FACULTY OF SCIENCE

DIVISION OF COMPUTER AND INFORMATION SCIENCE

M.Sc. INFORMATION TECHNOLOGY (INTEGRATED)
(5-Year)

Programme Code: SCIS52

Handbook
2019-2020
ANNAMALAI UNIVERSITY

REGULATIONS FOR THE FIVE YEAR INTEGRATED POST GRADUATE PROGRAMMES
UNDER CHOICE BASED CREDIT SYSTEM (CBCS)

These Regulations are common to all the students admitted to the Five Year Integrated Master’s Programmes in the Faculties of Arts, Science, Languages, Marine Sciences, and Education from the academic year 2019-2020 onwards.

1. Definitions and Nomenclature

1.1 University refers to Annamalai University.

1.2 Department means any of the academic departments and academic centres at the University.

1.3 Discipline refers to the specialization or branch of knowledge taught and researched in higher education. For example, Botany is a discipline in the Natural Sciences, while Economics is a discipline in Social Sciences.

1.4 Programme encompasses the combination of courses and/or requirements leading to a Degree. For example, M.A., M.Sc.

1.5 Course is an individual subject in a programme. Each course may consist of Lectures/Tutorials/Laboratory work/Seminar/Project work/Experiential learning/ Report writing/viva-voce etc. Each course has a course title and is identified by a course code.

1.6 Curriculum encompasses the totality of student experiences that occur during the educational process.

1.7 Syllabus is an academic document that contains complete information about an academic programme and defines responsibilities and outcomes. This includes course information, course objectives, policies, evaluation, grading, learning resources and course calendar.

1.8 Academic Year refers to the annual period of sessions of the University that comprises two consecutive semesters.

1.9 Semester is a half-year term that lasts for a minimum of 90 working days. Each academic year is divided into two semesters.

1.10 Choice Based Credit System A mode of learning in higher education that enables a student to have the freedom to select his/her own choice of elective courses across various disciplines for completing the Degree programme.

1.11 Core Course is mandatory and an essential requirement to qualify for the Degree.
1.12 **Elective Course** is a course that a student can choose from a range of alternatives.

1.13 **Value Added Courses** are optional courses that complement the students’ knowledge and skills and enhance their employability.

1.14 **Experiential Learning** is a process of learning through experience. It is specifically defined as “learning through reflection on doing”.

1.15 **Extension activities** are the activities that provide a link between the University and the community such as lab-to-land, literacy, population education, and health awareness programmes. These are integrated within the curricula with a view to sensitise the students about Institutional Social Responsibility (ISR).

1.16 **Credit** refers to the quantum of course work in terms of the number of class hours in a semester required for a programme. The credit value reflects the content and duration of a particular course in the curriculum.

1.17 **Credit Hour** refers to the number of class hours per week required for a course in a semester. It is used to calculate the credit value of a particular course.

1.18 **Programme Outcomes (POs)** are statements that describe crucial and essential knowledge, skills, and attitudes that students are expected to achieve and can reliably manifest at the end of a programme.

1.19 **Programme Specific Outcomes (PSOs)** are statements that list what the graduate of a specific programme should be able to do at the end of the programme.

1.20 **Learning Objectives (also known as Course Objectives)** are statements that define the expected goal of a course in terms of demonstrable skills or knowledge that will be acquired by a student as a result of instruction.

1.21 **Course Outcomes (COs)** are statements that describe what students should be able to achieve/demonstrate at the end of a course. They allow follow-up and measurement of learning objectives.

1.22 **Grade Point Average (GPA)** is the average of the grades acquired in various courses that a student has taken in a semester. The formula for computing GPA is given in Section 11.3.

1.23 **Cumulative Grade Point Average (CGPA)** is a measure of the overall cumulative performance of a student in all the semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters.

1.24 **Letter Grade** is an index of the performance of a student in a particular course. Grades are denoted by the letters S, A, B, C, D, E, and RA.
2. **Programmes Offered and Eligibility Criteria**

The Integrated Programmes offered by the University and the eligibility criteria are detailed below.

<table>
<thead>
<tr>
<th>Faculty of Arts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Programme</strong></td>
</tr>
<tr>
<td>M.A. History</td>
</tr>
<tr>
<td>M.A. Political Science</td>
</tr>
<tr>
<td>M.A. Economics</td>
</tr>
<tr>
<td>M.A. Sociology</td>
</tr>
<tr>
<td>M.A. Population and Development</td>
</tr>
<tr>
<td>M.Lib.I.Sc.</td>
</tr>
<tr>
<td>M.A. Rural Development</td>
</tr>
<tr>
<td>M.Com.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Programme</strong></td>
</tr>
<tr>
<td>M.Sc. Mathematics</td>
</tr>
<tr>
<td>M.Sc. Physics</td>
</tr>
<tr>
<td>M.Sc. Botany</td>
</tr>
<tr>
<td>M.Sc. Biotechnology</td>
</tr>
<tr>
<td>M.Sc. Microbiology</td>
</tr>
<tr>
<td>M.Sc. Geology</td>
</tr>
</tbody>
</table>
M.Sc. Statistics  A pass in H.S.E. (10+2 level) OR an Equivalent examination thereto under academic stream with Mathematics / Statistics / Business Mathematics / Computer Science as one of the subjects.

M.Sc. Zoology  A pass in H.S.E. (10+2 level) OR Equivalent thereto with a minimum aggregate of 40% marks under academic stream in the following subjects viz. Physics, Chemistry and Biology or Zoology and Botany.

M.Sc. Software Engineering  A pass in H.S.E. (10+2 level) OR Equivalent thereto under academic stream with Mathematics, as one of the Subjects.

M.Sc. Information Technology  A pass in H.S.E. (10+2 level) OR Equivalent thereto under academic stream with Mathematics as one of the subjects.

<table>
<thead>
<tr>
<th>Faculty of Marine Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.Sc. Ocean Science &amp; Technology  A pass in H.S.E. (10+2 level) OR Equivalent thereto under Academic Stream in the following subjects viz. Mathematics, Physics, Chemistry &amp; Biology.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty of Languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.A. Tamil  A pass in H.S.E. (10+2 level) OR Equivalent thereto.</td>
</tr>
<tr>
<td>M.A. English  A pass in H.S.E. (10+2 level) OR Equivalent thereto.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty of Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.Sc. Clinical Psychology  A pass in H.S.E. (10 + 2) OR Equivalent thereto.</td>
</tr>
</tbody>
</table>

2.1 **In the case of SC/ST and Differently-abled candidates, a pass is the minimum qualification for all the above Programmes.**

3. **Reservation Policy**

   Admission to the various programmes will be strictly based on the reservation policy of the Government of Tamil Nadu.

4. **Programme Duration**

   4.1 The Five Year Master’s Programmes consist of five academic years and ten semesters.

   4.2 Each academic year is divided into two semesters, the first being from July to November and the second from December to April.

   4.3 Each semester will have 90 working days (18 weeks).

5. **Programme Structure**

   5.1 The Five Year Integrated Programme consists of Language Courses, Core Courses, Allied Courses, Elective Courses, Soft Skills, Experiential Learning and Project. Students shall also participate in Extension Activities as part of their curriculum.
5.2 **Language Courses**

5.2.1 Each student shall take two languages of four courses each, one in each semester for the first two years of the programme.

5.2.2 Language-I shall be Tamil or another language such as Hindi or French.

5.2.3 Language-II shall be English.

5.3 **Core courses**

5.3.1 These are a set of compulsory courses essential for each programme.

5.3.2 The core courses include both Theory (Core Theory) and Practical (Core Practical) courses.

5.4 **Allied Courses**

5.4.1 Each student shall take courses in two disciplines allied to the main subject (Allied-I and Allied-II) of the programme in the first four semesters.

5.4.2 In Arts, Languages, and Education, there will be three Theory Courses each for Allied-I and Allied-II.

5.4.3 In Science and Marine Sciences, there will be two Theory courses and one Practical course each for Allied-I and Allied-II.

5.5 **Elective Courses**

5.5.1 **Departmental Electives (DEs)** are the electives that students can choose from a range of Electives offered within the Parent Department offering the Programme.

5.5.2 **Interdepartmental Electives (IDEs)** are electives that students can choose from amongst the courses offered by other departments of the same faculty as well as by the departments of other faculties.

5.5.3 *Students shall take a combination of both DEs and IDEs.*

5.6 **Soft Skills**

5.6.1 Soft skills are intended to enable students to acquire attributes that enhance their performance and achieve their goals with complementing hard skills.

5.6.2 Soft skills include communication skills, computer skills, social skills, leadership traits, team work, development of emotional intelligence quotients, among others.

5.6.3 Each student shall choose four courses on soft skills from a range of courses offered from the First to the Sixth Semester.

5.7 **Value Education**

All students shall take a course on Value Education that includes human values, sustainable development, gender equity, ethics and human rights.
5.8 Experiential Learning

5.8.1 Experiential learning provides opportunities to students to connect principles of the discipline with real-life situations.

5.8.2 In-plant training/field trips/internships/industrial visits (as applicable) fall under this category.

5.9 Extension Activities

5.9.1 It is mandatory for every student to participate in extension activities.

5.9.2 All the students shall enroll under NSS/NCC/YRC/RRC or any other Service Organisation in the University.

5.9.3 Students shall put in a minimum attendance of 40 hours in a year duly certified by the Programme Co-ordinator.

5.9.4 Extension activities shall be conducted outside the class hours.

5.10 Project

5.10.1 Each student shall undertake a Project in the final semester.

5.10.2 The Head of the Department shall assign a Project Supervisor to the student.

5.10.3 The Project Supervisor shall assign a topic for the project and monitor the progress of the student periodically.

5.10.4 Students who wish to undertake project work in recognised institutions/industry shall obtain prior permission from the University. The Project Supervisor will be from the host institute, while the Co-Supervisor shall be a faculty in the parent department.

5.11 Value Added Courses (VACs)

5.11.1 Students may also opt to take Value Added Courses beyond the minimum credits required for the award of the Degree. VACs are outside the normal credit paradigm.

5.11.2 VACs enhance the students’ employability and life skills. VACs are listed on the University website and in the Handbook on Interdepartmental Electives and VACs.

5.11.3 Each VAC carries 2 credits with 30 hours of instruction, of which 60% (18 hours) shall be Theory and 40% (12 hours) Practical.

5.11.4 Classes for VACs are conducted beyond the regular class hours and preferably in the VIII and IX Semesters.

5.12 Online Courses

5.12.1 The Heads of Departments shall facilitate enrolment of students in Massive Open Online Courses (MOOCs) platform such as SWAYAM to provide academic flexibility and enhance the academic career of students.
5.12.2 Students who successfully complete a course in the MOOC platform shall be exempted from one elective course of the programme.

5.13 **Credit Distribution**

The credit distribution is detailed in the Table.

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester I to VI</strong></td>
</tr>
<tr>
<td>Language-I (Tamil or any other Language)</td>
</tr>
<tr>
<td>Language-II (English)</td>
</tr>
<tr>
<td>Core Courses</td>
</tr>
<tr>
<td>Allied-I</td>
</tr>
<tr>
<td>Allied-II</td>
</tr>
<tr>
<td>Electives</td>
</tr>
<tr>
<td>Soft skills</td>
</tr>
<tr>
<td>Environmental studies (UGC mandated)</td>
</tr>
<tr>
<td>Value Education</td>
</tr>
<tr>
<td>Experiential learning</td>
</tr>
<tr>
<td>Extension activities</td>
</tr>
</tbody>
</table>

**Total Credits (Semester I to VI)** 140-145

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester VII to X</strong></td>
</tr>
<tr>
<td>Core Courses</td>
</tr>
<tr>
<td>Electives</td>
</tr>
<tr>
<td>Project</td>
</tr>
</tbody>
</table>

**Total Credits (Semester VII to X)** 90-95

**Total Credits Semester I to X (Minimum requirement for the award of Degree)** *230-240

*Each Department shall fix the minimum required credits for award of the Degree within the prescribed range of 230-240 credits.*

5.14 **Credit Assignment**

Each course is assigned credits and credit hours on the following basis:

1 Credit is defined as
1 Lecture period of one hour per week over a semester
1 Tutorial period of one hour per week over a semester
1 Practical/Project period of two or three hours (depending on the discipline) per week over a semester.
6  **Attendance**

6.1 Each faculty handling a course shall be responsible for the maintenance of *Attendance and Assessment Record* for students who have registered for the course.

6.2 The Record shall contain details of the students’ attendance, marks obtained in the Continuous Internal Assessment (CIA) Tests, Assignments and Seminars. In addition the Record shall also contain the organisation of lesson plan of the Course Instructor.

6.3 The record shall be submitted to the Head of the Department once a month for monitoring the attendance and syllabus coverage.

6.4 At the end of the semester, the record shall be duly signed by the Course Instructor and the Head of the Department and placed in safe custody for any future verification.

6.5 The Course Instructor shall intimate to the Head of the Department at least seven calendar days before the last instruction day in the semester about the attendance particulars of all students.

6.6 Each student should earn a minimum of 75% attendance in the courses of the particular semester failing which he or she will not be permitted to write the End-Semester Examination. The student has to redo the semester in the next year.

6.7 Relaxation of attendance requirement up to 10% may be granted for valid reasons such as illness.

7. **Mentor - Mentee System**

7.1 To help the students in planning their course of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a member of the faculty who shall function as a Mentor throughout their period of study.

7.2 The Mentors will guide their mentees with the curriculum, monitor their progress, and provide intellectual and emotional support.

7.3 The Mentors shall also help their mentees to choose appropriate electives and value-added courses, apply for scholarships, undertake projects, prepare for competitive examinations such as NET/SET, GATE etc., attend campus interviews and participate in extracurricular activities.

8. **Examinations**

8.1 The examination system of the University is designed to systematically test the student’s progress in class, laboratory and field work through Continuous Internal Assessment (CIA) Tests and End-Semester Examination (ESE).

8.2 There will be two CIA Tests and one ESE in each semester.
8.3 The Question Papers will be framed to test different levels of learning based on Bloom’s taxonomy, viz. Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation/Creativity.

8.4 Continuous Internal Assessment Tests

8.4.1 The CIA Tests shall be a combination of a variety of tools such as class tests, assignments, seminars, and viva-voce that would be suitable for the course. This requires an element of openness.

8.4.2 The students are to be informed in advance about the assessment procedures.

8.4.3 The pattern of question paper will be decided by the respective faculty.

8.4.4 CIA Test-I will cover the syllabus of the first two units while CIA Test-II will cover the last three units.

8.4.5 CIA Tests will be for one to three hours duration depending on the quantum of syllabus.

8.4.6 A student cannot repeat the CIA Test-I and CIA Test-II. However, if for any valid reason, the student is unable to attend the test, the prerogative of arranging a special test lies with the teacher in consultation with the Head of the Department.

8.5 End Semester Examinations (ESEs)

8.5.1 The ESEs for the odd semester will be conducted in November and for the even semester in May.

8.5.2 A candidate who does not pass the examination in any course(s) will be permitted to reappear in such course(s) in the subsequent semester/year.

8.5.3 The ESE will be of three hours duration and will cover the entire syllabus of the course.

9 Evaluation

9.1 Marks Distribution

9.1.1. Each course, both Theory and Practical as well as Project/Internship/Field work/In-plant training shall be evaluated for a maximum of 100 marks.

9.1.2 For the theory courses, CIA Tests will carry 25% and the ESE, 75% of the marks.

9.1.3 For the Practical courses, the CIA Tests will constitute 40% and the ESE 60% of the marks.

9.2. Assessment of CIA Tests

9.2.1 For the CIA Tests, the assessment will be done by the Course Instructor

9.2.2 For the Theory Courses, the break-up of marks shall be as follows:
9.2.3 For the Practical Courses (wherever applicable), the break-up of marks shall be as follows:

<table>
<thead>
<tr>
<th></th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test-I &amp; Test-II</td>
<td>15</td>
</tr>
<tr>
<td>Seminar</td>
<td>5</td>
</tr>
<tr>
<td>Assignment</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>

9.3 Assessment of End-Semester Examinations

9.3.1 Double Evaluation for the ESE is done by the University Teachers.

9.3.2 In case of a discrepancy of more than 10% between the two examiners in awarding marks, third evaluation will be resorted to.

9.4 Assessment of Project/Dissertation

9.4.1 The Project Report/Dissertation shall be submitted as per the guidelines laid down by the University.

9.4.2 The Project Work/Dissertation shall carry a maximum of 100 marks.

9.4.3 CIA for Project will consist of Review of literature, experimentation/field work, attendance etc.

9.4.4 The Project Report evaluation and viva-voce will be conducted by a committee constituted by the Head of the Department.

9.4.5 The Project Evaluation Committee will comprise of the Head of the Department, Project Supervisor, and a senior faculty.

9.4.7 The marks shall be distributed as follows:

<table>
<thead>
<tr>
<th>Continuous Internal Assessment (25 Marks)</th>
<th>End Semester Examination (75 Marks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review-I: 10</td>
<td>Project / Dissertation Evaluation</td>
</tr>
<tr>
<td>Review-II: 15</td>
<td>Viva-voce</td>
</tr>
<tr>
<td></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>
9.5 **Assessment of Value Added Courses**

9.5.1 VACs shall be evaluated completely by Internal Examiners.

9.5.2 Two CIA Tests shall be conducted during the semester by the Department(s) offering VAC.

9.5.3 A committee consisting of the Head of the Department, faculty handling the course and a senior faculty member shall monitor the evaluation process.

9.5.4 The grades obtained in VACs will not be included for calculating the GPA.

9.6 **Passing Minimum**

9.6.1 A candidate is declared to have passed in each course if he/she secures not less than 40% marks in the ESE and not less than 50% marks in aggregate taking CIA and ESE marks together.

9.6.4 A candidate who has not secured a minimum of 50% of marks in a course (CIA + ESE) shall reappear for the course in the next semester/year.

10. **Conferment of the Master’s Degree**

A candidate who has secured a minimum of 50% marks in all courses prescribed in the programme and earned the minimum required credits shall be considered to have passed the Master’s Programme.

11. **Marks and Grading**

11.1 The performance of students in each course is evaluated in terms of Grade Point (GP).

11.2 The sum total performance in each semester is rated by Grade Point Average (GPA) while Cumulative Grade Point Average (CGPA) indicates the Average Grade Point obtained for all the courses completed from the first semester to the current semester.

11.3 The GPA is calculated by the formula

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

where, \( C_i \) is the Credit earned for the Course \( i \) in any semester;

\( G_i \) is the Grade Point obtained by the student for the Course \( i \) and

\( n \) is the number of Courses passed in that semester.
11.4 **CGPA** is the Weighted Average Grade Point of all the Courses passed starting from the first semester to the current semester.

\[
CGPA = \frac{\sum_{i=1}^{m} \sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{m} \sum_{i=1}^{n} C_i}
\]

where, \(C_i\) is the Credit earned for the Course \(i\) in any semester;

\(G_i\) is the Grade Point obtained by the student for the Course \(i\) and

\(n\) is the number of Courses passed in that semester.

\(m\) is the number of semesters.

11.5 Evaluation of the performance of the student will be rated as shown in the Table.

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Grade Points</th>
<th>Marks %</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>10</td>
<td>90 and above</td>
</tr>
<tr>
<td>A</td>
<td>9</td>
<td>80-89</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>70-79</td>
</tr>
<tr>
<td>C</td>
<td>7</td>
<td>60-69</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>55-59</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>50-54</td>
</tr>
<tr>
<td>RA</td>
<td>0</td>
<td>Less than 50</td>
</tr>
<tr>
<td>W</td>
<td>0</td>
<td>Withdrawn from the examination</td>
</tr>
</tbody>
</table>

11.6 **Classification of Results.** The successful candidates are classified as follows:

11.6.1 For **First Class with Distinction:** Candidates who have passed all the courses prescribed in the Programme *in the first attempt* with a CGPA of 8.25 or above within the programme duration. Candidates who have withdrawn from the End Semester Examinations are still eligible for First Class with Distinction (*See Section 12 for details*).

11.6.2 For **First Class:** Candidates who have passed all the courses with a CGPA of 6.5 or above.

11.6.3 For **Second Class:** Candidates who have passed all the courses with a CGPA between 5.0 to less than 6.5.

11.6.4 Candidates who obtain highest marks in all examinations at the first appearance alone will be considered for University Rank.
11.7 Course-Wise Letter Grades

11.7.1 The percentage of marks obtained by a candidate in a course will be indicated in a letter grade.

11.7.2 A candidate is considered to have completed a course successfully and earned the credits if he/she secures an overall letter grade other than RA.

11.7.3 A course completed successfully, cannot be repeated for the purpose of improving the Grade Point.

11.7.4 A letter grade RA indicates that the candidate shall reappear for that course. The RA Grade once awarded stays in the grade card of the student and is not deleted even when he/she completes the course successfully later. The grade acquired later by the student will be indicated in the grade sheet of the Odd/Even semester in which the student has re-appeared.

11.7.5 If a student secures RA grade in the Project Work/Field Work/Practical Work/Dissertation, he/she shall improve it and resubmit if it involves only rewriting/ incorporating the clarifications suggested by the evaluators or he/she can re-register and carry out the same in the subsequent semesters for evaluation.

12. Provision for Withdrawal from the End Semester Examination

12.1 The letter grade W indicates that a candidate has withdrawn from the examination.

12.2 A candidate is permitted to withdraw from appearing in the ESE for one or more courses in ANY ONE of the semesters ONLY for exigencies deemed valid by the University authorities.

12.3 Permission for withdrawal from the examination shall be granted only once during the entire duration of the programme.

12.3 Application for withdrawal shall be considered only if the student has registered for the course(s), fulfilled the requirements for attendance and CIA tests.

12.4 The application for withdrawal shall be made ten days prior to the commencement of the examination and duly approved by the Controller of Examinations. Notwithstanding the mandatory prerequisite of ten days notice, due consideration will be given under extraordinary circumstances.

12.5 Withdrawal is not granted for arrear examinations of courses in previous semesters (for which the student has secured RA Grade) and for the final semester examinations.

12.6 Candidates who have been granted permission to withdraw from the examination shall reappear for the course(s) in the subsequent semester.
12.7 Withdrawal shall not be taken into account as an appearance for the examination when considering the eligibility of the student to qualify for First Class with Distinction.

13. **Academic misconduct**

Any action that results in an unfair academic advantage/interference with the functioning of the academic community constitutes academic misconduct. This includes but is not limited to cheating, plagiarism, altering academic documents, fabrication/falsification of data, submitting the work of another student, interfering with other students’ work, removing/defacing department library or computer resources, stealing other students’ notes/assignments, electronically interfering with other students’/University’s intellectual property. Since many of these acts may be committed unintentionally due to lack of awareness, students shall be sensitised on issues of academic integrity and ethics.

14. **Transitory Regulations**

Wherever there has been a change of syllabi, examinations based on the existing syllabus will be conducted for two consecutive years after implementation of the new syllabus in order to enable the students to clear the arrears. Beyond that, the students will have to take up their examinations in equivalent subjects, as per the new syllabus, on the recommendation of the Head of the Department concerned.

15. **Notwithstanding anything contained in the above pages as Rules and Regulations governing the Five Year Integrated Master’s Programmes at Annamalai University, the Syndicate is vested with the powers to revise them from time to time on the recommendations of the Academic Council.**
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>L</th>
<th>P</th>
<th>C</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CIA</td>
</tr>
<tr>
<td>SEMESTER - I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19ITAC11</td>
<td>Language – I</td>
<td>3</td>
<td>3</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>19IENC12</td>
<td>Language – II</td>
<td>3</td>
<td>3</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>19ICEC13</td>
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**Semester VII-X Total Credits**: 93

**Semester I-X Total Credits**: 237

Value Added Course

L-Lectures; P-Practical; C-Credits; CIA-Continuous Internal Assessment; ESE- End-Semester Examination

Note:

1. Students shall take both Department Electives (DEs) and Interdepartmental Electives (IDEs) from a range of choices available.

2. Students may opt for any Value-added Course listed in the University website.
## DEPARTMENT ELECTIVE COURSES

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## INTER DEPARTMENT ELECTIVE (IDE) COURSES OFFERED TO OTHER DEPARTMENTS

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## VALUE ADDED COURSES

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Programme Outcomes (PO)

PO1: **Domain knowledge**: Demonstrate knowledge of basic concepts, principles and applications of the specific science discipline.

PO2: **Resource Utilisation**: Cultivate the skills to acquire and use appropriate learning resources including library, e-learning resources, ICT tools to enhance knowledge-base and stay abreast of recent developments.

PO3: **Analytical and Technical Skills**: Ability to handle/use appropriate tools/techniques/equipment with an understanding of the standard operating procedures, safety aspects/limitations.

PO4: **Critical thinking and Problem solving**: Identify and critically analyse pertinent problems in the relevant discipline using appropriate tools and techniques as well as approaches to arrive at viable conclusions/solutions.

PO5: **Project Management**: Demonstrate knowledge and scientific understanding to identify research problems, design experiments, use appropriate methodologies, analyse and interpret data and provide solutions. Exhibit organisational skills and the ability to manage time and resources.

PO6: **Individual and team work**: Exhibit the potential to effectively accomplish tasks independently and as a member or leader in diverse teams, and in multidisciplinary settings.

PO7: **Effective Communication**: Communicate effectively in spoken and written form as well as through electronic media with the scientific community as well as with society at large. Demonstrate the ability to write dissertations, reports, make effective presentations and documentation.

PO8: **Environment and Society**: Analyse the impact of scientific and technological advances on the environment and society and the need for sustainable development.

PO9: **Ethics**: Commitment to professional ethics and responsibilities.

PO10: **Life-long learning**: Ability to engage in life-long learning in the context of the rapid developments in the discipline.
Programme Specific Outcomes (PSO)

**PSO1:** Take leading roles in industry, academia, entrepreneurship and applications.

**PSO2:** Analyze, design, validate and implement state-of-the-art Information Communication Technology systems in their operational context.

**PSO3:** Scientific, ethical and socially responsible approach for conducting and contributing to research in their specific area of study and to international trends in and related to their field of study.

**PSO4:** Implement the concepts of computer networks, cyber security, computer communication, data repository, data analytics, and to implement these concepts, the students are expected to develop skills on design and analyzing the problem and to take a decision on the problem.

**PSO5:** Identify appropriate mathematical and statistical techniques to solve the problems and develop a system which is useful to the industry and scientific communities, and the society.

**PSO6:** Develop programming skills in recent computer software to implement the above concepts.

**PSO7:** Handle the projects related to electronic commerce, software development related to on-line applications and can achieve organizational goals and objectives.

**PSO8:** Control, and maintain the communication system networks, and they should be cope up with the cutting-edge communication technology.
M.Sc. INFORMATION TECHNOLOGY (Integrated)
(5-year Programme)

Syllabus
FIRST YEAR: FIRST SEMESTER

Language – தமிழ் - I

19ITAC11 மாணை திறன்கைப்படும் கல்வி

அலுவலகம்: மாணை திறன்கைப்படும் கல்வி அறிவியல் விளையாட்டு. நூற்று திறன்கைப்படும் தொகுப்புக் காலநிலை - சம்பந்த மாணை விளையாட்டு - கல்வி விளையாட்டு - பாட்டிருப்பது - விளையாட்டு - மாணை திறன்கைப்படும் விளையாட்டு விளையாட்டு. திறன்கைப்படும் அறிவியல் தொகுப்பு விளையாட்டு விளையாட்டு விளையாட்டு விளையாட்டு;

அலுவலக - 1

1. புராணம் நிலைப்படுத்தல் - பாரம்பரிய நூற்றை
2. சிற்றுலக நிலைப்படுத்தல் - குறுக
3. தொருலகம் - பரந்த மனிதிக்கை
4. செயற்கை குறுக நிலைப்படுத்தல் - அறிவியல் தொகுப்பு
5. பெருமானுயர் நிலைப்படுத்தல் - தொகுப்பு மக்கள்

அலுவலக - 2

1. பாரதியா - புராணம் நிலைப்படுத்தல்
2. பாரதிதாச் - மாணை திறன்கை
3. உவைமானுதான் தான் - மாணை திறன்கை
4. புராணிக் காலநிலை - பாரதியா நிலைப்படுத்தல்
5. உந்தியோன் - நூற்றை வெளியீடு (பதில் 20 மணி)
6. இந்தியா - தொகுப்பு நூற்றை (பதில் 20 மணி)

அலுவலக - 3

1. புராணம் - பாரம்பரிய தொகுப்பு

அலுவலக - 4

1. தொன்பரவல் - தொகுப்பு
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<td>மணிவாசகா் பதி, தமிழ் வாரியம், சிங்கள வாரியம்.</td>
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<td>சேவ. - சிறமி இல்லாத இல்லாது மணிவாசகா் பதி, அன்பு பாத்திரங்கள்</td>
<td>மணிவாசகா் பதி, தமிழ் வாரியம், சிங்கள வாரியம்.</td>
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<td>மணிவாசகா் பதி, தமிழ் வாரியம், சிங்கள வாரியம்.</td>
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<td>ரதா - ரதா இல்லாத இல்லாது மணிவாசகா் பதி, அன்பு பாத்திரங்கள்</td>
<td>மணிவாசகா் பதி, தமிழ் வாரியம், சிங்கள வாரியம்.</td>
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<td>6.</td>
<td>ஆறி - ஆறிய இல்லாத இல்லாது மணிவாசகா் பதி, அன்பு பாத்திரங்கள்</td>
<td>மணிவாசகா் பதி, தமிழ் வாரியம், சிங்கள வாரியம்.</td>
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<td>மணிவாசகா் பதி, தமிழ் வாரியம், சிங்கள வாரியம்.</td>
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<td>மணிவாசகா் பதி, தமிழ் வாரியம், சிங்கள வாரியம்.</td>
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</tbody>
</table>

19ITAC11 : Hindi–I (Option)

Text Books

I. NAVEEN HINDI PATMAALA-I

First 15 lessons only (Poems omitted)

Published by Dakshina Bharatha Hindi Prachar Sabha, T. Nagar, Chennai-17
Learning Objectives
By introducing the course, it is intended to:

LO1. Develop the Language ability of the students
LO2. Enable students to understand the passage, to read fluently, to enrich their vocabulary, and to enjoy reading and writing
LO3. Make the students proficient in the four language skills
LO4. Make the students read with correct pronunciation, stress, intonation, pause, and articulation of voice
LO5. Develop their inquiry skill

Unit-1
Stephen Leacock  “With the Photographer”
Winston S. Churchill  “Examinations”
Grammar: Introduce the Parts of speech Nouns, Verbs, Adjectives, and Adverbs

Unit-2
G.B. Shaw  “Spoken English and Broken English”
M.K. Gandhi  “Voluntary Poverty”
Grammar: Articles

Unit-3
Robert Lynd  “On Forgetting”
Virginia Woolf  “Professions for Woman”
Grammar: Pronouns

Unit-4
A. G. Gardiner  “On Umbrella Morals”
R.K. Narayan  “A Snake in the Grass”
Grammar: Prepositions

Unit-5
Martin Luther King (Jr.)  “I Have a Dream”
George Orwell  “The Sporting Spirit”
Grammar: Conjunctions & Interjections
**Text Books**


**Course Outcomes**

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

CO1: Competency in communication both in written and oral skills

CO2: Fluency in the English language

CO3: Knowledge about construction of sentence structures

CO4: English Vocabulary to use the English language effectively

CO5: Proficiency in the four communication skills

**19ICEC13: Civics, Environment and Health Sciences**

**Unit–1**


**Unit–2**

Political System: Union Government: President – Prime Minister – Parliament – Supreme Court – Electoral System

State Government: Governor – Chief Minister – Center State Relations.


**Unit–3**


**Unit–4**


**Unit–5**

Physical Health – Introduction to health – Food, Meaning of balanced diet, sources, Common Nutritional deficiencies and prevention.
Personal Health – Cleanliness of body, Care of Skin, Nails, Eyes, hair, Oral Health, Clothing, Body posture and good habits such as exercises – Importance of avoiding smoking, alcoholism, drugs etc.,

Population explosion and Family Planning – Importance, Common methods of family planning for Men and Women.

Mothers and Children – Immunization of Children (importance, schedule) care of mothers during Pregnancy and after delivery.

Communicable Diseases – Symptoms and Prevention.

**Unit–6**

2. Adolescent Problems.
3. First Aid.

   Environment – Ventilation, Lighting, Simple Methods of purification of water, sanitary latrine, prevention of worm infestation (round worm, hook worm)

**Text and Reference Books**


**19IMAC14: Allied I: Mathematics–I**

**Learning Objectives**

To acquaint the student with the concepts in

LO1. Matrices
LO2. Differential Calculus
LO3. Integral calculus
LO4. Differential Equations
LO5. Vector differentiation
Unit–1


Unit–2


Analytical Geometry of three dimensions.

Unit–3

Integral Calculus: Methods of integration (Revision) – Integration by parts – properties of definite integrals – Reduction formulae – Evaluation of double and triple integrals – Change of order of integration – Application of multiple integrals for finding areas and volumes – Beta and Gamma functions.

Unit–4


Unit–5


Text Book


Reference Books


Course Outcomes

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

CO1. Handle matrix applications.
CO2. Understand the calculus, differential calculus, integral calculus and vector differentiation.

CO3. To solve problems related to computer science and applications.

19IITT15: Digital Computer Fundamentals

Learning Objectives

LO1. It aims to train the student to the basic concepts of Digital Computer Fundamentals

LO2. To impart the in-depth knowledge of logic gates, Boolean algebra,

LO3. To provide basic ideas about combinational circuits and sequential circuits.

Unit-1


Unit-2


Unit-3


Unit-4


Unit-5

Counters: Asynchronous and Synchronous Counters - Ripple, Mod, Up-Down Counters– Ring Counters. Memory: Basic Terms and Ideas –Types of ROMs – Types of RAMs.

Text Books


Course Outcomes

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

CO1. Convert different type of codes and number systems which are used in digital communication and computer systems.

CO2. Form different digital circuits and analyse different types of digital electronic circuit

CO3. Implement logical operations using combinational logic circuits.

CO4. Understand the counters

CO5. Know the basic terms and ideas of ROM and RAM

Outcome Mapping

|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1| ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    |
| CO2| ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    |
| CO3| ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    |
| CO4| ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    |
| CO5| ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    |

19IT16: Programming in C

Learning Objectives

LO1. To impart adequate knowledge on the need of programming languages and problem involving techniques

LO2. To develop programming skills using the fundamentals and constructs.

LO3. To enable effective usage of arrays, attributes, functions, pointers and to implement the memory management concepts.

LO4. To teach the issues in file organization and the usage of file systems.

LO5. To develop logics which will help them to create programs, applications in C.

Unit-1


Unit-2

Data input output functions - Simple C programs - Flow of control - if, if-else, while, do-while, for loop, Nested control structures - Switch, break and continue, go to statements - Comma operator.

Unit-3

Functions -Definition - proto-types - Passing arguments - Recursions. Storage Classes - Automatic, External, Static, Register Variables - Multi-file programs.
Unit-4
Arrays - Defining and Processing - Passing arrays to functions - Multi-dimension arrays - Arrays and String. Structures - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.

Unit-5

Text Book

Reference Books

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

CO1. Develop programs using the basic elements like control statements, arrays and strings

CO2. Understand about the code reusability with the help of user defined functions.

CO3. Develop advanced applications using enumerated data types, function pointer, nested structures, pre-processors and various header file directories.

CO4. Learn the basics of the handling mechanism that is essential for understanding the concepts in systems develop applications.

CO5. Handle the arrays, structures, pointers and more importantly files.

Outcome Mapping

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Learning Objectives

LO1. The course is oriented to those who want to advance structured and procedural programming understanding and to improve C programming skills.
LO2. The course is designed to provide complete knowledge of C language.
LO3. Students will be able to develop logics which will help them to create programs, applications in C.
LO4. Also by learning the basic programming constructs they can easily switch over to any other language in future.
LO5. The major objective is to provide students with understanding of code organization and functional hierarchical decomposition with using complex data types

List of Exercises

I Summation of Series
1. Sin(x), Cos(x), and Exp(x) (Comparison with built in functions)

II String Manipulation
1. Counting the number of vowels, consonants, words, white spaces in a line of text and array of lines.
2. Reverse a string and check for palindrome.
3. Sub string detection, count and removal.

III Recursion
1. “nPn", “nCr"
2. GCD of two numbers
3. Fibonacci sequence
4. Maximum & Minimum

IV Matrix Manipulation
1. Addition and Subtraction
2. Multiplication
3. Transpose, and trace of a matrix
4. Determinant of a Matrix

V Sorting and Searching
1. Insertion Sort
2. Bubble Sort
3. Linear Search
4. Binary Search
Course Outcomes

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

CO1. Know concepts in problem solving and understand the fundamentals of C programming.

CO2. Choose the loops and decision making statements to solve the problem.

CO3. Implement different Operations on arrays.

CO4. Ability to work with textual information, characters and strings.

CO5. Ability to understand the different sorting algorithm and their complexity.

Outcome Mapping

|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1| ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO2| ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO3| ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO4| ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO5| ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |

FIRST YEAR: SECOND SEMESTER

Language – தமிழ் – II

19ITAC21 பாபி திருக்கிருதம் சிற்றிகாலம்

பேரறிவடல்: பாபி பாபி திருக்கிருதத்தம் சிற்றிகாலம் அறிவுற்றது

பாபி திருக்கிருதம் பிரச்சனைகளுக்கு - இந்துரையாக வடிவமைத்த - பாபி - பாபி திருக்கிருதத்தம் அறிவுற்றது பாபி பிரச்சனைகளுக்கு வருமையுடன் நிறையித்தது. திருக்கிருதத்தம் அறு விரும்பும் தமிழ் பிரச்சனைகளும் திருக்கிருதத்தை பயிற்சியும்.

அடுத்த - 1 பாபி திருக்கிருதம்

1. திருக்கிருதம் வேகத்துடன் - திருக்கிருதம் - முதல் பாபி

(புது 5 பாட்டாகத்)

2. திருக்கிருதம் - திருக்கிருதம் (அல்பிருதத் பாபி, பாபி கூருமகி, பாபி கூருமகி, திருக்கிருதத் பாபி கூருமகி, ஆரம்ப வருமாறு விரும்பும் பாட்டாகத்)

3. திருக்கிருதம் - அறிவுற்றது (5 பாட்டாகத்)
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<thead>
<tr>
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<td>1. செல்வாமரன்</td>
<td>திர்காளின மருது (பொதுகு 5 பட்டம்)</td>
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<td>2. மூலகண்டர்</td>
<td>திர்காளினப் பண்டை - பண்டைக் கொள்ள பாலை முறை போறும்</td>
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<tr>
<td>1. சத்திராமணிகர</td>
<td>சொல்லின வாழ்பாலை</td>
</tr>
<tr>
<td>2. புண்குப்புரசாணிகர</td>
<td>பார்க்கும் விளையாட்டு பாலை</td>
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<tr>
<th>அலுது - 4</th>
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<td>1. சாதைல துயராணிகர</td>
<td>மல்ல மாள (ஏழாண்டவை பட்டம் புது)</td>
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<tr>
<td>2. பாதல்புராணிகர</td>
<td>பொறை மாள கால திர்குறித்திருமாணார் கொள்ள பாலை முறை போறும்</td>
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<th>அலுது - 5</th>
<th>திருக்கிற்கோயில் மகரணார்</th>
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<td>பக்தி திர்குறித்திருமாணார் மகரணார் - திருச்சனார் வலக்குக் குளம் - தோன் தமிழ் சமண மந்திரிஃ லா ராணாமான் மகரணார் - திர்குறித்திருமாணார் கொள்ள பாலை முறை போறும்</td>
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| பார்க்கும் குறிப்பிட்டுக்கொள்ள குறிப்புகள் |
|-------------|------------------|
| 1. குறி புரிப்புக்குளான் | - மூன்று திர்காளின மருது பல்லூரை பறிபுனை, விளையாடு. |
| 2. செல்வாமரனாகவ் | - மூன்று திர்காளின மருது பல்லூரை பறிபுனை, விளையாடு. |
| 3. புண்குப்புரசாணிகர் | - திர்குறித்திருமாணார் விளையாடு. பல்லூரை பறிபுனை, விளையாடு. |
| 4. மூலகண்டர் | - பல்லூரை திர்காளின விளையாடு. பறிபுனை, விளையாடு. |
| 5. குறி புரிப்புக்குளான் | - கூறியது புரிப்புக்குளான் விளையாடு பல்லூரை பறிபுனை, விளையாடு. |
| 6. செல்வாமரனாகவ் | - பல்லூரை திர்காளின விளையாடு. பறிபுனை, விளையாடு. மருது பல்லூரை பறிபுனை, விளையாடு. |
| 7. புண்குப்புரசாணிகர் | - பல்லூரை திர்காளின விளையாடு. பறிபுனை, விளையாடு. பல்லூரை பறிபுனை, விளையாடு. |
8. ந. ரேசு சந்திரன், ப.ஆ., - பெரேந்திறன் குரு பெரேந்திறன், நூற்றாண்டு

19ITAC21: Hindi – II (Option)

Text Book

I  NAVEEN HINDI PATMAALA-II

First 10 lessons (including poems) Pub. by DBHP Sabha, Chennai-17.

II  MANOHAR KAHANIYAM – PART-II

First 10 stories only Pub. by DBHP Sabha, Chennai-17.

19IENC22: English Through Literature II: Poetry

Learning Objectives

By introducing the course, it is intended to:

LO1. Develop the ability of the learner to comprehend and appreciate poems in English
LO2. Enhance the competence of the learner in using the English language
LO3. Improve the interest of the learner in human values and perceptions
LO4. Enable students to study and analyze the use of language in poetry
LO5. Provide learners with the theoretical and practical understanding of grammar

Unit-1

William Shakespeare “Sonnet 116”
William Blake “Lamb”
Robert Burns “A Red, Red Rose”
Grammar Finite & Non-finite verbs

Unit-2

PB Shelley “To Wordsworth”
John Keats “Sonnet to Sleep”
Thomas Hardy “Neutral Tones”
Grammar Strong and Weak Verbs, Auxiliaries and Modals

Unit-3

Robert Frost “Stopping By Woods on a Snowy Evening”
Wilfred Owen “Anthem for Doomed Youth”
Emily Dickinson “A Narrow Fellow in the Grass”
Grammar Transitive, Intransitive Verbs, Active and Passive Voice
Unit-4

Sri Aurobindo  “The Tiger and the Deer”
AK Ramanujan  “Obituary”
Sarojini Naidu  “Queen’s Rival”
Grammar Concord

Unit-5

Roger Mc Gough  “My Bus Conductor”
Maya Angelou  “Still I Rise”
Langston Hughes  “The Negro Speaks of Rivers”
Grammar Tenses and their forms

Supplementary Reading


Course Outcomes

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

CO1: Competency in communication, both in written and oral skills
CO2: Fluency in English language
CO3: Knowledge about construction of sentence structures
CO4: Vocabulary to use the English language effectively
CO5: Acquire the aesthetic sense for appreciating poetry

Learning Objectives

LO1. To study various finite structures of mathematics.
LO2. To understand the concepts of sets, functions and groups.
LO3. To understand the relations and digraphs.
Unit–1


Unit–2

**Relations and Digraphs:** Product Sets and Partitions – Relations and Digraphs – Paths in Relations and Digraphs – Properties of Relations – Equivalence Relations – Computer Representation of Relations and Digraphs – Manipulation of Relations – Transitive Closure and Warshall’s Algorithm.

Unit–3

**Functions:** Functions – Functions for Computer Science – Permutation Functions – Growth of Functions Topics in Graph Theory: Graphs – Euler Paths and Circuits – Hamiltonian Paths and Circuits – Coloring Graphs.

Unit–4


Unit–5


**Text Book**


**References**


**Course Outcomes**

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

CO1. Acquire the basic concepts in mathematical logic and theory of inferences.
CO2. Understand the concepts of set theory, relations and equivalence classes with matrix representation
CO3. Formalities lattice theory, Boolean algebra and group theory
CO4. Understand the basic concepts of graph theory, Eulerian and Hamiltonian graphs.

19IITT24: Data Structures and Algorithms

Learning Objectives

LO1. To impart the basic concepts of data structures and algorithms.
LO2. To understand the concepts of about stacks, queues, lists trees and graphs.
LO3. To gain knowledge on hashing/symbol tables and study various sorting algorithms
LO4. To Study various sorting algorithms
LO5. To develop applications using data structures.

Unit-1


Unit-2

Linked list: Singly Linked list - Linked stacks and queues - polynomial addition - More on linked Lists - Doubly linked List and Dynamic Storage Management - Garbage collection and compaction.

Unit-3


Unit-4


Unit-5

Internal sorting: Insertion sort - Quick sort - 2 way Merge sort - Heap sort - shell sort - sorting on keys. Files: Files, Queries and sequential organizations - Index Techniques - File organization.

Text Book

1. Ellis Horowitz, Sartaj Shani, Data Structures, Galgotia publication.
Reference Books
1. Data structures Using C Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, Kindersley (India) Pvt. Ltd.,

Course Outcomes
On successful completion of the course, the students will be able to
CO1. implement suitable data structures for various applications.
CO2. use appropriate sorting techniques.
CO3. handle different file organizations.
CO4. Familiarize with the usage of symbol tables.

Outcome Mapping

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19IITT25: Object Oriented Programming Using C++

Learning Objectives
LO1. To explain the advantages of object oriented programming over procedure oriented programming.
LO2. Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.
LO3. To learn how to implement constructors, function, pointes and class member functions.
LO4. Explain array handing, function overloading, operator overloading and virtual functions.
LO5. Helps in implementing some important features of C++ including templates, utilizing the I/O classes in C++ and exception handling.

Unit-1
Principles of Object- Oriented Programming – Beginning with C++ - Tokens, Expressions and Control Structures – Functions in C++

Unit-2
Classes and Objects – Constructors and Destructors – New Operator – Operator Overloading and Type Conversions.
Unit-3

Inheritance: Extending Classes – Pointers- Virtual Functions and Polymorphism

Unit-4

Managing Console I/O Operations – Working with Files – Templates – Exception Handling

Unit-5

Standard Template Library – Manipulating Strings – Object Oriented Systems Development

Text Book


Reference Book


Course Outcomes

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

CO1. Describe the principles of object-oriented problem solving and programming.
CO2. Explain programming fundamentals, including statement and control flow.
CO3. Apply the concepts of class, method, constructor, pointers, data abstraction, function abstraction, inheritance, overriding, overloading, polymorphism, IO streams, Templates.
CO4. Design program with basic data structure like array.

Outcome Mapping

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19IITP26: Practical – II: Data Structures Using C Lab

Learning Objectives

LO1. To develop skills to design and analyse simple linear and non-linear data structures.
LO2. It enables them to gain knowledge in practical application of data structures.
LO3. To Understand concepts about searching and sorting techniques
LO4. To understand basic concepts about Stacks, Queues, List, Tree and Graphs.
LO5. To understanding about writing algorithm and step by step approach in solving with the help of fundamental data structures.
List of Exercises

- Write a C program to create two array list of integers. Sort and store the elements of both of them in third list.
- Write a C program to multiply two matrices A and B and store the resultant matrix in C using arrays.
- Write a C program to experiment the operation of STACK using array.
- Write a C program to create menu driven options to implement QUEUE to perform the following
  - (i) Insertion
  - (ii) Deletion
  - (iii) Modification
  - (iv) Listing of elements
- Write a C program to create Linked list representations of employee records and do the following operations using pointers.
  - To add a new record.
  - To delete an existing record.
  - To print the details about an employee.
  - To find the number of employees in the structure.
- Write a C Program to count the total nodes of the linked list.
- Write a C program to insert an element at the end of the linked list.
- Write a C program to insert an element at the beginning of a doubly linked list.
- Write a C program to display the hash table, using the mid square method.
- Write a program to demonstrate Binary Search.
- Write a C program to insert nodes into a Binary tree and to traverse in preorder.
- Write a C program to traverse the given binary tree using all traversal methods.
- Write a C program to arrange a set of numbers in ascending order using QUICK SORT.

Course Outcomes

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

CO1. Analyse the problem and develop the mathematical logic and algorithm.
CO2. Analyse the problem and implement the dynamic memory concepts.
CO3. Analyse the problem and should have the implementation of the non-linear data structures like Tree and Graph.
CO4. Implement the various Searching and Sorting Techniques with Time complexity.
CO5. Analyse and implement the appropriate data structures with optimized memory and computational time complexity.
## Learning Objectives

LO1. To develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.

LO2. To demonstrate the usage of data abstraction, encapsulation, and inheritance.

LO3. To implement the abstract interface and polymorphism.

LO4. To learn syntax, features of, and how to utilize the Standard Template Library.

LO5. To learn other features of the C++ language including templates, exceptions, forms of casting, conversions, covering all features of the language.

## List of Exercises

1. Write a program in C++ to swap two numbers?
2. Write a C++ program to find the largest three elements in an array?
3. Write a program in C++ to calculate the series? 
   \[(1) + (1+2) + (1+2+3) + (1+2+3+4) + \ldots + (1+2+3+4+\ldots+n)\]?
4. Write a C++ program to find the Transpose of a Matrix?
5. Write a C++ program to convert binary number to decimal?
6. Write a C++ program to calculate area of a circle, a rectangle or a triangle depending upon user’s choice?
7. Write a C++ program to do Addition, subtraction and multiplication of two numbers using function?
8. Write a C++ program to overload unary operators that is increment and decrement.
9. Write a C++ program to read and print student’s information using two classes and simple inheritance?

## Course Outcomes

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

CO1. Demonstrate the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.

CO2. Implement dynamic memory management techniques using pointers, constructors, destructors, etc.

CO3. Write programs using concept of function overloading, operator overloading, virtual functions and polymorphism.
CO4. Implement early and late binding, usage of exception handling and generic programming.

CO5. Implement the use of various OOPs concepts with the help of program.

**Outcome Mapping**

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**SECOND YEAR: THIRD SEMESTER**

**Language – தமிழ் – III**

19ITAC31 அற இலகியலின் கருப்புக்

வெளிப்படை: தமிழ் உருண்டை அற இலகியலின் கருப்பு நுழைந்துகொண்டு ஆழம் அரசியல் அறக்கட்டுக்கள். இலகியல் நுழைந்து அரசியல் அறக்கட்டுக்கள் திறக்கும் பட்டம்.

**அல் - 1 அற இலகியலின்**

1. குருத்தக்கால் - பாமு, புதுக்குறுக்குக், காவல்கள், கூம்பு, பிரிவாக்கரம்

**அல் - 2 அற இலகியலின்**

1. குருமரப்பு - குருமரப்பு பிரிவாக்கரம்
2. புதுக்குறுக்கு காளப்பு - காளப்பு

**அல் - 3 கருப்பு**

1. மேம்பாட்டுக்குரு - மேம்பாட்டு குறுக்குக் காளப்பு
2. மேம்பாட்டுக்குரு - மேம்பாட்டு குறுக்குக் காளப்பு

**அல் - 4 கருப்பு**

1. புதுக்குறுக்குக் - புதுக்குறுக்கு புதுக்குறுக்கு
2. குறுக்குக் - குறுக்கு ஒதுக்கொழும்
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19ITAC31 : Hindi – III (Option)
Learning Objectives

By introducing the course, it is intended to:

LO1: Enhance the conversational competence of the learners by introducing drama in English.

LO2: Make the students understand the characteristics of the Elizabethan Age.

LO3: Make the students appreciate Shakespearean drama.

LO4: Make the students learn the key elements of sentence structures

LO5: Make the students master the mechanics of writing

Unit-1

William Shakespeare
Grammar
“The Tempest” (Act I)

Unit-2

William Shakespeare
Grammar
“The Tempest” (Act II)

Unit-3

William Shakespeare
Grammar
“The Tempest” (Act III)

Unit-4

William Shakespeare
Grammar
“The Tempest” (Act IV)

Unit-5

William Shakespeare
Grammar
“The Tempest” (Act V)

Text Books


Supplementary Reading


**Course Outcomes**

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

CO1: Obtain a literary acumen to answer MCQs of NET/SET Examinations and other competitive examination

CO2: Appreciate conversational English

CO3: Recognize the dramatic elements of Shakespearean dramas

CO4: Use punctuations and capitals effectively in their composition

CO5: Recognize the elements of the spoken discourses

**Learning Objectives**

LO1. Resource management techniques to finds applications in diverse fields including Engineering, Management Science, Computer Science and Economics.

LO2. In this course, the general linear programming problem, simplex computation procedure, revised simplex method, duality problems in linear programming and some nonlinear programming problems, Integer programming problem, transportation and assignment problems, PERT and CPM are also covered. The main objective is to solve varieties of problems.

**Unit–1**


**Unit–2**

Unit–3
Integer programming – cutting plane algorithm, branch and bound method – multistage (dynamic) – programming solution of LP by dynamic programming.

Unit–4

Unit–5
Project scheduling. network diagram representation – critical path method – time charts and resources levelling – PERT.

Text Book

Reference Books

Course Outcomes
On successful completion of the course, students will be able to
CO1. Model any real life situation into a mathematical model,
CO2. Solve the problem for the required demand,
CO3. Optimize the transportation and assignment of jobs,
CO4. Upgrade their ability in production management through project scheduling and allocation of resources,
CO5. Develop their personnel management through manpower planning and salary administration.

Outcome Mapping

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**Learning Objectives**

To understand the Computer Functional Units and the Design Procedure of Computer System.

LO1. To understand the Architecture and Organization of the Computer System.

LO2. To understand what a process is going on the Address modes and Programs.

LO3. To understand different approaches to Memory management Systems.

LO4. Students should be able to how to process going on Input and Output Organizations.

LO5. Students should understand the Computer Instruction, Arithmetic Instruction and Logical Instruction.

**Unit-1**


**Unit-2**

Stack Organization, Register Stack, Memory Stack, Reverse Polish Notation. Instruction Formats, Three-Address Instructions, Two-Address Instructions, One-Address Instructions, Zero-Address Instructions, RISC Instructions, Addressing Modes. RISC & CISC and their characteristics.

**Unit-3**


**Unit-4**

Modes Of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPU-IOP Communication. Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Cache Memory, Virtual Memory, Associative Memory.

**Unit-5**

Text and Reference Books

Course Outcomes
On successful completion of the course, the students will be able to
CO1. Understand the Organization of Computer and Basic Architecture Components involved in Computer Designs.
CO2. Explain the Central Processing Units system and Address, Arithmetic and Logical Instructions.
CO3. Analyse the various devices and Input / Output Organization Systems.
CO4. Understand the Addressing methods and Programs of Bus Structure in Computer Systems.

Outcome Mapping

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19IITT35: Basics of Information Technology

Learning Objectives
LO1. Give students an in-depth understanding of why computers are essential components in business, education and society.
LO2. Introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software, the Internet, networking and mobile computing.
LO3. Provide hands-on use of Microsoft Office 2013 applications Word, Excel, Access and PowerPoint. Completion of the assignments will result in MS Office applications knowledge and skills.
LO4. To get familiar with basics of the Internet Programming.
LO5. To acquire knowledge and skills for creation of web site considering both client and server side programming
LO6. To explore different web extensions and web services standards and ability to develop responsive web applications.

Unit-1

Introduction to computers:- Introductions, History, Generation of computers, Input, Output Devices – Computers Peripherals, Hardware devices – Software – Operating

**Unit-2**


**Unit-3**


**Unit-4**


**Unit-5**


**Reference Books**


Course Outcomes

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

CO1. Describe the usage of computers and why computers are essential components in business and society.

CO2. Solve common business problems using appropriate Information Technology applications and systems.

CO3. Identify categories of programs, system software and applications. Organize and work with files and folders and utilize the Internet Web resources and evaluate on-line e-business system.

CO4. Design a responsive web site using HTML5 and demonstrate Rich Internet Application.

CO5. Designate various types of networks, network standards and communication software.

Outcome Mapping

|      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   |
| CO2  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   |
| CO3  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   |
| CO4  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   |
| CO5  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️  | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   | ✔️   |

19IITT36: Programming in Java

Learning Objectives

LO1. To introduce the basic features of Java

LO2. To educate JAVA Programming structure, Virtual Machine concept etc.,

LO3. To introduce java classes and java applets

LO4. To educate inheritance, exception handlings and Threads.

LO5. To educate the design of web pages.

Unit-1


Unit-2


Unit-3


Unit-4


Unit-5


Text Book


Reference Books


Course Outcomes

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

CO1. Identify, declare and define the data type with scope of the variables and methods.
CO2. Identify and define the modules, classes, subclasses and methods.
CO3. To develop a package using inheritance and interface.
CO4. To identify and divide the system into various subsystems and apply the multithreading concepts. Also the student can be able to operate file handling mechanisms.
CO5. To develop GUI based applications using Applet and Swing.

Outcome Mapping

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19IITP37: Practical – IV: Java Programming Lab

Learning Objectives

LO1. To teach the basics of JAVA programs and its execution.
LO2. To teach the differences between C++ and Java programming.
LO3. To educate learn concepts like packages, applets and interfaces.
LO4. To understand the life cycle of the applets and its functionality.
LO5. To develop java programs using interfaces.

List of Exercises

- Define a class called Student with the attributes name, reg_number and marks obtained in four subjects(m1,m2,m3,m4). Write a suitable constructor and methods to find the total mark obtained by the student and display the details of the student.
- Write a Java program to find the area of a square, rectangle and triangle by (i) Overloading Constructor (ii) Overloading Method.
- Write a java program to add two complex numbers. [Use passing object as argument and return object].
- Define a class called Student_super with data members name, roll number and age. Write a suitable constructor and a method output () to display the details.
- Derive another class Student from Student_super with data members height and weight. Write a constructor and a method output () to display the details which overrides the super class method output(). [Apply method Overriding concept].
- Write a java program to create an interface called Demo, which contains a double type constant, and a method called area () with one double type argument. Implement the interface to find the area of a circle.
- Write a java program to create a thread using Thread class.
- Demonstrate Java inheritance using extends keyword.
- Create an applet with four Checkboxes with labels MARUTI-800, ZEN, ALTO and ESTEEM and a Text area object. The program must display the details of the car while clicking a particular Checkbox.
- Write a Java program to throw the following exception,
1) Negative Array Size 2) Array Index out of Bounds

- Write a java program to create a file menu with option New, Save and Close, Edit menu with option cut, copy, and paste.
- Write a java programming to illustrate Mouse Event Handling
- Write a Java program to practice String class and its methods

**Course Outcomes**

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

CO3. Use Intent, Broadcast receivers and Internet services in Android App.
CO4. Design and implement Database Application and Content providers.

**Outcome Mapping**

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**SECOND YEAR: FOURTH SEMESTER**

**Language** தமிழ் – IV

19ITAC-41 – மையக்கையில் நிருபிப்பியை வரவாண

உரையான: மேலும் நிருபிப்பியின் வரவர்ப்பு அல்லது. தமிழ் நிருபிப்பியின் நேராக மேற்படுத்தப்படும் நிருபிப்பியுடன் கூடிய – மேலும் நிருபிப்பியின் நேராக மேற்படுத்தப்படும் வரவறையுடன் விளக்கம்.

**அறு – 1 தமிழ்நாடுக் கல்வி**

1. குறிப்பிட்டு கூக் - 125, 129, 177, 302, 397 (முழுமக்)
2. முதல்விளக்க - 206, 217, 304, 334, 382 (முழுமக்)
3. நூற்றுபுதிய - 17, 18, 71, 75, 96, (முழுமக்)
4. எண்ணியல் - 147, 303, 370 (முழுமக்)
5. குறிப்புக் கூக் - 104, 105 (முழுமக்)

**அறு – 2 புத்தாண்டு புழைப்பு**

1. புத்தாண்டு - விளங்காற்றும் புழைப்பு 76, 83, 133, 146, 178, 188, 227, 261, 264, 278

**அறு – 3 பெற்றோர்**

1. பதிலிவைக்குரிய விளக்க

**அறு – 4 செம்முனை கால்வாண்**
19ITAC41: Hindi – IV (Option)
Learning Objectives

By introducing the course, it is intended to

LO1. Develop the communicative competence of learners in the English Language through training them in the skills of listening, speaking, reading, and writing

LO2. Enable the students to know about the origin and development of short story

LO3. Write objectively, avoiding vague, prejudice, and exaggeration

LO4. The broad aim of this course is to enable the learner to function through the written mode of English language in all situations including classroom, library, laboratory etc.

LO5. It also aims at different levels of a short story, such as discovering an author's purpose, drawing conclusions about certain events, evaluating cause and effect, and understanding point of view.

Unit-1

1. O’ Henry
   "The Gift of The Magi"
   Ken Liu
   "The Paper Menagerie"
   Grammar
   Synonyms and Antonyms

Unit-2

1. Flora Annie Steel
   "Valiant Vicky"
2. Oscar Wilde
   "Happy Prince"
   Grammar
   Words often confused

Unit-3

1. R. K. Narayan
   "The Martyr's Corner"
2. Mahasweta Devi
   "Draupati"
   Grammar
   Paragraph-Writing

Unit-4

1. Leo Tolstoy
   "How much Land Does a Man Need?"
2. Somerset Maugham
   "The Verger"
   Grammar
   Letter-Writing

Unit-5

1. Langston Hughes
   "On the Road"
2. Premchand
   "BakthiMarg"
   Grammar
   Precis-Writing
Supplementary Reading


Course Outcomes

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

CO1. Use more vocabularies while writing

CO2. Learner can ensure about the history and development

CO3. The learner has a development in flow of writing

CO4. Students can come up with new ideas while reading stories from different perspectives.

CO5. Write in a style appropriate for communicative purposes

Learning Objectives

LO1. To learn about HTML, DHTML concepts.

LO2. To implement a variety of presentation effects in HTML.

LO3. To know about appropriate client-side applications.

LO4. To gain the Knowledge of XML and its applications.

LO5. To know about java scripts and create adaptive web pages

Unit-1


Unit-2

Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, <frame> Element, Creating Links
Between Frames, Setting a Default Target Frame Using <base> Element, Nested Framesets, Inline or Floating Frames with <iframe>.

Unit-3


Unit-4


Unit-5


Text Book

1. Jon Duckett, Beginning HTML, XTM, CSS and Java script , Wiley Publishing

References Books


Course Outcomes

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

CO1. Analyze a web page and identify its elements and attribute.

CO2. Create web pages using HTML and CSS.

CO3. Validate the web data using java Script.

CO4. Develop applications using JSP.

Outcome Mapping

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19ITT44: Relational Data Base Management System

Learning Objectives

LO1. Understand the basic database concepts, including the database languages, Structure, Architecture and operations of the Relational database.

LO2. Construct simple and moderately advanced database queries using Structured Query Language (SQL).

LO3. To apply Relational Database design principles

LO4. To Understand the concepts of Indexing and Hashing,

LO5. To understand the concepts of serializability, concurrency and Deadlock handling.

Unit-1


Unit-2

SQL: Background-Basic Structure-Set Operation-Aggregate Function-Null Values- Nested Sub Queries - Views - Modification of the Database - Data Definition Language - Embedded SQL - Dynamic SQL.

Unit-3


Unit-4

Relational Database Design: First Normal Form - Pitfalls in Relational Database Design-Functional Dependencies (Second Normal Form) - Boyce-Codd Normal Form - Third Normal Form - Fourth Normal Form - Overall Database Design Process.

Unit-5


Text Book

**Reference Books**


**Website**


**Course Outcomes**

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

CO1. Analyse and design required tables with appropriate forms.
CO2. Analyse the problem at various subsystem level with appropriate data types and marshalling.
CO3. To design the relational database with appropriate features using various normalization.
CO4. Design basic database storage structures and access techniques.

**Outcome Mapping**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
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| CO2 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO3 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO4 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |

**19IITT45: System Software**

**Learning Objectives**

LO1. To introduce software systems with an emphasis on operating system.
LO2. To identify and understand different phases and passes of Assembler and their functioning.
LO3. To understand the basic concepts of linker, loader, interpreter, editor and debugger.
LO4. To understand the basic macro processor functions, Machine-independent macro processor features, macro expansion and MASM macro processor.
LO5. To study System Software Tools.
LO6. To view some of the major tasks of the system software of a computer system
LO7. To focus on internal working of the hardware
Unit-1
The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming.

Unit-2

Unit-3

Unit-4

Unit-5
Overview of the Editing Process - User Interface – Editor Structure - Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.

Text Book

Reference Books

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

CO1. Develop the system and program in assembler and lexical analyser.
CO2. Develop SIC assembler functions and algorithm, Program relocation and Machine independent assembler features.
CO3. Understand how linker and loader create an executable program from an object module created by assembler and compiler.
CO4. Understand macro processor functions, definition and expansion, macro processor algorithm, Macro within Macro-Implementation and ANSI C Macro language.

Outcome Mapping

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19IITP46: Practical-V: Web Technology Lab

Learning Objectives

LO1. To design web pages using various HTML tags
LO2. To write simple programs in Java Script to create forms.
LO3. To understand the importance of cascade style sheets in creating a web application.
LO4. To understand the use of XML in Document type Definition.

List of Exercises

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function)
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.

9. Create a form consists of a two Multiple choice lists and one single choice list
   (a) The first multiple choice list, displays the Major dishes available
   (b) The second multiple choice list, displays the Starters available.
   (c) The single choice list, displays the Soft drinks available.

10. Create a web page using two image files, which switch between one another as the mouse pointer moves over the image. Use the on Mouse Over and on Mouse Out event handlers.

**Course Outcomes**

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

CO1. Develop to build a complete website using HTML
CO2. Create web pages using DHTML and Cascading Style Sheets.
CO3. Able to include JavaScript for form validations and email validations.
CO4. Develop a simple web application using server side PHP programming and Database Connectivity using MySQL.

**Outcome Mapping**

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**Learning Objectives**

LO1. To describe a sound introduction to the discipline of database management systems.

LO2. To give a good formal foundation on the relational model of data and usage of Relational Algebra.

LO3. To introduce the concepts of basic SQL as a universal Database language.

LO4. To enhance knowledge in DDL, DML and DCL commands.

LO5. To gain knowledge in aggregate functions.

**List of Exercises**

- Data Definition of Base Tables.
- DDL with Primary key constraints
- DDL with constraints and verification by insert command
- Data Manipulation of Base Tables and Views
- Demonstrate the Query commands
• Write a PL/SQL code block that will accept an account number from the user and debit an amount of Rs. 2000 from the account if the account has a minimum balance of 500 after the amount is debited. The process is to fired on the Accounts table.

• Write a PL/SQL code block to calculate the area of the circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in a table Areas. Areas – radius, area.

• Write a PL/SQL block of code for reversing a number. (Example: 1234 as 4321).

• Create a transparent audit system for a table Client_master (client_no, name, address, Bal_due). The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operation are stored in the auditclient(client_no, name, bal_due, operation, userid, opdate) table, then the delete or update is allowed to go through.

Course Outcomes
On successful completion of the course, the students will be able to
CO1. Identify the data types, draw appropriate conceptual models, design database structure, and forms.
CO2. Implement different types of queries.
CO3. Develop the PL/SQL program for scientific problems and business data models.
CO4. Implement the DDL, DML and DCL methods in Business data models.
CO5. Normalize the business data model and should have the ability of implement the object oriented database concepts.

Outcome Mapping

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THIRD YEAR: FIFTH SEMESTER

19IITT51: Software Engineering

Learning Objectives

LO1. To understand the various software engineering models.
LO2. To understand the approaches of developing software.
LO3. To identify the risks in software development.
LO4. To understand and collect the requirements of software engineering.
LO5. To understand the design concepts, testing methods and strategies.
Unit-1


Unit-2


Unit-3


Unit-4


Unit-5


Text Book


Reference Books

Course Outcomes

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

CO1. Analyse the problem, estimate cost, time and risk and model the problem.
CO2. Gather information about the project and validate the requirements.
CO3. Design and develop various design tools.
CO4. Understand the various testing techniques and how to test the system with various approaches.

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19IITT52: Operating System

Learning Objectives

LO1. To understand the concepts, operation, design, implementation and services of an operating system.
LO2. To understand the structure and computing environment of the system.
LO3. To understand the concepts of process and its operations and how to synchronize and schedule the process. The methods of deadlock and its characterization were taught.
LO4. To understand the different approaches to memory management.
LO5. To understand the mass storage structure and how to schedule the disk. The structure and organization of the file
LO6. Students should understand the data structures and algorithms used to implement an operating system.

Unit-1

Introduction - History of operating system- Different kinds of operating system – Operating system concepts - System calls-Operating system structure.

Unit-2

Processes and Threads: Processes - threads - thread model and usage - inter process communication.

Unit-3
Scheduling - Memory Management: Memory Abstraction - Virtual Memory - Page replacement algorithms.

**Unit-4**


**Unit-5**


**Text Book**


**Reference Books**


**Course Outcomes**

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

CO1. Understand the structure the OS and basic architectural components involved in OS design.

CO2. Understands the concepts of operating structure and how to design and implement the system.

CO3. Understands the concept of scheduling for process and how to avoid the dead lock situations for the process.

CO4. Finding the ways to manage the memory and how to utilize the memory effectively.

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19IITT53: Programming in Python

Learning Objectives

LO1. To introduce the programming concepts and techniques.
LO2. To introduce the Python language syntax.
LO3. To learn control statements, loops, functions, and lists.
LO4. To write programs for wide variety problems in maths, science, finance, and games.
LO5. To analyze and design programs.

Unit-1


Unit-2

Conditions - Functions - Arguments - Return values - Iteration - Loops - Strings - Data Structures - Lists - Dictionaries - Tuples - Sequences - Exception Handling.

Unit-3


Unit-4


Unit-5

Introduction to Version Control Systems - Subversion/Git, Writing Unit Tests, Creating Documentation, Contributing to Open Source Projects

Text Book


Reference Books

Website

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

CO1. analyze and design strategies for solving basic programming problems.
CO2. use primitive data types, selection statements, loops, functions to write programs.
CO3. develop programs to solve a variety of problems in math, science, business, and games.
CO4. use the step-wise refinement approach.
CO5. use lists to store, process, and sort data.

Outcome Mapping

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19IIT54: Open Source Technology

Learning Objectives
LO1. To introduce Open Source methodologies.
LO2. To make the students to gain experience using open source tools, languages and frameworks to prepare for careers in software development.
LO3. To understand common open source licenses and the impact of choosing a license.
LO4. To understand concepts, strategies, and methodologies related to open source software development.
LO5. To be familiar with open source software products and development tools currently available on the market.

Unit-1
Unit-2

Unit-3
Community Building: Importance of Communities in Open Source Movement-JBoss Community- Starting and Maintaining an Open Source Project - Open Source Hardware

Unit-4
Apache HTTP Server and its flavors- WAMP server (Windows, Apache, MySQL, PHP)- Apache, MySQL, PHP, JAVA as development platform.

Unit-5
Open source vs. closed source Open source government, Open source ethics. Social and Financial impacts of open source technology, Shared software, Shared source.

Text Books

Reference Book

Websites
1. The Linux Documentation Project: http://www.tldp.org
2. Docker Project Home: http://www.docker.com

Course Outcomes
On successful completion of the course, the students will be able to
CO1. Access the open source software.
CO2. Handle open source project.
CO3. Operate on different platform.
CO4. Learn receive and process form submission data.
Outcome Mapping

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19IITP55: Practical - VII: Python Programming Lab

Learning Objectives

LO1. To understand the programming basics in Python Programming

LO2. To understand the object-oriented program design and development in Python Programming

LO3. To understand and be able to use the basic programming principles such as data types, variable, conditionals, loops, array, recursion and function calls.

LO4. To learn how to use basic mathematical problems are evaluated and be able to manipulate text files and file operations.

LO5. To understand the process and will acquire skills necessary to effectively attempt a programming problem and implement it with a specific programming language - Python.

List of Exercises

1. Create a simple calculator to do all the arithmetic operations
2. Write a program to use control flow tools like if.
3. Write a program to use for loop
4. Data structures
   - use list as stack
   - use list as queue
   - tuple, sequence
5. Create new module for mathematical operations and use in your program
6. Write a program to read and write files, create and delete directories
7. Write a program with exception handling
8. Write a program using classes
9. Connect with MySQL and create address book
10. Write a program using string handling and regular expressions
11. Program to parse apache log file
12. Create a GUI program using pyGTK.
Course Outcomes

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

CO1. Enable to understand the usage of the Mathematical and Statistical function; and image processing related functions and incorporation of the same functions.

CO2. Enable to develop applications related to business and scientific data in Python.

CO3. Enable to create comprehensive package for data processing methods.

CO4. To search and retrieve the image object and business data from website.

Outcome Mapping

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19IITP56: Practical – VIII: Open Source Technology Lab

Learning Objectives

LO1. To develop technical solutions for problems using the open source software readily available at free of cost.

LO2. To install WAMP Server.

LO3. Learn programming in PHP.

List of Exercises

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement.
2. Write a PHP script to redirect a user to a different page.
3. Write a PHP function to test whether a number is greater than 30, 20 or 10 using ternary operator.
4. Create a PHP script which display the capital and country name from the given array. Sort the list by the name of the country
5. Write a PHP script to calculate and display average temperature, five lowest and highest temperatures.
6. Create a script using a for loop to add all the integers between 0 and 30 and display the total.
7. Write a PHP script using nested for loop that creates a chess board.
8. Write a PHP function that checks if a string is all lower case.
9. Write a PHP script to calculate the difference between two dates.
10. Write a PHP script to display time in a specified time zone.
**Course Outcomes**

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

CO1. Write PHP scripts to find various solutions.
CO2. Write PHP functions to develop the programs.
CO3. Validate the web pages.
CO4. Implement various open source technologies.

**Outcome Mapping**

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**THIRD YEAR : SIXTH SEMESTER**


**Learning Objectives**

LO1. Learn Basics’ Amplitude Modulation System
LO2. Study working Principles of AM, DSBSC, SSB and VSB signals.

**Unit-1**

**Amplitude Modulation Systems:** Review of Spectral Characteristics of Periodic and Non-periodic signals; Generation and Demodulation of AM, DSBSC, SSB and VSB Signals; Comparison of Amplitude Modulation Systems

**Angle Modulation Systems:** Frequency Translation; Non – Linear Distortion; Phase and Frequency Modulation; Single tone, Narrow Band and Wideband FM; Transmission Bandwidth; Generation and Demodulation of FM Signal, FDM and OFDM.

**Unit-2**

**Fundamentals of Noise Theory:** Review of Probability, Random Variables and Random Process; Gaussian Process Shot noise, Thermal noise and white noise; Narrow band noise, Noise margin; Noise temperature; Noise Figure
Performance of Continuous Wave Modulation Systems: Super heterodyne Radio receiver and its characteristic; SNR; Noise in DSBSC systems using coherent detection; Noise in AM system using envelope detection Envelop Detection for FM; FM threshold effect; Pre-emphasis and De-emphasis in FM; Comparison of performances.

Unit-3

Digital Communication: Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying –binary phase shift keying QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery types- squaring loop, Costas loop, DPSK.

Unit-4

Digital Transmission: Introduction, Pulse modulation, PCM sampling, sampling rate, signal to quantization noise rate, companding analog and digital percentage error, delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission types- Intersymbol interference, eye patterns.

Unit-5


Textbook


Reference Books


Course Outcomes

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

CO1. Comprehend the electronic communication system.

CO2. Understand the working principles of AM, DSBSC, SSB and VSB signals.

CO3. Understand the skills in FM Transmission Bandwidth.

CO4. Understand the Fundamental of Noise Theory.

CO5. Know the basic concepts of Digital Transmission, Satellite and Optical Communication.
Outcome Mapping

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19IITT62: Mobile Computing

Learning Objectives

LO1. To understand of mobile computer systems particularly in the context of wireless network systems

LO2. To emphasises how to interface hardware to mobile computing devices

LO3. To learn the concepts of Mobile computing

LO4. To explore theoretical issues of Mobile computing

LO5. To develop skills of finding solutions and build software for Mobile computing applications.

LO6. To study the specifications and functionalities of various protocols/standards of mobile networks

LO7. To learn Android and IOS platform and its architecture

Unit-1

Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

Unit-2

Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)-Mobile Network Layer IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.
Unit-3


Unit-4

Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization.

Unit-5


Text Books


Websites


Course Outcomes

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

CO1. Have knowledge on the concepts and features of mobile computing technologies and applications.

CO2. Have a good understanding of wireless and mobile communication networks and their applications.

CO3. Identify the important issues of developing mobile computing systems and applications.


Outcome Mapping

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Learning Objectives

LO1. To understand the Linux OS
LO2. To Study shell programming.
LO3. To learn text formatting.
LO4. To handle files.
LO5. To write scripts.

Unit-1
Introduction to Linux: operating system and Linux - History of Linux and Unix - Linux overview - Linux Distributions - Vi editors.

Unit-2
Shell - comparison of Shells - working in the shell - Learning Basic Commands - Compiler and interpreter differences - various directories - Drilling deep into process management, job control and Automation.

Unit-3
Text processing - Text filtering Tools - working with commands. - Logical operators. - local variables and its scope - working with arrays.

Unit-4
Tricks with shell scripting - interactive shell scripts - The here document and << operator - sort command - WC command - file handling – Debugging.

Unit-5
Automating Decision - Making in scripts - Automating repetitive tasks - working with Functions.

Text Books
2. LINUX shell scripting by Ganesh Naik, Packt Publishing Ltd., 2015.

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

CO1. have good knowledge in script writing.
CO2. process the text in the Linux environment.
CO3. solve the practical issues in Linux shell scripting.
CO4. able to write scripts with functions.
Learning Objectives

LO1. To understand the fundamental concepts of computer networking such as network architectures, Layers and protocols.
LO2. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
LO3. Identify the different types of network devices and their functions within a network.
LO4. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
LO5. To understand and explain Data Communications System and its components.

Unit-1


Unit-2


Unit-3


Unit-4


Unit-5

Text Books


Course Outcomes

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

CO1. Familiarize the student with the basic taxonomy and terminology of the computer networking area.

CO2. Identify the different types of network topologies and protocols.

CO3. To understand the functions of each layer of the OSI model and TCP/IP.

CO4. Familiarize the student with the concept of SDMS, TDMA, FDMA AND CDMA.

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19IITT65: Computer Graphics

Learning Objectives

LO1. To understand the basic concepts of Computer Graphics

LO2. To apply geometric transformations, viewing and clipping on graphical objects

LO3. To understand visible surface detection techniques and illumination models

LO4. To familiarize input and output devices of computer graphics system.

Unit-1

Unit-2

Unit-3
Two Dimensional Geometric Transformation: Basic Transformations - Translation - Rotation - Scaling - Matrix Representations and Homogeneous Coordinates - Other Transformations Reflections Two Dimensional Viewing : Windows to view point coordinate Transformations - Clipping Operations - Point Clipping - Line Clipping - Curve Clipping - Text Clipping - Exterior Clipping.

Unit-4

Unit-5

Text Book

Reference Book

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

CO1. Understand the concepts of computer graphics system.
CO2. Handle the devices relates to computer graphics.
CO3. Develop algorithms for geometric transformation.
CO4. Detect visible surfaces using various techniques.


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### 19IITP66: Practical – IX: Shell Programming Lab

#### Learning Objectives

1. **LO1.** To Simulate the file commands
2. **LO2.** To write shell program for handling files.
3. **LO3.** To write programs for familiarising control statements.
4. **LO4.** To write programs for handling strings.

#### List of Exercises

1. Write a shell script to stimulate the file commands: `rm`, `cp`, `cat`, `mv`, `cmp`, `wc`, `split`, `diff`.
2. Write a shell script to show the following system configuration:
   a. currently logged user and his log name.
   b. current shell, home directory, Operating System type, current Path setting, current working directory.
   c. show currently logged number of users, show all available shells
   d. show CPU information like processor type, speed
   e. show memory information.
3. Write a Shell Script to implement the following: pipes, Redirection and tee commands.
4. Write a shell script for displaying current date, user name, file listing and directories by getting user choice.
5. Write a shell script to implement the filter commands.
6. Write a shell script to remove the files which has file size as zero bytes.
7. Write a shell script to find the sum of the individual digits of a given number.
8. Write a shell script to find the greatest among the given set of numbers using command line arguments.
9. Write a shell script for palindrome checking.
10. Write a shell script to print the multiplication table of the given argument using for-loop.

#### Course Outcomes

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

1. **CO1.** Write shell script for implementing control structures.
CO2. Write shell script for handling strings.
CO3. Write shell script for simulating file commands.
CO4. Write shell script for solving various problems.

Outcome Mapping

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19IITD67: Mini Project

Learning Objectives

LO1. To study the basic concepts of identifying, analysing and programming of real world problems and find the required solution.
LO2. Build and test the project.
LO3. Improve the communication and management skills.

Course Outcomes

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

CO1. Obtain practical knowledge on chosen project domain.
CO2. Distinguish, analyze, articulate and handle projects in a systematic manner.
CO3. Manage and work as an individual or in a team in development of technical projects.
CO4. Develop plans and effective communication skills for presentation of project and other development environment.

Outcome Mapping

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FOURTH YEAR: SEVENTH SEMESTER
Learning Objectives

LO1. To study Distributed operating system concepts

LO2. To understand hardware, software and communication in distributed OS

LO3. To learn the distributed resource management components.

LO4. Practices to learn concepts of OS and Program the principles of Operating Systems

Unit-1


Unit-2


Unit-3


Unit-4


Unit-5


Text Books

2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

**Reference Books**


**Course Outcomes**

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

CO1. Analyze the structure of OS and basic architectural components involved in OS design.

CO2. Analyze and design the applications to run in parallel either using process or thread models of different OS.

CO3. Analyze the various device and resource management techniques for timesharing and distributed systems.

CO4. Understand the Mutual exclusion, Deadlock detection, agreement protocols of Distributed operating system and Interpret the mechanisms adopted for file sharing in distributed Applications.

CO5. Conceptualize the components involved in Real time Operating systems.

**Outcome Mapping**

| PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| CO2 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
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| CO5 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |

**19IITT72: Advanced Java Programming**

**Learning Objectives**

LO1. To deepen student’s programming skills by analyzing the real world problem in a programmer’s point of view and implement the concepts in real time projects

LO2. To enable the students to learn the ethical, historical, environmental and technological aspects of Advanced Java Programming and how it impacts the social and economic development of society
**Unit-1**

Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern- Proxy Pattern-Decorator Pattern- Command Pattern- Template Pattern- Mediator Pattern-Collection Framework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class- Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class- Linked Hash Map class –Tree Map class - Comparable interface -Comparator interface-Comparable vs. Comparator

**Unit-2**


**Unit-3**

JDBC -Introduction - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and Inet address classes.

**Unit-4**


**Unit-5**

Lambda Expressions- Method Reference- Functional Interface- Streams API, Filters-Optional Class- Nashorn- Base 64 Encode Decode- JShell(RPEL)- Collection Factory Methods- Private Interface Methods- Inner Class Diamond Operator-Multiresolution Image API.

**Textbooks:**


Reference Books


Course Outcomes

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

CO1. Learn the Internet Programming, using Java Applets and create a full set of UI widgets using Abstract Windowing Toolkit (AWT) & Swings

CO2. Learn to access database through Java programs, using Java Data Base Connectivity (JDBC)

CO3. Create dynamic web pages using Servlets and JSP

CO4. Invoke the remote methods and multitier application using Remote Method Invocation (RMI) and EJB

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IIT1773: Design and Analysis of Algorithms

Learning Objectives

LO1. To learn about Algorithm Specification and Performance Analysis

LO2. To Understand the Divide and conquer Method

LO3. To learn Greedy Methods and problems.

LO4. To familiarize with Dynamic Programming Techniques

LO5. To posses the Knowledge of algorithm design strategies

LO6. To learn effective problem solving in Computing applications and analyze the algorithmic procedure to determine the computational complexity of algorithms.

Unit-1

Unit-2


Unit-3


Unit-4


Unit-5

Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost searchhod - 0/1 Knapsack Problem.

Text Book:


Reference Books

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcrofpt, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH.

Course Outcomes

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

CO1. Apply design principles and concepts to algorithm design.

CO2. Acquire the mathematical foundation in analysis of algorithms.
CO3. Understand the different algorithmic design strategies.
CO4. Analyze the efficiency of algorithms using various Problems and solve them.
CO5. It implement stepwise procedure to solve problems.

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19IITT74: Cryptography and Network Security

Learning Objectives

LO1. To understand Cryptography Theories, Algorithms and Systems.
LO2. To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.
LO3. To know about the malicious software & firewalls.

Unit-1


Unit-2


Unit-3


Unit-4

**Unit-5**


**Text Books:**


**Reference Books**


**Course Outcomes**

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

CO1. Understand the fundamentals of networks security, security architecture, threats and vulnerabilities

CO2. Apply the different cryptographic operations of symmetric cryptographic algorithms.

CO3. Apply the different cryptographic operations of public key cryptography.

CO4. Apply the various Authentication schemes to simulate different applications.

CO5. Understand various Security practices and System security standards.

**Outcome Mapping**
Learning Objectives

LO1. To provide the ability to design game based applications using graphics and animations

LO2. To understand abstract window toolkit (AWT), swing and event handling to create GUI applications

LO3. To understand client-server technologies to design and develop web applications and to know about server side programming such as Servlet and JSP

LO4. To develop applications using RMI and Beans

LO5. To be familiar with enterprise based applications

List of Exercises

- Generation of random numbers using Java utilities.
- Implementation of file operations using I/O streams.
- Implementation of two way communication between client and server.
- Creation of animation and playing audio clip using Applet.
- Demonstrating the mouse events in event handling using Frame.
- Implementation of database handling using MySql and JDBC.
- Demonstrating cookies in Java Servlet using NetBeans IDE.
- Reading and Displaying the parameters in JSP using NetBeans IDE.
- Designing a simple calculator using JavaScript.
- Demonstrating the frames and web page validation using JavaScript.
- Implementing RMI concepts using NetBeans IDE.
- Adding two variables by Session Bean in EJB using NetBeans IDE.

Course Outcomes

On completion of this course the students will be able to
CO1. Create a full set of UI widgets using Abstract Windowing Toolkit (AWT) & Swings.

CO2. Learn to access database through Java programs, using Java Data Base Connectivity (JDBC).

CO3. Create dynamic web pages using Servlets and JSP.

CO4. Invoke the remote methods in an application using Remote Method Invocation (RMI) and EJB.

**Outcome Mapping**

|        | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
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| CO1    | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    |
| CO2    | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    |
| CO3    | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    |
| CO4    | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    | ✔    |

19IITP76: Practical – XI: Algorithm Lab

**Learning Objectives**

LO1. Design and development the algorithms for different types of problems; and implement through JAVA

LO2. Employ various design strategies for problem solving.

LO3. Measure the computational complexity and compare the performance of different algorithms

**List of Exercises**

1. A. Create a Java class called Student with the following details as variables within it.
   (i) USN (ii)Name (iii)Branch (iv)Phone

   Write a Java program to create nStudent objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.

   B. Write a Java program to implement the Stack using arrays. Write Push(), Pop(), and Display() methods to demonstrate its working.

2. A. Design a superclass called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories.

   B. Write a Java class called Customer to store their name and date_of_birth. The date_of_birth format should be dd/mm/yyyy. Write methods to read customer data
as <name, dd/mm/yyyy> and display as <name, dd, mm, yyyy> using StringTokenizer class considering the delimiter character as “/”.

3. A. Write a Java program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero.

B. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.

4. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide and conquer method works along with its time complexity analysis: worst case, average case and best case.

5. Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of n> 5000, and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the Random number generator. Demonstrate using Java how the divide and conquer method works along with its time complexity analysis: worst case, average case and best case.

6. Implement in Java, the 0/1 Knapsack problem using (a) Dynamic Programming method (b) Greedy method.

7. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra’s algorithm. Write the program in Java.

8. Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal’s algorithm. Use Union-Find algorithms in your program.


10. Write Java programs to (a) Implement All-Pairs Shortest Paths problem using Floyd’s algorithm.

(b) Implement Travelling Sales Person problem using Dynamic programming.

11. Design and implement in Java to find a subset of a given set S = \{S1, S2, \ldots, Sn\} 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\}. Display a suitable message, if the given problem instance doesn’t have a solution.

12. Design and implement in Java to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle

**Course Outcomes**

On successful completion of the course, the students will be able to
CO1. Design and implement the algorithms using appropriate techniques like brute-force, greedy, dynamic programming, etc.

CO2. Implement a variety of algorithms, such as sorting, searching and Tree traverse, combinatorial, with minimum time complexity.

CO3. Analyze and compare the performance of the algorithms in terms of time complexity and accuracy.

CO4. Apply and implement learned algorithm design techniques and data structures to solve real world problems

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**FOURTH YEAR: EIGHTH SEMESTER**

**19IITT81: Advanced Web Technology**

**Learning Objectives**

LO1. Explore the backbone of web page creation by developing .NET skill.

LO2. Enrich knowledge about HTML control and web control classes

LO3. Provide depth knowledge about ADO.NET

LO4. Understand the need of usability, evaluation methods for web services

**Unit-1**

**Overview of ASP.NET** - The .NET framework – Learning the .NET languages: Data types – Declaring variables - Scope and Accessibility - Variable operations - Object Based manipulation - Conditional Structures - Loop Structures - Functions and Subroutines. Types, Objects and Namespaces: The Basics about Classes - Value types and Reference types - Advanced class programming - Understanding name spaces and assemblies. Setting Up ASP.NET and IIS.

**Unit-2**

Understanding regular expressions- A validated customer form. State management - Tracing, Logging, and Error Handling.

**Unit-3**


**Unit-4**

**Web Services** - Web services Architecture : Internet programming then and now- WSDL–SOAP- Communicating with a web service-Web service discovery and UDDI. Creating Web services : Web service basics- The StockQuote web service – Documenting the web service- Testing the web service- Web service Data types- ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with TerraService.

**Unit-5**


**Text Book**


**References:**


**Course Outcomes**

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

CO1. Design a web page with Web form fundamentals and web control classes
CO2. Recognize the importance of validation control, cookies and session
CO3. Apply the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model.
CO4. Recognize the difference between Data list and Data grid controls in accessing data.
Outcome Mapping

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19IIT82: Compiler Design

Learning Objectives

LO1. Discover principles, algorithms and techniques that can be used to construct various phases of compiler.

LO2. Acquire knowledge about finite automata and regular expressions

LO3. Learn context free grammars, compiler parsing techniques.

LO4. Explore knowledge about Syntax Directed definitions and translation scheme

LO5. Understand intermediate machine representations and actual code generation


Unit-2 - Syntax Analysis - The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers- LALR parsers.

Unit-3 - Semantic Analysis - Inherited and Synthesized attributes – Dependency graphs – Ordering the evaluation of attributes – S-attributed definitions – L-attributed definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes - Storage organization – Stack allocation of space.


Text Book

Reference Books


Course Outcomes

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

CO1. Use the knowledge of patterns, tokens & regular expressions

CO2. Have the knowledge in semantic analysis and syntax directed translation.

CO3. Design a code generator with a knowledge in code optimization.

CO4. Learn the new code optimization techniques to improve the performance of a program in terms of speed and space.

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19IIT83: Digital Image Processing

Learning Objectives

LO1. To provide complete knowledge on Digital Image Processing methods, such as image processing methods in Spatial domain and Frequency domain, Edge detection, Compression, Segmentation, and Morphological concepts, which enable the students to understand the concepts and implement them empirically.

Unit–1

Fundamentals: Image Sensing and Acquisition, Image Sampling and Quantization, relationship between Pixels; Random noise; Gaussian Markov Random Field, σ-field, Linear and Non-linear Operations; Image processing models: Causal, Semi-causal, Non-causal models.

**Unit–2**

**Spatial Domain:** Enhancement in spatial domain: Point processing; Mask processing; Smoothing Spatial Filters; Sharpening Spatial Filters; Combining Spatial Enhancement Methods.

**Frequency Domain:** Image transforms: FFT, DCT, Karhunen-Loeve transform, Hotlling’s $T^2$ transform, Wavelet transforms and their properties. Image filtering in frequency domain.

**Unit–3**

**Edge Detection:** Types of edges; threshold; zero-crossing; Gradient operators: Roberts, Prewitt, and Sobel operators; residual analysis based technique; Canny edge detection. Edge features and their applications.

**Unit–4**

**Image Compression:** Fundamentals, Image Compression Models, Elements of Information Theory. Error Free Compression: Huff-man coding; Arithmetic coding; Wavelet transform based coding; Lossy Compression: FFT; DCT; KLT; DPCM; MRFM based compression; Wavelet transform based; Image Compression standards.

**Unit–5**

**Image Segmentation:** Detection and Discontinuities: Edge Linking and Boundary Deduction; Threshold; Region-Based Segmentation. Segmentation by Morphological watersheds. The use of motion in segmentation, Image Segmentation based on Color.

**Morphological Image Processing:** Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology.

**Text Books**


**Reference Books**


Course Outcomes

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

CO1. Analyze general terminology of digital image processing.
CO2. Examine various types of images, intensity transformations and spatial filtering.
CO3. Analyze images in the frequency domain using various transforms.
CO4. Evaluate the methodologies for image compression and segmentation techniques.

Outcome Mapping

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19IITP84: Practical – XII: Advanced Web Technology Lab

Learning Objectives

LO1. To design web pages using ASP.NET
LO2. To write scripting to validate the webpages.
LO3. To connect with databases using LINQ.
LO4. To create web services.

List of Exercises

11. Create a welcome Cookie (Hit for a page) and display different image and text content each time when the user hit the page
12. List a table of content and navigate within the pages.
13. Demonstrate Request and Response object using HTML Form.
14. Database Connection to display all the values in the table in a webpage using ADO.NET.
15. Query textbox and Displaying records & Display records by using database
16. Write LINQ queries to access the database.
17. Create a web service using ASP.NET
18. Write a component based programming using advanced ASP.NET

Course Outcomes

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

CO1. Develop to build a complete web application using .NET Framework
CO2. Create interactive web pages using web controls.
CO3. Able to connect with databases using ADO.NET and ASP.NET.
CO4. Develop a simple web application using server-side PHP programming and
Database connectivity using MySQL.
CO5. Able to create a complete web application with all the required modules.

Outcome Mapping

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19IITP85: Practical – XIII: Image Processing Lab

Learning Objectives

LO1. To impart skills on the processing the digital images.
LO2. To learn the transform of the image from spatial domain to frequency
domain.
LO3. To perform edge deduction techniques.
LO4. To gain knowledge on compressing the images using suitable techniques.
LO5. To study the segmentation methods.

List of Exercises

- To perform linear and non linear operations on images.
- To perform smoothing operations on an image in spatial domain.
- To perform sharpening operations on an image in spatial domain.
- To transform the image into DCT, FFT and wavelet.
- To implement canny edge deduction.
- To study the performance of gradient operators.
- To implement huff-man coding technique.
- To perform DCT compression method.
- To implement image segmentation based on color.
- To implement erosion and dilation.

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

CO1. Read and display the image
CO2. Transform the domain from spatial to frequency.
CO3. Apply suitable operators to detect the edge.
CO4. Perform compression and segmentation methods.

Outcome Mapping

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FIFTH YEAR: NINTH SEMESTER
19IITT91: Machine Learning

Learning Objectives

LO1. To Learn about Machine Intelligence and Machine Learning applications
LO2. To implement and apply machine learning algorithms to real-world applications.
LO3. To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
LO4. To understand how to perform evaluation of learning algorithms and model selection.

Unit-1


Unit-2


Unit-3

BAYESIAN AND COMPUTATIONAL LEARNING: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief

**Unit-4**

**INSTANT BASED LEARNING** : K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

**Unit-5**


**Text Book**


**REFERENCES**


**Course Outcomes**

On completion of the course students will be expected to:

**CO1.** Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.

**CO2.** Have an understanding of the strengths and weaknesses of many popular machine learning approaches.

**CO3.** Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and unsupervised learning.

**CO4.** Be able to design and implement various machine learning algorithms in a range of real-world applications.

**Outcome Mapping**

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Learning Objectives

LO1. To identify the scope and necessity of Data Mining & Warehousing.
LO2. To understand various tools of Data Mining
LO3. To develop ability to design various algorithms based on data mining tools.
LO4. To be familiar with Data Warehousing structure.
LO5. To design Data Warehousing system for an enterprise.

Unit-1


Unit-2


Unit-3

Frequent Patterns, Associations And Classification: The Apriori Algorithm – Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbor – Other Classification Methods.

Unit-4


Unit-5

Spatial, Multimedia, Text And Web Data: Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining.

Text Books:


Reference Books


Course Outcomes

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

CO1. Basic data mining concepts for solving real world problems.
CO2. Understand the concepts of data mining
CO3. Analyze the feasibility of data mining solution.
CO4. Apply basic statistical to evaluate the results of data mining models.
CO5. Develop data mining application to solve problems.

Outcome Mapping

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19IITT93: Internet of Things

Learning Objectives

LO1. To provide an understanding of the technologies and the standards relating to the Internet of Things
LO2. To develop skills on IoT technical planning.
LO3. To implement Data and Knowledge Management and use of Devices in IoT Technology.
LO4. To understand State of the Art IoT Architecture.
LO5. To study Real World IoT Design Constraints, Industrial Automations in IoT.
Unit-1

INTRODUCTION TO IoT: Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

Unit-2

IoT ARCHITECTURE: M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

Unit-3


Unit-4


Unit-5


Reference Books


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

CO1. Understand the technology and standards relating to IoTs
CO2. Understand the critical parts of the ICT ecosystem required to mainstream IoTs
CO3. Acquire skills on developing their own national and enterprise level technical strategies;
CO4. Interpret the vision of IoT from a global context
CO5. Determine the Market perspective of IoT.

**Outcome Mapping**

| PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
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**Learning Objectives**

LO1. To expose the students in emerging technologies in the areas of machine learning.
LO2. To make use of Data sets in implementing the machine learning algorithms
LO3. To implement the machine learning concepts and algorithms.
LO4. To develop a basic understanding of the principles of machine learning
LO5. To derive practical solutions using predictive analytics.
LO6. To Understand which techniques are more appropriate for which problems.

**List of Exercises**

- Reading and writing into .csv files
- Implement the Find –S algorithm.
- Implement the Candidate-Elimination algorithm.
- Classify a sample using ID3 algorithm.
- Build an artificial neural network by implementing backpropagation algorithm.
• Construct the naïve Bayesian classifier for classification.
• Construct a naïve Bayesian classifier and evaluate the classifier with accuracy, precision, and recall metrics.
• Applying EM algorithm for clustering using K-means algorithm.
• Implement the k-Nearest Neighbour algorithm to classify the data set.
• Implement the non-parametric Locally Weighted Regression algorithm.

Course Outcomes

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

CO1. Understand components of a machine learning algorithm.
CO2. Apply machine learning tools to build and evaluate predictors.
CO3. Comprehend how machine learning uses computer algorithms to search for patterns in data.
CO4. Familiarize in using data patterns to make decisions and predictions with real-world examples.

Outcome Mapping

|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
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| CO2 | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
| CO3 | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   | ✔   |
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19IITP95: Practical – XV: Data Warehousing and Mining Lab

Learning Objectives

LO1. Practical exposure on implementation of well known data mining tasks.
LO2. Exposure to real life data sets for analysis and prediction.
LO3. Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
LO4. Handling a small data mining project for a given practical domain.

List of Exercises

1. Introduction to WEKA (Waikato Environment for Knowledge Analysis)
2. Implementation of measures of proximity
3. Introduction to exploratory data analysis using R
4. Implementation of Apriori Algorithm for Association rule mining
5. Learning and implementing k-means clustering
6 Learning Naïve and Decision Tress classifier in WEKA (Waikato Environment for Knowledge Analysis)
7 Learning Bayesian modeling
8 Implementation of outlier detection algorithms (nearest neighbor)
9 Data Mining Project

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

CO1. Implement the data mining tools for data cleaning, pre-processing and data integration.

CO2. Apply the statistical techniques through R tool, Hadoop, WEKA and interpret the results obtained.

CO3. Install outsourcing packages related to R tool, use the statistical techniques and apply time series models and interpret the results obtained.

CO4. Develop packages in R tool related to mathematical and statistical techniques and incorporate them to the R tool.

Outcome Mapping

| PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO2 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
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| CO4 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |

FIFTH YEAR: TENTH SEMESTER
19IITT101: Cloud Computing

Learning Objectives

LO1. To Acquire the Knowledge of Cloud and computing services
LO2. To learn the basics of Cloud Architecture and storage technologies.
LO3. To gain knowledge about the concept of Cloud Deployment Models
LO4. To Build Cloud based various applications
LO5. To gain Knowledge on security issues in cloud Environment.

Unit-1

Unit-2


Unit-3


Unit-4


Unit-5


Text Books

Reference Books


**Course Outcomes**

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

CO1. Apply different cloud programming model as per need.
CO2. Introduce the broad perspective of cloud architecture
CO3. Learn the economics of outsourcing IT to the Cloud.
CO4. Explore some important cloud computing-driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.
CO5. Learn how DNS works, and how it can be used for service discovery using Cloud.

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**Learning Objectives**

LO1. To acquire knowledge of database models.
LO2. To understand distributed database architecture.
LO3. To learn the concepts of spatial database.
LO4. To familiar with temporal database.

**Unit-1**


**Unit-2**

Distributed and Object based Databases: Architecture, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing. Complex Data Types, Structured Types and Inheritance, Table
Inheritance, array and Multiset, Object Identity and Reference Types, Object Oriented versus Object Relational.

**Unit-3**


**Unit-4**


**Unit-5**


**Text Books**


**Reference Books**


**Course Outcomes**

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

CO1. Know about the Various data models
CO2. Works on Database Architecture
CO3. Analyze data patterns
CO4. Handle object oriented databases.

**Outcome Mapping**

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Learning Objectives

LO1. To understand the basic and advanced methods to big data technology and tools.

LO2. To learn MapReduce and Hadoop and its ecosystem.

LO3. To acquire skills on R programming.

LO4. To analyse different classification methods.

LO5. To study data visualization tools.

Unit-1


Unit-2


Unit-3


Unit-4


Unit-5


Reports Consolidation – Communicating and operationalizing and Analytics Project – Creating the Final Deliverables: Developing Core Material for Multiple Audiences – Project Goals – Main Findings – Approach Model Description – Key points support with Data - Model details – Recommendations – Data Visualization

**Text Book**

1. *Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data*, EMC Education Services Published by John Wiley & Sons, Inc. 2015

**Reference Books**


**Websites**


**Course Outcomes**

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

CO1. Identify the characteristics of datasets for various applications.
CO2. Select environment for the applications.
CO3. Solve problems associated with big data characteristics.
CO4. Integrate mathematical and statistical tools with modern technologies like Hadoop and Mapreduce thereby provide better solution.

**Outcome Mapping**

PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 P010 PS01 PS02 PS03 PS04 PS05 PS06 PS07 PS08
19IITP104: Practical – XVI: Data Analytics Lab

Learning Objectives

LO1. To help students learn, understand, and practice big data analytics and machine learning approaches,

LO2. To make the student conversant with modern computing big data technologies and scaling up machine learning techniques with a focus on industry applications.

LO3. To make the student to learn classification techniques and decision trees. Decision trees are versatile Machine Learning algorithm that can perform both classification and regression tasks using R program.

LO4. To make the students to understand DBSCAN and BIRCH algorithms

LO5. To introduce the students to WEKA tools and R programming for data mining analysis.

List of Exercises

- Compute descriptive statistics for the data given below and sketch frequency distribution with normal curve. Give the interpretation for the obtained statistics and the frequency distribution.

- Derive correlation analysis and give interpretation for the result obtained.
  
  X: 14, 20, 22, 19, 15, 18, 30, 27
  Y: 16, 25, 27, 20, 16, 18, 27, 23

- Create a data Frame for student record using R. Sketch a decision tree and give interpretation.

- Carry out the correlation analysis between the mark scored by the male and female students of a class.

- Draw an autocorrelogram and identify the order of the given Time Series data. Give interpretation for the results obtained.

  raw data <- c(-0.21,-2.28,-2.71,2.26,-1.11,1.71,2.63,-0.45,-0.11,4.79,5.07,-2.24,6.46, 3.82, 4.29 , -1.47,2.69,7.95,4.46,7.28,3.43, -3.19, -3.14, -1.25, -0.50,2.25,2.77,6.72,9.17,3.73, 6.72, 6.04, 10.62,9.89,8.23,5.37, -0.10 ,1.40, 1.60,3.40,3.80,3.60,4.90,9.60, 18.20, 20.60,15.20, 27.00, 15.42, 13.31, 11.22, 12.77, 12.43, 15.83, 11.44, 12.32, 12.10, 12.02, 14.41,13.54,11.36, 12.97, 10.00, 7.20)

- Create a vector of a data set and treat it as an object. Using the vector and object perform (.) dot product and (x) cross product. Take your own data.
• Import and Export data from/to the Excel format and carry out the following analysis. Take your own data.
  o Correlation and regression.
• Derive a Decision Tree for the data you considered in the above exercise.
• Draw a Decision Tree. Take the data from WEKA. Interpret the result obtained.
• Implementing Apriori Algorithm in R using sample data set.
• R program to create a factor corresponding to height of women data set, which contains height and weights for a sample of women
• Categorize the data given below into three groups using control structures.
  5,3,4,5,8,6,20,18,22,26,23,50,45,46,44,42

Course Outcomes

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

CO1. Make the students to create data frame, list and factors using R Language.
CO2. Make the students select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
CO3. Implementing Apriori Algorithm in R using sample data set.
CO4. Make the students to integrate machine learning libraries and mathematical and statistical tools with modern technologies like R Programm and WEKA tools.

Outcome Mapping

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19IITP105: Practical – XVII: Advanced Database Management Systems Lab

Learning Objectives

LO1. To understand the basic concepts and terminology related to DBMS and Relational Database Design
LO2. To the design and implement Distributed Databases.
LO3. To understand advanced DBMS techniques to construct tables and write effective queries, forms, and reports.

List of Exercise

1. Formal review of relational database and FDs Implication, Closure, its correctness
2. 3NF and BCNF, Decomposition and synthesis approaches, Basics of query processing, external sorting, file scans
3. Processing of joins, materialized vs. pipelined processing, query transformation rules,
4. DB transactions, ACID properties, interleaved executions, schedules, serialisability
5. Correctness of interleaved execution, Locking and management of locks, 2PL, deadlocks, multiple level granularity, CC on B+ trees, Optimistic CC
6. T/O based techniques, Multiversion approaches, Comparison of CC methods,
7. Dynamic databases, Failure classification, recovery algorithm, XML and relational databases

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

CO1. Get exposure for students to write complex queries including full outer joins, self-join, sub queries, and set theoretic queries.

CO2. To perform the file organization and query optimization,

CO3. To perform transaction management, and database administration techniques.

CO4. To manage the web based transactions related to databases and recovery.

Outcome Mapping

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19IITD106: Project Work/ In-Plant Training

Learning Objectives

LO1. To provide insights into real world challenges and problem those required IT related solutions.

LO2. To empower the students to bring out the IT related solutions for the requirements.

LO3. To expose the students to have a broad ideas of literature related to the project domain.
LO4. To enable students to use all concepts of IT in creating a solution for a problem.

LO5. To improve the team building, communication and management skills of the students.

Course Outcomes

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

CO1. Discover the most thrust areas in the field of Information Technology.

CO2. Develop a complete project for a particular problem domain.

CO3. Identify, analyse, design and implement any IT related projects.

CO4. Compare and contrast existing solutions for developing a project.

CO5. Demonstrate an ability to work in a teams and manage with good communication skill.

Outcome Mapping

|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |      | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |
| CO2 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |      |
| CO3 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |      |
| CO4 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |
| CO5 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |

DEPARTMENT ELECTIVE COURSES

19IITE18.1 Internet and its Applications

Learning Objectives

LO1. To understand the basic ideas of internet and its applications.

Unit-1


Unit-2

Internet Technologies: Modem - Internet addressing - Physical connections - Telephone Lines - Internet browsers - Internet Explorer - Netscape Navigator.

Unit-3

Unit-4
Internet Relay Chat - Types of Network - Packet Switched Network - Circuit Switched Network - TCP/IP - Internet Protocol.

Unit-5
Case Study: Online Passport - Online Gas Services - Online Train Reservation - Tamilnadu government services

Textbooks

Course Outcomes
On successful completion of the course, the students will be able to
CO1. Understand Internet technologies.
CO2. Understand basics of communications
CO3. Learn about web servers
CO4. Learn about web browser and search engines.

Outcome Mapping

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO2 | ✓   | ✓   |     |     |     |     |     |     |     | ✓    | ✓    | ✓    | ✓    |     |     |     | ✓    |
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| CO4 | ✓   | ✓   |     |     |     |     |     |     |     | ✓    | ✓    | ✓    | ✓    |     |     |     | ✓    |

19IITE18.2 Internet Programming

Learning Objectives
LO1. To understand different Internet Technologies.
LO2. To learn java scripts.
LO3. To learn web applications

Unit-1
Unit -2

Unit-3

Unit-4

Unit-5

Text Book

References Books

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

CO1. Understand the concepts of elements in the web.
CO2. Write programs in Javascript
CO3. Design and implement webpages.
CO4. Understand the XML basics.
Outcome Mapping

|   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |      | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO2 | ✓   | ✓   | ✓   | ✓   |     |     | ✓   | ✓   | ✓   |      | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
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19IITE38.1 PHP Scripting Language

Learning Objectives

LO1. To understand the basic coding ideas of PHP.
LO2. To learn mailing list, custom logs and reports.

Unit-1

Basic of Coding in PHP: Mixing PHP and HTML - Introducing Variables and Operators - PHP Variables.

Unit-2

Displaying Dynamic Content - Sending E-Mail - Using File System - Uploading Files to Website.

Unit-3

Establishing a connection - Creating a Database Table - Inserting Data into the Table - Selecting and Displaying Data.

Unit-4

System Planning - Adding Contacts Modifying Contacts - Deleting Contacts - Working with Contacts.

Unit-5

Managing a Simple Mailing List: Mailing List Software - Developing Subscription Mechanism, Mailing Mechanism. Creating Custom Logs and Reports.

Textbook


Reference Books


Course Outcomes

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

CO1. Understand the concepts of elements in the PHP.
CO2. Write programs in PHP.
CO3. Design and implement webpages.
CO4. Deploy web scripting.

Outcome Mapping

|    | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| CO1| ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
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| CO4| ✓   |     | ✓   | ✓   |     |     |     |     |     | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |

19IITE38.2 Multimedia Systems

Learning Objectives

LO1. To understand the standards available for different audio, video and text applications
LO2. To learn various multimedia authoring systems in multimedia production team

Unit 1


Unit 2


Unit 3


Unit 4


Unit 5

Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing - Content and
Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent.

**Text Book**


**Reference Book**


**Course Outcomes**

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

CO1. Work on multimedia.
CO2. Handle various multimedia softwares
CO3. Develop multimedia projects.
CO4. Deploy multimedia projects.

**Outcome Mapping**

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**Learning Objectives**

LO1. To explore the backbone of GUI programming.
LO2. To become familiar with windows and form based applications
LO3. To provide depth knowledge in connecting databases from windows applications.

**Unit-1**


**Unit-2**


**Unit-3**
Menus, Sub procedures and sub functions: Menus - Common Dialog Boxes - Writing General Procedures. Multiple Forms: Multiple Forms - Standard Code Modules-Variables and Constants in Multiple-Form Projects.

Unit-4
List Boxes and Combo boxes - Do/Loop - For/Next Loop - Using MsgBox Function - Using String Function - Arrays: Control Arrays - Single Dimension Array - For Each/Next Statements - User defined data types - Multidimensional Arrays.

Unit-5
Accessing Database Files: Visual basic and Database Files - Using Data Control - Viewing a Database File - Navigating the Database in Code - Using List Boxes and Combo boxes as Data-Bound Controls.

Text Book

Reference Books

Course Outcomes
CO1. Learn major programming paradigms and techniques involved in windows and form based applications
CO2. Learn about Visual Studio and Visual Basic.
CO3. By the end students can develop, implement and creating Applications with Visual Basic
CO4. Creating databases and accessing the databases
CO5. An ability to use current techniques, skills, and tools necessary for computing practice.

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Learning Objectives

LO1. To understand the various steps in problem solving and implementation of algorithms.

LO2. To learn the usage of structured programming approach in solving problems.

Unit-1


Unit-2

Fundamental Algorithms: Exchanging the values of Two Variables - Counting - Summation of a set of Numbers - Factorial Computation-Sine function computation - Generation of the Fibonacci sequence - Reversing the Digits of an Integer - Base Conversion Character to Number Conversion.

Unit-3

Factoring Methods: Finding the square Root of a number - The Greatest Common Divisor of Two Integers - Generating Prime Numbers - Generation of Pseudo-random Numbers - Raising a Number to a Large Power.

Unit-4

Array Techniques: Array Order Reversal-Array Counting or Histogramming - Finding the Maximum Number in a Set - Removal of Duplicates from an Ordered Array - Partitioning an Array - Finding the kth Smallest Element.

Unit-5

Merging, Sorting and Searching: Two way merge - sorting by selection, insertion, diminishing increment and partitioning - Binary search.

Text Book


Reference Book


Course Outcomes

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

CO1. write algorithms and to draw flowcharts for solving problems.

CO2. convert the algorithms/flowcharts to programs

CO3. decompose a problem into functions and to develop modular reusable code.

CO4. analyze and implement perform searching and sorting problems.
Learning Objectives

LO1. To study communication network protocols, different communication layer structure

LO2. To learn security mechanism for data communication

Unit-1


Unit-2


Unit-3


Unit-4

Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.

Unit-5

Text Book

Reference Books
2) F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.

Website, E-learning resources:
1) http://peasonhighered.com/tanenbaum

Course Outcomes
After the completion of this course, students will be able to

CO1. To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.
CO2. To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
CO3. To be familiar with wireless networking concepts, and be familiar with contemporary issues in networking technologies.
CO4. To be familiar with network tools and network programming

Outcome Mapping

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
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| CO3 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO4 | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |

19ITE86.2: Business Intelligence

Learning Objectives
The student should be made to:

LO1. Be exposed with the basic rudiments of business intelligence system.
LO2. understand the modelling aspects behind Business Intelligence.

LO3. understand of the business intelligence life cycle and the techniques used in it.

LO4. Be exposed with different data analysis tools and techniques.

Unit-1


Unit - II

Knowledge Delivery: The business intelligence user types, Standard reports, Interactive Analysis and Adhoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

Unit - III

Efficiency: Efficiency measures – The CCR model: Definition of target objectives–Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis

Unit - IV

Business Intelligence Applications: Marketing models – Logistic and Production models – Case studies.

Unit-5


Text Book


Reference Books


**Course Outcomes**

After the completion of this course students will be able to

**CO1.** Explain the fundamentals of business intelligence.

**CO2.** Link data mining with business intelligence.

**CO3.** Apply various modelling techniques.

**CO4.** Explain the data analysis and knowledge delivery stages.

**CO5.** Apply business intelligence methods to various situations.

**CO6.** Decide on appropriate technique.

**Outcome Mapping**

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**Learning Objectives**

**LO1.** To learn core ideas behind parallel and distributed computing.

**LO2.** To explore the methodologies adopted for concurrent and distributed environment.

**LO3.** To understand the networking aspects of parallel and distributed computing.

**LO4.** To provide an overview of the computational aspects of parallel and distributed computing.

**LO5.** To learn parallel and distributed computing models.

**Unit-1**

**Parallel and Distributed Computing** — Introduction- Benefits and Needs- Parallel and Distributed Systems- Programming Environment- Theoretical Foundations-

Unit-2

**Synchronization**: Process Parallel Languages- Architecture of Parallel and Distributed Systems- Consistency and Replication- Security- Parallel Operating Systems.

Unit-3


Unit-4


Unit-5

**High-Performance Computing**: Molecular Sciences- Communication- Multimedia Applications for Parallel and Distributed Systems- Distributed File Systems.

**Textbook**


**Reference Books**


**Course Outcomes**

After the completion of this course, students will be able to

CO1. Explore the methodologies adopted for concurrent and distributed environment.

CO2. Analyse the networking aspects of Distributed and Parallel Computing.

CO3. Design high performance computing.

CO4. Establish effective communication among the network.
Learning Objectives

LO1. Introduce the concept of Object-oriented design and understand the fundamentals of OOSD life cycle.
LO2. Familiar with evolution of object-oriented model, classes and it notations
LO3. Practice UML in order to express the design of software projects.
LO4. Specify, analyze and design the use case driven requirements for a particular system.
LO5. Enrich knowledge about DBMS, designing classes and object oriented testing.

Unit-1


Unit-2


Unit-3

relationships, attributes, and methods: Association – Super-Sub class relationship – Aggregation – Class responsibility – Object responsibility.

Unit-4


Unit-5


**Text Book**

**Reference Books**

**Course Outcomes**

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

CO1. Show how the object-oriented approach differs from the traditional approach to systems analysis and design.

CO2. Analyze, design, document the requirements through use case driven approach

CO3. Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.
CO4. Recognize the difference between various object relationships: inheritance, association and aggregation.

CO5. Show the role and function of test cases, testing strategies and test plans in developing object-oriented software.

### Outcome Mapping

| PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
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### 19IITE96.2: Dot NET Programming

**Learning Objectives**

LO4. To explore the backbone of web page creation by developing .NET skill.

LO5. To familiar with Application, session and view state management

LO6. To provide depth knowledge about ADO.NET.

LO7. To understand the need of usability, evaluation methods for web services

LO8. To acquire knowledge on the usage of recent platforms in developing web applications


**Unit-2 - Developing VB.NET Applications** - Introduction to VB.Net, The .Net Framework and Common language runtime, Building VB. Net Application, VB IDE, forms, properties, events, VB language-console application and windows application, data type, declaring variable, scope of variable, operators and statements - Windows Applications-forms, adding controls to forms, handling events, MsgBox, Input Box, multiple forms, handling mouse and Keyboard events, object oriented programming creating and using classes and objects, Handling Exceptions- on Error Goto

Unit-4 - Developing C#.NET Applications - Introducing C# - overview of C# - Literals, Variables - Data Types, -Operators, -checked and unchecked operators – Expressions – Branching -Looping-Object Oriented Aspects Of C#: Class – Objects - Constructors and its types- inheritance, properties, indexers, index overloading – polymorphism - sealed class and methods - interface, - abstract class, operator overloading, - delegates, events, errors and exception - Threading.

Unit-5 - ADO.NET - Overview of ADO.NET - ADO.NET data access – Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class Data binding – Data list – Data grid – Repeater – Files, Streams and Email – Using XML.

Text Books
2. Mathew Mac Donald, “ASP.NET Complete Reference”, TMH 2005
5. ASP.NET Unleashed, C# programming – Wrox publication
6. Visual Basic. .NET Black Book, by Steven Holzner

Reference Books

Course Outcomes
CO6. Learn major programming paradigms and techniques involved in design and implementation of modern programming languages.
CO7. Learn about Microsoft .NET framework
CO8. By the end students can develop, implement and creating Applications with C#, VB.NET and ASP.NET
CO10. An ability to use current techniques, skills, and tools necessary for computing practice.
Outcome Mapping

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19IITE96.3: Wireless Networks

Learning Objectives

LO1. To Study about Wireless Networks, Protocol Stack and Standards.

Unit 1


Unit 2


Unit 3


Unit 4

Wireless Wide Area Network - Overview Of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-

**Unit 5**


**Text Books**


**Reference Books**


**Course Outcomes**

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

**CO1.** Conversant With The Latest 3G/4G And WiMAX Networks And Its Architecture.

**CO2.** Design and Implement Wireless Network Environment For Any Application Using Latest Wireless Protocols And Standards.

**CO3.** Implement Different Type of Applications For Smart Phones And Mobile Devices With Latest Network Strategies.

**Outcome Mapping**

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19ITE97.1: Cyber Security

Learning Objectives

LO1. To understand the key terms and concepts in cyber law, intellectual property and cyber-crimes, trademarks and domain theft.
LO2. To acquire knowledge about securing both clean and corrupted systems and protection of personal data and computer networks.
LO3. To understand the fundamentals of cryptography, and some key encryption techniques used today.
LO4. To develop an understanding of security policies and protocols to implement such policies.
LO5. To examine secure software development practices and able to incorporate approaches for risk management and best practices.

Unit-1


Unit-2


Unit-3


Unit-4

Unit-5


**Reference Books**


**Course Outcomes**

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

CO1. Assess cyber security risk management policies in order to adequately protect an organization's critical information and assets.

CO2. Measure the performance of security systems within an enterprise-level information system.

CO3. Troubleshoot, maintain and update an enterprise-level information security system.

CO4. Implement continuous network monitoring and provide real-time security solutions.

CO5. Formulate, update and communicate short- and long-term organizational cyber security strategies and policies.

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19IITE97.2: Advanced Data Structure and Algorithm

Learning Objectives

LO1. To teach efficient storage mechanisms of data for an easy access.
LO2. To design and implementation of various basic and advanced data structures.
LO3. To introduce various techniques for representation of the data in the real world.
LO4. To develop application using data structures.
LO5. To teach the concept of protection and management of data.

Unit-1


Unit-2


Unit-3


Unit-4


Unit-5

Advanced Data Structures - B- trees - Definition - Basic Operations on B-trees – Deleting a key from B-tree - Fibonacci heaps - Structure of Fibonacci heap - Data structure for disjoint sets - Disjoint set operations - Linked list representation of disjoint sets.

Text Books


Reference Books:


Course Outcomes

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

- CO1. Appropriate data structure as applied to specified problem definition.
- CO2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- CO3. Apply concepts learned in various domains like DBMS, compiler construction etc.
- CO4. Analyse the data structures and their implementation algorithms.

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19IITE97.3: Web Services

Learning Objectives

- LO1. To enable the student to be familiar with distributed services, XML and web services
- LO2. To study the use of web services in B2C and B2B applications

Unit-1

Overview of Distributed Computing. Introduction to web services – Industry standards, Technologies and concepts underlying web services – their support to web services. Applications that consume web services.

Unit-2

XML – its choice for web services – network protocols to back end databases-technologies – SOAP, WSDL – exchange of information between applications in
distributed environment – locating remote web services – its access and usage.
UDDI specification – an introduction.

**Unit-3**

A brief outline of web services – conversation – static and interactive aspects of
system interface and its implementation, work flow – orchestration and refinement,
transactions, security issues – the common attacks – security attacks facilitated
within web services quality of services – Architecting of systems to meet users
requirement with respect to latency, performance, reliability, QOS metrics, Mobile
and wireless services – energy consumption, network bandwidth utilization, portals
and services management.

**Unit-4**

Building real world enterprise applications using web services – sample source
codes to develop web services – steps necessary to build and deploy web services
and client applications to meet customer s requirement – Easier development,
customization, maintenance, transactional requirements, seamless porting to
multiple devices and platforms.

**Unit-5**

Deployment of Web services and applications onto Tomcat application server and
axis SOAP server (both are free wares) – Web services platform as a set of enabling
technologies for XML based distributed computing.

**Text Books**

1. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services : An
   Education India.

**Reference Book**


**Course Outcomes**

CO1. Understand the design principles and application of SOAP and REST based
   web services.
CO2. Design collaborating web services according to a specification.
CO3. Implement an application that uses multiple web services in a realistic
   business scenario.
CO4. Use industry standard open source tools such as Apache Axis2, Tomcat,
   Derby and Eclipse to build, test, deploy and execute web services and web
   applications that consume them.
Outcome Mapping

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19IITE97.4: Web Database and Information System

Learning Objectives

LO1. Understand how n-tiered architectures can be used to implement secure, scalable systems

LO2. Design and develop database-driven websites and applications

LO3. Understanding XML as a messaging and data exchange mechanism

LO4. Understand Web "semantic systems," such as auctions, recommendation systems, and search ranking.

LO5. Understand critical components of the modern Web infrastructure: DNS, Content Delivery Networks, etc.

Unit-1


Unit-2


Unit-3


Unit-4

Unit-5


Textbook


Reference Books


Course Outcomes

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

CO1. Know the concepts and terminologies related to web analytics.

CO2. Explore various parameters used for web analytics and their impact.

CO3. Explore the use of tools and techniques of web analytics.

CO4. Get experience on websites, web data insights and conversions.

Outcome Mapping

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INTER DEPARTMENT ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS

19CSE215.1 R Programming

Learning Objectives
LO1. To provide an overview of a new language R used for data science and to introduce students to the R programming environment and related ecosystem and thus provide them with an in demand skill-set, in both the research and business environments.

LO2. To demonstrate usage of as standard Programming Language.

LO3. To familiarize students with how various statistics like mean median etc. can be collected for data exploration in R and enable students to use R.

Unit-1
Overview and Preliminaries

Unit-2
Input, Output, Reading and Subsetting

Unit-3
Control Structures and Loop Functions

Unit-4
Statistics functions - Debugging, Profiling
Unit-5  
**Simulation and Graphs**  
Generating Random Numbers - Setting random number seed - Simulating Linear Model - Loading and Processing Raw Data – Creating a Graph - density plots - dot plots, bar charts - line charts - pie charts - box plots - Scatter plots.

**Text Book**  

**Reference Books**  

**Course Outcomes**  
On successful completion of the course, the students will be able to

CO1. Install and use R for simple programming tasks.  
CO2. Extend the functionality of R by using add-on packages and extract data from files and other sources and perform various data manipulation tasks on them.  
CO3. Code statistical functions in R and use R Graphics and Tables to visualize results of various statistical operations on data.  
CO4. Apply the knowledge of R gained to data Analytics for real life applications and to conduct analytics on large real life datasets.

**VALUE ADDED COURSES OFFERED BY OUR DEPARTMENT**  
19CISA215: WEB DEVELOPMENT

**Learning Objectives**  
LO1. To impart basic knowledge on web development  
LO2. To impart basic scripting ideas and importance in client server architecture  
LO3. To provide the basic knowledge about ASP, XML, CSS, PHP and MySql.

**Unit-1**  
**HTML:** History of the Internet and World Wide Web – HTTP, SMTP, POP3, MIME, Understanding roles of Web Browsers and Web Servers. Structure of HTML, Text formatting, Text styles, hyper link, image, and tables.

**Unit-2**  
**Frames, Forms and CSS:** Frames, Forms and controls, Embedding audio, video and animated files in HTML, CSS –Understanding CSS, Internal CSS, External CSS, Font Properties, Text Properties, Color and Background properties, Table properties, Numbering and List Properties.
Unit-3

JavaScript: Data types and literals, operators, conditional statements, loop constructs, reserved words; core Objects: Array Object, Date Object; Functions: passing value to JavaScript functions, user defined functions, Handling old browsers, javascript events, formatting cookie, retrieving cookie value from the cookie file, removing a cookie, animations using events.

Unit-4


Unit-5

PHP & MySQL: Why PHP and MySQL - Server-Side Web Scripting - Getting Started with PHP - Adding PHP to HTML -Syntax and Variables - Control and Functions - Passing Information between Pages - Strings - Arrays and Array Functions - Numbers - MySQL Database Administration - PHP/MySQL Functions -Displaying Queries in Tables - Building Forms from Queries.

Text Books

Reference Books

Course Outcomes

On successful completion of the course, the students will be able to
CO1. Develop simple components in web pages.
CO2. Write code using scripting languages.
CO3. Can connect databases via web applications.
CO4. Design a web page.
19CISA415: Advanced Web Development

Learning Objectives

LO1. To impart advanced ideas of web development

LO2. To impart scripting ideas and importance in web development.

LO3. To provide the basic knowledge about ASP.NET, ADO.NET and web services.

Unit-1

Overview of ASP.NET - The .NET framework – Learning the .NET languages: Data types – Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces : The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting Up ASP.NET and IIS.

Unit–2


Unit–3


Unit–4

Web Services - Web services Architecture : Internet programming then and now- WSDL–SOAP- Communicating with a web service- Web service discovery and UDDI. Creating Web services : Web service basics- The StockQuote web service – Documenting the web service- Testing the web service- Web service Data types- ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with TerraService.

Unit–5

**Text Book**


**Reference Books**


**Course Outcomes**

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

CO1. Overall view to develop web pages.

CO2. Write advanced codes in scripting languages.

CO3. Connect the different databases via web applications.

CO4. Able to use components, remote calls and web services in distributed web applications.