction to socket programming, overview of TCP/IP protocols, introduction to sockets, socket address structures, byte ordering functions, address conversion functions, elementary TCP sockets, socket, connect, bind, listen, accept, read, write, close functions, iterative server, concurrent server.

UNIT-II  APPLICATION DEVELOPMENT  Classes: 10
TCP echo server, TCP echo client, posixsignal handling, server with multiple clients; Boundary conditions: Server process crashes, server host crashes, server crashes and reboots, server shutdown, I/O multiplexing, I/O Models, select function, shutdown function, TCP echo server (with multiplexing), poll function, TCP echo client (with multiplexing).

UNIT-III  SOCKET OPTIONS, ELEMENTARY UDP SOCKETS  Classes: 10
Socket options, getsocket and setsocket functions, generic socket options, IP socket options, ICMP socket options, TCP socket options, elementary UDP sockets, UDP echo server, and UDP echo client.
Multiplexing TCP and UDP sockets, domain name system, and gethostbyname function, Ipv6 support in DNS, gethostbyadr function, getservbyname and getserv by port functions.

UNIT-IV  ADVANCED SOCKETS  Classes: 08
Ipv4 and Ipv6 interoperability, threaded servers, thread creation and termination, TCP echo server using threads, mutexes, condition variables, raw sockets, raw socket creation, raw socket input, raw socket output, ping program, trace route program.

UNIT-V  SIMPLE NETWORK MANAGEMENT  Classes: 09
SNMP network management concepts, SNMP management information, standard MIB’s, SNMPv1 protocol and practical issues, introduction to RMON, SNMPv2 andSNMPv3.

Text Books:
### Reference Books:


### Web References:

2. https://books.google.co.in/books?isbn=8184317565

### E-Text Books:

1. www.freebookcentre.net › Networking Books
2. https://books.google.co.in/books?isbn=933250640X

### Course Home Page:
SOFTWARE DEFINED NETWORKS

II Group: CSE / IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Learn about software defined networking.
II. Demonstrate an emerging internet architectural framework.
III. Analyze architectures, algorithms, protocols and applications of data center networks.

UNIT-I CENTRALIZED AND DISTRIBUTED CONTROL PLANES
Classes: 08
Introduction, distributed control planes; Centralized control planes open flow: Introduction; Hybrid Approaches SDN Controllers: Introduction General Concepts Layer 3 Centric Plexxi Cisco OnePK.

UNIT-II NETWORK PROGRAMMABILITY AND DATA CENTER CONCEPTS
Classes: 10
Network programmability: Introduction, the management interface, the application-network divide, modern programmatic interfaces, I2RS, modern orchestration; Data center concepts and constructs: Introduction, the multitenant data center, the virtualized multitenant data center, SDN solutions for the data center network, LANs, EVPN, VxLan, NVGRE.

UNIT-III NETWORK FUNCTION VIRTUALIZATION AND NETWORK TOPOLOGY
Classes: 08
Network function virtualization: Introduction, virtualization and data plane I/O, services engineered path, service locations and chaining, NFV at ETSI, Non-ETSI NFV Work.

UNIT-IV BUILDING AN SDN FRAMEWORK
Classes: 10
Building an SDN framework: Introduction, build code first; ask questions later, the Juniper SDN framework, IETF SDN framework(s), open daylight controller/framework, policy, use cases for bandwidth scheduling, manipulation, and calendaring: introduction, bandwidth calendaring, big data and CSPF, expanding topology, use cases for data center overlays, big data, and network function virtualization, introduction, data center orchestration, puppet (DevOps Solution).

UNIT-V NETWORK FUNCTION VIRTUALIZATION (NFV)
Classes: 09
Network Function Virtualization (NFV): Optimized big data, use cases for input traffic monitoring: Classification and triggered actions: Introduction, the firewall, firewalls as a service, network access control replacement, extending the use case with a virtual firewall, feedback and optimization, intrusion detection/threat mitigation.
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HIGH SPEED NETWORKS

II Group: CSE/IT

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Contact Classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the basis of ATM and Frame Relay concepts.
II. Explore the concept of queuing analysis, behind traffic management and congestion control.
III. Knowledge on TCP flow and congestion control in ATM.
IV. Study on different levels of quality of service (QOS) to different applications

UNIT-I  HIGH SPEED NETWORKS  Classes: 08
Frame relay networks, asynchronous transfer mode, ATM protocol architecture, ATM logical connection, ATM cell, ATM service categories, AAL; High speed LANs: Fast ethernet, gigabit ethernet, fiber channel; wireless LANs: Applications, requirements, architecture of 802.11.

UNIT-II  CONGESTION TRAFFIC MANAGEMENT  Classes: 10
Queuing analysis, queuing models, single server queues, effects of congestion, congestion control, traffic management, congestion control in packet switching networks, frame relay congestion control.

UNIT-III  TCP AND ATM CONGESTION CONTROL  Classes: 08
TCP flow control, TCP congestion control, retransmission, timer management, exponential RTO back off KARN’s Algorithm, window management, performance of TCP over ATM.
Traffic and congestion control in ATM: Requirements attributes, traffic management frame work, traffic control, ABR traffic management, ABR rate control, RM cell formats, ABR Capacity allocations, GFR traffic management.

UNIT-IV  INTEGRATED AND DIFFERENTIAL SERVICES  Classes: 10
Integrated services architecture: Approach, components, services, queuing discipline, FQ, PS, BRFQ, GPS, WFQ, random early detection, differentiated services.

UNIT-V  PROTOCOLS FOR QOS SUPPORT  Classes: 09
RSVP: Goals & characteristics, data flow, RSVP operations, protocol mechanisms, multiprotocol label switching, operations, label stacking, protocol details, RTP, protocol architecture, data transfer protocol, RTCP.

Text Books:
**Reference Books:**


**Web References:**

2. [http://whatis.techtarget.com/glossary/High-Speed-Networks](http://whatis.techtarget.com/glossary/High-Speed-Networks)

**E-Text Books:**

1. [https://books.google.co.in/books/about/High_speed_networks_and_internets.html?id](https://books.google.co.in/books/about/High_speed_networks_and_internets.html?id)
2. [www.amazon.in/High-Speed-Networks-Internets-2e-STALLINGS/dp/817758569X](http://www.amazon.in/High-Speed-Networks-Internets-2e-STALLINGS/dp/817758569X)

**Course Home Page:**
INTERNET OF THINGS

II Group: CSE/IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the architecture of Internet of Things and connected world.
II. Explore on use of various hardware, sensing technologies to build IoT applications.
III. Illustrate the real time IoT applications to make smart world.
IV. Understand challenges and future trends in IoT.

UNIT-I  INTRODUCTION TO INTERNET OF THINGS (IoT)  Classes: 08
Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT enabling technologies, IoT levels and deployment, domain specific IoTs.

UNIT-II  IoT AND M2M  Classes: 10
Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

UNIT-III  IOT ARCHITECTURE AND PYTHON  Classes: 10
Logical design using Python: Installing Python, Python data types and data structures, control flow, functions, modules, packages, file handling.

UNIT-IV  IOT PHYSICAL DEVICES AND ENDPOINTS  Classes: 08
Introduction to Raspberry Pi interfaces (Serial, SPI, I2C), programming Raspberry Pi with Python, other IoT devices.

UNIT-V  IOT PHYSICAL SERVERS AND CLOUD OFFERINGS  Classes: 09
Introduction to cloud storage models and communication APIs, WAMP – AutoBahn for IoT, Xively cloud for IoT, case studies illustrating IoT design – home automation, smart cities, smart environment.

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IMAGE PROCESSING

III Group: CSE / IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the concepts of digital image processing methods and techniques.
II. Study the image techniques in spatial and frequency domain for image quality improvement.
III. Learn the image restoration and compression techniques for optimization.
IV. Explore on color image features and transformation techniques.

UNIT-I  INTRODUCTION
Classes: 10
Introduction: What is digital image processing, origins of digital image processing, examples of fields that use dip, fundamental steps in digital image processing, components of an image processing system; Digital image fundamentals: Elements of visual perception, a simple image formation model, basic concepts in sampling and quantization, representing digital images, spatial and gray-level resolution, zooming and shrinking digital images, some basic relationships between pixels, linear and nonlinear operations.

UNIT-II  IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN
Classes: 10
Image enhancement in the spatial domain: Some basic gray level transformations, histogram processing, enhancement using arithmetic/logic operations, basics of spatial filtering, smoothing spatial filters, sharpening spatial filters, combining spatial enhancement methods; Image enhancement in the frequency domain: Introduction to the fourier transform and the frequency domain, smoothing frequency domain filters, sharpening frequency domain filters, homomorphic filtering.

UNIT-III  IMAGE RESTORATION AND FILTERING
Classes: 08
Image restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise only spatial filtering, periodic noise reduction by frequency domain filtering,
Image filtering: Linear position invariant degradations, estimating the degradation function, inverse filtering, minimum mean square error (wiener) filtering, constrained least square filtering, and geometric mean filter.

UNIT-IV  IMAGE PROCESSING
Classes: 10
Color fundamentals: Color models, pseudo color image processing, basics of full-color image processing, color transformations, smoothing and sharpening, color segmentation, noise in color images, color image compression; Wavelets and multi resolution processing: Image pyramids, sub band coding, the haar transform, multi resolution expansions, wavelet transforms in one dimension, fast wavelet transform, wavelet transforms in two dimensions, wavelet packets; Image compression: Fundamentals, image compression models, error-free (lossless) compression, lossy compression.
### UNIT-V MORPHOLOGICAL IMAGE PROCESSING

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Morphological image processing: Preliminaries, dilation and erosion, opening and closing, the hit-or-miss transformation, some basic morphological algorithms; Image segmentation: Detection of discontinuities, edge linking and boundary detection, thresholding, region-based segmentation.

### Text Books:


### Reference Books:


### Web References:


### E-Text Books:


### Course Home Page:
# PATTERN RECOGNITION

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**Contact Classes: 45**  
**Tutorial Classes: Nil**  
**Practical Classes: Nil**  
**Total Classes: 45**

## OBJECTIVES:

The course should enable the students to:

I. Understand basic concepts in pattern recognition.
II. Learn the fundamental algorithms for pattern recognition.
III. Gain knowledge about state-of-the-art algorithms used in pattern recognition research.
IV. Understand pattern recognition theories, such as Bayes classifier, linear discriminant analysis.
V. Apply pattern recognition techniques in practical problems.

## UNIT-I  
**PATTERN CLASSIFIER**  
Classes: 10

Overview of pattern recognition: Discriminant functions, supervised learning, parametric estimation; Maximum likelihood estimation: Bayesian parameter estimation; Problems with bayes approach, pattern classification by distance functions, minimum distance pattern classifier.

## UNIT-II  
**CLUSTERING**  
Classes: 10

Unsupervised classification clustering for unsupervised learning and classification: Clustering concept, c means algorithm; Hierarchical clustering procedures: Graph theoretic approach to pattern clustering, validity of clustering solutions.

## UNIT-III  
**STRUCTURAL PATTERN RECOGNITION**  
Classes: 09

Structural pattern recognition elements of formal grammars: String generation as pattern description, recognition of syntactic description.

Parsing; Stochastic grammars and applications: Graph based structural representation.

## UNIT-IV  
**FEATURE EXTRACTION**  
Classes: 08

Feature extraction and selection entropy minimization: Karhunen-Loeve transformation, feature selection through functions approximation, binary feature selection.

## UNIT-V  
**RECENT ADVANCES**  
Classes: 08

Fuzzy logic: Fuzzy pattern classifiers; Pattern classification using genetic algorithms, case study using fuzzy pattern classifiers and perception.

### Text Books:

**Reference Books:**


**Web References:**


**E-Text Books:**


**MOOC Course**


**Course Home Page:**
USER INTERFACE DESIGN

III Group: CSE/IT

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Contact Classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:

I. Determine the characteristics of good user interface designs.
II. Recognize how a computer system may be modified to include human diversity.
III. Develop user interface design tools.
IV. Investigate the automatic generation of user interface s from high-level specifications.
V. Evaluate user interfaces and applications using a variety of methods.

UNIT-I INTRODUCTION
Classes: 10

Human computer interface: Characteristics of graphics interface, direct manipulation graphical system; web user interface, popularity, characteristic and principles.

UNIT-II HUMAN COMPUTER INTERACTION
Classes: 10

User interface design process: Obstacles, usability, human characteristics in design, human interaction speed, business functions; Requirement analysis, direct ,indirect methods, basic business functions, design standards, system timings; Human consideration in screen design structures of menus, functions of menus, contents of menu, formatting, phrasing the menu, selecting menu choice, navigating menus, graphical menus.

UNIT-III WINDOWS
Classes: 09

Characteristics: Components, presentation styles, types, managements, organizations, operations.
Web systems: Device based controls characteristics, screen based controls, operate control, text boxes, selection control, combination control, custom control, presentation control.

UNIT-IV MULTIMEDIA
Classes: 08

Text for web pages: Effective feedback, guidance and assistance, internationalization, accessibility; Icons, image, multimedia, coloring.

UNIT-V WINDOWS LAYOUT-TEST
Classes: 08

Prototypes: Kinds of tests, retest, information search; Visualization, hypermedia; World wide web, software tools.

Text Books:

**Reference Books:**


**Web References:**

2. https://www.edx.org/course/user-experience-ux-design-human-factors-tsinghuax-70167012x-0

**E-Text Books:**


**MOOC Course**

1. https://www.coursera.org/specializations/interaction-design
3. https://www.edx.org/course/subject/design

**Course Home Page:**
### ADVANCED DATABASES

**III Group: CSE/IT**

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- **Contact Classes:** 45
- **Tutorial Classes:** Nil
- **Practical Classes:** Nil
- **Total Classes:** 45

**OBJECTIVES:**

The course should enable the students to:

1. Define entity relationship model and transaction processing system.
2. Understand various storage structures for database.
3. Describe the distributed and parallel database processing.
4. Describe object oriented database concepts and models.
5. Understand various advancements in database technology.

#### UNIT-I  ACTIVE DATABASES

Classes: 10

Syntax and Semantics (Starburst, Oracle, DB2): Taxonomy, applications, integrity management, workflow management, business rules, design principles, properties, rule modularization, rule debugging, IDEA methodology, open problems.

#### UNIT-II  TEMPORIAL AND OBJECT DATABASES

Classes: 10

Overview: Time domain, data types, associating facts with time, temporal query language; Transact-SQL (T-SQL): Time ontology, data model, language constructs; Implementation: System architecture, temporal support, support for TSQL2.

#### UNIT-III  COMPLEX QUERIES AND REASONING

Classes: 09

Logic of Query Languages: Relational calculi, relational algebra, recursive rules, syntax and semantics of data log, fix point semantics.

Implementation Rules and Recursion: Rule rewriting methods, compilation and optimization, recursive queries in SQL, open issues.

#### UNIT-IV  SPATIAL, TEXT AND MULTIMEDIA DATABASES

Classes: 08

Traditional Indexing Methods: Secondary keys, spatial access methods, text retrieval; Multimedia indexing: 1D time series, 2D color images, sub pattern matching.

#### UNIT-V  UNCERTAINTY IN DATABASES AND KNOWLEDGE BASES

Classes: 08

Introduction: Uncertainty in image database, uncertainty in temporal database, uncertainty in null value; Models of uncertainty; Uncertainty in relational databases: Lattice based relational databases, probabilistic relational databases.

**Text Books:**

### Reference Books:

### Web References:
1. web.cs.wpi.edu/~cs561/s12/Lectures/activeDB/ActiveDB.pdf
2. www.cs.bu.edu/fac/gkollios/ada05/LectNotes/lect13-05.ppt
3. web.cs.ucla.edu/classes/cs240a/winter98/notes/node3.html
4. user.it.uu.se/~torer/kursermdb/2007/TermPapers/ErikZeitler.pdf
5. booksite.elsevier.com/9781558604438/slides/zanitem5.htm

### E-Text Books:

### MOOC Course:

### Course Home Page:
### PARALLEL COMPUTING

**III Group: CSE/IT**

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**Contact Classes: 45**  **Tutorial Classes: Nil**  **Practical Classes: Nil**  **Total Classes: 45**

**OBJECTIVES:**

The course should enable the students to:

I. Understand the parallel computing.
II. Analyze the Parallel programming platforms.
III. Evaluate the Principles of parallel algorithm design.
IV. Understand the Shared address space platforms.

**UNIT-I**  **INTRODUCTION AND HARDWARE TAXONOMY**  **Classes: 9**

Introduction: Paradigms of parallel computing, synchronous, vector/array, SIMD (single instruction, multiple data), systolic, asynchronous, MIMD (multiple instruction, multiple data), reduction paradigm; Hardware taxonomy: Flynn's classifications, handler's classifications; software taxonomy: Kung's taxonomy, SPMD (single program, multiple data).

**UNIT-II**  **ABSTRACT PARALLEL COMPUTATIONAL MODELS AND PERFORMANCE METRICS**  **Classes: 9**

Abstract parallel computational models: Combinational circuits, sorting network, PRAM (parallel random-access machine) models, interconnection RAMs, parallelism approaches, data parallelism, control parallelism; performance metrics: Laws governing performance measurements, metrics speedups, efficiency, utilization, communication overheads, single/multiple program performances, bench marks.

**UNIT-III**  **PARALLEL PROCESSORS AND PARALLEL PROGRAMMING**  **Classes: 9**

Parallel Processors: Taxonomy and topology, shared memory multiprocessors, distributed memory networks, processor organization, static and dynamic interconnections, embeddings and simulations.
Parallel Programming: Shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming.

**UNIT-IV**  **PARALLELIZATION**  **Classes: 9**

Scheduling and Parallelization: Scheduling parallel programs, loop scheduling, parallelization of sequential programs, parallel programming support environments.

**UNIT-V**  **SCHEDULING**  **Classes: 9**

Scheduling: Organizational features of processor arrays, multi processors and multicomputers, mapping and scheduling aspects of algorithms, coffman graham scheduling algorithm for parallel processors.
**Text Books:**


**Reference Books:**


**Web References:**

3. https://www2.cisl.ucar.edu/user-support/parallel-computing-concepts

**E-Text Books:**

2. http://larc.unt.edu/ian

**MOOC Course**


**Course Home Page:**
DISTRIBUTED DATABASES

III Group: CSE/IT

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Contact Classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the fundamental principles and architecture of distributed database systems.
II. Familiar with the different methods and techniques distributed query processing.
III. Develop the understanding of choosing the optimized query execution plan for distributed queries.
IV. Able to design a multi database Systems and can resolve problems of heterogeneous multi database systems in database integration strategies.

UNIT-I OVERVIEW AND PRINCIPLES OF DISTRIBUTED DATABASES Classes: 10
Features of distributed versus centralized databases; Levels of distribution transparency: Reference architecture for distributed databases, types of data fragmentation; Distributed transparency: Read only application, update application; Distributed database access primitives; Integrity constraints in distributed databases.

UNIT-II GLOBAL QUERIES TO FRAGMENT QUERIES Classes: 10
Translation of global queries to fragment queries: Equivalence transformations for queries, transforming global queries into fragment queries, distributed grouping and aggregate function evaluation, parametric queries.

UNIT-III OPTIMIZATION OF ACCESS STRATEGIES Classes: 09
Optimization of access strategies: A framework for query optimization, join queries, general queries.
The management of distributed transactions: A framework for transaction management, supporting atomicity of distributed transactions, concurrency control for distributed transactions, architectural aspects of distributed transactions.

UNIT-IV CONCURRENCY CONTROL Classes: 08
Concurrency control: Foundation of distributed concurrency control, distributed deadlocks, and concurrency control based on timestamps, optimistic methods for distributed concurrency control.

UNIT-V DISTRIBUTED DATABASE ADMINISTRATION Classes: 08
Reliability: Basic concepts, non blocking commitment protocols, reliability and concurrency control, determining a consistent view of the network, detection and resolution of inconsistency, checkpoints and cold restart; Distributed database administration: Catalog management in distributed databases, authorization and protection.
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<td>1. <a href="http://www.cs.sjsu.edu/faculty/pollett/masters/Semesters/Fall06/Preethi/ddbms1.ppt">www.cs.sjsu.edu/faculty/pollett/masters/Semesters/Fall06/Preethi/ddbms1.ppt</a></td>
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<td>3. <a href="http://www.inf.unibz.it/dis/teaching/DDB/Ln/ddb07.pdf">www.inf.unibz.it/dis/teaching/DDB/Ln/ddb07.pdf</a></td>
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SOFTWARE DEVELOPMENT METHODOLOGY

IV Group: CSE/IT

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Contact Classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand a broad and critical processes for engineering high quality software and the principles, concepts and techniques associated with software development.
II. Analyze and evaluate problems and draw the theoretical and technical knowledge to develop solutions and systems.
III. Apply range of skills focused on the analysis of requirements, design and implementation of reliable and maintainable software, with strong emphasis on engineering principles applied over the whole development lifecycle.
IV. Create An awareness of current research in software development, the analytical skills and research techniques for their critical and independent evaluation and their application to new problems.

UNIT-I
INTRODUCTION, A GENERIC VIEW OF PROCESS AND PROCESS MODELS
Classes: 10
Introduction to software engineering: The evolving role of software, changing nature of software, legacy software, software myths; A generic view of process: Software engineering, a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models, process models: the waterfall model, incremental process models, the unified process.

UNIT-II
SOFTWARE REQUIREMENTS AND REQUIREMENTS ENGINEERING PROCESS
Classes: 10
Software requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document; Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT-III
DESIGN ENGINEERING, CREATING AN ARCHITECTURAL DESIGN AND MODELING COMPONENT-LEVEL DESIGN
Classes: 09
Design engineering: Design process and design quality, design concepts, the design model, pattern based software design.
Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, assessing alternative architectural designs, mapping data flow into software architecture.

UNIT-IV
TESTING STRATEGIES AND PRODUCT METRICS
Classes: 08
Testing strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging; Product metrics: Software quality, frame work for product metrics, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.
<table>
<thead>
<tr>
<th>UNIT-V</th>
<th>RISK MANAGEMENT AND QUALITY MANAGEMENT</th>
<th>Classes: 08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk management: Reactive vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM(Risk Mitigation, Monitoring and Management), RMMM plan; Quality Management: Quality concepts, software quality assurance, software Reviews, formal technical reviews, statistical software quality assurance, software reliability, The ISO 9000 quality standards.</td>
<td></td>
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</tr>
</tbody>
</table>

**Text Books:**


**Reference Books:**


**Web References:**

1. http://www.umsl.edu/~sauterv/analysis/Fall2013Papers/Buric/-5-references.html

**E-Text Books:**


**MOOC Course:**

1. https://www.mooc-list.com/tags/software-development

**Course Home Page:**
## SOFTWARE QUALITY MANAGEMENT

### IV Group: CSE/IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

### OBJECTIVES:

The course should enable the students to:

I. Analyze software quality models and quality measurement and metrics.
II. Understand quality plan, implementation and documentation and quality tools including case tools.
III. Evaluate quality control and reliability of quality process.
IV. Understand quality management system models and complexity metrics and customer satisfaction.
V. Remember international quality standards ISO, CMM.

### UNIT-I  INTRODUCTION

Classes: 10

Software process assessment overview, assessment phases, assessment principles, assessment conduct, implementation consideration, quality management, quality assurance plan, considerations, verification and validation.

### UNIT-II  CONFIGURATION MANAGEMENT

Classes: 10

Need for configuration management: Software product nomenclature, configuration management functions, baselines, responsibilities, need for automated tools, plan, SCM (Software Configuration Management) support functions, requirement phase design control, the implementation phase, test phase, SCM (Software Configuration Management) tools, configuration accounting and audit.

### UNIT-III  SOFTWARE STANDARDS AND INSPECTION

Classes: 09

Definitions, reason for software standards, benefits, establishing standards, guidelines, types of reviews.

Inspection: inspection of objectives, basic inspection principles, the conduct of inspection, inspection training.

### UNIT-IV  TESTING AND MANAGING SOFTWARE QUALITY

Classes: 08

Testing: principles, types, planning, development, execution and reporting, tools and methods, real time testing, quality management paradigm, quality motivation, measurement criteria, establishing a software quality program, estimating software quality.

### UNIT-V  DEFECT PREVENTION

Classes: 08

Principles of software defect prevention, process changes for defect prevention, defect prevention considerations, managements role, framework for software process change, managing resistance to software process change, case studies.

### Text Book:

<table>
<thead>
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<th>Reference Books:</th>
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<thead>
<tr>
<th>Web References:</th>
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<tbody>
<tr>
<td>1. <a href="http://www.win.tue.nl/~wstomv/edu/2ip30/references/#qualitymanagement">http://www.win.tue.nl/~wstomv/edu/2ip30/references/#qualitymanagement</a></td>
</tr>
<tr>
<td>2. <a href="http://www.rstonehouse.co.uk/old-site/biblio.html">http://www.rstonehouse.co.uk/old-site/biblio.html</a></td>
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<th>E-Text Books:</th>
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<th>MOOC Course</th>
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| Course Home Page: |
**SOFTWARE ARCHITECTURE AND DESIGN PATTERNS**

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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

**OBJECTIVES:**

The course should enable the students to:

I. Understand the challenges of advanced software design and the issues associated with large-scale software architectures, frameworks, patterns and components.

II. Understand the tools and techniques that may be used for the automatic analysis and evaluation of software.

III. Know the need for software architecture and the principles of the classic architectural styles.

IV. Understand the major approaches to automated software analysis achievable through static and dynamic analysis.

**UNIT-I**  SOFTWARE ARCHITECTURE

Classes: 09

Software architecture: What software architecture is and what it is not, architectural structures and views, architectural patterns, importance of software architecture, inhibiting or enabling a system’s quality attributes.

**UNIT-II**  PATTERNS

Classes: 09

Patterns: Introduction about pattern, what makes a pattern, pattern categories, relationship between patterns, pattern description, patterns and software architecture, summary.

**UNIT-III**  PATTERNS AND SOFTWARE ARCHITECTURE

Classes: 09

Patterns and software architecture: Introduction, patterns in software architecture, enabling techniques for software architecture, non-functional properties of software architecture.


**UNIT-IV**  ARCHITECTURAL PATTERNS

Classes: 09

Architectural patterns: Adaptable systems, micro-kernel, reflection design patterns, structural decomposition, master-slave, access control, proxy.

**UNIT-V**  PATTERN SYSTEMS

Classes: 09

Pattern systems: Introduction to pattern system, pattern classification, pattern selection, pattern systems as implementation guidelines.

**Text Books:**

### Reference Books:


### Web References:

1. [http://www.ece.ubc.ca/~matei/EECE417/BASS/ch02lev1sec4.html](http://www.ece.ubc.ca/~matei/EECE417/BASS/ch02lev1sec4.html)

### E-Text Books:


### MOOC Course

1. [https://www.udacity.com/course/software-architecture-design--ud821](https://www.udacity.com/course/software-architecture-design--ud821)

### Course Home Page:
### OBJECTIVES:
The course should enable the students to:
I. Analyze and understand basic software engineering methods and practices, and its applications.
II. Understand the software engineering practice & process models.
III. Understand design engineering, web applications, and software project management.
IV. Gain knowledge of the overall project activities.
V. Learn the role of project management including planning, scheduling, risk management.

### Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

<table>
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### UNIT-I  INTRODUCTION  Classes: 10

Introduction: Role of software engineer, software components, software characteristics, software crisis, software engineering processes, similarity and differences from conventional engineering processes, quality attributes; Assessment: How software engineering changes, software development life cycle (SDLC) models: Water fall model, prototype model, spiral model, evolutionary development models, iterative enhancement models, choosing a social relevant problem summary team report.

### UNIT-II  REQUIREMENT ENGINEERING PROCESS  Classes: 10

Requirement engineering Process: Elicitation, analysis, documentation, review and management of user needs, feasibility study, information modeling, data flow diagrams, entity relationship diagrams, designing the architecture; Assessment: Impact of requirement engineering in their problem. Decision tables, SRS document, IEEE standards for SRS, architectural design, component level design, user interface design, webapp design, submission of SRS document for team project.

### UNIT-III  QUALITY MANAGEMENT  Classes: 09

Quality concepts, review techniques, software quality assurance (SQA): Verification and validation, SQA plans, software quality frameworks.

Assessment: Framing SQA plan. ISO 9000 models, SEI-CMM model and their relevance to project management other emerging models like people CMM.

### UNIT-IV  ESTIMATION  Classes: 08

Estimation: Software project estimation, decomposition techniques, empirical estimation models, estimation for object oriented projects, specialized estimation techniques; Testing Objectives: Unit testing, integration testing, acceptance testing, regression testing, testing for functionality and testing for performance, top-down and bottom-up testing.

### UNIT-V  RISK MANAGEMENT  Classes: 08

Project management concepts: Process and project metrics, estimation for software projects, project scheduling, risk management, maintenance and reengineering; Assessment: Preparation of risk mitigation plan.
### Text Books:


### Reference Books:


### Web References:

2. http://nptel.ac.in/courses/106101061/

### E-Text Books:


### Course Home Page:
SOFTWARE PROCESS AND PROJECT MANAGEMENT

IV Group: CSE/IT

<table>
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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand overall software development life cycle and adopt suitable processes.
II. Analyze, prioritize, and manage both functional and quality requirements.
III. Estimate efforts required, plan, and track the plans.
IV. Understand and apply configuration and quality management techniques.

UNIT-I  DEVELOPMENT LIFE CYCLE PROCESSES  Classes: 10
Overview of Software Development Life Cycle, introduction to processes, Personal Software Process (PSP), Team Software Process (TSP), unified processes, agile processes, choosing the right process.

UNIT-II  REQUIREMENTS MANAGEMENT  Classes: 10
Functional requirements and quality attributes, elicitation techniques, Quality Attribute Workshop (QAW), analysis, prioritization, and trade off, Architecture Centric Development Method (ACDM), requirements, documentation, and specification, change management, traceability of requirements.

UNIT-III  ESTIMATION, PLANNING, AND TRACKING  Classes: 09
Identifying and prioritizing risks, risk mitigation plans, estimation techniques, use case points, function points, COCOMO II, top down estimation, bottom up estimation.
Work break down structure, macro and micro plans, planning poker, wideband Delphi, documenting the plan, tracking the plan, Earned Value Method (EVM).

UNIT-IV  CONFIGURATION AND QUALITY MANAGEMENT  Classes: 08
Identifying artificrafts to be configured, naming conventions and version control, configuration control, quality assurance techniques, peer reviews, Fegan inspection, unit, registration, system, and acceptance testing, test data and test cases, bug tracking, casual analysis.

UNIT-V  SOFTWARE PROCESS DEFINITION AND MANAGEMENT  Classes: 08
Process elements, process architecture, relationship between elements, process modeling, process definition techniques, ETVX (Entry-Task-Validation-exit), process baselining, process assessment and improvement, CMMI, six sigma.

Text Books:
**Reference Books:**


**Web References:**

1. [http://www.cs.ox.ac.uk/people/michael.wooldridge/teaching/soft-eng/lect05.pdf](http://www.cs.ox.ac.uk/people/michael.wooldridge/teaching/soft-eng/lect05.pdf)

**E-Text Books:**

1. [https://cs.uwaterloo.ca/~apidduck/se362/Lectures/1intro.pdf](https://cs.uwaterloo.ca/~apidduck/se362/Lectures/1intro.pdf)
2. [http://www.londoninternational.ac.uk/sites/default/files/computing-samples/co3353_ch1-3.pdf](http://www.londoninternational.ac.uk/sites/default/files/computing-samples/co3353_ch1-3.pdf)

**MOOC Course**

2. [https://www.coursera.org/specializations/project-management](https://www.coursera.org/specializations/project-management)
3. [https://www.coursera.org/learn/reviews-and-metrics-for-software-improvements](https://www.coursera.org/learn/reviews-and-metrics-for-software-improvements)
4. [https://www.coursera.org/learn/process-improvement](https://www.coursera.org/learn/process-improvement)
### COMPONENT BASED SOFTWARE ENGINEERING

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<th>IV Group: CSE/IT</th>
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</table>

**Contact Classes: 45**  **Tutorial Classes: Nil**  **Practical Classes: Nil**  **Total Classes: 45**

**OBJECTIVES:**

The course should enable the students to:

I. Understand the essentials of component-based software engineering.
II. Analyze the main characteristics of components and component models.
III. Estimate software development processes for component-based systems.
IV. Understand relations between software architecture and component models.

<table>
<thead>
<tr>
<th>UNIT-I COMPONENT DEFINITION</th>
<th>Classes: 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of a software component and its elements, the component industry metaphor, component models and component services; The case for components: The business case for components, COTS(commercial-off-the-shelf).</td>
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<tr>
<th>UNIT-II PLANNING TEAM ROLES</th>
<th>Classes: 10</th>
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</thead>
<tbody>
<tr>
<td>Planning team roles for component based development, common high-risk mistakes; CBSE success factors: Integrating architecture, process, and organization, software engineering practices, practices of software engineering, Component Based Software Development, status of Component Based Software Engineering in Europe.</td>
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<thead>
<tr>
<th>UNIT-III DESIGN OF SOFTWARE COMPONENT INFRASTRUCTURES</th>
<th>Classes: 09</th>
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</thead>
<tbody>
<tr>
<td>The design of software component infrastructures, software components and the UML, component infrastructures, business components, components and connectors. An OPEN process for component based development, designing models of modularity and integration, software architecture, software architecture design principles, Product-Line architectures.</td>
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<tr>
<th>UNIT-IV MANAGEMENT OF COMPONENT-BASED SOFTWARE SYSTEMS</th>
<th>Classes: 08</th>
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<tbody>
<tr>
<td>The Management of component based software systems, measurement and metrics for software components, implementing a practical reuse program for software components, selecting the right COTS software, software component project management, trouble with testing components, configuration management and component libraries, the evolution, maintenance, and management of component based software.</td>
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<thead>
<tr>
<th>UNIT-V COMPONENT TECHNOLOGIES</th>
<th>Classes: 08</th>
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<tbody>
<tr>
<td>Overview of the CORBA component model, Overview of COM+, overview of the EJB component model, Bonobo and Free Software GNOME components, choosing between COM+, EJB, and CCM, software agents as next generation software components.</td>
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</tr>
</tbody>
</table>

**Text Book:**

### Reference Books:


### Web References:


### E-Text Books:


### MOOC Course

1. https://www.coursera.org/learn/androidapps
2. https://www.coursera.org/specializations/seo

### Course Home Page:
ARTIFICIAL INTELLIGENCE

V Group: CSE/IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Study the concepts of artificial intelligence in problem solving.
II. Explore the methods of agents and reasoning patterns.
III. Introduce the concepts of knowledge representation and learning.
IV. Analyze and solve statistical learning methods using AI techniques.

UNIT-I  WHAT IS ARTIFICIAL INTELLIGENCE  Classes: 08
The AI problems, what is an AI technique, the levels of the model, the underlying assumption, problems; Problem spaces and search: Defining the problem as a state space search, production systems, problem characteristics and production system characteristics; Problem-solving: Uninformed search strategies; Informed search strategies: Heuristic search strategies, local search algorithms and optimization problems, backtracking search for csps.

UNIT-II  KNOWLEDGE AND REASONING  Classes: 10
Logical agents, knowledge-based agents, the wumpus world and propositional logic, reasoning patterns in propositional logic and agents based on propositional logic; First-order logic: Syntax and semantic of first-order logic, knowledge engineering in first-order logic; Inference in first-order logic: Propositional vs first-order inference, unification and lifting, forward chaining, backward chaining, resolution.

UNIT-III  KNOWLEDGE REPRESENTATION  Classes: 08
Ontological engineering, categories and objects, actions, situations and events, mental events and mental objects: The internet shopping world, reasoning systems for categories, truth maintenance systems.
Uncertain knowledge and reasoning: Uncertainty, acting under uncertainty, basic probability notation.

UNIT-IV  LEARNING  Classes: 10
Learning from observations, forms of learning, the axioms of probability, inference using full joint distributions, independence, Baye’s rule and its use; Inductive learning: Learning decision trees, ensemble learning; Why learning works: Computational learning theory.

UNIT-V  STATISTICAL LEARNING METHODS  Classes: 09
Knowledge in learning: A logical formulation of learning, knowledge in learning; Neural networks; Fuzzy logic systems: Introduction, crisp sets, fuzzy sets, some fuzzy terminology, fuzzy logic control, sugeno style of fuzzy inference processing, fuzzy hedges, α cut threshold.

Text Books:
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<th>Course Home Page:</th>
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</table>
## OBJECTIVES:

The course should enable the students to:

I. Illustrate the improved techniques and methodologies of soft computing that differ from conventional artificial intelligence.

II. Able to design and analyze on real life problems using various neural learning algorithms.

III. Conceptualize fuzzy logic and its implementation for various real world applications.

IV. Study the advantages and limitations of hybrid learning algorithms.

### UNIT-I

**INTRODUCTION TO SOFT COMPUTING**

Characteristics behavior of intelligent systems, knowledge based systems, knowledge representation and processing, soft computing characteristics; Constitutes of soft computing: Fuzzy logic and computing, neural computing, evolutionary computing, rough sets, probabilistic reasoning and machine learning.

### UNIT-II

**NEURAL NETWORKS**

Fundamental concepts and models of artificial neural systems: Biological neurons and their artificial models, models of artificial neural networks, neural processing, learning and adaptation, neural network learning rules and comparison; Linearly and non-linearly separable pattern classification; Linear convergence theorem; Multi-layer feed forward network: Delta learning rule for Multi perceptron layer, generalized delta learning rule, feed forward recall and error back propagation training, learning factors, character recognition application; Associative memory: Hopfield network, bidirectional associative memory, radial basis function networks.

### UNIT-III

**FUZZY LOGIC AND FUZZY SYSTEMS**

Evolution of fuzzy logic, fuzzy sets, fuzzy logic operations, fuzzy relations, fuzzy arithmetic and fuzzy measures, fuzzy rules and reasoning.

Fuzzy inference systems mandani fuzzy model, sugeno fuzzy model, tsukamoto fuzzy model, fuzzy modeling and decision making, neuro-fuzzy modeling, input space partitioning and fuzzy modeling.

### UNIT-IV

**HYBRID SYSTEMS**


### UNIT-V

**APPLICATIONS OF SOFT COMPUTING TECHNIQUES**

Applications of fuzzy in pattern recognition: Printed character recognition, inverse kinematics problems, automobile fuel efficiency prediction, soft computing for color recipe prediction, applications of evolutionary computing in image processing and computer vision, soft computing in mobile ad-hoc networks, soft computing in information retrieval and semantic web, soft computing in software engineering.

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**SOFT COMPUTING**

### V Group: CSE / IT

<table>
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**Contact Classes:** 45  
**Tutorial Classes:** Nil  
**Practical Classes:** Nil  
**Total Classes:** 45
## Text Books:


## Reference Books:


## Web References:

1. http://www.sctie.iitkgp.ernet.in/
3. http://www.sharbani.org/home2/soft-computing-

## E-Text Books:

1. https://www.books.google.co.in/books?id=bVbj9nhvHd4C

## Course Home Page:
ELEMENTS OF NEURAL COMPUTATION

**V Group: CSE/IT**

<table>
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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

**OBJECTIVES:**
The course should enable the students to:
I. Illustrate on Artificial Intelligence techniques and problems.
II. Understand the neural networks structure, architecture and learning process.
III. Explore on single and multilayer perception in network learning process.
IV. Study the concepts of Radial Basis Function networks and fuzzy set theory.

**UNIT-I  ARTIFICIAL INTELLIGENCE**
Classes: 08

Introduction to artificial intelligence, artificial intelligence problems, artificial intelligence techniques, problems, problem space and search-defining the problem as a state space search, production system, problem characteristics; Heuristic search technologies: Generate and test hill climbing, best first search, problem reduction, constraint satisfaction, means end analysis.

**UNIT-II  NEURAL NETWORKS**
Classes: 10


**UNIT-III  PERCEPTION AND HOPFIELD NETWORKS**
Classes: 08


Hopfield networks: The Hopfield model, Hopfield networks, recurrent and bidirectional associative memories, counter propagation networks, artificial resonance theory.

**UNIT-IV  RADIAL BASIS FUNCTION NETWORKS**
Classes: 10


**UNIT-V  INTRODUCTION TO FUZZYSET THEORY**
Classes: 09

Classical set Vs fuzzy set, properties of fuzzy sets, operations of fuzzy sets union, intersection, complement, T norm and co T norm; Fuzzy relations: Operations on fuzzy relations, cylindrical extensions interference rules, compositional rule of interference.
Text Books:


Reference Books:


Web References:


E-Text Books:


Course Home Page:
OBJECTIVES:
The course should enable the students to:
I. Understand the basics of an evolutionary computing paradigms and its application in engineering optimization problems.
II. Explore the fundamentals of neural networks applications using neuro-modeling.
III. Illustrate the concepts of fuzzy sets and fuzzy logic of machine intelligence applications.
IV. Study on advances in neural networks for natural immune systems.

UNIT-I INTRODUCTION TO COMPUTATIONAL INTELLIGENCE
Computational intelligence paradigms: Artificial neural networks, evolutionary computation, swarm intelligence, artificial immune systems, fuzzy systems; Evolutionary computation: Generic evolutionary algorithm, representation the chromosome, initial population, fitness function, selection; Reproduction operators: Stopping conditions, evolutionary computation versus classical optimization; Genetic algorithms: Canonical genetic algorithm, crossover, mutation, control parameters, genetic algorithm variants, advanced topics; Genetic programming: Tree-based representation, initial population, fitness function, building block genetic programming; Evolutionary programming: Basic evolutionary programming, evolutionary programming operators, strategy parameters, evolutionary programming implementations, advanced topics.

UNIT-II COMPUTATIONAL SWARM INTELLIGENCE
Particle swarm optimization: Basic particle swarm optimization, social network structures, basic variations, advanced topics, applications; Ant algorithms: Ant colony optimization meta-heuristic, cemetery organization and brood care, advanced topics, applications.

UNIT-III FUZZY SYSTEMS
Fuzzy Sets: Formal definitions, membership functions, fuzzy operators, fuzzy set characteristics, fuzziness and probability.
Fuzzy logic and reasoning: Fuzzy logic, fuzzy inferencing; Fuzzy controllers: Components of fuzzy controllers, fuzzy controller types.

UNIT-IV ARTIFICIAL NEURAL NETWORKS
UNIT-V | ARTIFICIAL IMMUNE SYSTEMS

Natural immune system: Classical view, antibodies and antigens, the white cells, immunity types, learning the antigen structure, the network theory, the danger theory; Artificial immune models: Artificial immune system algorithm, classical view models, clonal selection theory models.

Text Books:


Reference Books:


Web References:


E-Text Books:

1. http://www3.u-toyama.ac.jp/tanglab/content51/filed/CI.pdf

Course Home Page:
## INTELLEGENT SYSTEM DESIGN

### V Group: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
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**Contact Classes: 45**  
**Tutorial Classes: Nil**  
**Practical Classes: Nil**  
**Total Classes: 45**

### OBJECTIVES:
The course should enable the students to:

I. Able to prepare data in a way required by data mining algorithms.
II. Knows how to apply rough set (fuzzy set, Petri net) methods for solving basic problems coming from intelligent system domain and data analysis architecture.
III. Different ways of knowledge representation, basic algorithms from rough sets, fuzzy sets and Petri nets.

### UNIT-I  
**INTRODUCTION**  
Classes: 08

Fuzzy sets: Basic types, basic concepts, representation, extension principle, types of operation-union, intersection, complement.

### UNIT-II  
**FUZZY ARITHMETIC**  
Classes: 09

Fuzzy numbers, Linguistic variables, arithmetic operations on intervals, arithmetic operations on fuzzy numbers, lattice of fuzzy numbers, fuzzy equations.

### UNIT-III  
**FUZZY RELATIONS**  
Classes: 10

Projections and cylindrical extensions, binary fuzzy relations, binary relations on single set, fuzzy equivalence relations.

Fuzzy compatibility relations, fuzzy ordering relations, fuzzy morphisms.

### UNIT-IV  
**FUZZY SYSTEMS**  
Classes: 08

General discussion, fuzzy controllers: Overview, example, fuzzy systems and neural networks, fuzzy automata, fuzzy dynamic systems.

### UNIT-V  
**PATTERN RECOGNITION**  
Classes: 10

Introduction, fuzzy clustering, fuzzy pattern recognition, fuzzy image processing.
### Text Books:


### Reference Books:


### Web References:

2. [https://coursebook.utdallas.edu/hcs6349.5h1.16s/](https://coursebook.utdallas.edu/hcs6349.5h1.16s/)
3. [www.hshl.de/en-intelligent-systems-design](http://www.hshl.de/en-intelligent-systems-design)

### E-Text Books:


### Course Home Page:
### NATURAL LANGUAGE PROCESSING

**V Group: CSE / IT**

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**Contact Classes:** 45  **Tutorial Classes:** Nil  **Practical Classes:** Nil  **Total Classes:** 45

**OBJECTIVES:**
The course should enable the students to:
I. Knowledge of various levels of analysis involved in NLP.
II. Understand the concepts of word level and syntactic analysis.
III. Able to gain knowledge in automated natural language generation and machine translation.
IV. Study on design features of information retrieval systems and lexical resources.

**UNIT-I**  **OVERVIEW AND LANGUAGE MODELING OVERVIEW**  **Classes:** 08

Origins and challenges of NLP-language and grammar processing Indian languages NLP applications information retrieval; Language modeling: Introduction, various grammar based language models, statistical language model.

**UNIT-II**  **WORD LEVEL AND SYNTACTIC ANALYSIS**  **Classes:** 09

Word level analysis: introduction regular expressions, finite state automata morphological parsing, spelling error detection, correction words, word classes part-of speech tagging; Syntactic analysis: Introduction context free grammar constituency, parsing probabilistic parsing.

**UNIT-III**  **SEMANTIC ANALYSIS AND DISCOURSE PROCESSING**  **Classes:** 10

Semantic analysis: Introduction meaning, representation lexical semantics, ambiguity, word sense disambiguation.

Discourse processing: Introduction, cohesion, reference, resolution, discourse, coherence, structure.

**UNIT-IV**  **NATURAL LANGUAGE GENERATION AND MACHINE TRANSLATION**  **Classes:** 09

Natural language generation: Introduction, architecture of NLG systems generation tasks and representations, application of NLG; Machine translation: Introduction, problems in machine translation, characteristics of Indian languages, machine translation, approaches, translation involving Indian languages.

**UNIT-V**  **INFORMATION RETRIEVAL AND LEXICAL RESOURCES**  **Classes:** 09

Information retrieval: Introduction, design features of information retrieval systems, classical, non-classical, alternative models of information Retrieval evaluation; Lexical resources: Introduction, word net frame, net stemmers, POS tagger, research corpora.

**Text Books:**

**Reference Books:**


**Web References:**


**E-Text Books:**

CLOUD INFRASTRUCTURE AND SERVICES

VI Group: CSE / IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the fundamentals and essentials of cloud computing services.
II. Introduce the broad perceptive of cloud architecture model and virtualization.
III. Explore important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other Business Cloud Applications.
IV. Study the grid computing and able to start adopting Aneka cloud platform as a service.

UNIT-I  DISTRIBUTED SYSTEM MODELS AND VIRTUALIZATION  Classes: 08
Distributed system models and enabling technologies, parallel/distributed programming models, performance; Security and energy: Efficiency, performance metrics and scalability analysis, fault-tolerance and system availability, network threats and data integrity, energy-efficiency in distributed computing; Virtual machines and virtualization of clusters and data centers.

UNIT-II  INTRODUCTION TO CLOUD COMPUTING  Classes: 10
Introduction into cloud computing, migration into cloud enriching the integration as a service paradigm for the cloud era, cloud computing service models, architecture design of compute and storage clouds, public cloud platforms.

UNIT-III  CLOUD INFRASTRUCTURE AND PROGRAMMING MODELS  Classes: 08
Infrastructure as a service (IAAS) and platform and software as a service (PAAS/SAAS), secure distributed data storage in cloud computing.
Aneka comet cloud: T-systems work flow engine for clouds; Cloud programming and software environments: Parallel and distributed programming paradigms.

UNIT-IV  MONITORING, MANAGEMENT AND APPLICATIONS  Classes: 10
Architecture for federated cloud computing, SLA management in cloud computing, performance prediction for hpc on clouds, architecting cloud applications in the AWS cloud, building content delivery networks using clouds, resources cloud mashups.

UNIT-V  SECURITY IN THE CLOUD  Classes: 09
Security overview: Cloud security challenges and risks, software as a service security, security governance, risk management, security monitoring, security architecture design, data security, application security, virtual machine security, identity management and access control, autonomic security.
### Text Books:


### Reference Books:


### Web References:


### E-Text Books:

1. [https://books.google.co.in/books?id=evcgB7Qlix4C&pg=RA1-PT60&lpg=RA1 PT60&dq=1](https://books.google.co.in/books?id=evcgB7Qlix4C&pg=RA1-PT60&lpg=RA1 PT60&dq=1)
2. [https://books.google.co.in/books?id=VSDZAgAAQBAJ&pg=PR14](https://books.google.co.in/books?id=VSDZAgAAQBAJ&pg=PR14)

### Course Home Page:
WIRELESS AND MOBILE COMPUTING

VI Group: CSE / IT

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Contact Classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the concept of wireless transmission Protocols.
II. Learn the typical mobile networking infrastructure through a popular GSM protocol Architecture.
III. Illustrate the various layers of mobile networks for location management.
IV. Estimate the database issues in mobile environments and data delivery models.
V. Learn the platforms and protocols used in mobile environment.

UNIT-I WIRELESS FUNDAMENTALS AND PROTOCOLS Classes: 08

UNIT-II INTRODUCTION TO MOBILE COMPUTING AND SERVICES Classes: 10
Mobile computing: Paradigm, promises/novel applications and impediments and architecture, limitations of mobile and handheld devices; GSM: Services, system architecture, radio interfaces, protocols, localization, calling, handover, security, GPRS, DECT.

UNIT-III MEDIA ACCESS LAYER AND MOBILE NETWORK LAYER Classes: 08
Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, wireless LAN (IEEE802.11) system and protocol architecture.
Mobile network layer: Packet delivery and handover management, location management, registration, tunneling and encapsulation, route optimization, DHCP.

UNIT-IV MOBILE TRANSPORT LAYER Classes: 10
Conventional TCP/IP protocols, indirect TCP, snooping TCP, mobile TCP, other transport layers protocols for mobile networks; Database issues: Database hoarding & caching techniques, C-S computing and adaptation, transactional models, query processing, data recovery process and QoS issues.

UNIT-V MOBILE ADHOC NETWORKS(MANET'S) Classes: 09
Introduction, applications and challenges of a MANET, routing, classification of routing algorithms, algorithms such as DSR, AODV, DSDV; Protocols and platforms for mobile computing: Bluetooth, J2ME, Java card, PalmOS, windows CE, symbian OS, Linux for mobile devices, android.
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<td>2. <a href="https://books.google.co.in/books?id=LSqPLwEACAAJ&amp;source=gbs_book_other_versions">https://books.google.co.in/books?id=LSqPLwEACAAJ&amp;source=gbs_book_other_versions</a></td>
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HIGH PERFORMANCE COMPUTING

VI Group: CSE / IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the fundamental principles in design and programming of parallel algorithms.
II. Study the approaches to achieve high performance models in real time applications.
III. Explore on parallel computing development tools and technologies.
IV. Illustrate on add on tools to address the performance issues, analysis, data transformation and visualization.

UNIT-I  DESIGN OF PARALLEL ALGORITHMS  Classes: 08
Parallel computers and computation, a parallel machine model, a parallel programming model, parallel algorithm examples, partitioning, communication, agglomeration, mapping, load balancing algorithms, task, scheduling algorithms, case studies, random numbers generation, hypercube algorithms, vector reduction, matrix transposition, merge sort.

UNIT-II  APPROACHES TO PERFORMANCE MODELING  Classes: 10
A quantitative basis for design, defining performance, approaches to performance modeling, developing models, performance parameters, time, scalability, overheads, bandwidth, efficiency, speed, interconnection networks, input/output; Case study: Shortest path algorithms, floyd's algorithm, dijkstra's algorithm, modular design review, modularity and parallel computing performance analysis; Case study: Convolution, tuple space and matrix multiplication.

UNIT-III  PARALLEL COMPUTING DEVELOPMENT TOOLS  Classes: 08
C++ review, C, C++ introduction, concurrency, locality, processor objects, global pointers thread placement, communication, remote operations.
Synchronization, mutual exclusion, data transfer functions, asynchronous communication, determinism, mapping, modularity performance issues.

UNIT-IV  PARALLEL COMPUTING DEVELOPMENT TOOLS  Classes: 10
Fortran M, concurrency, communication, unstructured communication, asynchronous communication, determinism, argument passing, mapping, modularity, high performance Fortran, data parallelism, concurrency, data distribution, dummy arguments and modularity other HPF features, performance issues.

UNIT-V  ADD ON TOOLS FOR DEVELOPMENT  Classes: 09
Message passing libraries: The MPI programming model, MPI basics, C and Fortran language bindings with MPI functions, global operations, asynchronous communication, modularity, other MPI features, performance issues, performance tools, performance analysis, data collection, data transformation and visualization tools, paragraph, upshot—pablo, gauge, paraide, IBM's parallel environment, AIMS, custom tools.
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| Course Home Page: |
E-COMMERCE

VI Group: CSE/IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Describe e-commerce framework.
II. Explain electronic system for payment.
III. Describe the use of e-commerce advertising and marketing.
IV. Understand business documents and digital library.
V. Understand the usage of multimedia systems for e-commerce.

UNIT-I  INTRODUCTION TO ELECTRONIC COMMERCE  Classes: 10
Electronic Commerce: Frame work, media coverage; anatomy of e-commerce applications: E-commerce consumer applications, E-commerce organization applications.

UNIT-II  ELECTRONIC PAYMENT SYSTEMS  Classes: 10
Types of electronic payment systems; Digital token based electronic payment system: E-cash, properties of e-cash, electronic cash in action, business issues and electronic cash, operational risk and electronic cash, electronic checks; smart cards and electronic payment system; Credit card based electronic payment system; Risk and electronic payment system; Designing electronic payment system.

UNIT-III  INTER AND INTRA ORGANIZATIONAL COMMERCE  Classes: 09
Inter organizational commerce: Electronic data interchange, electronic data interchange implementation, and value added networks; Intra organizational commerce: Work flow, automation customization and internal commerce, supply chain management.
Corporate digital library: Document library, digital document types, corporate data warehouses; Advertising and marketing: Information based marketing, advertising on internet, on-line marketing process, market research.

UNIT-IV  CONSUMER SEARCH AND RESOURCE DISCOVERY  Classes: 08
Search and resource discovery paradigms, information search and retrieval, commerce catalogues, information filtering.

UNIT-V  MULTIMEDIA  Classes: 08
Multimedia: key multimedia concepts, digital video and electronic commerce, desktop video processing, desktop video conferencing.

Text Books:
**Reference Books:**


**Web References:**

1. www.engr.sjsu.edu/gaojerry/course/cmpe296u/296z/introduction.pdf
2. https://www.tutorialspoint.com/e_commerce/e_commerce_payment_systems.htm

**E-Text Books:**


**MOOC Course:**


**Course Home Page:**
WEB SERVICES

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**Contact Classes:** 45  **Tutorial Classes:** Nil  **Practical Classes:** Nil  **Total Classes:** 45

**OBJECTIVES:**
The course should enable the students to:
I. Understand the evolution of web services and their challenges in distributed computing.
II. Describe the concepts of core distributing technologies and soa.
III. Understand the basics of web services technologies that are related to enable the web services.
IV. Demonstrate the core fundamentals of soap and their message exchange models related to security.
V. Describe the concepts of web services life cycle and their anatomy of wsdl, uddi.

**UNIT-I**  **EVOLUTION AND EMERGENCE OF WEB SERVICES**  **Classes:** 10
Evolution and emergence of web services: Evolution of distributed computing, core distributed computing technologies, client/server, CORBA, Java RMI, Microsoft DCOM, MOM, challenges in distributed computing, role of J2EE and XML in distributed computing, emergence of web services and Service Oriented Architecture (SOA); Introduction to web services: The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

**UNIT-II**  **WEB SERVICES ARCHITECTURE**  **Classes:** 6
Web services architecture, web services architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services, developing web services enabled applications.

**UNIT-III**  **CORE FUNDAMENTALS OF SOAP**  **Classes:** 13
Core fundamentals of Simple Object Access Protocol (SOAP): SOAP message structure, SOAP encoding, SOAP message exchange models, SOAP communication and messaging, SOAP security; Developing web services using SOAP: Building SOAP web services, developing SOAP web services using Java.
Limitations of SOAP, describing web services: WSDL, WSDL in the world of web services, web services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL tools, limitations of WSDL.

**UNIT-IV**  **DISCOVERING WEB SERVICES**  **Classes:** 8
Discovering web services: Service discovery, role of service discovery in a SOA, service discovery mechanisms; Universal description, Discovery and Integration (UDDI): UDDI Registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, support for categorization in UDDI registries, publishing API, publishing information to a UDDI registry, searching information in a UDDI registry, deleting information in a UDDI registry, limitations of UDDI.
<table>
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<tr>
<th>UNIT-V</th>
<th>WEB SERVICES INTEROPERABILITY</th>
<th>Classes: 08</th>
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**Text Books:**


**Reference Books:**


**Web References:**

2. http://www.w3schools.com/xml/xml_services.asp  

**E-Text Books:**


**MOOC Course:**

2. https://www.intertech.com/training/java/java-ee/web-services  
3. http://www.slideshare.net/raaviraja/webservices-online-training-course-content

**Course Home Page:**
GREEN COMPUTING

VI Group: CSE/IT

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand green computing practices to minimize negative impacts on the environment.
II. Illustrate energy saving practices in their use of hardware.
III. Examine various technology tools that can reduce paper waste and carbon foot print by user.
IV. Analyze and understand how to minimize equipment disposal requirements.

UNIT-I  INTRODUCTION  Classes: 10
Green IT fundamentals: Business, IT, and the environment; Green computing: Carbon foot print, scoop on power; Green IT Strategies: Drivers, dimensions, and goals; Environmentally responsible business: Policies, practices, and metrics.

UNIT-II  GREEN ASSETS AND MODELING  Classes: 10
Green assets: Buildings, data centers, networks, and devices; Green business process management: Modeling, optimization, and collaboration; Green enterprise architecture: Environmental intelligence, green supply chains; Green information systems: Design and development models.

UNIT-III  GRID FRAMEWORK  Classes: 09
Virtualizing of IT systems: Role of electric utilities, telecommuting, teleconferencing and teleporting.
Materials recycling, best ways for Green PC, Green data center, Green Grid framework.

UNIT-IV  GREEN COMPLIANCE  Classes: 08

UNIT-V  CASE STUDIES  Classes: 08
The Environmentally Responsible Business Strategies (ERBS) : Case study scenarios for trial runs; Case studies: Applying Green IT strategies and applications to a home, hospital, packaging industry and telecom Sector.

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<td>1. <a href="http://searchdatacenter.techtarget.com/definition/green-computing">http://searchdatacenter.techtarget.com/definition/green-computing</a></td>
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ELEMENTS OF MECHANICAL ENGINEERING

VI Semester: Common for all Branches

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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Familiarize with fundamentals of mechanical systems.
II. Understand and appreciate the significance of mechanical engineering in different fields of engineering.
III. Understanding of application and usage of various engineering materials.

UNIT-I  INTRODUCTION TO ENERGY SYSTEMS  Classes: 09
Introduction: Prime movers and its types, concept of force, pressure, energy, work, power, system, heat, temperature, specific heat capacity, change of state, process, cycle, internal energy, enthalpy, statement of zeroth law and first law; Energy: Introduction and application, of energy sources like fossil fuels, nuclear fuels, hydels, solar, wind, and bio-fuels, environment issues like global warming and ozone depletion; Properties of gases: Gas laws, Boyle’s law, Charle’s law, gas constant, relation between $C_p$ and $C_v$, various non flow processes like constant volume processes, constant pressure process, isothermal process, adiabatic process, poly-tropic process.

UNIT-II  STEAM TURBINES, HYDRAULIC MACHINES  Classes: 09
Properties of steam: Steam formation, types of steam enthalpy, specific volume, internal volume, internal energy and dryness fraction of steam, use of steam tables, calorimeters; Heat engine: Heat engine cycle and heat engine, working substances, classification of heat engines, description and thermal efficiency of carnot, Rankine, otto cycle, diesel cycles; Steam boilers: Introduction, cochran, lancashire, babcock, and Wilcox boiler, functioning of different mountings and accessories.

UNIT-III  INTERNAL COMBUSTION ENGINES, REFRIGERATION AND AIR-CONDITIONING  Classes: 09
Internal combustion engines: Introduction, classification, engine details, four stroke, two stroke cycle, petrol engine, diesel engine, indicated power, brake power, efficiencies; Pumps: Types, operation of reciprocating, rotary, centrifugal pumps, priming.

Air compressors: Types, operation of reciprocating, rotary air compressors, significance of multi-staging; Refrigeration and air-conditioning: Refrigerant, vapor compression refrigeration system, vapor absorption refrigeration system, domestic refrigerator, window and split air conditioners.

UNIT-IV  MACHINE TOOLS AND AUTOMATION  Classes: 09
Machine tools and automation machine tools operation: Turning, facing, knurling, thread cutting, taper turning by swiveling the compound rest, drilling, boring, reaming, tapping, counter sinking, counter boring, plane milling, end milling, slot milling; Robotic and automation: Introduction, classification based on robot configuration, polar, cylindrical, cartesian, coordinate and spherical, application, advantages and advantages; Automation: Definition, types, fixed, programmable and flexible automation, NC/CNC machines, basic elements with simple block diagrams, advantages and disadvantages.
<table>
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<tr>
<th>UNIT-V</th>
<th>ENGINEERING MATERIALS, JOINING PROCESS</th>
<th>Classes: 09</th>
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<tbody>
<tr>
<td>Engineering materials and joining processes: Types, applications of ferrous metals, non-ferrous metals, alloys; Composites: Introduction, definition, classification and application (Automobile and Air Craft).</td>
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**Text Books:**


**Reference Books:**


**Web References:**

1. [http://www.nptel.ac.in/courses/112107144/](http://www.nptel.ac.in/courses/112107144/)
2. [http://www.nptel.ac.in/courses/112101098/download/lecture-37.pdf](http://www.nptel.ac.in/courses/112101098/download/lecture-37.pdf)

**E-Text Books:**

1. [www.wiley-vch.de/vch/journals/2081/books/2081_rel_title_varadan.pdf](http://www.wiley-vch.de/vch/journals/2081/books/2081_rel_title_varadan.pdf)

**Course Home Page:**
DISASTER MANAGEMENT

VI Semester: Common for all Branches

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</tbody>
</table>
| Contact Classes: 45 | Tutorial Classes: Nil | Practical Classes: Nil | Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Identify the major disaster types and develop an understanding of modern disaster management.
II. Recognize and develop awareness of the chronological phases of natural disaster response and refugee relief operations.
III. Understand the key concepts of disaster management related to development and the relationship of different disaster management activities.
IV. Categorize the organizations that are involved in natural disaster assistance and relief system.

UNIT-I | ENVIRONMENTAL HAZARDS AND DISASTERS | Classes: 09
Environmental hazards and disasters: meaning of environmental hazards, environmental disasters and environmental stress; concept of environmental hazards, environmental stress and environmental disasters, different approaches and relation with human ecology, landscape approach, ecosystem approach, perception approach, human ecology and its application in geographical researches.

UNIT-II | TYPES OF ENVIRONMENTAL HAZARDS AND DISASTERS | Classes: 09
Types of environmental hazards and disasters: Natural hazards and disasters, man induced hazards and disasters, natural hazards, planetary hazards/disasters, extra planetary hazards/disasters, endogenous hazards, exogenous hazards.

UNIT-III | ENDOGENOUS HAZARDS | Classes: 09
Endogenous hazards, volcanic eruption, earthquakes, landslides, volcanic hazards/disasters, causes and distribution of volcanoes, hazardous effects of volcanic eruptions, environmental impacts of volcanic eruptions.
Earthquake hazards/disasters, causes of earthquakes, distribution of earthquakes, hazardous effects of, earthquakes, earthquake hazards in India, human adjustment, perception and mitigation of earthquake.

UNIT-IV | EXOGENOUS HAZARDS | Classes: 09
Exogenous hazards/disasters, infrequent events, cumulative atmospheric hazards/disasters; Infrequent events: Cyclones, lightning, hailstorms; Cyclones: Tropical cyclones and local storms, destruction by tropical cyclones and local storms (causes, distribution human adjustment, perception and mitigation); Cumulative atmospheric hazards/disasters: Floods, droughts, cold waves, heat waves floods; Causes of floods, flood hazards India, flood control measures (human adjustment, perception and mitigation); Droughts: Impacts of droughts, drought hazards in India, drought control measures, extra planetary hazards/disasters, man induced hazards/disasters, physical hazards/disasters, soil erosion, Soil erosion: Mechanics and forms of soil erosion, factors and causes of soil erosion, conservation measures of soil erosion; Chemical hazards/disasters: Release of toxic chemicals, nuclear explosion, sedimentation processes; Sedimentation processes: Global sedimentation problems regional sedimentation problems, sedimentation and environmental problems, corrective measures of erosion and sedimentation, biological hazards/disasters, population explosion.
## UNIT-V
### EMERGING APPROACHES IN DISASTER MANAGEMENT

Emerging approaches in Disaster Management, Three Stages
1. Pre, disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage, Rehabilitation.

### Text Books:

### Reference Books:

### Web References:
1. https://www.google.co.in/?gfe_rd=cr&ei=iAwWLiDiay8we8_5LADA#q=disaster+mangement

### E-Text Books:
1. https://www.google.co.in/?gfe_rd=cr&ei=iAwWLiDiay8we8_5LADA#q=disaster+management+e+textbooks

### Course Home Page:
GEOSPATIAL TECHNIQUES

VI SEMESTER: Common for all branches

<table>
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<tr>
<th>Course Code</th>
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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Apply the technical skills to use geo-referenced data for the purpose of economic, educational, and social development.
II. Apply descriptive and analytical knowledge about map reading, statistics, and geospatial technologies.
III. Integrate the domains of geography and apply their knowledge to issues concerning people, places, and environments.
IV. Describe, analyze, and explain the patterns, processes, and interactions of human and physical phenomena on Earth’s surface.

UNIT-I  INTRODUCTION TO GEOSPATIAL DATA  Classes: 09
Introduction geospatial data, why to study geospatial data, importance of geospatial technology, spatial data infrastructure, three important geospatial technologies, spatial elements, coordinates and coordinate systems, basic electromagnetic radiation.

UNIT-II  PHOTOGRAMMETRY AND REMOTE SENSING  Classes: 09
Definition and scope, history of photogrammetry and remote sensing, principle, remote sensing data acquisition, remote sensing data analysis methods, advantages and limitations, hardware and software required; Map vs mosaic, ground control points; Energy interactions with atmosphere and earth surface features.

UNIT-III  MAPPING AND CARTOGRAPHY  Classes: 09
What is map and its importance, map scale and types, elements of map and indexing, map coordinate systems, visual interpretation of satellite images, interpretation of terrain evaluation.
Introduction to digital data analysis, cartographic symbolization, classification of symbols, colours in cartography, scale and purpose of a map, cartographic design, thematic cartography, digital cartography.

UNIT-IV  GEOGRAPHIC INFORMATION SYSTEM  Classes: 09
Introduction to GIS, definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, a theoretical framework for GIS, GIS data structures, data collection and input overview, processing of spatial data, data input or output, vector data model, raster data model, geometric representation of spatial feature and data structure; Spatial data and modeling, tin, DTM, overlay, spatial measurement etc.

UNIT-V  GEOSPATIAL TECHNOLOGIES APPLICATIONS  Classes: 09
Visual image analysis for land use/land cover mapping, land use and land cover in water resources, surface water mapping and inventory, geological and soil mapping, agriculture applications for forestry applications, water resources applications, urban and regional planning, environmental assessment, principles of land form identification and evaluation: sedimentary, igneous and metamorphic rock terrain.
### Text Books:


### Reference Books:


### Web References:

1. https://www.aaas.org/content/what-are-geospatial-technologies
3. https://geography.columbian.gwu.edu/applied-geospatial-techniques

### E-Text Books:


### Course Home Page:
PRINCIPLES OF OPERATING SYSTEMS

VI Semester: Common for all Branches

<table>
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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the functionalities of main components in operating systems.
II. Analyze the algorithms used in memory and process management.
III. Understand the clock synchronization protocols.
IV. Interpret the concepts of input and output storage for file management.

UNIT-I  INTRODUCTION

Classes: 10

Operating systems objectives and functions: Computer system architecture, operating systems structure, operating systems operations; Evolution of operating systems: Simple batch, multi programmed, time shared, real time systems, operating system services; Systems calls: Types of systems calls.

UNIT-II  PROCESS AND CPU SCHEDULING, PROCESS COORDINATION

Classes: 10

Process concepts: The process, process state, process control block, threads; process scheduling: Scheduling queues, schedulers, context switch, preemptive scheduling, dispatcher, scheduling criteria, scheduling algorithms, Process synchronization, the critical section problem; semaphores and monitors.

UNIT-III  MEMORY MANAGEMENT AND VIRTUAL MEMORY

Classes: 08

Logical and physical address space: Swapping, contiguous memory allocation, paging, structure of page table.
Segmentation: Segmentation with paging, virtual memory, demand paging; Page replacement, page replacement algorithms, thrashing.

UNIT-IV  FILE SYSTEM INTERFACE

Classes: 09

The concept of a file, access methods, directory structure, file system mounting, file sharing, protection, file system structure, file system implementation, allocation methods, free space management, directory implementation.

UNIT-V  DEADLOCKS, PROTECTION

Classes: 08

System model: Deadlock characterization, methods of handling deadlocks, deadlock prevention, dead lock avoidance, dead lock detection, principles of protection, domain of protection, access matrix, implementation of access matrix.
### Text Books:


### Reference Books:


### Web References:

1. https://www.smartzworld.com/notes/operatingsystems
2. https://www.scoopworld.in
3. https://www.sxecw.edu.in
4. https://www.technofest2u.blogspot.com

### E-Text Books:


### Course Home Page:
JAVA PROGRAMMING

VI Semester: Common for all Branches

<table>
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</table>

Contact Classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand fundamentals of object-oriented terminology and programming concepts in java.
II. Acquire basics of how to translate solution problem into object oriented form.
III. Develop programs in java for solving simple applications.
IV. Design and implement simple program that use exceptions and multithreads.

UNIT-I    OOP CONCEPTS AND JAVA PROGRAMMING         Classes: 08
OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, constructors, methods, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, arrays, parameter passing.

UNIT-II    INHERITANCE                                Classes: 10
Inheritance: Inheritance hierarchies, super and subclasses, member access rules, Polymorphism: Dynamic binding, method overriding, abstract classes and methods.

UNIT-III   EXCEPTION HANDLING AND MULTI THREADING     Classes: 08
Exception Handling: Benefits of exception handling, the classification of exceptions, usage of try, catch, throw, throws and finally.

Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads.

UNIT-IV    INTERFACES AND PACKAGES                    Classes: 09
Interface: Interfaces vs Abstract classes, defining an interface, implement interfaces, Packages: Defining, creating and accessing a package, importing packages.

UNIT-V     FILES, AND CONNECTING TO DATABASE           Classes: 10
Files: streams – byte streams, character stream, text input/output, binary input/output, file management; Connecting to Database: Connecting to a database, querying a database and processing the results, updating data with JDBC.

Text Books:
**Reference Books:**


**Web References:**


**E-Text Books:**


**Course Home Page:**
OBJECTIVES:
The course should enable the students to:
I. Imbibe knowledge about the basic functions, structure, concepts and applications of Embedded Systems.
II. Understand Real time operating system concepts.
III. Analyze different tools for development of embedded software.
IV. Understand the architecture of advanced processors.

UNIT-I  EMBEDDED COMPUTING  Classes: 09
Definition of embedded system, embedded systems vs. general computing systems, history of embedded systems, complex systems and microprocessor, classification, major application areas, the embedded system design process, formalisms for system design, design examples.

UNIT-II  THE 8051 ARCHITECTURE  Classes: 09

UNIT-III  INTRODUCTION TO EMBEDDED C AND APPLICATIONS  Classes: 09
Embedded systems programming in C, binding and running embedded C program in Keil IDE, dissecting the program, building the hardware;
Basic techniques for reading and writing from I/O port pins, LED interfacing, interfacing with keyboards, displays, D/A and A/D conversions, using embedded C interfacing

UNIT-IV  INTRODUCTION TO REAL – TIME OPERATING SYSTEMS  Classes: 09

UNIT-V  INTRODUCTION TO ADVANCED ARCHITECTURES  Classes: 09
ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus.
**Text Books:**


**Reference Books:**

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education.

**Web References:**


**E-Text Books:**

4. https://docs.google.com/file/d/0B6Cytl4eS_ahUS1LTkVXb1hxaw00/edit
### INTRODUCTION TO AUTOMOBILE ENGINEERING

#### VI Semester: Common for all Branches

<table>
<thead>
<tr>
<th>Course Code</th>
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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

#### OBJECTIVES:

The course should enable the students to:

I. Understand the function of various parts of automobile, features of fuel supply systems for S.I and C.I engines.

II. Distinguish the features of various types of cooling, ignition and electrical systems.

III. Identify the merits and demerits of the various transmission and suspension systems.

IV. Recognize the working of various braking and steering systems.

V. Summarize the ways and means of reducing the emissions from automobiles.

#### UNIT-I  INTRODUCTION

Introduction to automobile engineering, chassis and automobile components, automobile engines, otto cycle, diesel cycle, dual cycle, engine lubrication, lubricating oil, lubrication oil filter, engine servicing; Fuel supply system; Fuel tank, strainer, feed pump, fuel filter, injection pump, injector, filters, electronic controlled fuel injection, common rail direct injection systems.

#### UNIT-II  COOLING SYSTEM

Cooling requirements, air cooling, liquid cooling, water forced circulation system, radiators, cooling fan, water pump, thermostat, pressure sealed cooling, antifreeze solutions, intelligent cooling; Ignition system: Function of an ignition system, battery ignition system, storage battery, condenser and spark plug, magneto coil ignition system, electronic ignition system, electronic ignition, spark advance mechanisms; Electrical system: Charging circuit, generator, current-voltage regulator, starting system, bendix drive mechanism solenoid switch, lighting systems, automatic high beam control, horn, wiper, fuel gauge, oil pressure gauge, engine temperature indicator.

#### UNIT-III  TRANSMISSION AND SUSPENSIONS SYSTEMS

Transmission system: Clutches, principle, types, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel.

Gear boxes, types, constant mesh, synchro mesh gear boxes, epicyclic gear box, auto transmission, continuous variable transmission, propeller shaft, Hotch-Kiss drive, Torque tube drive, universal joint, differential, rear axles types, wheels and tyres; Suspension system: Objects of suspension systems, rigid axle suspension system, torsion bar, shock absorber, independent suspension system.

#### UNIT-IV  BRAKING AND STEERING SYSTEMS

Braking system: Mechanical brake system, Hydraulic brakes system, Master cylinder, wheel cylinder; Requirements of brake fluid, pneumatic and vacuum brake, ABS; Steering system: Steering geometry, camber, castor, king pin, rake, combined angle toe-in, toe-out, types of steering mechanism, Ackerman steering mechanism, Davis steering mechanism, steering gears types, steering linkages.
### UNIT-V
#### EMISSIONS FROM AUTOMOBILES

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<th>Classes: 09</th>
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<tr>
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<td>Emissions from automobiles, pollution standards national and international, pollution control techniques, petrol injection, common rail diesel injection, variable valve timing; Energy alternatives, solar, photovoltaic, hydrogen, biomass, alcohols, LPG, CNG, liquid fuels and gaseous fuels, hydrogen as a fuel for internal combustion engines, their merits and demerits.</td>
</tr>
</tbody>
</table>

**Text Books:**


**Reference Books:**


**Web References:**

1. http://www.nptel.kmeacollege.ac.in/syllabus/125106002/
2. http://www.nptel.ac.in/courses/125106002/

**E-Text Books:**

1. http://www.engineeringstudymaterial.net/tag/automotive-engineering-books

**Course Home Page:**
## INTRODUCTION TO ROBOTICS

**VI Semester:** Common for all Branches

<table>
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**Contact Classes:** 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

### OBJECTIVES:
The course should enable the students to:
- I. Familiarize with the automation and brief history of robot and applications.
- II. Understand the kinematics of robots and knowledge about robot end effectors and their design.
- III. Apply robot actuators and feedback components to automation.

### UNIT-I  INTRODUCTION TO ROBOTICS  Classes: 09

Introduction: Automation and robotic, an overview of robotics, classification by coordinate system and control systems; Components of the industrial robotics: Degrees of freedom, end effectors: Mechanical gripper, magnetic, vacuum cup and other types of grippers, general consideration on gripper selection and design.

### UNIT-II  MOTION ANALYSIS AND KINEMATICS  Classes: 09

Motion analysis: Basic rotation matrices, composite rotation matrices, Euler angles, equivalent angle and axis, homogeneous transformation, problems; Manipulator kinematics: D-H notations, joint coordinates and world coordinates, forward and inverse kinematics, problems.

### UNIT-III  KINEMATICS AND DYNAMICS  Classes: 09

Differential kinematics: Differential kinematics of planar and spherical manipulators, Jacobians, problems.

Robot dynamics: Lagrange, Euler formulations, Newton-Euler formulations, problems on planar two link manipulators.

### UNIT-IV  TRAJECTORY PLANNING AND ACTUATORS  Classes: 09

Trajectory planning: Joint space scheme, cubic polynomial fit, avoidance of obstacles, types of motion: Slew motion, joint interpolated motion, straight line motion, problems; Robot actuators and feedback components; Actuators: pneumatic and hydraulic actuators.

### UNIT-V  ELECTRIC ACTUATORS AND ROBOTIC APPLICATIONS  Classes: 09

Electric actuators: DC servo motors, stepper motors, feedback components: position sensors, potentiometers, resolvers and encoders, velocity sensors, tactile sensors; Robot application in manufacturing: Material handling, assembly and inspection.

### Text Books:
### Reference Books:

### Web References:
3. [https://www.researchgate.net/publication/277712686_Introduction_to_Robotics_class_notes_UG_level](https://www.researchgate.net/publication/277712686_Introduction_to_Robotics_class_notes_UG_level)

### E-Text Books:

### Course Home Page:
OBJECTIVES:
The course should enable the students to:
I. Demonstrate with an overview of various aerospace propulsion systems and a sound foundation in the fundamentals of thermodynamics.
II. Distinguish the elementary principles of thermodynamic cycles as applied to propulsion analysis.
III. Prioritize an introduction to combustion & gas kinetic theory.
IV. Discover a working knowledge of and the tools to measure various flight propulsion systems such as turbojets, turbofans, ramjets, rockets, air turbo-rockets and nuclear/electric propulsion systems.

UNIT-I
ELEMENTS OF AIRCRAFT PROPULSION
Classes: 10
Classification of power plants, methods of aircraft propulsion, propulsive efficiency, specific fuel consumption, thrust and power, factors affecting thrust and power, illustration of working of gas turbine engine, characteristics of turboprop, turbofan and turbojet, ram jet, scram jet, methods of thrust augmentation, atmospheric properties, turbojet, turbofan, turboprop, turbo-shaft engine construction and nomenclature, theory and performance, introduction to compressors, turbines, combustors and afterburners for aircraft engines.

UNIT-II
PROPELLER THEORY
Classes: 08
Momentum theory, Blade element theory, combined blade element and momentum theory, propeller power losses, propeller performance parameters, prediction of static thrust and in flight, negative thrust, prop fans, ducted propellers, propeller noise, propeller selection, propeller charts.

UNIT-III
INLETs, NOZZLES AND COMBUSTION CHAMBERS
Classes: 10
Subsonic and supersonic inlets, relation between minimum area ratio and external deceleration ratio, starting problem in supersonic inlets, modes of inlet operation, jet nozzle, efficiencies, over expanded, under and optimum expansion in nozzles, thrust reversal.
Classification of combustion chambers, combustion chamber performance flame tube cooling, flame stabilization.

UNIT-IV
THERMODYNAMICS OF REACTING SYSTEMS
Classes: 09
Chemical kinetics: equilibrium, analysis of simple reactions, steady, state and partial equilibrium approximations, explosion theories; Transport phenomena: Molecular and convective transports; Conservation equations of multicomponent, reacting systems.

UNIT-V
PREMIXED FLAMES
Classes: 08
Rankine hugoniot relations, theories of laminar premixed flame propagation, quenching and flammability limits; Diffusion flames: Burke-Schumann theory, laminar jet diffusion flame, droplet combustion, turbulent combustion, closure problem, premixed and non-premixed turbulent combustion, introduction to DNS and LES.
# Text Books:

# Reference Books:

# Web References:
1. https://www.nptel.ac.in/courses/101101002/
4. https://www.aero.iisc.ernet.in/page/propulsion

# E-Text Books:
3. https://www.books.google.co.in/books?id=iUuPAQAAQBAJ&source=gbs_similarbooks

# Course Home Page:
FUNDAMENTALS OF IMAGE PROCESSING

VII SEMESTER: Common for all Branches

<table>
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</table>

Contact Classes: 45 Tutorial Classes: 0 Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:

I. Understand the image fundamentals and the relationship between pixels.
II. Understand the image enhancement techniques in spatial domain and frequency domain.
III. Analyze the image restoration technique from degraded image using various filtering techniques.
IV. Design segmentation of the image for boundary detection.
V. Differentiate redundancy techniques and apply for image compression.

UNIT-I INTRODUCTION
Digital image fundamentals and image transforms digital image fundamentals, sampling and quantization, relationship between pixels.

UNIT-II IMAGE ENHANCEMENT
Introduction, image enhancement in spatial domain, enhancement through point processing, types of point processing, histogram manipulation, linear and non-linear gray level transformation, local or neighborhood operation, median filter processing; Spatial domain high pass filtering, filtering in frequency domain, obtaining frequency domain filters from spatial filters, generating filters directly in the frequency domain, low pass (smoothing) and high pass (sharpening) filters in frequency domain.

UNIT-III IMAGE RESTORATION
Image restoration degradation model, algebraic approach to restoration, inverse filtering.
Least mean square filters, constrained least square restoration, interactive restoration.

UNIT-IV IMAGE SEGMENTATION, MORPHOLOGICAL IMAGE PROCESSING
Image segmentation detection of discontinuities, edge linking and boundary detection, threshold, region oriented segmentation. Morphological image processing dilation and erosion, structuring element decomposition, the Strel function, erosion; Combining dilation and erosion: Opening and closing the hit and miss transformation.

UNIT-V IMAGE COMPRESSION

Text Books:
**Reference Books:**


**Web References:**

1. https://imagingbook.com/

**E-Text Books:**

OBJECTIVES:
The course should enable the students to:
I. Understand the role of database management system in an organization and learn the database concepts.
II. Design databases using data modeling and data normalization techniques.
III. Construct database queries using relational algebra and calculus.
IV. Understand the concept of a database transaction and related database facilities.
V. Learn how to evaluate set of queries in query processing.

UNIT I  CONCEPTUAL MODELING
Introduction to file and database systems: Database system structure, data models: entity relationship model, relational model.

UNIT II  RELATIONAL APPROACH
Relational algebra and calculus: Relational algebra, selection and projection, set operations, renaming, joins, division, examples of algebra queries, relational calculus, tuple relational calculus.

UNIT III  BASIC SQL QUERY AND NORMALIZATION
SQL data definition; Queries in SQL: updates, views, integrity and security, relational database design.
Normal Forms: 1NF, 2NF, 3NF and BCNF.

UNIT IV  TRANSACTION MANAGEMENT
Transaction processing: Introduction, need for concurrency control, desirable properties of transaction, schedule and recoverability, Serializability and schedules.

UNIT V  CONCURRENCY CONTROL
Concurrency control; Types of locks: Two phases locking, deadlock, timestamp based concurrency control, recovery techniques, concepts, immediate update, deferred update, shadow paging.

Text Books:
### Reference Books:


### Web References:

1. https://www.youtube.com/results?search_query=DBMS+online+classes
2. http://www.w3schools.in/dbms/

### E-Text Books:


### Course Home Page:
OBJECTIVES:
The course should enable the students to:
I. Learn the basic categories of threats to computers and networks.
II. Understand various cryptographic algorithms and be familiar with public-key cryptography.
III. Apply authentication functions for providing effective security.
IV. Analyze the application protocols to provide web security.
V. Discuss the place of ethics in the Information Security Area.

UNIT I  ATTACKS ON COMPUTERS  Classes: 08
Attacks on computers and computer security: Introduction, the need for security, security approaches, types of security attacks and security services.

UNIT II  SYMMETRIC KEY CIPHERS  Classes: 10
Symmetric key ciphers: Block cipher principles and algorithms (DES, AES), differential and linear cryptanalysis, block cipher modes of operation, stream ciphers; Asymmetric key ciphers: Principles of public key cryptosystems, algorithms (RSA Diffie – Helman).

UNIT III  MESSAGE AUTHENTICATION AND CRYPTOGRAPHY  Classes: 08
Message authentication algorithm and hash functions: Authentication requirements, functions, message, authentication codes, hash functions, secure hash algorithm, whirlpool, digital signatures.

Cryptography: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography.

UNIT IV  E-MAIL SECURITY  Classes: 10
E-mail security: Pretty good privacy; S/MIMI IP Security: IP security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management.

UNIT V  WEB SECURITY  Classes: 09
Web security: Web security considerations, secure electronic transaction intruders; Virus and firewalls: Intruders, intrusion detection password management, virus and related threats, firewall design principles; Types of firewalls.

Text Books:

Reference Books:

**Web References:**

2. https://books.google.co.in/books/about/Cryptography_Network_Security_Sie_2E.html?id=Kokjwdf0E7QC
3. https://books.google.co.in/books/about/Information_Security.html?id=Bh45pU0_E_4C

**E-Text Books:**

1. https://books.google.co.in/books/about/Information_Security.html

**Course Home Page:**
MODELING AND SIMULATION

VII Semester: Common to All Branches

<table>
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</table>

Contact Classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the basic system concept and definitions of system.
II. Study the techniques to model and to simulate various systems.
III. Analyze a system and to make use of the information to improve the performance.

UNIT-I INTRODUCTION Classes: 08
When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of models; Discrete event system simulation; Steps in a simulation study; The basics of spreadsheet simulation; Simulation example: Simulation of queuing systems in a spreadsheet.

UNIT-II GENERAL PRINCIPLES SIMULATION SOFTWARE Classes: 10
Concepts in discrete-event simulation: The event-scheduling / time-advance algorithm, world views, manual simulation using event scheduling; List processing, simulation in java; Simulation in GPSS review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions; Poisson process; Empirical distributions.

UNIT-III QUEUING MODELS AND RANDOM NUMBERS Classes: 08
Characteristics of queuing systems; Queuing notation; Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues; Rough-cut modeling: An illustration.
Properties of random numbers: Generation of pseudo random numbers; Techniques for generating random numbers; Tests for random numbers random-variate generation: Inverse transforms technique; Acceptance-rejection technique; Special properties.

UNIT-IV INPUT MODELING Classes: 10
Data collection; Identifying the distribution with data; Parameter estimation; Goodness of fit tests; Fitting a non-stationary poisson process; Selecting input models without data; Multivariate and time-series input models.

UNIT-V ESTIMATION OF ABSOLUTE PERFORMANCE Classes: 09
Types of simulations with respect to output analysis; Stochastic nature of output data; Absolute measures of performance and their estimation; Output analysis for terminating simulations; Output analysis for steady-state simulations; Model building, verification and validation; Verification of simulation models; Calibration and validation of models, optimization via simulation.
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<td>2. <a href="https://www.google.co.in/?gfe_rd=cr&amp;ei=YGRCWOWMKuPx8AfQqaaoCg#q=simulation+and+modeling+e+books&amp;start=30">https://www.google.co.in/?gfe_rd=cr&amp;ei=YGRCWOWMKuPx8AfQqaaoCg#q=simulation+and+modeling+e+books&amp;start=30</a></td>
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<th>Course Home Page:</th>
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RESEARCH METHODOLOGIES

VII Semester: Common for All Branches

<table>
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<th>Course Code</th>
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<th>Credits</th>
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Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Orient the student to make an informed choice from the large number of alternative methods and experimental designs available.
II. Empower the student with the knowledge and skills they need to undertake a research project, to present a conference paper and to write a scientific article.
III. Develop a thorough understanding of the fundamental theoretical ideas and logic of research.
IV. Identify various sources of information for literature review and data collection.

UNIT-I  INTRODUCTION TO RESEARCH AND PHILOSOPHIES  Classes: 07

Introduction to research: The role of research, research process overview; Philosophies and the language of research theory building: Science and its functions, what is theory, the meaning of methodology.

UNIT-II  A RESEARCHER PROBLEMS AND HYPOTHESES  Classes: 10

Thinking like a researcher: Understanding concepts, constructs, variables, and definitions; Problems and hypotheses: Defining the research problem, formulation of the research hypotheses, the importance of problems and hypotheses.

UNIT-III  RESEARCH DESIGN AND DATA COLLECTION  Classes: 09

Research design: Experimental and no experimental research design, field research, and survey research.
Methods of data collection: Secondary data collection methods, qualitative methods of data collection, and survey methods of data collection.

UNIT-IV  ATTITUDE MEASUREMENT, SCALING AND SAMPLING TECHNIQUES  Classes: 09

Attitude measurement and scaling: Types of measurement scales; Questionnaire designing, reliability and validity; Sampling techniques: The nature of sampling, probability sampling design, non probability sampling design, and determination of sample size.

UNIT-V  PROCESSING AND ANALYSIS OF DATA, ETHICAL ISSUES  Classes: 10

Processing and analysis of data; Ethical issues in conducting research; Report generation, report writing, and APA format; Title page, abstract, introduction, methodology, results, discussion, references, and appendices.

Text Books:
### Reference Books:


### Web References:


### E-Text Books:

2. https://www.federaljack.com/ebooks/My%20collection%20of%20medical%20books,%2020...

### Course Home Page
ENERGY FROM WASTE

VII Semester: Common for all Branches

<table>
<thead>
<tr>
<th>Course Code</th>
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<td>L OT P C CIA SEE Total</td>
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</table>

Contact Classes: 45  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the principles associated with effective energy management and to apply these principles in the day to day life.
II. Develop insight into the collection, transfer and transport of municipal solid waste.
III. Explain the design and operation of a municipal solid waste landfill.
IV. Device key processes involved in recovering energy from wastes, systematically evaluate the main operational challenges in operating thermal and biochemical energy from waste facilities.

UNIT - I  INTRODUCTION TO WASTE AND WASTE PROCESSING  Classes: 08
Solid waste sources solid waste sources, types, composition, properties, global warming; Municipal solid waste: Physical, chemical and biological properties, waste collection and, transfer stations, waste minimization and recycling of municipal waste, segregation of waste, size reduction, managing waste, status of technologies for generation of energy from waste treatment and disposal aerobic composting, incineration, furnace type and design, medical waste / pharmaceutical waste treatment technologies, incineration, environmental impacts, measures to mitigate environmental effects due to incineration.

UNIT - II  WASTE TREATMENT AND DISPOSAL  Classes: 10
Land fill method of solid waste disposal land fill classification, types, methods and sitting consideration; Layout and preliminary design of landfills: Composition, characteristics, generation, movement and control of landfill leach ate and gases, environmental monitoring system for land fill gases.

UNIT - III  BIO-CHEMICAL CONVERSION  Classes: 09
Energy generation from waste bio-chemical conversion: Sources of energy generation, anaerobic digestion of sewage and municipal waste, direct combustion of MSW-refuse derived solid fuel.
Industrial waste, agro residues and anaerobic digestion.

UNIT - IV  THERMO-CHEMICAL CONVERSION  Classes: 10
Biogas production, land fill gas generation and utilization, thermo-chemical conversion: Sources of energy generation, gasification of waste using gasifies briquetting, utilization and advantages of briquetting, environmental benefits of bio-chemical and thermo-chemical conversion.

UNIT - V  E-WASTE MANAGEMENT  Classes: 08
E-waste: E-waste in the global context: Growth of electrical and electronics industry in India, environmental concerns and health hazards; Recycling e-waste: A thriving economy of the unorganized sector, global trade in hazardous waste, impact of hazardous e-waste in India; Management of e-waste: E-waste legislation, government regulations on e-waste management, international experience, need for stringent health safeguards and environmental protection laws of India.
### Text Books:


### Reference Books:

5. AD Bhide, BB Sundaresan, “Solid Waste Management in Developing Countries”, INSDOC, New Delhi, 1983.

### Web References:

2. [https://www.What is the impact of E-waste: Tamara Thompson](https://www.What is the impact of E-waste: Tamara Thompson)

### E-Text Books:

1. [https://www.unep.org](https://www.unep.org)
2. [https://www.outledge.com](https://www.outledge.com)
3. [https://www.bookdepository.com](https://www.bookdepository.com)
4. [https://www.ecoactiv.com](https://www.ecoactiv.com)

### Course Home Page:
**FINITE ELEMENT ANALYSIS**

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<th>VII Semester: Common for all branches</th>
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<td>AAE552</td>
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| **Contact Classes**: 45 | **Tutorial Classes**: Nil | **Practical Classes**: Nil | **Total Classes**: 45 |

**OBJECTIVES:**

The course should enable the students to:

I. Possess a good understanding of the theoretical basis of the weighted residual finite element method.

II. Use the commercial finite element package ANSYS to build finite element models and solve a selected range of engineering problems.

III. Communicate effectively in writing to report (both textually and graphically) the method used, the implementation and the numerical results obtained.

<table>
<thead>
<tr>
<th>UNIT-I</th>
<th>INTRODUCTION</th>
<th>Classes: 10</th>
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<tbody>
<tr>
<td>Review of various approximate method, variational approach and weighted residual approach application to structural mechanics problems; Finite difference methods- governing equation and convergence criteria of finite element method.</td>
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<tr>
<th>UNIT-II</th>
<th>DISCRETE ELEMENTS</th>
<th>Classes: 10</th>
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<tbody>
<tr>
<td>Bar elements, uniform section, mechanical and thermal loading, varying section, 2D and 3D truss element. Beam element, problems for various loadings and boundary conditions 2D and 3D Frame elements, longitudinal and lateral vibration; Use of local and natural coordinates.</td>
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<tr>
<th>UNIT-III</th>
<th>CONTINUUM ELEMENTS</th>
<th>Classes: 09</th>
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<tbody>
<tr>
<td>Plane stress, plane strain and axi-symmetric problem; Derivation of element matrices for constant. Linear strain triangular elements and axi-symmetric element.</td>
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<tr>
<th>UNIT-IV</th>
<th>ISOPARAMETRIC ELEMENTS</th>
<th>Classes: 08</th>
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<tbody>
<tr>
<td>Definitions, Shape function for 4, 8 and 9 nodal quadrilateral elements, stiffness matrix and consistent load vector, evaluation of element matrices using numerical integration.</td>
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<th>UNIT-V</th>
<th>FIELD PROBLEM AND METHODS OF SOLUTIONS</th>
<th>Classes: 08</th>
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<td>2. <a href="http://nptel.ac.in/courses/112104116/">http://nptel.ac.in/courses/112104116/</a></td>
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| Course Home Page: |
## BASIC REFRIGERATION AND AIR-CONDITIONING

### VI Semester: Common for all Branches

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<th>Course Code</th>
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| Contact Classes: 45 | Tutorial Classes: Nil | Practical Classes: Nil | Total Classes: 45 |

### OBJECTIVES:
The course should enable the students to:
1. Analyze and understand various concepts and laws of thermodynamics.
2. Understand the concepts of refrigeration and air refrigeration.
3. Understand vapour compression refrigeration system and also vapour absorption refrigeration system.
4. Identify various psychometric properties and processes.

### UNIT-I RECAPITULATION OF THERMODYNAMICS

Recapitulation of thermodynamics: Thermodynamic systems, laws of thermodynamics, phase, state, process, cycle, concepts of enthalpy, entropy, specific heat, sensible heat, latent heat, dryness fraction, correlations involving enthalpy, entropy and dryness fraction, types of various processes and their representation on T-s, P-V and P-h diagrams, carnot cycle, reversed carnot cycle.

### UNIT-II INTRODUCTION AND AIR REFRIGERATION

Introduction to Refrigeration: Basic concepts, unit of refrigeration; C.O.P: Refrigerators, heat pump, Carnot refrigerators and applications of refrigerator; Air refrigeration cycle: Bell Coleman cycle, open and dense air system – ideal and actual refrigeration, applications, aircraft refrigeration cycles; Refrigerants: Desirable properties, nomenclature and selection of refrigerants, effects of refrigerants on ozone depletion and global warming, alternate refrigerants.

### UNIT-III VAPOUR COMPRESSION REFRIGERATION

Vapor compression refrigeration, ideal cycle, effect of variation in evaporator pressure, condenser pressure, super heating of vapor, sub cooling of liquid.

Evaporator and condenser temperatures, deviations of practical (actual cycle) from ideal cycle, construction and use of p-h chart problems.

### UNIT-IV VAPOUR ABSORPTION REFRIGERATION

Vapor absorption refrigeration: description, working of NH3-Water, Li Br–water system, calculation of HCOP, principle and operation of three fluid vapor absorption refrigeration systems, steam jet refrigeration system, working principle, basic operation, principle and operation of thermo electric and vortex tube or hilsch tube refrigeration systems.

### UNIT-V INTRODUCTION TO AIR CONDITIONING

Psychometric properties and processes, sensible and latent heat loads, characterization, need for ventilation, consideration of infiltration, load concepts of RSHF, ASHF, ESHF and ADP; Concept of human comfort and effective temperature, comfort air conditioning, industrial air conditioning and requirements, air conditioning load calculations.
| Course Home Page: |  |
LAUNCH VEHICLES AND CONTROLS

VII Semester: Common to all branches

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Contact Classes: 45 Tutorial Classes: Nil Practical Classes: Nil Total Classes: 45

OBJECTIVES:
The course should enable the students to:
I. Understand the various configurations of launch vehicles and application of controls.
II. Identify different tracking systems for launch vehicles.
III. Distinguish between different errors associated with navigation system and compensation errors.
IV. Compare the guidance systems for short medium and long range missile.

UNIT-I  INTRODUCTION  Classes: 10
Types of rockets and missiles, various configurations, components forces on the vehicle during atmospheric flight, nose cone design and drag estimation; Concepts of navigation ADF, VOR/DME, Doppler, LORAN and OMEGA, guidance and control; Introduction to basic principles; Air data information; Guidance trajectories; Radar systems; Principle of working of radar; Radar equations and applications; MTI and pulse Doppler radar; moving target detector; limitation of MTI performance.

UNIT-II  TRACKING WITH RADAR  Classes: 10
Mono pulse tracking; Conical scan and sequential lobbing; Automatic tracking with surveillance radar (ADT); CW radar; Applications; Other guidance systems; Gyros and stabilized platforms; Inertial guidance and laser based guidance; Components of inertial navigation system; imaging infrared guidance; Satellite navigation; GPS; Accelerometers.

UNIT-III  INERTIAL NAVIGATION SYSTEM  Classes: 09
INS transfer function and errors; Different coordinate system, compensation errors, schuler loops; Cross coupling; Missile control system; Guided missile concept; Augmented systems.
Control of aerodynamic missile; Missile parameters for dynamic analysis; Missile autopilot schematics; Longitudinal and Lateral autopilots.

UNIT-IV  MISSILE GUIDANCE  Classes: 08
Missile guidance laws, short and medium range missiles; Proportional navigation guidance; Command guidance; Comparison of guidance system performance; Bank to turn missile guidance; Terminal guidance; Weapon control missile guidance.

UNIT-V  INTEGRATED FLIGHT/FIRE CONTROL SYSTEM  Classes: 08
Director fire control system; Fire control modes; Tracking control laws; Longitudinal flight control system; Lateral flight control system; Rate of change of Euler angle, auto pilot; Integrated flight and fire control (IFFC) flight testing.
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| **Course Home Page:** |
## INTELLECTUAL PROPERTY RIGHTS

### IV Semester: Common for all Branches

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Contact Classes: Nil  
Tutorial Classes: Nil  
Practical Classes: Nil  
Total Classes: Nil

### OBJECTIVES:
The course should enable the students to:

I. Explore the knowledge in determination of trade secrets status.

II. Adequate knowledge in New Developments in trade law.

III. Understand the complexities involved in the process of attributing intellectual property rights to people.

IV. Learn the legalities of intellectual property to avoid plagiarism and other IPR relates crimes like copyright, infringements, etc.

V. Learn the fundamental principles and the application of those principles to factual, real-world disputes.

### UNIT-I  INTRODUCTION TO INTELLECTUAL PROPERTY

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

### UNIT-II  TRADE MARKS

Purpose and function of trademarks, acquisition of trademarks rights, protectable matter, selecting and evaluating trademark, trademark registration processes.

### UNIT-III  LAW OF COPYRIGHTS AND LAW OF PATENTS

Fundamentals of copyrights law, originality of material, rights to reproduction, rights to perform the work publicly, copyright ownership issues.

Copyright registration, notice of copyright, international copyright law, foundation of patent law, patent searching process, ownership rights and transfer.

### UNIT-IV  TRADE SECRETS AND UNFAIR COMPETITION:

Trade secrets law, determination of trade secrets status, liability for misappropriations of trade secrets, protection for submission, trade secrets litigation, misappropriation of right of publicity and false advertising.

### UNIT-V  NEW DEVELOPMENTS OF INTELLECTUAL PROPERTY

New developments in trade law, copyright law, patent law, intellectual property audits international overview of intellectual property, international-trademark law, copyright law, international patent law, international development in trade secrets law.

### Text Books:

**Reference Books:**


**Web References:**


**E-Text Books:**


**Course Home Page:**
OBJECTIVES:
The course should enable the students to:

I. Understand the philosophy and core values of Total Quality Management (TQM).
II. Determine the voice of the customer and the impact of quality on economic performance and long-term business success of an organization.
III. Apply and evaluate best practices for the attainment of total quality.
IV. Utilize Statistical Process Control (SPC) techniques as a means to diagnose, reduce and eliminate causes of variation.
V. Describe and apply the development and nature of quality control charts.

UNIT-I PRINCIPLES AND PRACTICES-1

Introduction, gurus of TQM, historic review, benefits of TQM - leadership, characteristics of quality leaders, the deming philosophy, quality councils, strategic planning, customer satisfaction, customer perception of quality service quality, customer retention, employee involvement, employee survey-empowerment, gain sharing, performance appraisal.

UNIT-II PRINCIPLES AND PRACTICES-2

Continuous process improvement, the jurantrilogy, the PDCA cycle-kaizen, reengineering; Supplier partnership, partnering, sourcing, supplier selection, supplier rating, performance measures, basic concept, strategy quality cost benchmarking, reasons for benchmarking, process understanding current performance, pitfalls and criticism of benchmarking.

UNIT-III TOOLS AND TECHNIQUES-1

Information technology, computers and the quality functions, information quality issues, quality management system, benefits of ISO registration, ISO 9000 series standards, internal audits.

Environmental management system, ISO 14000 series, benefits of EMS, relation to healthy and safety quality function deployment, the voice of the customer, building a house of quality, QFD process.

UNIT-IV TOOLS AND TECHNIQUES-2

Quality by design benefits, communication model, failure mode and effective analysis, failure rate, FMEA documentation, the process of FMEA documentation, product liability, proof and expert witness; Total productive maintenance, promoting the philosophy and training-improvements and needs, autonomous work groups.

UNIT-V MANAGEMENT TOOLS

Management tools introduction-forced field analysis, tree diagram, process decision program chart statistical process control, cause and effect diagram-histogram, state of control, process capability, experimental design, hypothesis, orthogonal design two factors and full factors-quality strategy for Indian industries, quality management in India.
### Text Books:


### Reference Books:


### Web References:

1. [http://managementhelp.org/quality/total-quality-management.htm](http://managementhelp.org/quality/total-quality-management.htm)
2. [http://www.tandfonline.com/toc/ctqm20/current](http://www.tandfonline.com/toc/ctqm20/current)

### E-Text Books:


### Course Home Page:
### PROFESSIONAL ETHICS AND HUMAN VALUES

#### IV Semester: Common for all Branches

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<th>Course Code</th>
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<th>Hours / Week</th>
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<td>AHS603</td>
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| Contact Classes: Nil | Tutorial Classes: Nil | Practical Classes: Nil | Total Classes: Nil |        |

#### OBJECTIVES:
The course should enable the students to:

I. Understand the fundamental theoretical and historic graphical topics of professional ethics and human values.

II. Study independence and self-evaluation professional ethics and human values, so that they can grasp the core values as independent thinkers.

III. Develop their analytical and pragmatic abilities & situational reasoning aligned towards right and wrong.

#### UNIT-I  INTRODUCTION TO PROFESSIONAL ETHICS

Basics of profession: Engineering and professionalism, two models of professionalism, three types of ethics or morality, the negative face of engineering ethics, the positive face of engineering ethics, responsibility in engineering, engineering standards, the standard care, blame responsibility and causation.

#### UNIT-II  PROFESSIONAL ETHICS IN ENGINEERING

Engineering ethics, variety of moral issues, types of inquiry moral dilemmas, moral autonomy, the problems of many hands, Kohlburg’s theory, Gilligan’s theory impediments to responsible action, engineering as social experimentation, framing the problem, determining the facts, codes of ethics, clarifying concepts application issues, common ground, general principles, utilitarian thinking respect for persons.

#### UNIT-III  ETHICS AND HUMAN VALUES

Human values, morals, values, and ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully.

Caring, sharing, honesty, courage, valuing time, co-operation, commitment, empathy, self-confidence, spirituality, character.

#### UNIT-IV  MORAL RESPONSIBILITIES & RIGHTS

Ethics consensus, controversy, models of professional roles, theories about right action, self, interest, customs and religion, uses of ethical theories, responsibility for rights, respect for authority, conflicts of interest, occupational crime, professional rights and employee rights, communicating risk and public policy, collective bargaining.

#### UNIT-V  GLOBAL ETHICS & VALUES

Global issues, multinational corporations, environmental ethics, engineers as managers, advisors, and experts witnesses, moral leadership sample codes of ethics problem of bribery, extortion and grease payments, problem of nepotism, excessive gifts, paternalism, different business practices, negotiating tax, global trends.
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<tr>
<th>E-Text Books:</th>
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<tbody>
<tr>
<td>1. <a href="https://www.amazon.com/Professional-Ethics-Human-Values-Govindarajan-ebook/dp/B00K6GSSUW">https://www.amazon.com/Professional-Ethics-Human-Values-Govindarajan-ebook/dp/B00K6GSSUW</a></td>
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Course Home Page:
LEGAL SCIENCES

IV Semester: Common for all Branches

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<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
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Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: Nil

OBJECTIVES:
The course should enable the students to:
I. Acquaint the student with the scientific method of social science research.
II. Provide the knowledge of the technique of selection, collection and interpretation of primary and secondary data in socio legal research.
III. Emphasis would be laid on practical training in conducting research.

UNIT-I  CONCEPT OF LEGAL SCIENCE

UNIT-II  TECHNOLOGY & LEGAL SYSTEMS
Principles of corporate law conjunction, temporal, subordinate clauses complex sentences, intellectual property rights, contract law, cyber law.

UNIT-III  CONSTITUTION AND ADMINISTRATIVE LAW
Minorities law, human rights, international and national sphere, media law.
Health law, globalization vis-à-vis human rights, significance of human rights.

UNIT-IV  HUMAN RIGHTS INTERNATIONAL AND NATIONAL SPHERE
Human rights with special reference to right to development, rights of disadvantaged and vulnerable groups, critical analysis, cultural relativism and human rights, human rights in the Indian sphere, an overview, constitution and the analysis of preamble, social action litigation and the role of Indian judiciary, critical examination of the human rights council and human rights commission, treaty mechanism with respect to covenants ICESCR and ICCPR, convention on the elimination of discrimination against women and child rights convention.

UNIT-V  SCIENTIFIC METHODOLOGY IN LEGAL SYSTEMS
The science of research and scientific methodology, analysis of law with scientific methods, scientific approach to socio legal problems, interrelation between speculation, fact and theory building fallacies of scientific methodology with reference to socio legal research, inter-disciplinary research and legal research models, arm chair research vis-a-vis empirical research, legal research-common law and civil law legal systems.

Text Books:
### Reference Books:


### Web References:

3. [http://www.theglobaljusticenetwork.org/journal](http://www.theglobaljusticenetwork.org/journal)
5. [http://as.nyu.edu/docs/IO/1172/globaljustice.pdf](http://as.nyu.edu/docs/IO/1172/globaljustice.pdf)

### E-Text Books:

CLINICAL PSYCHOLOGY

IV Semester: Common for all Branches

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<th>Course Code</th>
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<th>Hours / Week</th>
<th>Credits</th>
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</table>

Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: Nil

OBJECTIVES:
The course should enable the students to:
I. Develop the knowledge pertinent to the organism, developmental, social and situational factors those are relevant to the initiation and maintenance of human behavior.
II. Understand the present and implement effective strategies to deal with these issues during work with patients.
III. Study the professional identity and practice as clinical psychologists through fundamental knowledge of psychology, commitment to professional ethics.
IV. Understand the multiculturalism, diversity and participation in life-long learning.

UNIT-I  BASIC PSYCHOLOGY
Introduction: Psychology, definition, psychology as a science, early schools of psychology, modern perspectives, methods of psychology, experimental method, systematic observation, case study method, survey method, fields of psychology.

UNIT-II  BIOLOGY OF BEHAVIOR AND SENSORY PROCESS
Neurons and synapses: Nervous system, peripheral and central nervous system: brain and sleep: importance of fore brain, association cortex, left and right hemisphere functions; Some general properties of senses, subliminal stimuli, the visual sense, auditory sense, the other senses; Consciousness, meaning, functions, divided consciousness, stages of sleep, dreams, meditation, hypnosis.

UNIT-III  ATTENTION AND PERCEPTION
Selective attention; physiological correlates of attention, internal influences on perception, learning set, motivation and emotion, cognitive styles.
External influences on perception, figure ground, movement, illusions, perceptual organization, constancy, depth perception, binocular and monocular cues.

UNIT-IV  MOTIVATION AND EMOTION MOTIVES
Definitions, motivation cycle, theories of motivation, biological motivation, social motives, frustration and conflicts of motives, defense mechanism, emotion, expression and judgment of emotion, the physiology of emotion, theories of emotion.

UNIT-V  CLINICAL PSYCHOLOGY & MENTAL HEALTH
History of clinical psychology and its role in understanding and alleviation of mental illness, promotion of mental health and rehabilitation of the mentally ill, role and functions of clinical psychologists in DMHP, professional code of conduct and ethical issues.
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<th><strong>Reference Books:</strong></th>
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<tr>
<td>2. <a href="https://books.google.co.in/books/about/Clinical_Psychology.html?id=u4aDPdw0Fi4C&amp;redir_esc=y">https://books.google.co.in/books/about/Clinical_Psychology.html?id=u4aDPdw0Fi4C&amp;redir_esc=y</a></td>
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| **Course Home Page:** |
ENGLISH FOR SPECIAL PURPOSES

IV Semester: Common for all Branches

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Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: Nil

OBJECTIVES:
The course should enable the students to:
I. Learn the structure and style of effective sentences, paragraphs, and essays.
II. Focus on diction and spelling, punctuation and mechanics, and functional grammar in direct relation to students' own writing.
III. Understand and apply the basic conventions of syntax and mechanics; and proofread competently and prepare acceptable manuscripts.
IV. Emphasize the importance of language in academic and employability.
V. Empower the communicative skills which enhance the employability skills with self-confidence.

UNIT-I  PRESENTATION SKILLS

English presentation, effective presentation, live presentation, web access, language orientation, classifications, method of presentations, declarations, impact, concepts of presentation, skill oriented presentations, analysis of presentation, types of presentations.

UNIT-II  NON-VERBAL COMMUNICATION

Overview, this unit includes body language, posture, distance different levels of physical closeness appropriate to different types of relationship, right usage of gestures, open and closed postures, to be aware of facial expressions and their importance in non-verbal communication.

UNIT-III  INTERPERSONAL SKILLS

To build rapport, handling the criticism, giving and receive the feedback, be assertive, influencing and negotiation skills.
Methods of interpersonal skills, problem solving, decision making, verbal communication, peer negotiation, effective participating.

UNIT-IV  LISTENING

Listen effectively, how to make notes, the difference between active listening and passive listening to understand different dialects. Initiating the contact, the important context in communicating, the reluctant speaker, appendices, problems in listening.

UNIT-V  SPEAKING AND READING

Actively participate in GDs and debates, deal with JAM topics, answer questions in interviews, vocabulary section, useful information, discussing, socializing the effectiveness; How to read critically, to understand the main idea and tone of the author to understand complex ideas.
**Text Books:**


**Reference Books:**


**Web References:**


**E-Text Books:**

1. [http://www.linguistik-online.org/40_09/dahmardeh.pdf](http://www.linguistik-online.org/40_09/dahmardeh.pdf)

**Course Home Page:**
ENTREPRENEURSHIP

IV Semester: Common for all Branches

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<thead>
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<th>Course Code</th>
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<td>Tutorial Classes: Nil</td>
<td>Practical Classes: Nil</td>
<td>Total Classes: Nil</td>
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OBJECTIVES:
The course should enable the students to:
I. Identify and apply the elements of entrepreneurship and to entrepreneurial processes;
II. Recognize the importance of entrepreneurship and identify the profile of entrepreneurs and their role in economic growth.
III. Analyze the business environment, opportunity recognition, and the business idea-generation process;
IV. Develop an idea on the legal framework and also understand strategic perspectives in entrepreneurship.

UNIT-I  UNDERSTANDING ENTREPRENEURIAL MINDSET

The revolution impact of entrepreneurship-The evolution of entrepreneurship-Approaches to entrepreneurship-Process approach-Twenty first centaury trend s in entrepreneurship.

UNIT-II  THE INDIVIDUAL ENTREPRENEURIAL MINDSET

The individual entrepreneurial mind set and personality, the entrepreneurial journey, stress and the entrepreneur, the entrepreneurial ego, entrepreneurial motivation, corporate entrepreneurial mindset the nature of corporate entrepreneur, conceptualization of corporate entrepreneurship strategy sustaining corporate entrepreneurship

UNIT-III  LAUNCHING ENTREPRENEURIAL VENTURES

Opportunities identification, entrepreneurial imagination and creativity, the nature of the creativity process, innovation and entrepreneurship, methods to initiate ventures.

Creating new ventures acquiring an established entrepreneurial venture, franchising-hybrid disadvantage of franchising.

UNIT-IV  LEGAL CHALLENGES OF ENTREPRENEURSHIP

Intellectual property protection, patents, copyrights trademarks and trade secrets-avoiding trademark pitfalls, formulation of the entrepreneurial plan, the challenges of new venture start-ups, poor financial understanding, and critical factors for new venture development-the evaluation process-feasibility criteria approach.

UNIT-V  STRATEGIC PERSPECTIVES IN ENTREPRENEURSHIP

Strategic planning, strategic actions, strategic positioning business stabilization, building the adaptive firms-understanding the growth stage, unique managerial concern of growing ventures.
## Text Books:


## Reference Books:


## Web References:

2. http://www.advalue-project.eu/content_files/EN/33/AdValue_Personal_Effectiveness_EN.pdf

## E-Text Books:

# GERMAN LANGUAGE

**IV Semester: Common for all Branches**

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<th>Course Code</th>
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<td>Perspective</td>
<td>L T P C CIA SEE Total</td>
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</table>

**Contact Classes: Nil**  
**Tutorial Classes: Nil**  
**Practical Classes: Nil**  
**Total Classes: Nil**

## OBJECTIVES:
The course should enable the students to:
I. Complete reading, writing, speaking, and listening assignments with ever increasing proficiency and accuracy.
II. Increase grammatical accuracy on written assignments.
III. Implement the language skills in listening, speaking, reading and writing in German language.

## UNIT-I  
**GERMAN SOUNDS**

Vowels, consonants, diphthongs, umlaut, the nouns, gender distinctions, cases, definite and indefinite articles, conjugation of verbs, verbs with separable and inseparable prefixes, modal verbs, personal pronouns, possessive pronouns, reflexive pronouns, cases nominative, accusative and dative; Structure of sentence and categories of sentences, subordinate clause, causative and conditional sentences; A very interesting slideshow presentation is held to enlighten the students about the culture, people, and lifestyle in Germany.

## UNIT-II  
**SENTENCES FORMATION**

Infinite sentences, use of conjunctive and conjunctive ii (contd.) plusquam perfect, modal verb (contd.)
Conjunction, temporal, subordinate clauses complex sentences.

## UNIT-III  
**GERMAN BASIC GRAMMAR**

Verbs: Different forms, past tense and present perfect tense, adjectives and their declension, degrees of comparison; Prepositions, genitive case, conjunctive.

Different conjunctions (co-ordinating and subordinating), simple, complex and compound sentences, active and passive voice, relative pronouns.

## UNIT-IV  
**PURPOSE OF LANGUAGE STUDY**

Pictures and perceptions, conflicts and solutions, change and the future, the purpose of the study of the German language, listening, understanding, reacting, speaking, communicating, use of language, pronunciation and intonation ,reading, reading and understanding; writing, text writing, text forming, use of language, language reflection, building up the language, language comparison, culture reflection, other cultures and cultural identity.

## UNIT-V  
**GERMAN ADVANCED COMMUNICATION LEVEL-1**

**Text Books:**


**Reference Books:**


**Web References:**

2. [https://upload.wikimedia.org/wikipedia/commons/2/2d/German.pdf](https://upload.wikimedia.org/wikipedia/commons/2/2d/German.pdf)

**E-Text Books:**

2. [https://weblearn.ox.ac.uk/access/content/group/modlang/general/handbooks/09-10/prelims/german_language_guide_0910.pdf](https://weblearn.ox.ac.uk/access/content/group/modlang/general/handbooks/09-10/prelims/german_language_guide_0910.pdf)

**Course Home Page:**
DESIGN HISTORY

VII Semester: Common for all Branches

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Contact Classes: Nil  
Tutorial Classes: Nil  
Practical Classes: Nil  
Total Classes: Nil

OBJECTIVES:
The course should enable the students to:
I. Understand the fundamental theoretical and historiographical topics of design, from the fifties of the twentieth century to the present day.
II. Use methodological tools and develop their analytical and critical capacities, so that they can grasp the bonds that link works of design with their respective social, economic and cultural backdrop.
III. Identify the influences at work between the various different creative disciplines.
IV. Develop their analytical and critical abilities, focusing on their search for their own expressive design language.

UNIT-I  
INTRODUCTION TO DESIGN HISTORY

Materials and techniques of design, design in the machine age, design body, environmental design.

UNIT-II  
DESIGN PRODUCTS

Innovative ideas of design products, intellectual and creative research, commercial and critical perspectives on design products, social, ethical and economic impact of your design.

UNIT-III  
GLOBAL INNOVATION IN DESIGN

Styles of global innovation design, the service design basics.

Concepts of vehicle design, techniques of design engineering (IDE).

UNIT-IV  
THE DESIGN INTERACTIONS

Interaction design, digital media, fine art, products, graphic and furniture design, architecture, life sciences, biotech, social sciences, and computer science, human consequences of different technological design futures.

UNIT-V  
RESEARCH IN DESIGN HISTORY

Research in craftsmanship and artisanal cultures, design, trade and exchange, design exhibitions, curatorial practice, history and theory, design and national, global identities, the design and material culture of the domestic interior, material history and the history of materiality, asian design history.

Text Books:
### Reference Books:


### Web References:


### E-Text Books:


### Course Home Page:
GENDER SENSITIVITY

III Semester: CSE / IT

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<tr>
<th>Course Code</th>
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Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: Nil

OBJECTIVES:
The course should enable the students to:
I. Understand the basic concepts relating to gender and to provide logical understanding of gender roles.
II. Analyze present various perspective of body and discourse on power relationship.
III. Develop cultural construction of masculinity and femininity.
IV. Study the evolution of gender studies from women's studies

UNIT-I INTRODUCTION
Sex and gender; types of gender, gender roles and gender division of labour, gender stereotyping and gender discrimination-the other and objectification, male gaze and objectivity.

UNIT-II GENDER PERSPECTIVES OF BODY
Biological-phenomenological and socio-cultural perspectives of body, body as a site and articulation of power relations- cultural meaning of female body and women’s lived experiences -gender and sexual culture.

UNIT-III SOCIAL CONSTRUCTION OF FEMININITY
Bio-social perspective of gender, gender as attributional fact, essentialism in the construction of femininity, challenging cultural notions of femininity.
Butler, Douglas, Faucault and Haraway, images of women in sports, arts, entertainment and fashion industry, media and feminine identities.

UNIT-IV SOCIAL CONSTRUCTION OF MASCULINITY
Definition and understanding of masculinities, sociology of masculinity, social organization of masculinity and privileged position of masculinity, politics of masculinity and power, media and masculine identities.

UNIT-V WOMEN'S STUDIES AND GENDER STUDIES
Evolution and scope of women’s studies, from women’s studies to gender studies: A paradigm shift, women’s studies vs. gender studies, workshop, gender sensitization through gender related.

Text Books
### Reference Books


### Web References:

1. [https://www.google.co.in/search?q=clinical++pscyology+ebooks&ie=utf-8&oe=utf-8&client=firefox-b-ab&gfe_rd=cr&ei=xPmJV6OhFcuL8Qf3qam4Cw#q=gender+sensitivity+web+references](https://www.google.co.in/search?q=clinical++pscyology+ebooks&ie=utf-8&oe=utf-8&client=firefox-b-ab&gfe_rd=cr&ei=xPmJV6OhFcuL8Qf3qam4Cw#q=gender+sensitivity+web+references)

### E-Text Books:

1. [http://ebooklibrary.org/articles/gender_sensitization](http://ebooklibrary.org/articles/gender_sensitization)
2. [http://cbseacademic.in/publication_ebooks.html](http://cbseacademic.in/publication_ebooks.html)
Angular Javascript

VI Semester: CSE / IT

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Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: Nil

Objectives:
The course should enable the students to:

V. Angular JS is to reduce the code to build user interface applications.
VI. Simplify the application development and testing performance by providing a framework called MVC.
III. Create single page web applications.
IV. Restore data from back-end server and manipulate it easily.

Unit-I  Introduction to HTML and JavaScript

Introduction to html: fundamentals of HTML elements, Document body, text, hyperlink, lists, tables, color and images, frames; Cascading Style Sheets: Introduction, defining your own styles, properties and values in styles, style sheets, formatting blocks, and layers.
JavaScript: JavaScript basics, variables, string manipulation, mathematical functions, statements, operators, arrays and functions; Objects in JavaScript; Dynamic HTML with JavaScript: Data validation;

Unit-II  Introduction to Angular JS

Introduction to AngularJS, Advantages of AngularJS, Setting up the Environment, MVC Architecture, NODE JS environment, AngularJS Hello World Application, Understanding ng attributes, Expressions: Number and String Expressions using {{}} and ng-bind.

Unit-III  Working with Arrays and Directives

Arrays, AngularJS modules, creating a module, ng-app directive, ng-init directive, ng-model directive, ng-app, ng-repeat directive, Working with Tables, Controllers.

Unit-IV  Data Binding and Filters

Two way data binding, Validating User Input, Adding filters to directives, Uppercase Filter, Lowercase Filter, Currency Filter, OrderBy Filter.

Unit-V  Forms and DOM

Sindex, Seven & Sodd, Events: working with events, mouse events, ng-click, Working with Forms, Checkbox, Radio buttons, Select, formCtrl, reset(), HTML DOM, Form Validation: Client side form validation.

Text Books:

Reference Books:
2. ANDREW GRAND, “Beginning AngularJS “, APRESS EDITION.

Web References:
1. https://www.w3schools.com/angular/
### SALESFORCE

**VI Semester: CSE / IT**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
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Contact Classes: Nil  
Tutorial Classes: Nil  
Practical Classes: Nil  
Total Classes: Nil

**OBJECTIVES:**
The course should enable the students to:
I. Analyze and understand how the expectations the salesmen have to fulfill.
II. Allocating scares product to customers.
III. Supporting other promotional efforts of the company.
IV. Building and maintaining healthy and permanent relations with the customer.

#### Unit-I  
**SALESFORCE BASICS**


#### Unit-II  
**OPTIMIZING MARKETING**

Driving Demand with Campaigns-Understanding Campaigns, Building Target Lists, Executing Campaigns, Tracking Responses; Driving Sales Effectiveness with Documents-Understanding the Document Library, Organizing Your Documents, Adding Documents, Using Documents, Maintaining the Document Library.

#### Unit-III  
**DELIVERING EXCELLENT SERVICES**

Understanding Salesforce Service & Support, Preparing Salesforce Service & Support, Analyzing Data with Reports-Discovering Reports, Developing Reports with the Wizard, Filtering on a Report, Exporting Reports to Excel, Organizing Your Reports.

#### Unit-IV  
**MEASURING OVERALL BUSINESS PERFORMANCE**

Big Picture with Dashboards- Figuring Out Dashboards, Building Dashboards, Updating Dashboards, Organizing Your Dashboards; Fine-Tuning the Configuration- Figuring Out Configuration, Verifying Your Company Profile, Defining the Role Hierarchy, Defining Your Sharing Model, Setting Up Profiles, Adding Users to Salesforce, Using Other Security Controls.

#### Unit-V  
**DESIGNING SALESFORCE SOLUTION**

### Text Books:


### Reference Books:

2. Jen Doylas and Wes Nolte,” Salesforce Hand Book”.

### Web References:


### E-Text Books:

### Course Details

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Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: Nil

### Objectives:
The course should enable the students to:

1. Able to gain knowledge regarding to the management of automation campaigns
2. Build and modify automation techniques in the OpenSpan.
3. Grasp knowledge regarding the practical concepts of OpenSpan.
4. Assess the key considerations while designing an RPA solution.
5. Work proficiently with the leading RPA tool ‘UiPath.’

### Units

#### UNIT – I  WINDOWS INTEGRATION

#### UNIT - II  INTERACTION FRAMEWORK
Working with Interaction Framework, Working with Activities and Active MDI Windows.

#### UNIT - III  INTERROGATION FORM AND COMPONENTS
Interrogation Form: Default, Debug Matching, Select Element, Replace Control, Html Table Designer.

Components: Windows Form related Component, Automation related Components, All types of Components, Compare Expressions (Mathematical Components), Excel and word Connectors, Script Component and Variables.

#### UNIT - IV  WEB INTEGRATION AND AGILE DESKTOP DEPLOYMENT
Defining Properties, Events, and Methods, Using the Web Adapter, Interrogating a Web Application, Working with Web Adapter Match Rules, Automating the Training Web Site.


#### UNIT - V  WIDOW APPLICATION AND WEB APPLICATION
### Text Books:


### Reference Books:


### Web References:

CISCO CERTIFIED NETWORK ASSOCIATE (CCNA)

VI Semester: CSE / IT

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<th>Course Code</th>
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<td>Practical Classes: Nil</td>
<td>Total Classes: Nil</td>
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</table>

OBJECTIVES:
The course should enable the students to:
I. Understand Internetworking, review of Ethernet networking and TCP/IP
II. Study the concept of sub netting, trouble shooting in TCP/IP and internetworking operating system.
III. Study the routing in the internetworking and Managing a Cisco Internetwork.
IV. Understand about the switching networks and how the security provided in the virtual LAN.
V. Understanding the Concept of Network Address Translation (NAT) and Cisco’s Wireless Technologies.

UNIT-I Internetworking, review of Ethernet networking and data encapsulation and introduction to TCP/IP

INTERNETWORKING BASICS, INTERNETWORKING MODELS, THE OSI REFERENCE MODEL; ETHERNET NETWORKS IN
REVIEW ETHERNET CABLE DATA ENCAPSULATION, THE CISCO THREE-LAYER HIERARCHICAL MODEL; INTRODUCING
TCP/IP, TCP/IP AND THE DOD MODEL, IP ADDRESSING, IPV4 ADDRESS TYPES

UNIT-II Easy sub netting, variable length subnet masks (VLSMS), summarization, and troubleshooting TCP/IP and Cisco’s internetworking operating system (IOS)

SUB NETTING BASICS; VARIABLE LENGTH SUBNET MASKS (VLSMS) VARIABLE LENGTH SUBNET MASKS (VLSMS)
SUMMARIZATION, TROUBLESHOOTING IP ADDRESSING; THE IOS USER INTERFACE, COMMAND-LINE INTERFACE (CLI),
ROUTER AND SWITCH ADMINISTRATIVE CONFIGURATIONS, ROUTER INTERFACES, VIEWING, SAVING, AND ERASING
CONFIGURATIONS.

UNIT-III Managing a Cisco Internetwork, IP ROUTING AND: Enhanced IGRP (EIGRP) and Open Shortest Path First (OSPF)

THE INTERNAL COMPONENTS OF A CISCO ROUTER, THE ROUTER BOOT SEQUENCE, MANAGING CONFIGURATION
REGISTER, BACKING UP AND RESTORING THE CISCO IOS, BACKING UP AND RESTORING THE CISCO CONFIGURATION,
USING CISCO DISCOVERY PROTOCOL (CDP), USING TELNET, RESOLVING HOSTNAMES, CHECKING NETWORK
CONNECTIVITY AND TROUBLESHOOTING; ROUTING BASICS, THE IP ROUTING PROCESS, CONFIGURING IP ROUTING IN
OUR NETWORK, DYNAMIC ROUTING, DISTANCE-VECTOR ROUTING PROTOCOLS, ROUTING INFORMATION PROTOCOL (RIP)
VERIFYING YOUR CONFIGURATIONS; EIGRP FEATURES AND OPERATION, USING EIGRP TO SUPPORT LARGE
NETWORKS, CONFIGURING EIGRP, LOAD BALANCING WITH EIGRP, VERIFYING EIGRP, OPEN SHORTEST PATH FIRST
(OSPF) BASICS, CONFIGURING OSPF, VERIFYING OSPF CONFIGURATION, OSPF DR AND BDR ELECTIONS, OSPF
AND LOOPBACK INTERFACES, TROUBLESHOOTING OSPF, CONFIGURING EIGRP AND OSPF SUMMARY ROUTES

UNIT-IV Layer 2 Switching and Spanning Tree Protocol (STP), Virtual LANs (VLANs) AND Security

BEFORE LAYER 2 SWITCHING, SWITCHING SERVICES, SPANNING TREE PROTOCOL (STP) CONFIGURING CATALYST
SWITCHES; VLAN BASICS, VLAN MEMBERSHIPS, IDENTIFYING VLANs, VLAN TRUNKING PROTOCOL (VTP)
ROUTING BETWEEN VLANs, CONFIGURING VLANs, CONFIGURING VTP TELEPHONY: CONFIGURING VOICE
VLANs;
PERIMETER, FIREWALL, AND INTERNAL ROUTERS, INTRODUCTION TO ACCESS LISTS, STANDARD ACCESS LISTS, EXTENDED
ACCESS LISTS, TURNING OFF AND CONFIGURING NETWORK SERVICES, MONITORING ACCESS LISTS.
UNIT-V  
Network Address Translation (NAT), Cisco’s Wireless Technologies, Internet Protocol  
Version 6 (IPv6) AND Wide Area Networks

When Do We Use NAT?, Types of Network Address Translation, NAT Names, How NAT Works,  
Testing and Troubleshooting NAT; Introduction to Wireless Technology, Basic Wireless Devices,  
and Uses of IPv6, IPv6 Addressing and Expressions, How IPv6 Works in an Internetwork, IPv6 Routing  
Protocols, Migrating to IPv6; Introduction to Wide Area Networks, Cable and DSL, Cabling the Serial  
Wide Area Network, High-Level Data-Link Control (HDLC), Protocol Point-to-Point Protocol (PPP),  
Frame Relay Virtual Private Networks

Text Books:

1. Todd Lammle, “CCNA Cisco Certified Network Associate STUDY GUIDE”, CSYBEX, 7th Edition  
2. B. Allan Johnson, “CCNA Routing and Switching Practice and Study Guide” Exercises, Activities and  
   Scenarios to Prepare for the Icnd2/CCNA (200-101) Certification Exam

Reference Books:

1. Wilkins Sean, “CCNA Routing and Switching 200-125 Network Simulator”,  
2. William Tedder, “CCNA Routing and Switching Deluxe Study Guide” December 2013,  

Web References:

1. https://study-ccna.com/  

E-Text Books:

VII Semester: CSE / IT

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Hours / Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
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<td>ACS805</td>
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<td>L T P C CIA SEE Total</td>
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</table>

Contact Classes: Tutorial Classes: Nil Practical Classes: Nil Total Classes: 

OBJECTIVES:
The course should enable the students to:
I. Acquaint with the fundamental concepts and programming environment of PHP.
II. Design classes and efficiently use PHP functions.
III. Implement object oriented concepts like inheritance, reusability, and encapsulation.
IV. Apply custom exceptions and employ concurrency.

UNIT – I INTRODUCTION TO PHP


UNIT – II PHP OBJECT ORIENTED LANGUAGE

Introduction – Object, Class, new Keyword, Constructor, Destructor, Accessing Methods and Properties Using the this Variable, Class Constants, Cloning Objects, polymorphism, parent :: and self ::, instance of Operator, Abstract method and Classes, Interfaces and Inheritance of Interfaces. Final methods, Overloading, Exception handling.

UNIT – III WEB PAGES WITH PHP

Embedding into HTML, User Input, Safe Handling user Input, PHP Form, form processing, Working with Form Data, GET, POST, REQUEST.

Reading Data in web Pages, Performing Data validation, required data, number, text, Cookies and Session in PHP.

UNIT – IV WORKING WITH DATABASE

MySQL, Creating Database and Table, CURD, JOIN, Aggregate Queries, Connecting to MySQL with PHP, Accessing and Updating Database with PHP, SQL injections, Prepared Statements.

UNIT – V ADVANCED CONCEPTS

File Handling -Create, Open, read, write to files, Working with FTP in PHP, PHP mail functions, Advanced mail functions, Building and Formatting dates and times, PHP filters.

Text Book:

Reference Books:
Web References:

1. https://www.w3schools.com/php/
### OBJECTIVES:
The course should enable the students to:
I. Understand the architecture of Internet of Things and connected world.
II. Explore on use of various hardware and sensing technologies to build IoT applications.
III. Illustrate the real time IoT applications to make smart world.
IV. Understand the available cloud services and communication API's for developing smart cities.

#### UNIT-I
**INTRODUCTION TO INTERNET OF THINGS (IoT)**
Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT enabling technologies, IoT levels and deployment, domain specific IoTs.

#### UNIT-II
**IoT AND M2M**
Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

#### UNIT-III
**IOT ARCHITECTURE AND PYTHON**

Logical design using Python: Installing Python, Python data types and data structures, control flow, functions, modules, packages, file handling.

#### UNIT-IV
**WORKING WITH PYTHON ON INTEL GALILEO GEN**
Setting up the board to work with Python as the programming language, Retrieving the board's assigned IP address, Connecting to the board's operating system, Installing and upgrading the necessary libraries to interact with the board, Installing pip and additional libraries, Invoking the Python interpreter.

#### UNIT-V
**INTERACTING WITH DIGITAL OUTPUTS WITH PYTHON**
Turning on and off an onboard component, Prototyping with breadboards, Working with schematics to wire digital outputs, Counting from 1 to 9 with LEDs, Python code and the mraa library, Taking advantage of object-oriented code to control digital outputs, Improving our object-oriented code to provide new features, Isolating the pin numbers to improve wirings, Controlling digital outputs with the wiring-x86 library.

#### Text Books:
**Reference Books:**


**Web References:**

1. https://www.udemy.com/python-for-iot-tutorials/
2. https://www.coursera.org/specializations/iot

**E-Text Books:**

OBJECTIVES:
The course should enable the students to:
I. Understand the significance of performance testing and its tools
II. Implement various types of test plans
III. Describe about the features and working of JMeter
IV. Understand the role of listeners and their significance
V. Create user variables and use JMeter functions.

UNIT-I  INTRODUCTION

Introduction: JMeter and Features, How JMeter Works, JMeter -Environment and System Requirements
Jmeter-Test Plan: What is a Test Plan, Writing a Test Plan?.

UNIT-II  JMETER-TEST PLAN ELEMENTS

JMeter-Test Plan Elements: Thread Group, Controllers, Listeners, Timers, Assertions, Configuration Elements, Pre-processor Elements, Post-processor Elements, Execution Order of Test Elements; JMeter-Web Test Plan: Start JMeter, Rename the Test Plan, Add Thread Group, AddSampler, AddListener, Run the Test Plan, View the Output.

UNIT-III  JMETER-DATABASE AND FTP PLAN

JMeter-Database Test Plan: Create JMeter Test Plan, Adding JDBC Requests, Create Listener, Save and Execute Test Plan.


UNIT -IV  JMETER –WEBSITE,JMS AND MONITOR TEST PLAN


UNIT -V  JMETER-LISTENERS AND FUNCTIONS

JMeter-Listeners: Default Configuration, CSV Log format, Saving Response Data, Loading (Reading) Response Data, Saving the Listener GUI Data; Meter-Functions: JMeter Functions and User Variables, List of Functions, Where to Use Functions and Variables, Referencing Variables and Functions, The Function Helper Dialog, Pre-defined Variables and Pre-defined Properties.

Text Books:
<table>
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<tr>
<td>2. <a href="https://jmeter.apache.org/download_jmeter.cgi">https://jmeter.apache.org/download_jmeter.cgi</a></td>
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R PROGRAMMING

VII Semester: CSE / IT

<table>
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</table>

Contact Classes: Nil  Tutorial Classes: Nil  Practical Classes: Nil  Total Classes: Nil

OBJECTIVES:
The course should enable the students to:

I. Understand the data storage and access techniques
II. Explore the knowledge on SQL and NoSQL databases and different data analysis techniques
III. Understand the machine learning and cluster models
IV. Illustrate working scenario of artificial neural networks and evaluation of hypothesis
V. Learn data presentation techniques

UNIT-1  INTRODUCTION TO DATA SCIENCE AND R PROGRAMMING

Data science process, roles, stages in data science project, working with data from files, working with relational databases, exploring data, managing data, cleaning and sampling for modeling; Introduction to R: Introduction to various data types, numeric, character, date, data frame, array, matrix etc., reading and writing datasets, working with different file types .txt, .csv, outliers, R functions and loops; Summary statistics: Summary, str, aggregate, subset, head, tail; Probability distribution.

UNIT -II  SQL, NoSQL, DATA ANALYSIS

SQL using R, excel and R, introduction to NoSQL, connecting R to No SQL databases, R with XML, JSON; Correlation analysis; Covariance analysis, ANOVA, forecasting, heteroscedasticity, autocorrelation; Regression analysis: Covariance analysis, ANOVA, forecasting, heteroscedasticity, autocorrelation; Regression analysis: Regression modeling, multiple regression.

UNIT -III  DATA MODELS

Choosing and evaluating models, mapping problems to machine learning, evaluating clustering models, validating models.

Cluster analysis: K-means algorithm, Naive Bayes memorization methods, unsupervised methods.

UNIT -IV  ARTIFICIAL NEURAL NETWORKS AND EVALUATION

Artificial neural networks: Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back propagation algorithm, remarks on the back propagation algorithm; Evaluation hypotheses: Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT -V  GRAPHS AND PLOT MODELS

Documentation and deployment, producing effective presentations, introduction to graphical analysis, plot() function, displaying multivariate data, matrix plots, multiple plots in one window, exporting graph, using graphics parameters, case studies.
### Text Books:

### Reference Books:

### Web References:

### E-Text Books:
1. http://r-pkgs.had.co.nz/
VISION AND MISSION OF THE INSTITUTE

VISION
To bring forth professionally competent and socially sensitive engineers, capable of working across cultures meeting the global standards ethically.

MISSION
To provide students with an extensive and exceptional education that prepares them to excel in their profession, guided by dynamic intellectual community and be able to face the technically complex world with creative leadership qualities.

Further, be instrumental in emanating new knowledge through innovative research that emboldens entrepreneurship and economic development for the benefit of wide spread community.

B.TECH - PROGRAM OUTCOMES (POs)

PO-1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems (Engineering Knowledge).

PO-2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences (Problem Analysis).

PO-3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations (Design/Development of Solutions).

PO-4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions (Conduct Investigations of Complex Problems).

PO-5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations (Modern Tool Usage).

PO-6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice (The Engineer and Society).

PO-7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development (Environment and Sustainability).

PO-8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice (Ethics).

PO-9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings (Individual and Team Work).

PO-10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (Communication).

PO-11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change (Life-long learning).
OBJECTIVES OF THE DEPARTMENT

DEPARTMENT OF INFORMATION TECHNOLOGY

Programme Educational Objectives (PEO’s)

A graduate of the Information Technology Program should:

PEO – I: To prepare the graduates for a successful career to meet the diversified needs of industry, academia and research.

PEO – II: To equip graduates with a solid foundation in discrete mathematical and engineering fundamentals required to develop problem solving ability in complex engineering design.

PEO – III: To train students to comprehend, analyze, design and provide ability to create novel products and technologies that give solution-frameworks to real world problems.

PEO – IV: To inculcate in graduates the qualities of leadership in technology innovation and entrepreneurship with effective communication skills, teamwork, ethics and to create ability for life-long learning needed in a successful professional career.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO – I: Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity.

PSO – II: Software Engineering Practices: The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.

PSO – III: Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.
FREQUENTLY ASKED QUESTIONS AND ANSWERS ABOUT AUTONOMY

1. **Who grants Autonomy? UGC, Govt., AICTE or University**
   In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy but only after concurrence from the respective state Government as well as UGC. The State Government has its own powers to grant autonomy directly to Govt. and Govt. aided Colleges.

2. **Shall IARE award its own Degrees?**
   No. Degree will be awarded by Jawaharlal Nehru Technological University, Hyderabad with a mention of the name IARE on the Degree Certificate.

3. **What is the difference between a Deemed University and an Autonomy College?**
   A Deemed University is fully autonomous to the extent of awarding its own Degree. A Deemed University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4. **How will the Foreign Universities or other stake – holders know that we are an Autonomous College?**
   Autonomous status, once declared, shall be accepted by all the stake holders. The Govt. of Telangana mentions autonomous status during the First Year admission procedure. Foreign Universities and Indian Industries will know our status through our website.

5. **What is the change of Status for Students and Teachers if we become Autonomous?**
   An autonomous college carries a prestigious image. Autonomy is actually earned out of our continued past efforts on academic performances, our capability of self-governance and the kind of quality education we offer.

6. **Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?**
   There is a built in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee, which will keep a watch on the academics and keep its reports and recommendations every year. In addition the highest academic council also supervises the academic matters. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7. **Will the students of IARE as an Autonomous College qualify for University Medals and Prizes for academic excellence?**
   No. IARE has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural on co-curricular organized by the University the students shall qualify.

8. **Can IARE have its own Convocation?**
   No. Since the University awards the Degree the Convocation will be that of the University, but there will be Graduation Day at IARE.

9. **Can IARE give a provisional degree certificate?**
   Since the examinations are conducted by IARE and the results are also declared by IARE, the college sends a list of successful candidates with their final Grades and Grade Point Averages including CGPA to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.
10 Will Academic Autonomy make a positive impact on the Placements or Employability?
Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment. Also the autonomous status is more responsive to the needs of the industry. As a result therefore, there will be a lot of scope for industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

11 What is the proportion of Internal and External Assessment as an Autonomous College?
Presently, it is 70% external and 30% internal. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12 Is it possible to have complete Internal Assessment for Theory or Practicals?
Yes indeed. We define our own system. We have the freedom to keep the proportion of external and internal assessment component to choose.

13 Why Credit based Grade System?
The credit based grade system is an accepted standard of academic performance the world over in all Universities. The acceptability of our graduates in the world market shall improve.

14 What exactly is a Credit based Grade System?
The credit based grade system defines a much better statistical way of judging the academic performance. One Lecture Hour per week of Teaching Learning process is assigned One Credit. One hour of laboratory work is assigned half credit. Letter Grades like A, B,C,D, etc. are assigned for a Range of Marks. (e.g. 91% and above is A+, 80 to 90% could be A etc.) in Absolute Grading System while grades are awarded by statistical analysis in relative grading system. We thus dispense with sharp numerical boundaries. Secondly, the grades are associated with defined Grade Points in the scale of 1 to 10. Weighted Average of Grade Points is also defined Grade Points are weighted by Credits and averaged over total credits in a Semester. This process is repeated for all Semesters and a CGPA defines the Final Academic Performance

15 What are the norms for the number of Credits per Semester and total number of Credits for UG/PG programme?
These norms are usually defined by UGC or AICTE. Usually around 25 Credits per semester is the accepted norm.

16 What is a Semester Grade Point Average (SGPA)?
The performance of a student in a semester is indicated by a number called SGPA. The SGPA is the weighted average of the grade points obtained in all the courses registered by the student during the semester.

$$SGPA = \frac{\sum_{i=1}^{n} (C_i G_i)}{\sum_{i=1}^{n} C_i}$$

Where, $C_i$ is the number of credits of the $i^{th}$ course and $G_i$ is the grade point scored by the student in the $i^{th}$ course and $i$ represent the number of courses in which a student registered in the concerned semester. SGPA is rounded to two decimal places.

17 What is a Cumulative Grade Point Average (CGPA)?
An up-to-date assessment of overall performance of a student from the time of his first registration is obtained by calculating a number called CGPA, which is weighted average of the grade points obtained in all the courses registered by the students since he entered the Institute.

$$CGPA = \frac{\sum_{j=1}^{m} (C_j S_j)}{\sum_{j=1}^{m} C_j}$$
Where, $S_j$ is the SGPA of the $j^{th}$ semester and $C_j$ is the total number of credits upto the semester and $m$ represent the number of semesters completed in which a student registered upto the semester. CGPA is rounded to two decimal places.

18 **Is there any Software available for calculating Grade point averages and converting the same into Grades?**
Yes, The institute has its own MIS software for calculation of SGPA, CGPA, etc.

19 **Will the teacher be required to do the job of calculating SGPA etc. and convert the same into Grades?**
No. The teacher has to give marks obtained out of whatever maximum marks as it is. Rest is all done by the computer.

20 **Will there be any Revaluation or Re-Examination System?**
No. There will double valuation of answer scripts. There will be a make up Examination after a reasonable preparation time after the End Semester Examination for specific cases mentioned in the Rules and Regulations. In addition to this, there shall be a ‘summer term’ (compressed term) followed by the End Semester Exam, to save the precious time of students.

21 **How fast Syllabi can be and should be changed?**
Autonomy allows us the freedom to change the syllabi as often as we need.

22 **Will the Degree be awarded on the basis of only final year performance?**
No. The CGPA will reflect the average performance of all the semester taken together.

23 **What are Statutory Academic Bodies?**
Governing Body, Academic Council, Examination Committee and Board of Studies are the different statutory bodies. The participation of external members in every body is compulsory. The institute has nominated professors from IIT, NIT, University (the officers of the rank of Pro-vice Chancellor, Deans and Controller of Examinations) and also the reputed industrialist and industry experts on these bodies.

24 **Who takes Decisions on Academic matters?**
The Governing Body of institute is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like Boards of Studies. Decisions taken at the Boared of Studies level are to be ratified at the Academic Council and Governing Body.

25 **What is the role of Examination committee?**
The Examinations Committee is responsible for the smooth conduct of internal, End Semester and make up Examinations. All matters involving the conduct of examinations spot valuations, tabulations preparation of Grade Cards etc fall within the duties of the Examination Committee.

26 **Is there any mechanism for Grievance Redressal?**
The institute has grievance redressal committee, headed by Dean - Student affairs and Dean - IQAC.

27 **How many attempts are permitted for obtaining a Degree?**
All such matters are defined in Rules & Regulation

28 **Who declares the result?**
The result declaration process is also defined. After tabulation work wherein the SGPA, CGPA and final Grades are ready, the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the Examinations and Result Committee for its approval. The result is then declared on the institute
notice boards as well put on the web site and Students Corner. It is eventually sent to the University.

29 Who will keep the Student Academic Records, University or IARE?
It is the responsibility of the Dean, Academics of the Autonomous College to keep and preserve all the records.

30 What is our relationship with the JNT University?
We remain an affiliated college of the JNT University. The University has the right to nominate its members on the academic bodies of the college.

31 Shall we require University approval if we want to start any New Courses?
Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.

32 Shall we get autonomy for PG and Doctoral Programmes also?
Yes, presently our PG programmes also enjoying autonomous status.
## MALPRACTICES RULES

### DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

<table>
<thead>
<tr>
<th>S.No</th>
<th>Nature of Malpractices/Improper conduct</th>
<th>Punishment</th>
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<tbody>
<tr>
<td></td>
<td><strong>If the candidate:</strong></td>
<td></td>
</tr>
<tr>
<td>1. (a)</td>
<td>Possesses or keeps accessible in examination hall, any paper, note book, programmable calculator, cell phone, pager, palm computer or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>(b)</td>
<td>Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>2.</td>
<td>Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the Controller of Examinations.</td>
</tr>
<tr>
<td>3.</td>
<td>Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
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<tr>
<td>4.</td>
<td>Smuggles in the Answer book or additional sheet or takes out or arranges to send out the</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and</td>
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<tr>
<td></td>
<td>Question</td>
<td>Action</td>
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</tr>
<tr>
<td>1.</td>
<td>Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
<td>Cancellation of the performance in that subject.</td>
</tr>
<tr>
<td>2.</td>
<td>Refuses to obey the orders of the Controller of Examinations /Additional Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the COE or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the COE or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the Institute premises or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</td>
</tr>
<tr>
<td>3.</td>
<td>Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>4.</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
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<td>9.</td>
<td>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
<td>Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>10.</td>
<td>Comes in a drunken condition to the examination hall.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.</td>
</tr>
<tr>
<td>11.</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
<td>Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.</td>
</tr>
<tr>
<td>12.</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.</td>
<td></td>
</tr>
</tbody>
</table>
UNDERTAKING BY STUDENT / PARENT

“To make the students attend the classes regularly from the first day of starting of classes and be aware of the College regulations, the following Undertaking Form is introduced which should be signed by both student and parent. The same should be submitted to the Dean, Academic”.

I, Mr./Ms. ______________________________________________ joining I Semester / III Semester for the academic year 2016-2017 / 2017-2018 in Institute of Aeronautical Engineering, Hyderabad, do hereby undertake and abide by the following terms, and I will bring the ACKNOWLEDGEMENT duly signed by me and my parent and submit it to the Dean, Academic.

1. I will attend all the classes as per the timetable from the starting day of the semester specified in the institute Academic Calendar. In case, I do not turn up even after two weeks of starting of classes, I shall be ineligible to continue for the current academic year.

2. I will be regular and punctual to all the classes (theory/practical/drawing) and secure attendance of not less than 75% in every course as stipulated by Institute. I am fully aware that an attendance of less than 65% in more than three theory courses will make me lose one year.

3. I will compulsorily follow the dress code prescribed by the college.

4. I will conduct myself in a highly disciplined and decent manner both inside the classroom and on campus, failing which suitable action may be taken against me as per the rules and regulations of the institute.

5. I will concentrate on my studies without wasting time in the Campus/Hostel/Residence and attend all the tests to secure more than the minimum prescribed Class/Sessional Marks in each course. I will submit the assignments given in time to improve my performance.

6. I will not use Mobile Phone in the institute premises and also, I will not involve in any form of ragging inside or outside the campus. I am fully aware that using mobile phone to the institute premises is not permissible and involving in Ragging is an offence and punishable as per JNTUH/UGC rules and the law.

7. I declare that I shall not indulge in ragging, eve-teasing, smoking, consuming alcohol drug abuse or any other anti-social activity in the college premises, hostel, on educational tours, industrial visits or elsewhere.

8. I will pay tuition fees, examination fees and any other dues within the stipulated time as required by the Institution / authorities, failing which I will not be permitted to attend the classes.

9. I will not cause or involve in any sort of violence or disturbance both within and outside the college campus.

10. If I absent myself continuously for 3 days, my parents will have to meet the HOD concerned/ Principal.

11. I hereby acknowledge that I have received a copy of IARE - R16 Academic Rules and Regulations, Syllabus copy and hence, I shall abide by all the rules specified in it.

___________________________________________________________________________________________

ACKNOWLEDGEMENT

I have carefully gone through the terms of the undertaking mentioned above and I understand that following these are for my/his/her own benefit and improvement. I also understand that if I/he/she fail to comply with these terms, shall be liable for suitable action as per Institute/JNTUH/AICTE/UGC rules and the law. I undertake that I/he/she will strictly follow the above terms.

Signature of Student with Date ___________________________ Signature of Parent with Date ___________________________

Name & Address with Phone Number ___________________________