1. Condition for Admission

Candidates for admission to the first year of the four year B.E. Degree programmes shall be required to have passed the final examination of the plus 2 Higher Secondary Course with Mathematics, Physics and Chemistry as courses of study and candidates who have passed the Higher Secondary Examination through vocational stream under Engineering, conducted by the Board of Secondary Education, Government of Tamil Nadu or an examination of any other authority accepted by the Syndicate of this University as equivalent thereto. They shall satisfy the conditions regarding qualifying marks, age and physical fitness as may be prescribed by the Syndicate of the Annamalai University from time to time.

Candidates who have passed the Diploma programme in Engineering of the State Board of Technical Education, Tamil Nadu (listed in Annexure-I) will be eligible for admission to the second year of the four year degree programme in B.E. under the lateral entry scheme provided they satisfy other conditions.

2. Branches of Study in B.E.

   BRANCH I   - Chemical Engineering
   BRANCH II  - Civil Engineering
   BRANCH III - Civil and Structural Engineering
   BRANCH IV  - Computer Science and Engineering
   BRANCH V   - Electrical and Electronics Engineering
   BRANCH VI  - Electronics and Communication Engineering
   BRANCH VII - Electronics and Instrumentation Engineering
   BRANCH VIII - Information Technology
   BRANCH IX  - Mechanical Engineering
   BRANCH X   - Mechanical Engineering (Manufacturing)

3. Courses of Study and Scheme of Examinations

The courses of study with respective syllabi and the scheme of Examinations are given separately.

4. Choice Based Credit System (CBCS)

The curriculum includes six components namely Humanities / Social Sciences/Management, Basic Sciences, Engineering Sciences, Professional Core, Professional Electives and Open Electives in addition to Seminar & Industrial Training and Project. Each semester curriculum shall normally have a blend of theory and practical courses. The total credits for the entire degree Programme is 166 (124 for lateral entry students).
5. Eligibility for the Degree

A candidate shall be eligible for the degree of Bachelor of Engineering if the candidate has satisfactorily undergone the prescribed courses of study for a period of four academic years and has passed the prescribed examinations in all the four academic years. For the award of the degree, a student has to

5.1 Earn a minimum of 166 credits (124 for lateral entry students).

5.2 Serve in any one of the Co-curricular activities such as
   - National Cadet Corps (NCC)
   - National Service Scheme (NSS)
   - National Sports Organization (NSO) and
   - Youth Red Cross (YRC)

for at least one year. The students enrolled in any one of the co-curricular activities (NCC / NSS / NSO / YRC) will undergo training for about 80 hours and attend a camp of about seven days. The training shall include classes on hygiene and health awareness and also training in first-aid. While the training activities will normally be during weekends, the camp will normally be during vacation period.

(or)

Enrol as a student member of a recognized professional society such as
   - Student Chapters of Institution of Engineers (India)
   - Student Chapters of other Professional bodies like ICI, ISA, IIChe, IEEE, SAE, ASHRAE, CSI and IWS

5.3 B.E (Honours) Degree

A student shall be eligible to get Under Graduate degree with Honours, if he/she completes an additional 20 credits. Thus the total credits are 186. Out of 186 credits (144 credits for lateral entry students), 20 credits must be earned by studying additional course offered by the same or allied Departments (listed in Annexure-II) in sixth, seventh and eighth semesters. These additional 20 credits could be acquired through the MOOC courses of SWAYAM portal also.

5.4 B.E Degree with Minor Engineering

A student shall be eligible to get Under Graduate degree with additional Minor Engineering, if he/she completes an additional 20 credits. Out of the 186 credits, 20 credits must be earned from the courses offered by any one of the Departments (listed in Annexure-II) in the Faculty of Engineering and Technology in sixth, seventh and eighth semesters. These additional 20 credits could be acquired through the MOOC courses offered in SWAYAM portal also.

6. Assignment of Credits for Courses

Each course is normally assigned one credit per hour of lecture/tutorial per week and half credit for one hour for laboratory or practical or drawing course per week.

7. Duration of the Programme

A student is normally expected to complete the B.E. programme in four years but in any case not more than seven years from the time of admission.
8. Registration for Courses

A newly admitted student will automatically be registered for all the courses prescribed for the first, second and third semesters without any option.

Every other student shall enrol for the courses intended to be credited in the succeeding semester in the current semester itself by completing the registration form indicating the list of courses. This registration will be done a week before the last working day of the current semester.

A student is required to earn 166 (124 for lateral entry students) credits in order to be eligible for obtaining the degree. However the student is entitled to enjoy an option to earn either more or less than the total number of credits prescribed in the curriculum of a particular semester on the following guidelines:

8.1 Slow Learners

The slow learners may be allowed to withdraw certain courses with the approval by the Head of the Department and those courses may be completed by them in the fifth year of study and still they are eligible to be awarded with I Class. A student can withdraw a maximum of 2 courses per semester from IV semester to VII semester and take up those courses in the fifth year of study. However, courses withdrawn during odd semesters (V and VII) must be registered in the odd semester of fifth year and courses withdrawn during even semesters (IV and VI) must be registered in the even semester of fifth year.

8.2 Advance Learners

The advance learners may be allowed to take up the open elective courses of eighth semester in sixth and seventh semesters one in each to enable them to pursue industrial training/project work in the entire eighth semester period provided they should register those courses in the fifth semester itself. Such students should meet the teachers offering those elective courses themselves for clarifications. No specific slots will be allotted in the time table for such courses.

9. Mandatory Internship (Industrial Training)

To promote industrial internship at the graduate level in technical institutes and also to enhance the employability skills of the students passing out from Technical Institutions, the internship for the students at different stages of the programme, is included in the curriculum. The student has to undergo the internship during the summer vacation, after the II semester / IV semester / VI semester of the programme as per the details outlined below. Further the student has to submit a report on completion of the internship during the subsequent Odd semester that is in the III / V / VII semesters respectively.

9.1 During the summer vacation, after the II Semester,

The student must get involved in any of the following Inter/ Intra Institutional Activities for 4 weeks duration:

(i) Training with higher Institutions; Soft skill training organized by Training and Placement Cell.

(ii) Contribution at incubation/ innovation /entrepreneurship cell of the institute.
(iii) Participation in conferences/ workshops/ competitions.
(iv) Learning at Departmental Lab/ Institutional workshop.
(v) Working for consultancy/ research project within the University.
(vi) Participation in activities like IPR workshop / Leadership Talks/ Idea/ Design/
      Innovation/ Technical Expos.

9.2 During the summer vacation, after the IV Semester and also after the VI Semester,
The student may choose any of the following Internship / Innovation / Entrepreneurship related activities for 4 weeks duration:
(i) Work on innovation or entrepreneurial activities resulting in start-up
(ii) Undergo internship with industry/ NGO’s/ Government organizations/
     Micro/ Small/ Medium enterprises
(iii) Undergo internship with National Employment Enhancement Mission (NEEM) Facilitator.

10. Project Work
The student typically registers for project at the end of seventh semester and completes it at the end of the eighth semester along with the courses prescribed for study in the eighth semester. However a student who has registered and successfully completed the courses of eighth semester by acquiring additional credits in the earlier semesters can attempt to spend his/her period of study in an industry and complete his/her project work, submit the project report and appear for viva-voce examination at the end of eighth semester.

11. Mandatory Induction program
A 3-week long induction program for the UG students entering the institution, right at the start is proposed. Normal classes start only after the induction program is over. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.
   Physical Activity
   Creative Arts
   Imparting Universal Human Values
   Literary Activities
   Conduct of crash courses on soft skills
   Lectures by Eminent People
   Visits to Local Area
   Familiarization to Dept./Branch & Innovative practices

12. Electives
The elective courses fall under two basic categories: Professional Electives and Open Electives.

12.1 Professional Elective courses
The Professional Elective courses are offered in the concerned branch of specialization
and a student can choose the Professional Elective courses with the approval of the Head of the Department concerned.
12.2 Open Elective courses

Apart from the various Professional elective courses, a student must study three open elective courses two of which offered by the Department concerned and the other open elective course offered by any other Department in the Faculty of Engineering & Technology during either sixth or seventh or eighth semester of study, with the approval of the Head of the Department and the Head of the Department offering the course.

12.3 MOOC (SWAYAM) Courses

Further, the student can be permitted to earn not more than 20% of his total credits (that is 32 credits) by studying the Massive Open Online Courses offered through the SWAYAM Portal of UGC with the approval of the Head of the Department concerned. These courses will be considered as equivalent to the professional elective and/or open elective courses. Thus the credit earned through MOOC courses can be transferred and considered for awarding Degree to the student concerned.

12.4 Value added courses (Inter Faculty Electives)

Of the four open elective courses, a student must study one value added course that is offered by other Faculties in our University either in sixth or seventh semester of the B.E programme.

12.5 One Credit Courses

One credit courses shall be offered by a Department with the prior approval from the Dean, Faculty of Engineering and Technology.

12.5.1 Industry Expert

For one credit courses, a relevant potential topic may be selected by a committee consisting of the Head of the Department concerned and the Board of Studies member from the Department and a senior faculty member from the Department concerned. An expert from industry familiar with the topic chosen may be accordingly invited to handle classes for the students. The details of the syllabus, time table and the name of the industrial expert may be sent by the above committee to the Dean for approval. The credits earned through the one credit courses shall be over and above the total credit requirement prescribed in the curriculum for the award of the degree. Students can take a maximum of two one credit courses (one each in VI and VII semesters). They shall be allowed to take one credit courses offered in other Departments with the permission of Head of the Department offering the courses. A separate mark sheet shall be issued for one credit courses.

12.5.2 NSQF Courses

A student can be permitted to acquire additional credits not more than two by undergoing any two of the one credit courses conducted under the auspices of National Skills Qualification Framework (NSQF). NSQF is a nationally integrated education and competency based skill and quality assurance framework that will provide for multiple pathways, horizontal as well as vertical, including vocational education, vocational training, general education and technical education, thus linking one level of learning to another higher level. This will enable a student to
acquire desired competency levels, transit to the job market and at an opportune time, return for acquiring additional skills to further upgrade their competencies.

13. Assessment
13.1 Theory Courses
The break-up of continuous assessment and examination marks for theory courses is as follows:

First assessment (Mid-Semester Test-I) : 10 marks
Second assessment (Mid-Semester Test-II) : 10 marks
Third Assessment : 5 marks
End Semester Examination : 75 marks

13.2 Practical Courses
The break-up of continuous assessment and examination marks for Practical courses is as follows:

First assessment (Test-I) : 15 marks
Second assessment (Test-II) : 15 marks
Maintenance of record book : 10 marks
End Semester Examination : 60 marks

13.3 Project Work
The continuous assessment marks for the project work will be 40 and to be assessed by a review committee consisting of the project guide and a minimum of two members nominated by the Head of the Department. One of the committee members will be nominated as the Chairman by the Head of the Department. The Head of the Department may be a member or the Chairman. At least two reviews should be conducted during the semester by the review committee. The student shall make presentation on the progress made before the committee. 60 marks are allotted for the project work and viva voce examination at the end of the semester.

13.4 Industrial Internship
After attending the internship during the summer vacation of even semester (II / IV / VI semester), the student has to present a report at the start of the subsequent odd semester (III / V / VII semester) to the committee which will assess and award marks out of 100. The committee is constituted with an Internship Coordinator and a minimum of two members nominated by the Head of the Department for each class.

14. Substitute Assessment
A student, who has missed, for genuine reasons accepted by the Head of the Department, one or more of the assessments of a course other than the final examination, may take a substitute assessment for any one of the missed assessments. The substitute assessment must be completed before the date of the third meeting of the respective class committees.

A student who wishes to have a substitute assessment for a missed assessment must apply to the Dean / Head of the Department within a week from the date of the missed assessment.
15. Student Counsellors (Mentors)

To help the students in planning their course of study and for general advice on the academic programme, the Dean / Head of the Department will attach a certain number of students to a member of the faculty who shall function as student counsellor for those students throughout their period of study. Such student counsellors shall advise the students, give preliminary approval for the courses to be taken by the students during each semester and obtain the final approval of the Dean / Head of the Department.

16. Class Committee

For all the branches of study during the first two semesters, a common class committee will be constituted by the Dean of the faculty. From among the various teachers teaching the same common course to different classes during each semester of the first year, the Dean shall appoint one of them as course coordinator. The composition of the class committee during first and second semesters will be as follows:

- Course coordinators of all courses.
- All the Heads of the Sections, among whom one may be nominated as Chairman by the Dean.
- The Dean may opt to be a member or the Chairman.

For each of the higher semesters, separate class committees will be constituted by the respective Head of the Departments. The composition of the class committees from third to eighth semester will be as follows:

- Teachers of the individual courses.
- A seminar coordinator (for seventh semester only) shall be appointed by the Head of the Department
- A project coordinator (for eighth semester only) shall be appointed by the Head of the Department from among the project supervisors.
- One Professor or Associate Professor, preferably not teaching the concerned class, appointed as Chairman by the Head of the Department.
- The Head of the Department may opt to be a member or the Chairman.

The class committee shall meet three times during the semester. The first meeting will be held within two weeks from the date of class commencement in which the type of assessment like test, assignment etc. for the third assessment and the dates of completion of the assessments will be decided.

The second meeting will be held within a week after the completion of the first assessment to review the performance and for follow-up action.

The third meeting will be held after all the assessments but before the University semester examinations are completed for all the courses, and at least one week before the commencement of the examinations. During this meeting the assessment on a maximum of 25 marks for theory/40 marks for seminar/industrial training, practical and project work will be finalized for every student and tabulated and submitted to the Head of the Department (to the Dean in the case of I & II Semester) for approval and transmission to the Controller of Examinations.
17. Attendance requirements

The students with 75% attendance and above are permitted to appear for the University examinations. However, the Vice Chancellor may give a rebate / concession not exceeding 10% in attendance for exceptional cases only on Medical Grounds.

18. Temporary break of study

A student is permitted to go on break of study for a maximum period of one year either as two breaks of one semester each or a single break of one year.

If a student wishes to apply for break of study, the student shall apply to the Dean in advance, in any case, not later than the last date of the first assessment period.

The application duly filled by the student shall be submitted through the Head of the Department. In the case of short term employment/ training/ internship, the application for break of study shall be approved and forwarded by the Head of the Department concerned to the Dean.

However, the student must complete the entire programme within the maximum period of seven years.

19. Procedure for withdrawing from the Examinations

A student can withdraw from all the examinations of the semester only once during the entire programme on valid grounds accepted by the University. Such withdrawal from the examinations of a semester will be permitted only if the candidate applies for withdrawal at least 24 hours before the commencement of the last examination. The letter grade 'W' will appear in the mark sheet for such candidates.

20. Passing and declaration of examination results

All assessments of all the courses on an absolute marks basis will be considered and passed by the respective results passing boards in accordance with the rules of the University. Thereafter, the Controller of Examinations shall convert the marks for each course to the corresponding letter grade as follows, compute the Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), and prepare the mark sheets.

- 90 to 100 marks : Grade 'S'
- 80 to 89 marks : Grade 'A'
- 70 to 79 marks : Grade 'B'
- 60 to 69 marks : Grade 'C'
- 55 to 59 marks : Grade 'D'
- 50 to 54 marks : Grade 'E'
- Less than 50 marks : Grade 'RA'

Withdrawn from the examination : Grade 'W'

A student who obtains less than 30 / 24 marks out of 75 / 60 in the theory / practical examinations respectively or is absent for the examination will be awarded grade RA.
A student who earns a grade of S, A, B, C, D or E for a course, is declared to have successfully completed that course. Such a course cannot be repeated by the student.

A student who is detained for lack of attendance must re-register for and repeat the courses in the respective semester.

A student who obtains letter grade RA in the mark sheet must reappear for the examination of the courses except for Honours courses.

A student who obtains letter grade W in the mark sheet must reappear for the examination of the courses.

The following grade points are associated with each letter grade for calculating the grade point average and cumulative grade point average.

S - 10; A - 9; B - 8; C - 7; D - 6; E - 5; RA - 0

Courses with grade RA / W are not considered for calculation of grade point average or cumulative grade point average.

A student can apply for re-valuation of one or more of his examination answer papers within a week from the date of issue of mark sheet to the student on payment of the prescribed fee per paper. The application must be made to the Controller of Examinations with the recommendation of the Head of the Department.

After the results are declared, mark sheets will be issued to the students. The mark sheet will contain the list of courses registered during the semester, the grades scored and the grade point average for the semester.

GPA is the sum of the products of the number of credits of a course with the grade point scored in that course, taken over all the courses for the semester, divided by the sum of the number of credits for all courses taken in that semester.

CGPA is similarly calculated considering all the courses taken from the time of admission.

21. Awarding Degree

After successful completion of the programme, the degree will be awarded with the following classification based on CGPA.

21.1 Honours Degree

To obtain Honours Degree a student must earn a minimum of 186 credits within four years (144 credits within three years for lateral entry students) from the time of admission, pass all the courses in the first attempt from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students) and obtain a CGPA of 8.25 or above.

21.2 First Class with Distinction

To obtain B.E Degree First Class with Distinction, a student must earn a minimum of 166 Credits within four years (124 credits within three years for lateral entry students) from the time of admission, by passing all the courses in the first attempt from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students) and obtain a CGPA of 8.25 or above.
21.3 First Class
To obtain B.E Degree First Class, a student must earn a minimum of 166 credits within five years (124 credits within four years for lateral entry students) from the time of admission and obtain a CGPA of 6.75 or above for all the courses from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

21.4 Second Class
For Second Class, the student must earn a minimum of 166 credits within seven years (124 credits within six years for lateral entry students) from the time of admission.

21.5 B.E Degree with Minor Engineering
For Minor Engineering, the student must earn a minimum of 186 credits within four years (144 credits within three years for lateral entry students) from the time of admission, pass all the courses. The rules for awarding the B.E degree in First Class with Distinction or in First Class or in Second Class will be applicable for this also.

22. Ranking of Candidates
The candidates who are eligible to get the B.E. degree with Honours will be ranked together on the basis of CGPA for all the courses of study from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

The candidates who are eligible to get the B.E. degree in First Class with Distinction will be ranked next after those with Honours on the basis of CGPA for all the courses of study from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

The Candidates passing with First Class will be ranked next after those with distinction on the basis of CGPA for all the courses of study from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

The ranking of candidates will be done separately for each branch of study.

23. Transitory Regulations
The University shall have powers to revise or change or amend the regulations, the scheme of examinations, the courses of study and the syllabi from time to time.

Wherever there had been change of syllabi, examinations based on the existing syllabi will be conducted for three consecutive times after implementation of the new syllabi in order to enable the students to clear the arrears. Beyond that the students will have to take up their examinations in equivalent courses, as per the new syllabi, on the recommendations of the Head of the Department concerned.
## DIPLOMA PROGRAMMES ELIGIBLE FOR THE B.E (LATERAL ENTRY) PROGRAMMES OFFERED IN FEAT

(FROM 2019-2020)

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Branches of Study</th>
<th>Eligible Diploma Programme (FT / PT / SW)</th>
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</table>
| 1.     | Chemical Engineering                                       | i. Petrochemical Engineering  
ii. Chemical Engineering  
iii. Environmental Engineering and Pollution Control  
iv. Leather Technology (Footwear)  
v. Leather Technology  
vi. Plastic Technology  
vii. Polymer Technology  
viii. Sugar Technology  
ix. Textile Technology  
x. Chemical Technology  
xii. Ceramic Technology  
xiii. Petro Chemical Technology  
xiv. Pulp & Paper Technology  
xv. Petroleum Engineering |
| 2.     | Civil Engineering                                           | i. Civil Engineering  
ii. Civil Engineering (Architecture)  
iii. Environmental Engineering and Pollution Control (Full Time)  
iv. Architectural Assistantship  
v. Civil Engineering (Rural Tech.)  
vi. Civil and Rural Engineering  
vii. Agricultural Engineering |
| 3.     | Civil and Structural Engineering                           |                                                                                                                                                           |
| 4.     | Computer Science and Engineering                           | i. Electronics and Communication Engineering  
ii. Computer Technology  
iii. Computer Science and Engineering  
iv. Information Technology  
v. Computer Engineering  
vi. Computer Networking  
vii. Electronics (Robotics)  
viii. Mechatronics Engineering |
| 5.     | Electrical and Electronics Engineering                    | i. Electrical and Electronics Engineering  
ii. Electronics and Communication Engg.  
iii. Electronics and Instrumentation Engg  
iv. Electronics Engineering (Instrumentation)  
v. Instrument Technology  
vi. Instrumentation and Control Engineering  
vii. Electrical Engineering (Instruments and Control)  
viii. Electrical Engineering  
ix. Instrumentation Technology  
x. Electronics (Robotics)  
xi. Mechatronics Engineering |
ii. Computer Technology  
iii. Computer Science and Engineering  
iv. Information Technology  
v. Computer Engineering |


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<td>vi. Computer Networking</td>
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<td>Information Technology</td>
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<td>Mechanical Engineering</td>
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<td>iii. Mechanical Design and Drafting</td>
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<td>viii. Metallurgy</td>
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<td>x. Machine Tool Maintenance and Repairs</td>
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<td>xviii. Marine Engineering</td>
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<td>xix. Mechanical Engineering(Production)</td>
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<td>xx. Mechanical Engineering(Tool &amp;Die)</td>
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<td>xxii. Mechanical Engineering(R &amp; A.C.)</td>
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<td>xxiii. Electronics(Robotics)</td>
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| 1.    | Chemical Engineering   | 1. Chemical Engineering  
2. Pharmacy  
3. Electronics and Instrumentation Engineering | 1. Civil Engineering  
2. Mechanical Engineering  
3. Electronics and Instrumentation Engg  
4. Information Technology  
5. Civil and Structural Engg  
6. Electrical Engineering  
7. Electronics and Communication Engg  
8. Mechanical (Manufacturing) Engg  
9. Computer Science and Engineering |
| 2.    | Civil Engineering      | 1. Civil Engineering  
2. Civil and Structural Engg. | 1. Mechanical Engineering  
2. Electrical Engineering  
3. Chemical Engineering  
4. Computer Science and Engineering  
5. Mechanical (Manufacturing) Engg  
6. Electronics and Instrumentation Engg  
7. Information Technology  
8. Electronics and Communication Engg |
2. Information Technology  
3. Electronics and Communication Engineering | 1. Civil Engineering  
2. Electronics and Instrumentation Engg  
3. Electronics and Communication Engg  
4. Mechanical Engineering  
5. Mechanical |
2. Information Technology  
3. Electronics and Communication Engineering | 1. Civil Engineering  
2. Electronics and Instrumentation Engg  
3. Electronics and Communication Engg  
4. Mechanical Engineering  
5. Mechanical |
| 5. | Electrical and Electronics Engineering | 1. Electrical Engineering  
2. Electronics and Instrumentation Engineering  
3. Electronics and Communication Engineering | 1. Civil Engineering  
2. Civil and Structural Engg  
3. Mechanical Engineering  
4. Chemical Engineering  
5. Mechanical (Manufacturing) Engg  
6. Computer Science and Engineering  
7. Information Technology |
2. Civil and Structural Engg  
3. Mechanical Engineering  
4. Chemical Engineering  
5. Mechanical (Manufacturing) Engg  
6. Computer Science and Engineering  
7. Information Technology |
| 7. | Electronics and Instrumentation Enng. | 1. Civil Engineering  
2. Civil and Structural Engg  
3. Mechanical Engineering  
4. Chemical Engineering  
5. Mechanical (Manufacturing) Engg  
6. Computer Science and Engineering  
7. Information Technology |
2. Information Technology  
3. Electronics and Communication Engineering | 1. Civil Engineering  
2. Electronics and Instrumentation Engg  
3. Electronics and Communication Engg  
4. Mechanical Engineering  
5. Mechanical (Manufacturing) Engg  
6. Civil and Structural Engg  
7. Electrical Engineering  
8. Chemical Engineering |
| 9. | Mechanical Engineering | 1. Mechanical Engineering  
2. Mechanical (Manufacturing) Engg. | 1. Civil Engineering  
2. Civil and Structural Engg  
3. Electrical Engineering  
4. Chemical Engineering  
5. Computer Science and Engineering  
6. Electronics and Instrumentation Engg  
7. Information Technology  
8. Electronics and Communication Engg |
| 10. | Mechanical (Manufacturing) Engg. | | |
# B.E. (FOUR YEAR) DEGREE PROGRAMME (FULL–TIME)

**CHOICE BASED CREDIT SYSTEM (CBCS)**

**CURRICULUM FOR FIRST YEAR B.E.**

**COURSES OF STUDY AND SCHEME OF EXAMINATIONS (REGULATION 2018-19)**

## SEMESTER I

<table>
<thead>
<tr>
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**Total Credits 17.5**

## SEMESTER II

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**Total Credits 20.5**

Students must undergo Internship for 4 weeks during summer vacation which will be assessed in the forthcoming III Semester.

| HS       | Humanities and Social Sciences including Management courses |
| BS       | Basic Science courses                                      |
| ES       | Engineering Science Courses                                |
| CA       | Continuous Assessment Marks                                |
| FE       | Final Exam Marks                                           |
# DEPARTMENT OF INFORMATION TECHNOLOGY

## COURSES OF STUDY AND SCHEME OF EXAMINATIONS (REGULATION -2019)

<table>
<thead>
<tr>
<th>Course Code</th>
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*For the Lateral entry students total credit for III Semester is 23.5 as they are exempted from internship during summer vacation of II semester.*

Total Credits 27.5

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<th>Course Code</th>
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*Four weeks during the summer vacation at the end of II Semester*
Students must undergo Internship for 4 weeks during summer vacation which will be assessed in the forthcoming V Semester.

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**COURSES OF STUDY AND SCHEME OF EXAMINATIONS (REGULATION -2019)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Course</th>
<th>L</th>
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<td>PC-VIII</td>
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Total Credits 26.5
Students must undergo Internship for 4 weeks during summer vacation which will be assessed in the forthcoming VII Semester.

### DEPARTMENT OF INFORMATION TECHNOLOGY

#### COURSES OF STUDY AND SCHEME OF EXAMINATIONS (REGULATION -2019)

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**Total Credits 21.0**

Students must undergo Internship for 4 weeks during summer vacation which will be assessed in the forthcoming VII Semester.

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**Total Credits 19.5**

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DEPARTMENT OF INFORMATION TECHNOLOGY

VISION
To produce globally competent, quality technocrats, to inculcate values of leadership and research qualities and to play a vital role in the socio–economic progress of the nation.

MISSION
- To partner with the University community to understand the information technology needs of faculty, staff and students
- To develop dynamic IT professionals with globally competitive learning experience by providing high class education
- To involve graduates in understanding need based Research activities and disseminate the knowledge to develop entrepreneur skills

PROGRAMME EDUCATIONAL OBJECTIVES
1. To offer students with core competence in mathematical, scientific and basic engineering rudiments necessary to prepare, analyze and solve hardware/software engineering problems and/or also to pursue advanced study or research.
2. To educate students with good scope of knowledge in core areas of IT and related engineering so as to comprehend engineering trade-offs, analyze, design, and synthesize data and technical concepts to create novel products and solutions for the real life problems.
3. To instil in students to maintain high proficiency and ethical standards, effective oral and written communication skills, to work as part of teams on multidisciplinary projects and diverse professional environments, and relate engineering issues to the society, global economy and to emerging technologies.
4. To deliver our graduates with learning environment awareness of the life-long learning needed for a successful professional career and to introduce them to written ethical codes and guidelines, perform excellence, leadership and demonstrate good citizenship.
After the successful completion of the B.E. Information Technology degree programme, the students will be able to:

PO 1: Capability to apply knowledge of mathematics, Science, Engineering fundamentals and core IT skills to the solution of complex engineering problems.

PO 2: Identify, articulate, research literature and analyze complex engineering problems in IT.

PO 3: Design and develop software solutions for complex problems in data engineering, distributed systems and information systems.

PO 4: Use research based knowledge and methodologies in the design and conduct of experiments, organization, analyze and interpretation of data to identify patterns, produce meaningful conclusion and recommendation for complex problems.

PO 5: Create, select and apply appropriate techniques, resources and modern engineering and IT tools to complex engineering problems.

PO 6: Apply reasoning informed by the contextual knowledge to societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Understand the impact if the professional engineering solution in societal and environmental context and demonstrate the knowledge and need for sustainable development.

PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice in managing information technology.

PO 9: Function effectively as an individual and as a member or leader in diverse teams to deliver reports and projects.

PO 10: Communicate effectively in complex engineering activities. Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological changes.
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### LIST OF MINOR ENGINEERING ELECTIVES

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<td>Basics of Computer Graphics and Multimedia</td>
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<td>ITMISCN</td>
<td>Fundamentals of Data Mining</td>
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SYLLABUS FOR B.E. (INFORMATION TECHNOLOGY)

THIRD SEMESTER

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COURSE OBJECTIVES

- To learn, partial differential equations, Fourier series, Boundary value problems.
- To learn the transforms such as Sine, Cosine, Fourier transform and Z-transforms.
- To gain knowledge of the method to find the Solution of difference equations.

Unit–I


Unit–II


Unit–III

Boundary value problems – Solutions of one dimensional wave equation – One dimensional heat equation (without derivation) – Fourier series solutions in Cartesian co-ordinates.

Unit–IV


Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

At the end of this course, the students will be able to
2. Understand Fourier transform and Z–transforms.

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<th>Mapping with Programme Outcomes</th>
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ETES302  ENVIRONMENTAL STUDIES  

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COURSE OBJECTIVES

- To make the students conversant with basic principles of natural resources, forest resources, ecosystem and bio-diversity.
- To get knowledge about pollution and its control.
- To know about the importance of Information Technology in Environment and Human health.

Unit–I

Introduction – Multidisciplinary nature of environmental studies – Definition, scope and importance – Need for public awareness.

Natural resources – Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer–pesticide problems, Energy resources: Growing energy needs, renewable and Non-renewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources– Equitable use of resources for sustainable lifestyles.

Unit–II

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological – pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem – Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit–III

Unit–IV


Unit–V


TEXT BOOKS
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R).

REFERENCES
5. Down to Earth, Centre for Science and Environment.
COURSE OUTCOMES

At the end of this course, the students will be able to
1. To be conversant with basic principles of natural resources, forest resources
2. To be conversant with basic principles of ecosystem and bio-diversity
3. To identify the causes of pollution and its control measures

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COURSE OBJECTIVES

- To emphasize the fundamentals of analog and digital communication systems.
- To explore the various modulation techniques of digital transmission.
- To provide the basic ideas about synchronous and asynchronous communication, error detection, control and correction techniques.
To study about the working of low-speed and high-speed modems.

Unit–I

Unit–II
Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and Deemphasis, Threshold effect in angle modulation.

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance
4. Analyze different digital modulation schemes and can compute the bit error performance

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**ITES304 BASIC ELECTRONICS ENGINEERING**

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**COURSE OBJECTIVES**

- To understand the fundamentals of semiconductor devices, transistors and amplifiers
- To introduce the laws of Boolean algebra and solve problems in combinational logic
- To explain sequential logic and memory circuits and systems

**Unit–I**


**Unit–II**


**Unit–III**


**Unit–IV**

Combinational Logic: Transistor as a switch – Reversible stable states – Laws of boolean algebra–Boolean expressions and logic diagrams– Negative logic – Introduction to mixed logic – Min Terms and Max Terms – Truth tables and maps –

Unit–V

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Acquire knowledge of diodes, rectifiers and transistors.
2. Understand the operation of amplifiers and oscillators.
3. Implement Boolean expressions using gates.
4. Design counters using flip flops.

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ITPC305 MICROPROCESSORS AND MICROCONTROLLERS

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COURSE OBJECTIVES
- To study the architecture of 8085/8086 microprocessor and other processor.
- To learn the design aspects of I/O and Memory Interfacing circuits.
• To study about communication and bus interfacing.
• To study the architecture of 8051 microcontroller.

**Unit–I**


**Unit–II**


**Unit–III**

Memory Interfacing and I/O interfacing – Parallel communication interface–Serial communication interface-D/A and A/D Interface-Timer – Keyboard/display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display, LCD display, Keyboard display interface and Alarm Controller.

**Unit–IV**


**Unit–V**


**TEXT BOOKS**


**REFERENCES**


**COURSE OUTCOMES**
At the end of this course, the students will be able to
1. Design the programs on 8086 microprocessor.
2. Analyze the Input/output circuits.
3. Identify Memory Interfacing circuits.
4. Implement 8051 microcontroller based system.

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**COURSE OBJECTIVES**

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To enable them to write algorithms for solving problems with the help of fundamental data structures

**Unit-I**


**Unit-II**


**Unit-III**

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

**Unit-IV**

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the
trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

**Unit-V**

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

**TEXT BOOKS**


**REFERENCES**

2. R. G. Dromey, “How to Solve it by Computer”, 2nd Impression, Pearson Education.

**COURSE OUTCOMES**

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

1) analyze the algorithms to determine the time and computation complexity and justify the correctness.
2) implement for a given Search problem (Linear Search and Binary Search)
3) implement for a given problem of Stacks, Queues and linked list and analyze the same to determine the time and computation complexity.
4) write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.

**Mapping with Programme Outcomes**

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**COURSE OBJECTIVES**

- To get familiar with basic electronic compounds such as registers, capacitor, inductor diodes, transmitters, etc.
• To text and understand the function of various electronic components.
• The student will be equipped with IC interfacing and its applications.

LIST OF EXPERIMENTS
1) Characteristics of Semiconductor Diodes.
2) Characteristics of Zener Diode.
3) Characteristics of Bipolar Junction Transistor (BJT).
4) Estimation of Ripple factor and efficiency in a full wave rectifier with and without filter.
5) Verification of logic gates using integrated chips.
6) Simplification of Boolean expressions using Karnaugh Map.
7) Verification of Digital Multiplexer and DeMultiplexer.

COURSE OUTCOMES
At the end of this course, the student will be able to
1) Students will be able to explain basic circuit concepts and responses.
2) The student can explain the concept at capacitance, inductance and the concepts at terminal devices.
3) Familiarize with working principles, assembly and applications of IC.

COURSE OBJECTIVES
• The students will be able to understand the microprocessor programs and its applications.
• The students will be able to understand the architecture of 8085 and 8086 microprocessor.
• To study and understand the assembly language programming using 8085 microprocessor.
• The students will be equipped with microprocessor interfacing and its applications.

LIST OF EXERCISES
1) Study of 8085 and study of 8086 microprocessor.
2) 8–bit Arithmetic Operation.
3) 16–bit Arithmetic Operation.
4) Find the number of even and odd number in a block of data.
5) Fibonacci series
6) Hexadecimal to binary conversion.
7) Matrix Addition.
8) Sorting an array of number.
9) Searching a string
10) Digital clock
11) Square wave generation using 8253IC.
12) Stepper motor interface using 8255IC.
13) Data transfer using USART.
14) Keyboard status
15) Message display 8279IC.
16) Simulation of traffic light control signal.

**COURSE OUTCOMES**

At the end of this course, the students will be able to
1) Familiarize with assembly language programming.
2) Design circuits for various applications using interfaces.
3) An in– depth knowledge of applying concepts on real time applications.

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**COURSE OBJECTIVES**

- To develop skills to design and analyze simple linear and non linear data structures.
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem.
- To Gain knowledge in practical applications of data structures.

**LIST OF EXERCISES**

1. Array implementation of List ADT, Stack ADT, Queue ADT.
2. Implementation of Singly linked list (addition, deletion, insertion in all positions).
3. Implementation of Doubly linked list (addition, deletion, insertion in all positions).
4. Implementation of Stack and Queues using linked list.
5. Implementation of binary search technique.
6. Program for tree traversal (inorder, postorder, preorder).
7. Implementation of Quick sort, Merge sort, Shell sort.
8. Implementation of Dijkstra’s algorithm.
10. Applications of Linked List, Stack and Queue in real world.
FOURTH SEMESTER

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COURSE OBJECTIVES

- Discrete Mathematics is designed to study various finite structures of Mathematics which are essential to develop the various concepts of Computer Science.

- The rise of the digital computer over the second half of the twentieth century has coincided with a growth of interest in these fields.

- Discrete Mathematics has now become a major area of Mathematics in its own right.

Unit–I

Unit–II

Unit–III

Unit–IV

Unit–V
Graph Theory: Graphs – Special simple graphs – Matrix representation of graphs – Path cycles and connectives – Eulerian and Hamiltonian graphs – Shortest path algorithms.

TEXT BOOKS

REFERENCES
COURSE OUTCOMES

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

1. Acquire the basic concepts in Mathematical Logic and theory of inferences.
2. Understand the concepts of Set theory, Relations and equivalence classes with matrix representation.
3. Familiarize Lattice theory, Boolean algebra and Group theory
4. Design coding and encoding group codes concept.
5. Understand the basic concepts of Graph theory, Eulerian and Hamiltonian graphs

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ITES402 | SIGNALS AND SYSTEMS | L | T | P | C
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COURSE OBJECTIVES

- To introduce the fundamental ideas of signals and systems analysis and characterization.
- To provide a foundation to numerous applications that deal with signal and system concepts directly or indirectly. Application areas of signals and systems include audio and image processing, communications, control systems, machine learning, and finance.
- To serve as a central building block for students interested in further studying information processing in any form.

Unit–I

Signals and systems as seen in everyday life, and in various branches of engineering and science.

Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity, additivity and homogeneity, shift-invariance, causality, stability, realizability.

Unit–II

Unit–III

Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval’s Theorem. The idea of signal space and orthogonal bases.

Unit–IV

The Laplace Transform, notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior.

The $z$-Transform for discrete time signals and systems- eigen functions, region of convergence, $z$-domain analysis.

Unit–V


Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on. Aliasing and its effects. Relation between continuous and discrete time systems.

TEXT BOOKS


REFERENCES


COURSE OUTCOMES

At the end of this course, the students will be able to
1. Analyze different types of signals
2. Represent continuous and discrete systems in time and frequency domain using different transforms
3. Investigate whether the system is stable
4. Sampling and reconstruction of a signal

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COURSE OBJECTIVES

- To get a clear understanding of object-oriented concepts.
- To understand the basics of C++, objects and classes, Inheritance, Polymorphism.
- To understand the basics of I/O and file management, and advance topics including templates, exceptions and Standard Template Library.

Unit-I


Unit-II


Unit-III


Unit-IV

Unit–V


TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Analyze and design a computer program based on Object Oriented Principles.
2. Solve a real world problems based on Object Oriented Principles.
3. Gain the basic knowledge on Object Oriented concepts.
5. Implement features of object oriented programming to solve real world problems.

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40
COURSE OBJECTIVES
To expose the students to the following:
- Instruction Level Architecture and Instruction Execution
- The current state of art in memory system design
- How I/O devices are accessed and its principles.
- Concepts of advanced pipelining techniques.

Unit–I
Basic Structure of Computers, Functional units, software, performance issues software, machine instructions and programs, Types of instructions, Instruction sets: Instruction formats, Assembly language, Stacks, Queues, Subroutines.

Unit–II
Processor organization, Information representation, number formats. Multiplication & division, ALU design, Floating Point arithmetic, IEEE 754 floating point formats.

Unit–III
Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit. Microprogrammed Control - Basic concepts, minimizing microinstruction size, multiplier control unit. Microprogrammed computers - CPU control unit.

Unit–IV
Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache & associative memories, Virtual memory.

Unit–V
System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces
Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
At the end of this course, the students will be able to
1. learn how computers work
2. know basic principles of computer’s working
3. analyze the performance of computers
4. know how computers are designed and built
5. Understand issues affecting modern processors (caches, pipelines etc.).

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ITPC405 COMPUTER NETWORKS

COURSE OBJECTIVES
- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- To provide an opportunity to do network programming
- To provide a WLAN measurement ideas.

Unit–I

Unit–II
Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA

Unit–III
Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.
Unit–IV


Unit–V

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

TEXT BOOKS


REFERENCES


COURSE OUTCOMES

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

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
4. For a given problem related TCP/IP protocol developed the network programming.
5. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

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Mapping with Programme Outcomes

43
COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.

- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models

- To understand and use data manipulation language to query, update, and manage database

- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.

Unit–I

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit–II

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit–III

Storage strategies: Indices, B-trees, hashing.

Unit–IV

Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit–V


Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

TEXT BOOKS


REFERENCES


COURSE OUTCOMES
At the end of this course, the students will be able to
1. Write relational algebra expressions for a given query and optimize the developed expressions
2. Design the databases using E_R method and normalization, for a given specification of the requirement.
3. Construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2 for a given specification.
4. Optimize its execution using Query optimization algorithms for a given query
5. Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system

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COURSE OBJECTIVES
The student should be made to:
- Be familiar with the main features of C++ language
- Understands Object Oriented Programming paradigm
- Be able to test and debug C++ programs
- Able to apply Object Oriented Programming concepts in solving software problems

LIST OF EXERCISES
1. Classes and Objects
   1. write a C++ program that uses a class where the member functions are defined inside a class.
   2. write a C++ program that uses a class where the member functions are defined outside a class.
   3. write a C++ program to demonstrate the use of static data members.
   4. write a C++ program to demonstrate the use of const data members.
2. **Constructors and Destructors**
   1. write a C++ program to demonstrate the use of zero argument and parameterized constructors.
   2. write a C++ program to demonstrate the use of dynamic constructor.
   3. write a C++ program to demonstrate the use of explicit constructor.

3. **Initializer Lists**
   1. write a C++ program to demonstrate the use of initializer list.

4. **Operator Overloading**
   2. write a C++ program to demonstrate the overloading of increment and decrement operators.
   3. write a C++ program to demonstrate the overloading of binary arithmetic operators.
   4. write a C++ program to demonstrate the overloading of memory management operators.
   5. Typecasting
   6. write a C++ program to demonstrate the typecasting of basic type to class type.
   7. write a C++ program to demonstrate the typecasting of class type to basic type.
   8. write a C++ program to demonstrate the typecasting of class type to class type.

6. **Inheritance**
   1) write a C++ program to demonstrate the multilevel inheritance.
   2) write a C++ program to demonstrate the multiple inheritance.
   3) write a C++ program to demonstrate the virtual derivation of a class.

7. **Polymorphism**
   1) write a C++ program to demonstrate the runtime polymorphism.

8. **Exception Handling**
   1) write a C++ program to demonstrate the exception handling.

9. **Templates and Generic Programming**
   1) write a C++ program to demonstrate the use of function template.
   2) write a C++ program to demonstrate the use of class template.

10. **File Handling**
    1) write a C++ program to demonstrate the reading and writing of objects.
    2) write a C++ program to demonstrate the reading and writing of mixed type of data.
    3) write a C++ program to copy the contents of a file to another file byte by byte.
COURSE OBJECTIVES

- To understand basic database concepts, including the structure and operation of the relational data model.
- To construct simple and moderately advanced database queries using Structured Query Language (SQL).
- To understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- To design and implement a small database project using Microsoft Access.

LIST OF EXERCISES

1) Implementation of queries for student database
2) Data Definition Language— with constraint and without constraint
3) Data Manipulation Language— Insert, Delete, Update, Select and truncate
4) Transaction Control Statement – Commit, Save point, Roll back
5) Data Control Statement – Grant, Revoke
6) Data Projection Statement – Multi column, alias name, arithmetic operations, distinct records, concatenation, where clause
7) Data Selection Statement – Between, and, not in, like, relational operators and logical operators
8) Aggregate functions – count, maximum, minimum, sum, average, order by, group by, having
9) Joint queries – inner join, outer join, selfjoin, Cartesian join, or cross join
10) Sub queries – in, not in, some, any, all, exist, not exist
11) Set operations – union, union all, intersect, minus
12) Database objects – synonym, sequences, views and index
13) Cursor
14) Functions and procedures
15) Trigger
16) Exceptions
17) Packages
18) Factorial of a number
19) Checking whether a number is prime or not
20) Fibonacci series
21) Reverse the string
22) Swapping of numbers
23) Odd or even number
24) Duplication of records
COURSE OBJECTIVES

- To understand the working principle of various communication protocols.
- To analyze the various routing algorithms.
- To know the concept of data transfer between nodes.

LIST OF EXERCISES

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

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## COURSE OBJECTIVES
- Understand various computing models like Finite State Machine, Pushdown Automata and Turing Machine.
- Be aware of decidability and un-decidability of various problems.
- Learn types of grammars, tractable and intractable problems.

## Unit–I

## Unit–II

## Unit–III

## Unit–IV

## Unit–V
TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1) Design Finite state Machine, Pushdown Automata and Turing Machine.
2) Explain the decidability or undecidability of various problems.
3) Explain the concept of different types of grammars.

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COURSE OBJECTIVES
- To study the basic components of DSP systems.
- To study DFT and its computation.
- To study the design techniques for digital filters (IIR & FIR).
- To study the finite word length effects and applications in signal processing.

Unit–I
Basic Elements of Digital Signal Processing Systems – Classification of Signals – The concept of frequency in Continuous time and Discrete time domain –

Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

At the end of this course, the students will be able to
1. Design both analog and digital filters.
2. Design DSP processors.
3. Do the projects in Signal processing, Image processing and Speech Processing.
COURSE OBJECTIVES

- To develop, design and implement two dimensional and three dimensional graphical structures.
- To provide knowledge about transformations and clipping techniques.
- To acquire knowledge in OpenGL programming.
- To understand various aspects of multimedia and the concepts of audio, video, images and animation.

Unit–I


Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCES

COURSE OUTCOMES
At the end of the course, the student will be able to
1) Design 2D and 3D graphical structures.
2) Apply 2D and 3D transformations.
3) Implement clipping techniques.
4) Create graphical structures using OpenGL.

Gain knowledge of multimedia systems.

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COURSE OBJECTIVES
- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication.
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
- To know the components and management aspects of concurrency management and memory management.

Unit–I
Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an

Unit–II

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.
Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Unit–III


Unit–IV

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker’s algorithm, Deadlock detection and Recovery.
Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.
Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

Unit–V

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms
File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.
Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks
TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of the course, the student will be able to
1) Create processes and threads.
2) Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3) develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time for a given specification of memory organization.
4) Design and implement file management system.
5) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers for a given I/O devices and OS (specify).

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COURSE OBJECTIVES
- To develop, design and implement two dimensional and three dimensional graphical structures.
- To provide knowledge in OpenGL programming.
• To understand various aspects of multimedia and to learn the concept of sound, images and videos.

LIST OF EXERCISES

1) Implementation of Bresenham's Algorithm – Line and Circle.
2) Implementation of Bresenham's Algorithm – Ellipse.
3) Implementation of Line, Circle and Ellipse attributes.
4) Two Dimensional transformations – Translation, Rotation, Scaling, Reflection, Shear.
5) Cohen Sutherland 2D line clipping and Windowing.
6) Sutherland – Hodgeman Polygon clipping Algorithm.
7) Three dimensional transformations – Translation, Rotation, Scaling.
8) Drawing three dimensional objects and Scenes.
9) Line DDA, chain of diamonds, chessboard.
10) Generating Fractal images

GIMP
1) Creating Logos.
2) Simple Text Animation.

Audacity
1) Silencing, Trimming and Duplicating the Audio Signal.
2) Giving the Advancing Effect to the Audio Signal.

Windows Movie Maker
1) Applying effect to Video.
2) Creating Titles in Video.

Swish
1) Text Effects.
2) PrE-Loader.

Flash:
1) Changing the shape of the object.
2) Imaging Viewing using Mask.

Photo Impact
1) Text Effects.
2) Image Slicing.

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COURSE OBJECTIVES

• To understand basic concepts such as techniques, management, know how to use them.
• To understand Operating System features and its difference from structured design.
• To use the UNIX as a modeling and communication utilities.
• To utilize the step of the process to produce better software.
LIST OF EXERCISES

1) Job scheduling techniques.
2) Disk scheduling techniques.
3) Memory allocation techniques.
4) Memory management techniques.
5) Page replacement techniques.
6) Producer consumer problem.
7) Bankers algorithm.
8) Dining Philosophers problem.
9) Write a shell script to perform the file operations using UNIX commands.
10) Write a shell script to perform the operations of basic UNIX utilities.
11) Write a shell script for arrange'n'numbers using ‘awk’.
12) Write a shell script to perform nCr calculation using recursion.
13) Write a shell script to sort numbers and alphabetic from a text file using single ‘awk’ command.
14) Write a Shell script to display all the files which are accessed in the last 10 days and to list all the files in a directory having size less than 3 blocks, greater than 3 blocks and equal to 3 blocks.
15) Write a Shell script to display the numbers between 1 and 9999 in words.
16) Write a Shell script for Palindrome Checking.

ITCP509 DIGITAL SIGNAL PROCESSING LAB

COURSE OBJECTIVES
- To generate various types of continuous and discrete time signals and perform various operations
- To demonstrate various properties of continuous and discrete time systems
- To represent the signals using various forms of Fourier representation
- To characterize and analyze systems using Laplace, Fourier and z-transforms

LIST OF EXERCISES

1) Generation of Elementary Signals.
2) Verification of Sampling Theorem.
3) Impulse and Step Response of LTI System.
4) Linear and Circular Convolution of Discrete Sequences.
5) Correlation and Auto Correlation of Discrete Sequences.
6) Z-Transform and Inverse Z-Transform.
7) Computation of DFT & IDFT of a Signal.
8) Spectral Analysis of a Signal.
9) Alteration of Sampling Rate of a Signal.
10) Design of IIR Filters.
11) Design of FIR Filters.
12) Finding the Sum of two Sinusoidal Signals.
13) N Point FFT of a given sequence.
14) Frequency Response of Analog Low Pass and High Pass Filters.
15) FFT of a given 1–D signal.
COURSE OBJECTIVES

- To be familiar with the concepts of data warehouse and data mining,
- To be acquainted with the tools and techniques used for Knowledge Discovery in Databases.
- To learn and know the concepts of mining, clarification and prediction, clustering methods and the applications of data mining.

Unit–I


Unit–II


Unit–III


Unit–IV

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

Unit–V


TEXT BOOKS


REFERENCES


**COURSE OUTCOMES**

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

1) Apply data mining techniques and methods to large data sets.
2) Use data mining tools for different applications.
3) Compare and contrast the various classifiers.

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**COURSE OBJECTIVES**

- To acquire knowledge about information and entropy.
- To acquire knowledge about Hamming weight, minimum distance decoding and different types of codes.
- They also learn about syndrome calculation and design of an encoder and decoder.
- To gain knowledge about text compression techniques. They also learn about speech and audio coding.
- To know about, image compression, graphics interchange format, JPEG and MPEG standards.

**Unit–I**


**Unit–II**

Unit–III


Unit–IV


Unit–V


TEXT BOOKS

REFERENCES

COURSE OUTCOMES

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

1) Student should be able to analyze and design an Information coding system.
2) Students will be able to solve a discrete symmetric channel.
3) Gain the basic knowledge on Error Control Coding and Convolutional codes
4) Ability to develop applications using Text, Audio and Speech source codes
5) Develop skill to implement the image and video source codes

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ITCP607 INFORMATION CODING TECHNIQUES LAB

COURSE OBJECTIVES
- To expose students the basic concepts of information theory.
- To make students understand and implement various codes.
- To explore various coding techniques applicable for multimedia inputs such as text, audio, image and video.

LIST OF EXERCISES
1) Determination of entropy of a given source
2) Determination of various entropies and mutual information for a noise free channel
3) Determination of various entropies and mutual information for a binary symmetric channel
4) Coding and decoding of linear block codes
5) Coding and decoding of cyclic codes
6) Coding and decoding of convolutional codes
7) Coding and decoding of BCH codes
8) Coding and decoding of RS codes.
9) Implementation of Shannon-Fano coding algorithm.
10) Implementation of static Huffman coding algorithm.
11) Implementation of dynamic Huffman coding algorithm.
12) Implementation of run length encoding algorithm.
13) Implementation of arithmetic coding algorithm.
14) Implementation of linear predictive coding
15) Implement any one image compression algorithm
16) Implement any one video compression algorithm

ITCP608 DATA MINING LAB

COURSE OBJECTIVES
- To understand the basic principles, concepts and applications of data warehousing and data mining.
- To introduce the task of data mining as an important phase of knowledge recovery process.
- Ability to do Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment.
- Have a good knowledge of the fundamental concepts that provide the foundation of data mining.
- Design a data warehouse or data mart to present information needed by management in a form that is usable for management client.
LIST OF EXERCISES

1) Evolution of data management technologies, introduction to data warehousing concepts.
2) Develop an application to implement defining subject area, design of fact dimension table, data mart.
3) Develop an application to implement OLAP, roll up, drill down, slice and dice operation
4) Develop an application to construct a multidimensional data.
5) Develop an application to implement data generalization and summarization technique.
6) Introduction to exploratory data analysis using R
7) Introduction to regression using R
8) Introduction to the Weka machine learning toolkit
9) Performing data preprocessing for data mining in Weka
10) Classification using the Weka toolkit
11) Performing clustering in Weka
12) Association rule analysis in Weka
13) Data mining case study.

SEVENTH SEMESTER

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COURSE OBJECTIVES

- To understand the moral and ethical dimensions in engineering.
- To take balanced decisions.
- To know about intellectual property rights (IPR) and business ethics.

Unit–I


Unit–II


Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
1) Understand the relationship between the engineer and the society.
2) Learn the importance of codes in engineering practice.
3) Acquire knowledge on the legal, moral and ethical aspects in engineering.

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ITPC702 INFORMATION SYSTEM AND NETWORK SECURITY

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COURSE OBJECTIVES
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
• To understand how to deploy encryption techniques to secure data in transit across data networks
• To design security applications in the field of Information technology

Unit–I

Unit–II

Unit–III
Introduction to Public key Cryptography– Number theory– The RSA Cryptosystem and Factoring Integer– Attacks on RSA–The ELGamal Cryptosystem–Digital Signature Algorithm–Finite Fields–Elliptic Curves Cryptography– Key management – Session and Interchange keys, Key exchange and generation–PKI.

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES
8) OWASP top ten security vulnerabilities: http://xml.coverpages.org/OWASPTopTen.pdf

COURSE OUTCOMES
1) Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
2) Analyze the possible security attacks in complex real time systems and their effective countermeasures
3) Identify the security issues in the network and resolve it.
4) Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations
5) Formulate research problems in the computer security field.

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ITCP706 NETWORK SECURITY LAB

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COURSE OBJECTIVES
The student should be made to:
- Be exposed to the different cipher techniques
- Learn to implement the algorithms DES, RSA, MD5, SHA–1
- Learn to use network security tools like GnuPG, KF sensor, Net Strumbler

LIST OF EXERCISES
1) Implement the following substitution & transposition techniques:
   a. Caesar Cipher
   b. Playfair Cipher
   c. Hill Cipher
   d. Vigenere Cipher
   e. Rail fence-row & Column Transformation
2) Implement the following algorithms
   a. DES
   b. RSA Algorithm
   c. Diffiee-Hellman
   d. MD5
3) Implement the SIGNATURE SCHEME-Digital Signature Standard
4) Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
5) Setup a honey pot and monitor the honeypot on network (KF Sensor)
6) Installation of rootkits and study about the variety of options
7) Perform wireless audit on an access point or a router and decrypt WEP and WPA.( Net Stumbler)
8) Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

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<td>1. To encourage the students to study advanced engineering developments.</td>
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<td>2. To prepare and present technical reports.</td>
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<td>3. To encourage the students to use various teaching aids such as over head projectors, power point presentation and demonstrative models.</td>
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<td>1. To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.</td>
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<td>2. To train the students in preparing project reports and to face reviews and viva voce examination.</td>
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<td>1) On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology</td>
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3) Understand the modelling, analysis and design concepts by taking up a structure.

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**PE-PROFESSIONAL ELECTIVES**

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**COURSE OBJECTIVES**

- To understand the concept of web designing using HTML.
- To understand the concept of server-side web designing using Java applets and Swings.
- To understand the concept of server-side web designing using Servlets and JSP.
- To understand the concept of client-side web designing using Java Script.

**Unit-I**


**Unit-II**


**Unit-III**


**Unit-IV**

JSP: JSP overview – JSP language basics – JSP translation and Compilation directives – Standard Java objects from JSP – JSP configuration and deployment – Actions and tags of JSP.

**Unit-V**


**TEXT BOOKS**


REFERENCES


COURSE OUTCOMES

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

1) Design static web page using HTML.
2) Develop server–side web page using Java applets and Swings.
3) Acquire engineering knowledge on server–side web page using Servlets.
4) Develop individual and team work based server–side web page using JSP.
5) Perform client–side project management using Java Script.

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COURSE OBJECTIVES

- To understand the basic Perl language features.
- To understand Perl language as a tool for convenient text, data storage and file processing.
- Execute programs from Perl environment and process their result.

Unit–I


Unit–II

Lists and Hashes: Introduction to lists, Simple lists, Complex lists, Accessing list values, List slices, Ranges, Combining ranges and Slices. Arrays – Accessing single and Multiple elements from an array – Interpolating Arrays into Strings – For
Control Structure-Array functions (pop, push, shift, unshift, and sort) – Array manipulations; Introduction to Hashes – Hash element access – Hash functions – Typical use of hash.

**Unit–III**


**Unit–IV**


**Unit–V**


**TEXT BOOKS**


**REFERENCES**


**COURSE OUTCOMES**

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

1) Apply prerequisite basic programming concepts to Perl

2) Write, compile, and run Perl programs, Analyze the effects of using Perl structures that implement decisions, loops, and store arrays and use these structures in a well–designed, OOP program

3) Create Perl programs that make use of various directories and use several files linked together

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COURSE OBJECTIVES

- To understand and be able to use the basic programming principles such as data types, variable, conditionals, loops, recursion and function calls.
- To learn how to use basic data structures such as List, Dictionary and be able to manipulate text files and images.
- To understand the process and will acquire skills necessary to effectively attempt.
- Programming problem and implement it with a specific programming language-Python.

Unit–I

Unit–II

Unit–III
Unit–IV


Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

At the end of this course, the students will be able to
1) Gain knowledge about the basic concepts of python programming.
2) Solve the basic design problems using object and classes.
3) Able to demonstrate systematic knowledge of backend and front end by developing an appropriate application.
4) Obtain the knowledge of DBM and SQL databases from python.

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COURSE OBJECTIVES

The student should be made to:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and Non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.

Unit–I


Unit–II


Unit–III

Active Filters: – Butterworth Filters, Band–Pass Filters, Band Reject Filters, All–Pass Filters. Oscillators and Wave Generators:– Phase Shift Oscillator, Wien Bridge Oscillator, Voltage–Controlled Oscillator(VCO), Square Wave Generator, Triangular Wave Generator, Saw–tooth Wave Generator.

Unit–IV


Unit–V

TEXT BOOKS

REFERENCES
1) OP–AMP and Linear IC’s By Ramakant A. Gayakwad, Prentice Hall
2) Digital Integrated Electronics, By Taub and Schilling, McGraw Hill
3) Integrated Electronics, By Millman J. and Halkias C.C., McGraw Hill.
4) Op–Amp and Linear IC’s, By Caughlier and Driscoll, PHI

COURSE OUTCOMES
At the end of the course, the student should be able to:
1) Understand the characteristics of Op Amp.
2) Understand the applications ICs in the processing of analog signals.
3) Analyze and design high frequency amplifier using Op Amp.
4) Analyze and design the electronic circuits using linear integrated circuit
5) Analyze and design the Voltage Regulators using ICs.

Mapping with Programme Outcomes

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ITPESCN SOFTWARE ENGINEERING

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COURSE OBJECTIVES
- To understand the phases of development of a Software Project.
- To understand the major considerations for enterprise integration and deployment concepts of Requirements engineering and Analysis Modeling.
- To learn various testing, maintenance measures and risk management methods.
- To learn the Software quality management and configuration management concepts.

Unit–I

Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

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

1) Comprehend the basic elements of Software Project Models.
2) Visualize the significance of the different kind of Software Testing methods.
3) Ability to analyze the strategies in Software Designing.
4) Understand the significance of Software Reengineering.
5) Perform SQA process in Software projects.

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COURSE OBJECTIVES

- To know about the fundamentals to programming in distributed objects using Microsoft’s COM/DCOM architecture.
- To understand foundations of Distributed Objects.
- To understand the concepts of peer to peer services and file system.
- To understand in detail the system level and support required for distributed Objects.

Unit–I


Unit–II


**Unit–III**


**Unit–IV**

Support – The operating system layer – Protection – Processes and threads – Communication and invocation – Operating system architecture-Virtualization at the operating system level – Distributed Objects and Components Distributed objects – Case study: CORBA – From objects to components – Case studies: Enterprise JavaBeans and Fractal

**Unit–V**


**TEXT BOOKS**


**REFERENCES**


**COURSE OUTCOMES**

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

1) Acquiring Knowledge on fundamental of distributed objects using Microsoft’s COM/DCOM architecture.
2) Gaining experienced skills on Distributed Objects.
3) Familiarizing the peer to peer services and file system.
COURSE OBJECTIVES

The student should be made to:

- Learn XML fundamentals and be exposed to build applications based on XML.
- Understand the key principles behind SOA.
- Be familiar with the web services technology elements for realizing SOA.
- Learn the various web service standards.

Unit–I


Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCES


77


**COURSE OUTCOMES**

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

1) Build applications based on XML.
2) Develop web services using technology elements.
3) Build SOA – based applications for intra-enterprise and inter-enterprise applications

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**COURSE OBJECTIVES**

- To learn the fundamental concepts of MATLAB.
- To introduce basic concepts like acquiring, storing and processing of images.
- To provide details about enhancing the quality of images and to introduce techniques for extraction and processing of region of interest.
- To understand the applications of Image Processing.

**Unit–I**


**Unit–II**


**Unit–III**

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES

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

1) To understand the basic image enhancement techniques in spatial & frequency domains.
2) To understand the basic multi–resolution techniques and segmentation methods.
3) To apply this concepts for image handling in various fields.

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79
COURSE OBJECTIVES

- Be exposed with the basic rudiments of business intelligence system.
- Understand the modeling aspects behind Business Intelligence.
- Understand of the business intelligence life cycle and the techniques used in it.
- Be exposed with different data analysis tools and techniques.

Unit–I


Unit–II

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

Unit–III


Unit–IV

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

Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES
At the end of this course, the students will be able to
1) Organizational and individual decision–making.
2) Key concepts and current practices of business intelligence.
3) The individual, organizational and societal impacts of bi systems.
4) Analytical techniques used in business intelligence systems.
5) Integration of business intelligence into decision–making processes.

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COURSE OBJECTIVES
The student should be made to:

- Learn about various open source licenses and implications for users, developers and the software community in general
- Use the communication modes particular to the open source world through participation in such things as mailing lists, IRC, wikis, etc.
- Learn and understand Agile development methodology and use it to develop open source software within the project
- Work collaboratively with fellow students and other members of the project’s community

Unit–I
Unit–II

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1) Have a good understanding of how to develop a software system in a team with other developers
2) Able to develop web-enabled software using common software components such as Spring and Hibernate.
3) Have a basic understanding of Scripting languages and how to develop modern web enabled applications.
4) Have a basic understanding of mobile app development using native applications.
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COURSE OBJECTIVES

- To understand objects, classes and inheritance.
- To understand utilization of software objects to build software projects.
- To use UML in requirements elicitation and designing.
- To develop applications using UML.

Unit–I

Unit–II

Unit–III
Object Oriented analysis: Use Case Driven Object Oriented Analysis Object Oriented Analysis: Classification Noun Phrase Approach – Common Class Patterns Approach – Object Relationship analysis.

Unit–IV

Unit–V
Applications: Data Acquisition: Weather Monitoring Station – Frameworks: Foundation Class library – Client/Server Computing: Inventory Tracking.

TEXT BOOKS
REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1) Analyze the Systems Development Life Cycle.
2) Identify the basic software requirements UML Modeling.
3) Express software design with UML diagrams.
4) Develop applications using UML.

Mapping with Programme Outcomes

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ITPESCN SYSTEM SOFTWARE AND COMPILER DESIGN

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COURSE OBJECTIVES
- View some of the major tasks of the system software of a computer system, focusing on internal working of the hardware and software interface of a typical system.
- Identify and understand the design, function and implementation of assemblers, linkers, loaders, macro processors and system software tools.
- Understand the theory and practice of compiler implementation and to learn context free grammars, compiler parsing techniques, construction of syntax trees, symbol tables, intermediate representations and actual code generation.

Unit-I

84
Unit–II

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1) Understand and design principles of assemblers, linkers and loaders.
2) Know the Phases of compilation.
3) Optimize code and study techniques of syntax directed translation.
Mapping with Programme Outcomes

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ITPESCN SOFTWARE TESTING AND QUALITY ASSURANCE

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<td>• To impart knowledge on software testing, quality and Software Quality Assurance (SQA).</td>
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<td>• To introduce the various software testing techniques and different levels of testing.</td>
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<td>• To introduce the SQA standards and components of SQA system.</td>
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<td>• To explain the components of quality plan for software projects.</td>
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Unit–I

Phases of Software project – Quality, Quality assurance and quality control – Testing, Verification and Validation – White box testing – Static testing – Structural testing – Black box testing – Definition, need for black box testing – Black box testing techniques – Requirements based testing, Positive and Negative testing, Boundary Value Analysis, Decision Tables, Equivalence Partitioning, Graph based Testing, Compatibility Testing, Domain Testing.

Unit–II

Integration testing – Integration testing as a type of testing – Integration testing as a phase of testing – Scenario testing – Defect bash – System and Acceptance testing – System testing overview – Need for System testing – Functional system testing – Non-functional testing – Acceptance testing.

Unit–III


Unit–IV

Software quality – definition – Software quality assurance-definition and objectives – Software quality assurance and software engineering – Software quality factors – The components of the software quality assurance system – The SQA system – SQA architecture Pre-project components – Software project life cycle components – Infrastructure components for error prevention and improvement – Management SQA components – SQA standards, system certification, and
assessment components – Organizing for SQA – The human components – Considerations guiding construction of an organization’s SQA system.

**Unit–V**

Development plan and quality plan objectives – Elements of the development plan – Elements of the quality plan – Development and quality plans for small projects and for internal projects – Integrating quality activities in the project life cycle–Classic and other software development methodologies – Factors affecting intensity of quality assurance activities in the development process – Verification, validation and qualification – A model for SQA defect removal effectiveness and cost.

**TEXT BOOKS**


**REFERENCES**


**COURSE OUTCOMES**

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

1) Techniques and skills on use of modern software testing tools to support software testing projects.

2) Planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generating a test report.

3) Advanced software testing topics, such as object–oriented software testing methods, and component–based software testing issues, challenges, and solutions.

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COURSE OBJECTIVES

- To study the concepts of mobile internet protocol and transport layer.
- To understand the concepts of mobile telecommunication system.
- To understand the concept of mobile ad–hoc networks.
- To study the concepts of mobile platforms and applications.

Unit–I


Unit–II


Unit–III

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

Unit–IV


Unit–V


TEXT BOOKS


REFERENCES

7) Windows Phone Dev Center : http://developer.windowsphone.com
8) BlackBerry Developer : http://developer.blackberry.com/

COURSE OUTCOMES
At the end of this course, the students will be able to
1) Understand the principles and concepts of mobile communication.
2) Describe the characteristics and design issues of ad–hoc networks.
3) Analyze and compare the multiplexing techniques.

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COURSE OBJECTIVES
- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers
- To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration
- To learn fiber slicing and connectors, noise effects on system performance, operational principles of WDM and solutions

Unit—I

Unit—II
Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

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

1) Comprehend the basic elements of optical fiber transmission link, fiber modes and structure configurations.
2) Visualize the significance of the different kind of losses, signal distortion in optical wave guides, signal degradation factors and dispersion management techniques in optical system performance.
3) Compare the various optical source materials, LED structures, quantum efficiency as well as structures and figure of merit of Laser diodes.
4) Analyze the fiber optic receiver operation and configuration.
5) Identify and integrate fiber optical components in variety of schemes and operational principles WDM.
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**COURSE OBJECTIVES**

- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of ad hoc routing protocols.
- Learn the architecture and protocols of wireless sensor networks.

**Unit–I**

**Unit–II**

**Unit–III**

**Unit–IV**

**Unit–V**
TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1) Have an understanding of the principles of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
2) Analyze the protocol design issues of ad hoc and sensor networks.
3) Understanding of the principles and characteristics of wireless sensor networks.
4) Have gained an understanding of the current topics in MANETs and WSNs, both from an industry and research point of views.

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| CO4 ✓ | ✓ | ✓ | ✓ | ✓ |

COURSE OBJECTIVES
- To introduce the students to the basic concepts and principles of various components of remote sensing.
- To provide an exposure to GIS and its practical applications.

Unit–I
EMR and its Interaction with Atmosphere & Earth Material: Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan–Boltzman and Weins Displacement Law – Atmospheric scattering, absorption –
Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

**Unit–II**


**Unit–III**


**Unit–IV**


**Unit–V**


**TEXT BOOKS**


**REFERENCES**


**COURSE OUTCOMES**

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

1) Principles of Remote Sensing and GIS.

2) Analysis of RS and GIS data and interpreting the data for modeling applications.

3) Real time application of RS and GIS.
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**COURSE OBJECTIVES**

The student should be made to:

- Understand how Grid computing helps in solving large scale scientific problems
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing
- Learn how to program the grid and the cloud
- Understand the security issues in the grid and the cloud environment

**Unit–I**


**Unit–II**


**Unit–III**

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software-Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure-virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

**Unit–IV**

Unit–V

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure-Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1) Apply grid computing techniques to solve large scale scientific problems.
2) Apply the concept of virtualization.
3) Use the grid and cloud tool kits.

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COURSE OBJECTIVES
- To study about the Data, Task parallelism and java multithreading.
- To understand the concepts of Deadlocks and Parallel Computational Models.
- To study typical models for distributed algorithms and programming languages.
- To demonstrate the general concepts on Cloud computing, grid computing, and peer-to-peer systems
Unit–I

INTRODUCTION: THE POWER AND POTENTIAL OF PARALLELISM: The power and potential of parallelism-purpose of using parallelism- different parallel architecture- reasoning about performance of parallel programs.

Unit–II

DATA, TASK PARALLELISM AND JAVA MULTITHREADING: Introduction of data and task parallelism-Independent parallelism- Introduction to Java multithreading- Fork-join parallelism- Analyze fork and join parallelism- parallel prefix-parallel pack.

Unit–III


Unit–IV

PARALLEL ALGORITHMS AND PROGRAMMING LANGUAGES: Parallel Programming Language - Brent’s Theorem - Simple parallel programs in MPI environments- Parallel algorithms on network- Addition of Matrices- Multiplication of Matrices- Parallel quick sort-Synchronizing shared data structure-Shared memory.

Unit–V

DISTRIBUTED SYSTEM MODEL AND CASES: Distributed system models- Inter process communication- Message passing- Message passing algorithm- Distributed synchronization- Consistency- replication- Cluster computing- MapReduce- Distributed storage- Wide area computing- Distributed hash table- Peer-to-peer systems.

Cases : Parallel computing algorithms and representative programming models- Convergence of parallel- distributed and cloud computing- Cluster Computing-its performance model and system evolution.

TEXT BOOKS


REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. To reason about ways to parallelize a problem and be able to evaluate a parallel platform for a given problem
2. To understand and explore the concepts with programming with MPI and Map Reduce/Hadoop
3. To demonstrate the general concepts on Cloud computing, grid computing, and peer-to-peer systems
4. To become familiar with evaluation of online social networks and their potential

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COURSE OBJECTIVES

- To learn the fundamentals of software defined networks.
- To understand the separation of the data plane and the control plane.
- To study about the SDN Programming.
- To study about the various applications of SDN

Unit–I

Unit–II
OPEN FLOW & SDN CONTROLLERS: Open Flow Specification – Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor-Based Overlays – SDN via Opening up the Device – SDN Controllers – General Concepts

Unit–III
DATA CENTERS: Multitenant and Virtualized Multitenant Data Center – SDN Solutions for the Data Center Network – VLANs – EVPN – VxLAN – NVGRE

Unit–IV
SDN PROGRAMMING: Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs – Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications
Unit–V

SDN: Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller – Floodlight Controller – Bandwidth Calendaring – Data Center Orchestration

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Analyze the evolution of software defined networks
2. Express the various components of SDN and their uses
3. Explain the use of SDN in the current networking scenario
4. Design and develop various applications of SDN

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ITPESCN WEB TECHNOLOGY

COURSE OBJECTIVES
- To understand the technologies used in Web Programming.
- To know the importance of object oriented aspects of Scripting.
- To understand creating database connectivity using JDBC.
- To learn the concepts of web based application using sockets.

Unit–I

Scripting: Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java Script-Object, names, literals, operators and expressions- statements and features- events - windows - documents - frames -
data types - built-in functions- Browser object model - Verifying forms.-HTML5-CSS3- HTML 5 canvas - Web site creation using tools.

Unit–II

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Design web pages.
2. Use technologies of Web Programming.
3. Apply object oriented aspects to Scripting.
4. Create databases with connectivity using JDBC.
5. Build web based application using sockets.

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99
COURSE OBJECTIVES

- To know the characteristic of wireless channel
- To learn the various cellular architectures
- To understand the concepts behind various digital signaling schemes for fading channels
- To be familiar with various multipath mitigation techniques and multiple antenna systems

Unit–I


Unit–II

CELLULAR ARCHITECTURE: Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept-Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement.

Unit–III

DIGITAL SIGNALING FOR FADING CHANNELS: Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

Unit–IV

MULTIPATH MITIGATION TECHNIQUES: Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver

Unit–V

MULTIPLE ANTENNA TECHNIQUES: MIMO systems – spatial multiplexing - System model -Pre-coding - Beam forming – transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.
TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Characterize wireless channels
2. Design and implement various signaling schemes for fading channels
3. Design a cellular system
4. Compare multipath mitigation techniques and analyze their performance
5. Design and implement systems with transmit/receive diversity and MIMO systems and analyze their performance

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ITPESCN  ROBOTICS AND AUTOMATION | L  | T  | P  | C  |
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COURSE OBJECTIVES
- To introduce the functional elements of Robotics
- To impart knowledge on the direct and inverse kinematics
- To introduce the manipulator differential motion and control
- To educate on various path planning techniques

Unit–I
Introduction: Definition, Classification of Robots, geometric classification and control Classification, Robot Elements: Drive system, control system, sensors, end effectors, gripper actuators and gripper design.
Unit–II

Robot Coordinate Systems and Manipulator Kinematics: Robot co-ordinate system representation, transformation, homogenous transform and its inverse, relating the robot to its world. Manipulators Kinematics, parameters of links and joints, kinematic chains, dynamics of kinematic chains, trajectory planning and control, advanced techniques of kinematics and dynamics of mechanical systems, parallel actuated and closed loop manipulators.

Unit–III

Robot Control: Fundamental principles, classification, position, path velocity and force control systems, computed torque control, adaptive control, Sereo system for robot control, and introduction to robot vision.

Unit–IV

Robot Programming: Level of robot programming, language based programming, task level programming, robot programming synthesis, robot programming for welding, machine tools, material handing, assembly operations, collision free motion planning.

Unit–V

Applications: Application of robot in welding, machine tools, material handling, assembly operations parts sorting and parts inspection.

TEXT BOOKS

2. Y. Koren “Robotics for Engineers” Mcgraw Hill.

REFERENCES

2. Asfahl, “Robots & Manufacturing Automat (c)All TCP SYN Packets.

COURSE OUTCOMES

At the end of this course, the students will be able to
1. analyze Instrumentation systems and their applications
2. know about the differential motion add statics in robotics
3. know about the various path planning techniques
4. know about the dynamics and control in robotics industries

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COURSE OBJECTIVES

- To understand the basics of satellite orbits.
- To understand the satellite segment and earth segment.
- To analyze the various methods of satellite access.
- To understand the applications of satellites.

Unit–I

INTRODUCTION TO SATELLITE COMMUNICATION: Historical background, Basic concepts of Satellite Communications, Communication Networks and Services, Comparison of Network Transmission technologies, Orbital and Spacecraft problems, Growth of Satellite communications.

Unit–II


Unit–III


Unit–IV


Unit–V

SATELLITE APPLICATIONS: INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast
(DAB)- World space services, Business TV(BTV), GRAMSAT, Specialized services – E-mail, Video conferencing, Internet.

**TEXT BOOKS**

**REFERENCES**

**COURSE OUTCOMES**
At the end of this course, the students will be able to
1. Analyze the satellite orbits.
2. Analyze the earth segment and space segment.
3. Design various satellite applications

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**COURSE OBJECTIVES**
- Understand foundations of Distributed Systems
- Introduce the idea of peer to peer services and file system
- Understand in detail the system level and support required for distributed system
- Understand the issues involved in studying process and resource management
Unit–I

Unit–II

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
At the end of this course, the students will be able to
1. Discuss trends in Distributed Systems.
2. Apply network virtualization.
3. Apply remote method invocation and objects.
4. Design process and resource management systems.

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COURSE OBJECTIVES
- To learn the role of information retrieval in various real-time applications
- To learn and apply information retrieval models
- To design Web Search Engine
- To be exposed to Link Analysis

Unit–I
Introduction- History of IR –Components of IR-Issues– Open source Search engine Frameworks- The impact of the web on IR-The role of artificial intelligence (AI) in IR-IRVersus Web Search- Components of a Search engine – Characterizing the web

Unit–II

Unit–III

Unit–IV
Link Analysis – husband authorities – Page Rank and HITS algorithms-Searching and Ranking– Relevance Scoring and ranking for Web – Similarity –
Hadoop & Map Reduce-Evaluation- Personalized search - Collaborative filtering and content-based recommendation of documents and products – handling “invisible” Web- Snippet generation, Summarization, Question Answering, Cross-Lingual Retrieval

Unit–V

Information filtering; organization and relevance feedback – Text Mining- Text classification and clustering – Categorization algorithms: naïve Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization(EM).

TEXT BOOKS


REFERENCES

6. www.nptel.ac.in

COURSE OUTCOMES

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

1. Gain an understanding of the basic concepts and techniques in Information Retrieval;
2. Understand how statistical models of text can be used to solve problems in IR, with a focus on how the vector-space model and language models are implemented and applied to document retrieval problems;
3. Understand how statistical models of text can be used for other IR applications, for example clustering and news aggregation;
4. Appreciate the importance of data structures, such as an index, to allow efficient access to the information in large bodies of text;
5. Understand common text compression algorithms and their role in the efficient building and storage of inverted indices.
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ITPESCN | COMPILER DESIGN
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COURSE OBJECTIVES

- To learn the design principles of a Compiler.
- To learn the various parsing techniques and different levels of translation.
- To learn how to optimize and effectively generate machine codes.

Unit–I
INTRODUCTION TO COMPILERS: Translators-Compilation and Interpretation-Language processors -The Phases of Compiler Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools - Programming Language basics.

Unit–II

Unit–III

Unit–IV
Unit-V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

At the end of this course, the students will be able to
1. Design and implement a prototype compiler.
2. Apply the various optimization techniques.
3. Use the different compiler construction tools.

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COURSE OBJECTIVES

- To know the basics of ERP and to understand the key implementation issues of ERP
- To know the business Modules of ERP
- To be aware of some popular products in the area of ERP
- To appreciate the current and future trends in ERP
Unit–I


Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

At the end of this course, the students will be able to
1. Design and develop ERP implementation cycle.
2. Awareness of core and extended Modules of ERP.
3. Knowledge about the business Modules of ERP.

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COURSE OBJECTIVES

- To provide basic knowledge about the types of Electronic payment systems.
- To illustrate the concepts of various On-Demand Education and Software Agents

Unit–I


Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Identify and analyze the construction and working principles of E-Commerce.
2. Develop and implement the Electronic Payment Systems and EDI.

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ITOESCN BIO INFORMATICS

COURSE OBJECTIVES
- To study the fundamentals of Bioinformatics technologies
- To learn principles of modern bio-informatics and to apply basic predictive methods those are common use in the field.
- To study the tools and databases applied in the field.

Unit–I
Introduction: Need for Bioinformatics technologies –Overview of Bioinformatics technologies Structural bioinformatics –Data format and processing–Secondary resources and applications –Role of Structural bioinformatics –Biological Data Integration System.

Unit–II

Unit–III
Modeling for bioinformatics: Hidden markov modeling for biological data analysis –Sequence identification –Sequence classification–multiple alignment generation –Comparative modeling –Protein modeling – genomic modeling –
Probabilistic modeling – Bayesian networks – Boolean networks – Molecular modeling – Computer programs for molecular modeling.

**Unit–IV**


**Unit–V**


**TEXT BOOKS**


**REFERENCES**


**COURSE OUTCOMES**

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

1. Develop models for biological data.
2. Apply pattern matching techniques to bioinformatics data – protein data genomic data.
3. Apply micro array technology for genomic expression study.

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113
COURSE OBJECTIVES

- To understand the importance of major decisions in supply chain management
- To present the vision of supply chain management and their role in enterprise competitiveness
- To appreciate the current trends in SCM

Unit-I

Unit-II

Unit-III

Unit-IV

Unit-V

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Ability to build a competitive supply chain using strategies, models, techniques and information technology.
2. Manage a competitive supply chain using strategies, models, techniques and information technology.

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COURSE OBJECTIVES
- To study the fundamentals of Computer Forensics
- To learn, analyze and validate Forensics Data
- To study the tools and tactics associated with Cyber Forensics

Unit–I

Unit–II
Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

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

1. Identify the present indicators that a Cyber Security incident has occurred.


4. Work in teams to analyze and resolve Cyber Security issues.

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COURSE OBJECTIVES

- To understand the basic system concept and definitions of system.
- To understand the system concept and apply functional modeling method to model the activities of a static system.
- To understand the behavior of a dynamic system and create an analogous model for a dynamic system.
- To understand simulate the operation of a dynamic system and make improvement according to the simulation results.

Unit–I


Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Acquiring knowledge of Simulation Terminologies and Classification.
2. Familiarizing the idea of Mathematical Models.
3. Familiarizing of Simulation Data.
4. Gaining experience skills on Verification and Validation of Simulation Models.
5. Familiarizing on Simulation Tools and Simulation Project Management.

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COURSE OBJECTIVES
- To understand the concept of semantic web and related applications
- To learn knowledge representation using ontology
- To understand human behavior in social web and related communities
- To learn visualization of social networks

Unit–I
Unit–II

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES
COURSE OUTCOMES

At the end of this course, the students will be able to
1. Know basic notation and terminology used in network science
2. Work on the internals components of the social network
3. Model and visualize the social network
4. Understand the behaviour of the users in the social network

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ITOESCN | SOFT COMPUTING TECHNIQUES | L | T | P | C
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COURSE OBJECTIVES

• Learn the various soft computing frameworks
• Be familiar with the design of various Neural Networks
• Be exposed to Fuzzy Logic
• Learn Genetic programming and Hybrid Systems

Unit–I


Unit–II


Unit–III


**Unit–IV**


**Unit–V**


**TEXT BOOKS**


**REFERENCES**


**COURSE OUTCOMES**

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

1. Select and apply various soft computing frameworks
2. Design of various neural networks
3. Use fuzzy logic
4. Apply genetic programming
5. Understand hybrid soft computing
### Mapping with Programme Outcomes

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### ITOESCN KNOWLEDGE MANAGEMENT

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### COURSE OBJECTIVES

- Design and maintain knowledge management system.
- Coverage of knowledge management concepts and methodologies which includes knowledge creation, knowledge architecture and knowledge codification.
- Broad understanding of knowledge management tools and knowledge portals as well as the notions of knowledge transfer in the E-world.

#### Unit–I


#### Unit–II


#### Unit–III


#### Unit–IV


#### Unit–V

Knowledge Transfer And Sharing: Transfer Methods – Role of the Internet – Knowledge Transfer in E-world – KM System Tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence-Decision

**TEXT BOOKS**

**REFERENCES**

**COURSE OUTCOMES**
At the end of this course, the students will be able to
1. Obtain Knowledge of components in KMS and how to use in business environment for effective decision making.
2. Become familiar with the current theories, practices, tools and techniques in Knowledge Management.
3. Learn to determine the infrastructure requirements to manage the intellectual capital in organizations.
4. Identify and select tools and techniques of KM for the stages of creation, acquisition, transfer and management of knowledge.
5. Evaluate the impact of technology including telecommunications, networks, and internet/intranet role in managing knowledge.

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**COURSE OBJECTIVES**
- To understand the activities in project management.
- To impart knowledge on project scheduling, monitoring and to control.
- To Study about managing people and teams.
Unit–I
Project Definition – Contract Management – Activities Covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning.

Unit–II

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Understand the basic concepts and issues of software project management
2. Effectively planning the software projects and Create project plans that address real–world management challenges.
3. Implement the project plans through managing people, communications and change.
4. Deliver successful software projects that support your organization’s strategic goals.
Mapping with Programme Outcomes

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ITOESCN PRODUCT DESIGN L T P C

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**COURSE OBJECTIVES**

- To familiarize the students about the aspects of product design and development.
- To provide basic knowledge about the costs of product development.
- To illustrate the concepts of Quality control and reliability of product.

**Unit–I**

Introduction: Significance of product design– challenges of product design–product design and development process–sequential engineering design method– the challenges of product development– Identifying opportunities evaluate and prioritize projects–allocation of resources.

**Unit–II**


**Unit–III**


**Unit–IV**


**Unit–V**

TEXT BOOKS
1. Karl Ulrich, Steven Eppinger, “Product Design and Development”, Tata
2. Alex Milton, Paul Rodgers, “Product Design”, Laurence King Publishing,
2011

REFERENCES
1. Niebel B.W and Draper A.B., “Product design and process Engineering”,

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Describe an engineering design and development process
2. Demonstrate individual skill using selected manufacturing techniques, including drilling, tapping, and rapid prototyping
3. Employ engineering, scientific and mathematical principles to execute a design from concept to finished product

| Mapping with Programme Outcomes |
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ITOESCN | ORGANIZATIONAL BEHAVIOUR AND MANAGEMENT | L | T | P | C |
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COURSE OBJECTIVES
- Educate the students with the basic nature of management and its process.
- Know the responsibilities of a professional manager as well as the organizational behavior.
- Know the importance about leadership.
- Understand the performance at the individual and group levels.

Unit–1
Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Understand about management, its process and also the responsibilities of a professional manager.
2. Understand the performance at the individual and group levels.
3. Obtain leadership quality.

Mapping with Programme Outcomes

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HONOURS ELECTIVES

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COURSE OBJECTIVES
- To understand the basics of IoT and its application sectors
- To understand M2M and IoT
- To understand and apply IoT protocols appropriately
- To design and develop IoT based applications

Unit–I
Introduction to IOT, definition and characteristics of IOT- Architecture of Internet of Things, Physical and logical design of IOT, IOT enabling technologies, IOT levels and deployment templates- Domain specific IOTs, home automation, cities, environment, Domain specific IOTs, Energy, retail, agriculture, industry, health and lifestyle.

Unit–II
IoT and M2M Communication: M2M, difference between IOT and M2M, ETSI M2M Architecture, system architecture- ETSI M2M SCL resource structure, Security in ETSI M2M framework, SDN and NFV for IOT, IOT system management, need for IOT system management- SNMP, Network operator requirements, NETCONF-YANG, IOT system management with NETCONF-YANG, IoT Design methodology-case study on IOT system for Weather Monitoring.

Unit–III

Unit–IV
IoT Technical Standards And Protocols: RF Protocols: RFID, NFC; IEEE 802.15.4: ZigBee, Z-WAVE, THREAD; Bluetooth Low Energy (BLE), IPv6 for Low Power and Lossy Networks (6LoWPAN) and Routing Protocol for Low power and
lossy networks (RPL)- CoAP, XMPP, Web Socket, AMQP, MQTT, WebRTC, PuSH-
Architectural Considerations in Smart Object Networking.

Unit–V

Developing Internet Of Things: IoT platforms design methodology, IoT Physical
devices and endpoints- IoT Systems: Logical design using Python, IoT physical
servers and cloud offerings (Cloud computing for IoT)

TEXT BOOKS

2. Oliver Hersent, David Boswarthick, Omar Elloumy, “The Internet of

REFERENCES

1. Michael Miller, “The Internet of Things, How Smart TVs, Smart Cars, Smart
   Homes, and Smart Cities are changing the World”, First edition ,2015,
   Pearson.
3. https://thingsee.com/blog/quality-hardware-list-for-your-iot-projects, as on
date: 25/04/16
5. http://dret.net/lectures/iot-spring15/protocols, as on date: 25/04/2016
   frameworks, as on date: 25/04/2016

COURSE OUTCOMES

At the end of this course, the students will be able to
1. Identify the components of IoT.
2. Analyze various protocols of IoT.
3. Design portable IoT using appropriate boards.
4. Develop schemes for the applications of IOT in real time scenarios.
5. Design business Intelligence and Information Security for WoT

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COURSE OBJECTIVES

- To understand the concepts of machine learning.
- To appreciate supervised and unsupervised learning and their applications.
- To understand the theoretical and practical aspects of Probabilistic Graphical Models.
- To appreciate the concepts and algorithms of reinforcement learning.

Unit–I


Unit–II


Unit–III


Unit–IV


Unit–V


**TEXT BOOKS**

**REFERENCES**

**COURSE OUTCOMES**
At the end of this course, the students will be able to
1. Define various methods and learning techniques in machine learning.
2. Identify the choice of using an available tool for different machine learning techniques.
3. Apply probabilistic discriminative and generative algorithms for an application.
4. Experiment different clustering algorithms on various applications.
5. Design and implement probabilistic graphical

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**ITHESCN SPEECH SIGNAL PROCESSING**

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**COURSE OBJECTIVES**
- To understand the basic mechanism of speech production and auditory perception.
- To learn the basic concepts of time and frequency domain analysis of speech signal.
• To extract various parameters of speech.
• To develop several applications of speech signal processing.

Unit–I


Unit–II


Frequency-Domain Representations: Introduction, Discrete-Time Fourier Analysis, Short-Time Fourier Analysis, Spectrographic Displays, Overlap Addition Method of Synthesis, Filter Bank Summation Method of Synthesis

Unit–III

The Cepstrum and Homomorphic Speech Processing: Introduction, Homomorphic Systems for Convolution, Computing the Short-Time Cepstrum and Complex Cepstrum of Speech, Homomorphic Filtering of Natural Speech, Cepstrum Distance Measures.


Unit–IV


Unit–V

Text dependent and text independent speaker identification and verification. Natural Language Understanding: Spoken Language Understanding, Dialog Management and Spoken Language Generation, User Interfaces, Multimodal User Interfaces.


TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Understand human speech communication system
2. Interpret time varying signals and system for modeling speech
3. Analyze short-time characteristics of speech signal
4. Extract various types of parameters and representations from speech
5. Develop applications using various speech processing techniques

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COURSE OBJECTIVES

- To understand several key big data technologies used for storage, analysis and manipulation of data.
- To recognize the key concepts of Hadoop framework, MapReduce, and Hadoop Ecosystem.
- To analyze various big data based case studies and prepare a sample big data project.

Unit–I

Unit–II

Unit–III
MapReduce: Analyzing the Data with Hadoop - Scaling Out - Hadoop Streaming - Hadoop Pipes. Developing a MapReduce Application: The Configuration API - Configuring the Development Environment - Writing a Unit Test - Running Locally on Test Data - Running on a Cluster - Tuning a Job - MapReduce Workflow - Anatomy of a MapReduce Job Run - Failures - Job Scheduling - Shuffle and Sort - Task Execution

Unit–IV
Pig: Installing and Running - An Example - Pig Latin - User-Defined Functions - Pig in Practice
Hive - Installing Hive - An Example - Running Hive - Comparison with Traditional Databases - HiveQL - Tables - Querying Data - User-Defined Functions
Hbase: Hbasics - Concepts - Installation - Clients – Example

Unit–V
ZooKeeper: Installing and Running ZooKeeper - An Example - The ZooKeeper Service - Building Applications with ZooKeeper
Sqoop: Getting Sqoop - A Sample Import - Generated Code - Database Imports - Working with Imported Data - Importing Large Objects - Performing an Export.
Case Studies: Hadoop Usage at Last.fm - Hadoop and Hive at Facebook - Nutch Search Engine - Log Processing at Rackspace
TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. categorize and summarize big data and its importance.
2. differentiate various big data technologies like Hadoop, MapReduce, and Hadoop Ecosystem
3. apply tools and techniques to analyze big data.
4. earn tips and tricks for big data use cases and solutions.

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COURSE OBJECTIVES
- Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.
- Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
- Implement deep learning algorithms and solve real-world problems.

Unit–I
Basics of Artificial Neural Networks - Characteristics of Neural Networks, ANN Terminology, Models of Neuron, Topology, Basic Learning Laws.
Deep Learning Applications - Large Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications
Unit–II

Functional Units of ANN for Pattern Recognition Tasks - Pattern Recognition Problem, Basic Functional Units.

Unit–III
Feedforward Neural Networks - Introduction, Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks.


Unit–IV

Unit–V
Regularization for Deep Learning - Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

TEXTBOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Explain different network architectures and how these are used in current applications
2. Implement, train, and evaluate neural networks using existing software libraries
3. Present and critically assess current research on neural networks and their applications
4. Relate the concepts and techniques introduced in the course to your own research
5. Plan and carry out a research project on neural networks within given time limits
### ITHESCN DATA ANALYTICS

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#### COURSE OBJECTIVES

- To introduce fundamental techniques and tools required for data analytics
- To learn basic tools for statistical analysis, R, and key methods used in machine Learning
- To learn MapReduce techniques for parallel processing and Hadoop

#### Unit I


#### Unit II


#### Unit III

Map Reduce: Introduction – Distributed file system – Algorithms using map reduce, Matrix–Vector Multiplication by Map Reduce-Hadoop – Understanding the Map Reduce architecture-Writing Hadoop MapReduce Programs – Loading data into HDFS – Executing the Map phase-Shuffling and sorting – Reducing phase execution.

#### Unit IV


Case Studies: Social Network Analysis – Text analysis –Marketing analysis.
Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

At the end of this course, the students will be able to
1. Understand fundamental techniques and tools required for data analytics.
2. Use basic tools for statistical analysis, R, Hadoop, and key methods used in machine learning.
3. Apply Map Reduce techniques for parallel processing.
4. Apply fundamental algorithmic ideas to process data, and apply hypotheses and data into actionable predictions.
5. Document and transfer the results, and effectively communicate the findings using visualization techniques.

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MINOR ENGINEERING ELECTIVES

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COURSE OBJECTIVES

- To introduce the fundamentals of computer programming languages, Operating system, database terminology.
- To introduce the basics of information technology, its role and present scenario and basics of multimedia.
- To introduce network concepts, internet tools and search engines.
- To elaborate on future trends of information technology.

Unit–I


Unit–II


Unit–III


Unit–IV

The Basics of Networks, Internet and Internet Tools. Computer Networks - Computer Network, Network Topologies, Network Devices. Internet - Introduction, Evolution of Internet, Basic Internet Terms, and Getting connected to the Internet, Internet Applications. Internet Tools - Introduction, Web Browser, Browsing Internet using Internet Explorer, E-mail Address Structure, Search engines.

Unit–V

TEXT BOOKS
1. “Introduction to Information Technology”, ITL Education solutions limited, PEARSON.

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
2. Identify system components and utilize computer hardware.
3. Describe basics of programming, components of a database and operating system.
4. Understand the strategic importance of information technology.
5. Understand the fundamental terminology of data communication and internet tools.
6. Recognize the applications of IT in various sectors and future trends.

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COURSE OBJECTIVES
- To introduce the object oriented concepts.
- To learn object oriented programming using C++.
- To understand the challenges in developing object oriented programming.

Unit–I
Introduction: Evolution of programming methodologies-Disadvantages of conventional programming-programming paradigms.

Unit–II

Unit–III


Classes and objects: Defining member functions function and data members – objects and memory – static object – array of objects – objects as function arguments, friend functions, member functions and non-member functions – overloading member functions.

Unit–IV


Overloading Functions: Overloading unary operators — overloading binary operators – overloading with friend functions.

Inheritance: Introduction – public, private, and protected derivations-Types of Inheritance

Unit–V


TEXT BOOKS


REFERENCES


COURSE OUTCOMES

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

1. Analyze and design a problem using an object-oriented approach.
2. Implement the problem using C++ programming Language.
3. Understand the concepts of Features of object oriented programming.
4. Learn the programming details of object oriented programming.
5. Develop C++ programs for various real time applications.
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COURSE OBJECTIVES

- Gets the idea of choosing the required functionality at each layer for a given application and trace the flow of information from one node to another node in the network.
- Then gives the understanding of division of network functionalities into layers, the component required to build different types of networks and identifying the solution for the functionalities in each layer.

Unit–I


Unit–II


Unit–III


Unit–IV


Unit–V

Application Layer: DNS – Name space – Resource records – name servers – e-mail - Message Formats - Message Transfer - Final Delivery – WWW - Static Web
TEXT BOOKS

REFERENCES

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Analyze the requirement of various hardware components and software to be developed to establish a network.
2. Understand the Layered Architecture of Computer Networks.
3. Understand the operation of the main components of computer networks.
4. Acquire the required skill to design simple computer networks.

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COURSE OBJECTIVES
- The purpose of this subject is to introduce the concepts and techniques used in Computer Graphics, Animations & Multimedia.
- The students should have general idea about input/output devices and computing fundamentals.
- In addition, a familiarity with general mathematical transformations is required.
Unit–I
Pixel, frame, buffer, application of computer graphics, Raster Graphics fundamentals. Display Devices- Random Scan, Raster Scan Monitors, Color CRT Monitor, DVST and Plasma Panel.

Unit–II

Unit–III
3-D Transformation: Translation, Scaling, Rotation, windowing & clipping windows, view port, line clipping, polygon clipping, windows & view port transformation. Display file, Segment table, Segment creation, deletion, rename.

Unit–IV

Unit–V

TEXT BOOKS

REFERENCES
3. Andleigh, Thakral, “Multimedia System Design”, PHI Learning

COURSE OUTCOMES
At the end of this course, the students will be able to
1. Identify system components and utilize computer hardware.
2. Describe basics of programming, components of a database and operating system.
3. Understand the strategic importance of information technology.
4. Understand the fundamental terminology of data communication and internet tools.
5. Recognize the applications of IT in various sectors and future trends.

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COURSE OBJECTIVES

- To understand the number theory used for network security.
- To understand the design concept of cryptography and authentication.
- To understand the design concepts of internet security.
- To understand Intrusions and intrusion detection

Unit–I

Unit–II
Operating System Security: Protected objects and methods of protection-Memory address protection-Control of access to general objects-File protection mechanism-Authentication: Authentication basics- Password-Challenge-response-Biometrics

Unit–III
Database Security: Security requirements-Reliability and integrity-Sensitive data-Interface- Multilevel database-Proposals for multilevel security

Unit–IV
Security in Networks: Threats in networks- Network security control-Firewalls-Intrusion detection systems- Secure e-mail-Networks and cryptography-Example protocols: PEM- SSL-Ipsec.

Unit–V

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
At the end of this course, the students will be able to
1. Understand basic cryptographic algorithms, message and web authentication and security issues.
2. Identify information system requirements for both of them such as client and server.
3. Understand the current legal issues towards information security.

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COURSE OBJECTIVES
- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

Unit–I

Unit–II
Data Pre-processing: Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

Unit–III
Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction. Alternative Techniques, Bayes’ Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

Unit–IV
Association Analysis: Basic Concepts and Algorithms: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. (Tan & Vipin)
Unit–V


TEXT BOOKS
2. Jiawei Han, Michel Kamber, “Data Mining concepts and Techniques”, 3rd Edition, Elsevier.

REFERENCES
4. Alex Berson, Stephen Smith, “Data Warehousing Data Mining & OLAP”, TMH.

COURSE OUTCOMES
At the end of this course, the students will be able to
1) Understand stages in building a Data Warehouse
2) Understand the need and importance of preprocessing techniques
3) As Understand the need and importance of Similarity and dissimilarity techniques
4) Analyze and evaluate the performance of algorithms for Association Rules.
5) Analyze Classification and Clustering algorithms

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