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.

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.

<table>
<thead>
<tr>
<th>Marks Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 to 100</td>
<td>‘S’</td>
</tr>
<tr>
<td>80 to 89</td>
<td>‘A’</td>
</tr>
<tr>
<td>70 to 79</td>
<td>‘B’</td>
</tr>
<tr>
<td>60 to 69</td>
<td>‘C’</td>
</tr>
<tr>
<td>55 to 59</td>
<td>‘D’</td>
</tr>
<tr>
<td>50 to 54</td>
<td>‘E’</td>
</tr>
<tr>
<td>Less than 50</td>
<td>‘RA’</td>
</tr>
<tr>
<td>Withdrawn from the examination</td>
<td>‘W’</td>
</tr>
</tbody>
</table>

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.

\[
\begin{align*}
S & : 10; \\
A & : 9; \\
B & : 8; \\
C & : 7; \\
D & : 6; \\
E & : 5; \\
RA & : 0
\end{align*}
\]

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.
<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Branches of Study</th>
<th>Eligible Diploma Programme (FT / PT / SW)</th>
</tr>
</thead>
</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  
                    xi. Ceramic Technology  
                    xii. Petro Chemical Technology  
                    xiii. Pulp & Paper Technology  
                    xiv. 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. | iv. Architectural Assistantship  
                    v. Civil Engineering (Rural Tech.)  
                    vi. Civil and Rural Engineering  
                    vii. Agricultural 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       | 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 |
| 6. | **Electronics and Communication 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  
ix. Electrical and Electronics Engineering  
x. Electronics and Instrumentation Engg |
|----|------------------------------------------|-----------------------------------------------|
| 7. | **Electronics and Instrumentation 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)  
x. Mechatronics Engineering |
| 8. | **Information Technology** | 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 |
| 9. | **Mechanical Engineering** | i. Mechanical Engineering  
ii. Mechanical and Rural Engineering  
iii. Mechanical Design and Drafting  
iv. Production Engineering  
v. Production Technology  
vi. Automobile Engineering  
vii. Automobile Technology  
viii. Metallurgy |
<table>
<thead>
<tr>
<th></th>
<th>Mechanical Engineering (Manufacturing Engineering)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ix.</td>
<td>Mechatronics Engineering</td>
</tr>
<tr>
<td>x.</td>
<td>Machine Tool Maintenance and Repairs</td>
</tr>
<tr>
<td>xi.</td>
<td>Tool and Die making</td>
</tr>
<tr>
<td>xii.</td>
<td>Tool Engineering</td>
</tr>
<tr>
<td>xiii.</td>
<td>Tool Design</td>
</tr>
<tr>
<td>xiv.</td>
<td>Foundry Technology</td>
</tr>
<tr>
<td>xv.</td>
<td>Refrigeration and Air Conditioning</td>
</tr>
<tr>
<td>xvi.</td>
<td>Agricultural Engineering</td>
</tr>
<tr>
<td>xvii.</td>
<td>Agricultural Technology</td>
</tr>
<tr>
<td>xviii.</td>
<td>Marine Engineering</td>
</tr>
<tr>
<td>xix.</td>
<td>Mechanical Engineering(Production)</td>
</tr>
<tr>
<td>xx.</td>
<td>Mechanical Engineering(Tool &amp;Die)</td>
</tr>
<tr>
<td>xxi.</td>
<td>Mechanical Engineering (Foundry)</td>
</tr>
<tr>
<td>xxii.</td>
<td>Mechanical Engineering(R &amp; A.C.)</td>
</tr>
<tr>
<td>xxiii.</td>
<td>Electronics(Robotics)</td>
</tr>
<tr>
<td>xxiv.</td>
<td>Mining Engineering</td>
</tr>
<tr>
<td>xxv.</td>
<td>Agricultural Engineering and Farm Machinery</td>
</tr>
<tr>
<td>xxvi.</td>
<td>Equipment Technology</td>
</tr>
<tr>
<td>S.No.</td>
<td>Branch of Study in B.E</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------</td>
</tr>
</tbody>
</table>
| 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 |
| 3.    | Civil and Structural Engineering | 1. Civil Engineering  
                             2. Civil and Structural Engg. | 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 |
                             2. Information Technology  
                             3. Electronics and Communication Engineering | 1. Civil Engineering  
                             2. Electrical Engineering  
                             3. Electronics and Communication Engg  
                             4. Mechanical Engineering  
                             5. Mechanical (Manufacturing) Engg  
                             6. Civil and Structural Engg  
                             7. Electrical Engineering  
                             8. Chemical Engineering |
| 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. 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. Information Technology  
3. Electronics and Communication Engineering |
| 9. | Mechanical Engineering | 1. Civil Engineering  
2. Electronics and Instrumentation Engg  
3. Electrical Engineering |
| 10. | Mechanical (Manufacturing) Engg. | 1. Mechanical Engineering  
3. Chemical Engineering  
4. Electrical Engineering  
5. Computer Science and Engineering  
6. Electronics and Instrumentation Engg  
7. Information Technology  
8. Electronics and Communication Engg |
### SEMESTER I

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**Total Credits** | 17.5

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

### SEMESTER IV

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**Total Credits 21.5**

Students must undergo Internship for 4 weeks during summer vacation which will be assessed in the forthcoming V Semester.
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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.
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**Total Credits**: 19.5

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**PE – PROFESSIONAL ELECTIVES**

1. Perl Programming
2. Visual Programming
3. Web Technology
4. Real Time Systems
5. Distributed Systems
6. Mobile App Development
7. Software Testing and Quality Assurance
8. Mobile Computing
9. Cryptography and Network Security
10. Pervasive Computing
11. Adhoc and sensor Networks
12. Digital Image Processing
13. Machine Learning
14. Digital Signal Processing
15. Cloud Computing
16. Speech Processing and Synthesis
17. Information Retrieval Techniques
18. Data Mining
19. Web Application Framework
20. Open Source Programming
21. Soft Computing Techniques
OE- OPEN ELECTIVES

1. Internet of Things
2. Enterprise Resource Planning
3. E-Commerce
4. Supply Chain Management
5. Cyber Forensics
6. System Modeling and Simulation
7. Big Data Analytics
8. Social Network Analysis

LIST OF HONORS ELECTIVE COURSES

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<td>Artificial Intelligence</td>
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<td>Graph Theory</td>
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<td>4</td>
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<td>Deep Learning (or) Operation Research</td>
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<td>5</td>
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<td>Parallel and Distributed Algorithms</td>
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LIST OF MINOR ENGINEERING ELECTIVE COURSES

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<td>Object Oriented Programming</td>
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<td>CSMISCN</td>
<td>Database Management Systems (or) Software Engineering</td>
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<td>Internet of Things</td>
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<td>6</td>
<td>CSMISCN</td>
<td>Big Data Analytics (or) Social Network Analysis</td>
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<td>7</td>
<td>CSHESCN</td>
<td>Digital Watermarking and Steganography</td>
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I Semester

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**Oscillations, waves and optics**

**Pre-requisites**
(i) Mathematics course on Differential equations
(ii) Introduction to Electromagnetic theory

**Unit 1: Simple harmonic motion, damped and forced simple harmonic oscillator**
(*7 lectures*)

Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance, steady state motion of forced damped harmonic oscillator, power absorbed by oscillator.

**Unit 2: Non-dispersive transverse and longitudinal waves in one dimension and introduction to dispersion**
(*7 lectures*)

Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching, standing waves and their eigenfrequencies, longitudinal waves and the wave equation for them, acoustics waves and speed of sound, standing sound waves. Waves with dispersion, water waves, superposition of waves and Fourier method, wave groups and group velocity.

**Unit 3: The propagation of light and geometric optics**
(*10 lectures*)

Fermat’s principle of stationary time and its applications e.g. in explaining mirage effect, laws of reflection and refraction, Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster’s angle, total internal reflection, and evanescent wave. Mirrors and lenses and optical instruments based on them, transfer formula and the matrix method.

**Unit 4: Wave optics**
(*6 lectures*)

Huygens’ principle, superposition of waves and interference of light by wavefront splitting and amplitude splitting; Young’s
double slit experiment, Newton’s rings, Michelson interferometer, Mach-Zehnder interferometer. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

**Unit 5: Lasers (8)**

Einstein’s theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO₂), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

**Suggested Reference Books**

(i) Ian G. Main, Oscillations and waves in physics
(ii) H.J. Pain, The physics of vibrations and waves
(iii)E. Hecht, Optics
(iv)A. Ghatak, Optics
(v)O. Svelto, Principles of Lasers

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**Unit 1: Calculus: (6 lectures)**

Evolutes- and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

**Unit 2: Calculus: (6 lectures)**

Rolle’s Theorem, Mean value theorems, Taylor’s and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

**Unit 3: Sequences and series: (10 lectures)**

Convergence of sequence and series, tests for convergence; Power
series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval’s theorem.

**Unit 4: Multivariable Calculus (Differentiation): (8 lectures)**
Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

**Unit 5: Matrices (10 lectures)**
Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

**Suggested Text/Reference Books**

**Course Outcomes**
The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. The students will learn:
- To apply differential and integral calculus to notions of
curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.

- The fallouts of Rolle’s Theorem that is fundamental to application of analysis to Engineering problems.
- The tool of power series and Fourier series for learning advanced Engineering Mathematics.
- To deal with functions of several variables that are essential in most branches of engineering.
- The essential tool of matrices and linear algebra in a comprehensive manner.

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<tr>
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<td>Course Title</td>
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**Unit 1: DC Circuits (8 Hours)**

**Unit 2: AC Circuits (8 Hours)**
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RLC combinations (Series and Parallel), resonance, Three phase balanced circuits, voltage and current relations in star delta connections.

**Unit 3: Transformers (6 Hours)**
Magnetic Materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Autotransformer and three-phase transformer connections.

**Unit 4: Electrical Machines (8 Hours)**
Unit 5: Power Converters and Electrical Installations (12 Hours)
DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation. Components of LT switchgear: Switch Fuse Unit(SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics of Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Text/Reference Books

Course Outcomes
• To understand and analyze basic electric and magnetic circuits.
• To study and working principles of electrical machines and power convertors.
• To introduce the components of low voltage electrical installations.
**Course Code**: ETBP104  
**Category**: Basic Science Course  
**Course Title**: Physics Laboratory  
**Scheme and Credits**  

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**List of Experiments:**

1. Air Wedge  
2. Newton’s Rings  
3. Simple Pendulum  
4. Dispersive power of the Prism  
5. Diffraction Grating  
6. Acoustic diffraction Grating  
7. Compound Pendulum  
8. Kunt’s tube experiment  
9. Young’s double slit experiment  
10. Laser Grating  
11. Torsional Pendulum  
12. Young’s Modulus – Non-uniform Bending  

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**Course Code**: ETSP105  
**Category**: Engineering Science Course  
**Course Title**: Electrical Engineering Laboratory  
**Scheme and Credits**  

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**List of experiments/ demonstrations:**

- Measuring the steady – state and transient time-response of R-L,R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L and R-C circuits – impedance calculation and verification. Observation of phase difference between current and voltage. Resonance in R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an
oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonies. Loading of a transformer: measurement of primary and secondary voltages and currents and power.

- Demonstration of cut-out sections of machines: de machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging-slip ring arrangement) and single-phase induction machine.
- Torque Speed Characteristic of separately excited de motor.
- Synchronous Machine operating as a generator: stand-alone operation with a load.
- Control of voltage through field excitation.
- Demonstration of (a) dc-dc convertors (b) dc-ac convertors – PWM waveform (c) the use of dc-ac convertor for speed control of an induction motor and (d) Components of LT switchgear

**Laboratory Outcomes**

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.
- Get an exposure to the working of power electronic converters.

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<tr>
<td>Category</td>
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<tr>
<td>Course title</td>
<td><strong>Engineering Workshop / Manufacturing Practices</strong></td>
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(i) Lectures & Videos: (10 hours)
1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods (3 lectures)
2. CNC machining, Additive manufacturing (1 lecture)
3. Fitting operations & power tools (1 lecture)
4. Electrical & Electronics (1 lecture)
5. Carpentry (1 lecture)
6. Plastic moulding, glass cutting (1 lecture)
7. Metal casting (1 lecture)
8. Welding (arc welding & gas welding), brazing (1 lecture)

Suggested Text/Reference Books:

Course Outcomes
Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

(ii) Workshop Practice: (60 hours)
1. Machine shop (10 hours)
2. Fitting shop (8 hours)
3. Carpentry (6 hours)
4. Electrical & Electronics(8 hours)
5. Welding shop ( 8 hours (Arc welding 4 hrs + gas welding 4 hrs)
6. Casting (8 hours)
7. Smithy (6 hours)
8. Plastic moulding & Glass Cutting (6 hours)
Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

**Laboratory Outcomes**
- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

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**II Semester**

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<tr>
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**Unit 1: Vocabulary Building**

1.1 The concept of Word Formation
1.2 Root words from foreign languages and their use in English
1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
1.4 Synonyms, antonyms, and standard abbreviations.

**Unit 2: Basic Writing Skills**

2.1 Sentence Structures
2.2 Use of phrases and clauses in sentences
2.3 Importance of proper punctuation
2.4 Creating coherence
2.5 Organizing principles of paragraphs in documents
2.6 Techniques for writing precisely

**Unit 3: Identifying Common Errors in Writing**
3.1 Subject-verb agreement
3.2 Noun-pronoun agreement
3.3 Misplaced modifiers
3.4 Articles
3.5 Prepositions
3.6 Redundancies
3.7 Clichés

Unit 4: Nature and Style of sensible Writing

4.1 Describing
4.2 Defining
4.3 Classifying
4.4 Providing examples or evidence
4.5 Writing introduction and conclusion

Unit 5: Writing Practices & Oral Communication

5.1 Comprehension
5.2 Precis Writing
5.3 Essay Writing

Suggested Readings:

Course Outcomes
The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

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<tr>
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**Unit 1: Atomic and molecular structure (12 lectures)**

Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

**Unit 2: Spectroscopic techniques and applications (8 lectures)**


**Unit 3: Intermolecular forces and potential energy surfaces & Periodic properties (8 Lectures)**

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H₃, H₂F and HCN and trajectories on these surfaces. Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

**Unit 4: Use of free energy in chemical equilibria (6 lectures)**


**Unit 5: Stereochemistry Organic reactions (8 lectures)**

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds. Introduction to reactions involving substitution, addition,
elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

**Suggested Text Books**

(i) University chemistry, by B. H. Mahan  
(iii) Fundamentals of Molecular Spectroscopy, by C. N. Banwell  
(iv) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan  
(v) Physical Chemistry, by P. W. Atkins  
http://bcs.whfreeman.com/vollhardtschore5e/default.asp

**Course Outcomes**

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.
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**Scheme and Credits**

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**Unit 1:** Introduction to Programming, Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.), Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code. *(8 lectures)*

**Unit 2:** Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops. *(14 lectures)*

**Unit 3:** Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required). *(12 lectures)*

**Unit 4:** Function: Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference, Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort. *(10 lectures)*

**Unit 5:** Structure: Structures, Defining structures and Array of Structures, Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation). File handling (only if time is available, otherwise should be done as part of the lab). *(6 lectures)*

**Suggested Text Books**

(i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill  
(ii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

**Suggested Reference Books**

(i) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
Course Outcomes

The student will learn

➢ To formulate simple algorithms for arithmetic and logical problems.
➢ To translate the algorithms to programs (in C language).
➢ To test and execute the programs and correct syntax and logical errors.
➢ To implement conditional branching, iteration and recursion.
➢ To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
➢ To use arrays, pointers and structures to formulate algorithms and programs.
➢ To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
➢ To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.

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<td>Scheme and Credits</td>
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Unit 1: Multivariable Calculus (Integration): (10 lectures)
Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

Unit 2: First order ordinary differential equations: (6 lectures)
Exact, linear and Bernoulli’s equations, Euler’s equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type.

Unit 3: Ordinary differential equations of higher orders: (8 lectures)
Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power
series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

**Unit 4: Complex Variable – Differentiation: (8 lectures)**
Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

**Unit 5: Complex Variable – Integration: (8 lectures)**
Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville’s theorem and Maximum-Modulus theorem (without proof); Taylor’s series, zeros of analytic functions, singularities, Laurent’s series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

**Suggested Text/Reference Books**

**Course Outcomes**
The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables. It aims
to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

The students will learn:

- The mathematical tools needed in evaluating multiple integrals and their usage.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

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<td>Category</td>
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**List of Topics**

1. Listening Comprehension
2. Pronunciation, Intonation, Stress and Rhythm
3. Common Everyday Situations: Conversations and Dialogues
4. Communication at Workplace
5. Interviews
6. Formal Presentations

**Suggested Software package**: Globarena Package for communicative English

The Globarena Package consists of the following exercises

1. Reading comprehension
2. Listening comprehension
3. Vocabulary exercises
4. Phonetics
5. Role Play in dialogues
6. Auto Speak

**Suggested Readings**:  
3. A Practical course in English Pronunciation, (with two Audio cassettes) by
iii. A text book of English Phonetics for Indian Students by T. Balasubramanian (Macmillan)
iv. English Skills for Technical Students, WBSCTE with British Council, OL.

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**List of Experiments:**

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Determination of the rate constant of a reaction
6. Determination of cell constant and conductance of solutions
7. Potentiometry - determination of redox potentials and emfs
8. Saponification/acid value of an oil
9. Determination of the partition coefficient of a substance between two immiscible liquids
10. Adsorption of acetic acid by charcoal
11. Volumetric analysis

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<tr>
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[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given]

**Tutorial 1:** Problem solving using computers:  
**Lab1:** Familiarization with programming environment
Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 & 9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures

Tutorial 12: File handling:
Lab 12: File operations

Laboratory Outcomes
➢ To formulate the algorithms for simple problems
➢ To translate given algorithms to a working and correct program
➢ To be able to correct syntax errors as reported by the compilers
➢ To be able to identify and correct logical errors encountered at runtime
➢ To be able to write iterative as well as recursive programs
➢ To be able to represent data in arrays, strings and structures and manipulate them through a program
➢ To be able to declare pointers of different types and use
them in defining self-referential structures.
➢ To be able to create, read and write to and from simple text files.

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<tr>
<td>Category</td>
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<tr>
<td>Course title</td>
<td>Engineering Graphics and Design</td>
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<td>Scheme and Credits</td>
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*Traditional Engineering Graphics:*
Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

*Computer Graphics:*
Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM)

*(Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory)*

**Unit 1: Introduction to Engineering Drawing** covering,
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

**Unit 2: Orthographic Projections** covering,
Principles of Orthographic Projections-Convention - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

**Unit 3: Projections of Regular Solids** covering,
those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.
Unit 4: Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

Unit 5: Isometric Projections covering,
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

Overview of Computer Graphics covering,
listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

Customisation & CAD Drawing
consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

Annotations, layering & other functions covering
applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section
views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

**Demonstration of a simple team design project that illustrates**

Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

**Suggested Text/Reference Books:**


(v) (Corresponding set of) CAD Software Theory and User Manuals

**Course Outcomes**

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

- to prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare you to communicate effectively
- to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice
The student will learn:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

*****

*
VISION
To provide an academically ambient environment for individuals to develop and blossom as academically superior, socially conscious and nationally responsible citizens.

MISSION
- To impart high quality computer knowledge to the students by conducting education Programmes.
- To provide exposure to the students about the emerging technological advancements for meeting the demands of the industry.
- To advance discipline of computing through internationally recognized research and development.
- To foster an environment that promotes extension activities and continuing education.
- To discover new knowledge through innovative research and creative teaching and learning that lead to prosperity, economic and societal benefit to the people.

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<td>PEO1</td>
<td>PEO2</td>
<td>To provide the graduates with the requisite knowledge to pursue higher education and carry out research in the field of Computer Science.</td>
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<td>To equip the graduates with the required skills to stay motivated and adapt to a dynamically changing world so as to remain successful in their career.</td>
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<td>PEO4</td>
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<td>To communicate the graduates with effectively, work collaboratively and exhibit high levels of professionalism and ethical responsibility.</td>
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After the successful completion of the B.E(CSE) degree program the students will be able to:

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<td>PO1</td>
<td><strong>Life-long Learning</strong>: Adapt the acquired knowledge for solving current and emerging issues and involved in lifelong learning.</td>
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<td>PO2</td>
<td><strong>Engineering Knowledge</strong>: Apply the engineering knowledge in various disciplines such as engineering, medicine, agriculture, banking, law, etc.</td>
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<td>PO3</td>
<td><strong>Problem Analysis</strong>: Assess and analyze the problem, breaking into components with clear boundaries and interaction among them to achieve the expected outcome within the stipulated duration.</td>
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<td><strong>Conduct Investigations</strong>: Utilize the knowledge acquired in programming laboratories for further analysis, modification and understanding of data for research.</td>
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<td>PO5</td>
<td><strong>Design &amp; Development of Solutions</strong>: Identify and formulate algorithmic principles, mathematical knowledge and theory of Computer Science in modeling and design of computer based systems.</td>
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<td><strong>The Engineer and Society</strong>: Transmit the healthy engineering solutions to customers/users or peers.</td>
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<td><strong>Modern Tool Usage</strong>: Implement innovative notions and solutions to produce user friendly tools for the benefit of the society.</td>
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<td>PO8</td>
<td><strong>Project Management</strong>: Develop and deploy software and/or hardware systems with assured quality and efficiency.</td>
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<td>PO9</td>
<td><strong>Ethics</strong>: An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.</td>
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<td>PO10</td>
<td><strong>Communication Skills</strong>: An ability to communicate and engage effectively with diverse stakeholders.</td>
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<td>PO11</td>
<td><strong>Environment and Sustainability</strong>: An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</td>
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<td>PO12</td>
<td><strong>Individual and Team Work</strong>: An ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.</td>
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### B.E. (CSE) – MAPPING OF PO WITH PEO

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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 Partial Differential Equations


UNIT – II Fourier Series

Dirichle’s conditions - General Fourier series - Odd and Even functions - Half range sine series - Half range cosine series - Complex form of Fourier series - Parseval’s identity.

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 Fourier Transform

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

UNIT – V Z-Transform

Elementary properties - Inverse Z-Transform - Convolution theorem - Solution of difference equations using Z-Transform.

TEXT BOOKS:


REFERENCES:

Course Outcomes:

At the end of this course, the students will be able to
2. Knowledge about Fourier series.
3. Understand Fourier transform.
4. Solve boundary value problems.
5. Understand Z-transform.

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<th>Mapping of Course Outcomes with Programme Outcomes</th>
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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.

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 Bio Diversity

Definition: genetic, species and ecosystem diversity - Bio geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels - India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – IV Types of Pollution


UNIT – V Environment and Human Health


TEXT BOOKS :

REFERENCES :
Course Outcomes:

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

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CSES303 ANALOG ELECTRONIC CIRCUITS

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<tr>
<td>• To study the qualitative and quantitative exposition of fundamental concepts of silicon and germanium semiconductor devices.</td>
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<tr>
<td>• To understand the principle, operation and characteristics of diode, bipolar junction transistor and metal oxide field effect transistor.</td>
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<tr>
<td>• To study the characteristics of operational amplifiers and its applications.</td>
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</table>

UNIT - I Diode

P-N junction diode, I-V characteristics of a diode-review of half-wave and full-wave rectifiers-Zener diodes-clamping and clipping circuits.

UNIT – II BJT

Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model-biasing circuits- current mirror-common-emitter-common-base and common collector amplifiers-Small signal equivalent circuits, high-frequency equivalent circuits.

UNIT - III MOSFET Structure

I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers-small signal equivalent circuits - gain, input and output impedances- transconductance-high frequency equivalent circuit.

UNIT – IV Amplifiers

Differential amplifier; power amplifier-direct coupled multi-stage amplifier; internal structure of an operational amplifier-ideal op-amp- non-idealities in an op-amp (Output offset voltage-input bias current-input offset current-slew rate- gain bandwidth product).
UNIT - V  Analysis of op-amp Circuits


TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Understand the characteristics of transistors.
2. Design and analyze various rectifier.
3. Knowledge about amplifier circuits.
4. Understand the fundamental concepts of MOSFETs and their applications for analog electronics circuits.
5. Understand the functioning of OP-AMP and design OP-AMP based circuits.

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</table>
Course Objectives:
- To understand the fundamentals of semiconductor devices, transistors and amplifiers.
- To introduce the laws of Boolean algebra and solve problems in combinatorial logic.
- To explain sequential logic and memory circuits and systems.

UNIT - I  Digital Circuits-Introduction
Digital signals - digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations - Boolean algebra - examples of IC gates - number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes - error detecting and correcting codes - characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT - II  Standard Representation for Logic Functions

UNIT - III  Flip Flops and Counters
A 1-bit memory, the circuit properties of Bi stable latch, the clocked SR flip flop, J-K-T and D-type flip flops- applications of flip flops- shift registers-applications of shift registers-serial to parallel converter- parallel to serial converter- ring counter- sequence generator- ripple (Asynchronous) counters- synchronous counters- counters design using flip flops-special counter IC's- asynchronous sequential counters- applications of counters.

UNIT - IV  ADC and DAC Converters

UNIT - V  Memory Organization
Memory organization and operation-expanding memory size-classification and characteristics of memories- sequential memory- read only memory (ROM)-read and write memory(RAM)- content addressable memory (CAM)- charge de coupled device memory (CCD)- commonly used memory chips- ROM as a PLD- Programmable logic array- Programmable array logic- complex Programmable logic devices (CPLDS)- Field Programmable Gate Array (FPGA).
TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Understand the working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Be able to use PLDs to implement the given logical problem.
5. Knowledge about the Memories.

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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  Basic Terminologies

Elementary Data Organizations - Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm - Asymptotic Notations - Time-Space trade off. Searching-Linear Search and Binary Search Techniques- their complexity analysis.

UNIT – II  ADT Stack and its operations


UNIT - III  Linked Lists

Singly linked lists-Representation in memory-Algorithms of several operation-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 :

Course Outcomes :
At the end of this course, the students will be able to
1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.

4. Student will able to 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.

5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

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Course Objectives:
- To get a clear understanding of object-oriented concepts.
- To understand the basics of objects and classes, Inheritance, Polymorphism.
- To know the principles of packages and interfaces.
- To define exceptions and use thread to develop applications.

UNIT – I Introduction

UNIT - II Member Functions and Overloading
UNIT - III Inheritance


UNIT – IV OOP in Java


UNIT - V Threads

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups.

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 a computer program based on Object Oriented Principles.
2. Students will be able to solve a real world problems based on Object Oriented Principles.
3. Gain the basic knowledge on Object Oriented concepts.
4. Ability to develop applications using Object Oriented Programming concepts.
5. Ability to implement features of object oriented programming to solve real time problems.
Mapping of Course Outcomes with Programme Outcomes

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CSSP307 | DIGITAL ELECTRONICS LAB | L | T | P | C
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Course Objectives:
- To study and experiment the characteristics of semiconductor diode and Zener diode.
- To do estimation of parameters of amplifiers, oscillators and multivibrators.
- To implement the concepts of Digital Logic design such as logic gates, flip flops, multiplexer and demultiplexer.

LIST OF EXERCISES

2. Characteristics of Zener diode and Zener diode as a voltage regulator.
3. Estimation of ripple factor and efficiency in a full wave / Bridge rectifier with and without filter.
5. Frequency response of RC coupled amplifier.
6. Estimation of gain and efficiency in a class B power amplifier.
7. Measurement of frequency of the output voltage in a RC phase shift oscillator.
8. Estimation of the frequency of the output voltage of a Bistable Multivibrator.
11. Study of multiplexer and Demultiplexer.

Course Outcomes:
At the end of this course, the students will be able to
1. Understand the basic digital circuits and to verify their operation.
2. Construct basic combinational circuits and verify their functionalities.
3. Apply Boolean laws to simplify the digital circuits.
4. Understand the working principles of semiconductor diodes.
5. Understand the working principle of multiplexer and demultiplexer.
Mapping of Course Outcomes with Programme Outcomes

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List of Exercises

1. Write a program to create a Stack and perform insertion and deletion operations on it.
2. Write a program to create a List and perform operations such as insert, delete, update and reverse.
3. Write a program to create a Queue and perform operations such as insertion and deletion.
4. Write a program to Implement Linear Search Algorithm.
5. Using iteration and recursion concepts write programs for finding the element in the array using the Binary Search method.
6. Write a program and simulate various graph traversing techniques.
7. Write a program and simulate various tree traversing techniques.
8. Write a program to Implement Binary Search Tree.
9. Write a program to simulate Bubble sort, quick sort and Merge sort algorithms.

Course Objectives:

- To learn how the choice of data structures and algorithm design methods impacts the performance of programs.
- To learn object-oriented design principles and gain experience writing programs in C++.
- To study specific data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs.
- To study specific algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, and branch and bound.

Course Outcomes:

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

1. Design and analyze the time and space efficiency of the data structure.
2. Identity the appropriate data structure for given problem.
3. Have practical knowledge on the applications of data structure.
4. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
5. Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures.
Course Objectives:

- To learn object-oriented design principles and gain experience writing programs in C++ and java.
- Ability to develop applications using Object Oriented Programming Concepts.
- Ability to implement features of Object Oriented programming to solve real world problems.

LIST OF EXERCISES

C++ PROGRAM

1. Write a C++ program to design a class having static function names showcount() which has the property of displaying the number of objects created of the class.
2. Write a C++ program to find maximum of two numbers using friend function.
3. Write a C++ program using copy constructor to copy data of an object to another object.
4. Write a C++ program to design a class representing complex numbers and having functionality of performing addition and multiplication of two complex numbers using operator overloading.
5. Write a C++ program to design a student class representing student roll no. and a tests class (derived class of student) representing the scores of the student in various subjects and sports class representing the score in sports. The sport and test class should be inherited by the result class having the functionality to add the scores and display the final result for the student.
6. Write a C++ program to maintain the records of the person with details (Name and Age) and find the eldest among them. The program must use this pointer to return the result.
7. Write a C++ program to illustrate the use of virtual function in a class.
8. Write a C++ program showing data conversion between objects of different classes.
JAVA PROGRAM

1. Simple Java Applications
   a. Understanding References to an Instant of a Class
   b. Handling Strings

2. Simple Package Creation
   a. Creating User Defined Packages
   b. Creating User Defined Packages - Array of Objects

3. Interfaces
   a. Implementing User Defined Interfaces
   b. Implementing Pre Defined Exceptions

4. Threading
   a. Creation of Threading
   b. MultiThreading

5. Exception Handling Mechanism in Java
   a. Implementing Predefined Exceptions
   b. Implementing User Defined Exceptions

Course Outcomes:
At the end of this course, the students will be able to
1. Develop solutions for a range of problems using objects and classes using C++ and Java.
2. Use the Java SDK environment to create, debug and run simple Java programs.
3. Demonstrate how to achieve reusability using inheritance, interfaces and packages.
4. Demonstrate understanding and use of different exception handling mechanisms
5. and concept of multithreading.
6. Be able to write computer programs to solve real world problems in Java and C++.

| Mapping of Course Outcomes with Programme Outcomes |
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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  Mathematical Logic


UNIT - II  Set Theory and Relations


UNIT - III  Lattice and Boolean Algebra


UNIT - IV  Group and Group code


UNIT - V  Graph Theory


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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CSES402 DESIGN AND ANALYSIS OF ALGORITHMS

Course Objectives:

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

UNIT – I Introduction


UNIT – II Fundamental Algorithmic Strategies

Brute-Force – Greedy - Dynamic Programming- Branch- and-Bound and Backtracking methodologies for the design of algorithms - Illustrations of these techniques for Problem-Solving - Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

UNIT – III Graph and Tree Algorithms

Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS) - Shortest path algorithms - Transitive closure - Minimum Spanning Tree - Topological sorting, Network Flow Algorithm.
UNIT – IV Tractable and Intractable Problems


UNIT – V Advanced Topics

Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE.

TEXT BOOKS :


REFERENCES :


Course Outcomes :

1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2. Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
5. Develop the dynamic programming algorithms, and analyze it to determine its computational complexity.

| Mapping of Course Outcomes with Programme Outcomes |
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| CO5            | ✓   | ✓   |     |     | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |
Course Objectives:
- To understand the fundamentals of DBMS and E-R Diagrams.
- To impart the concepts of the Relational model and SQL.
- To disseminate the knowledge on various Normal Forms.
- To inculcate the fundamentals of transaction management and Query processing.
- To give an introduction on current trends in data base technologies.

UNIT – I Introduction

UNIT – II Relational Approach

UNIT – III Database Design

UNIT – IV Query Processing and Transaction Management

UNIT – V Trends in Data Base Technologies

TEXT BOOKS:
REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Differentiate database systems from file systems by enumerating the features provided by database systems.
3. Formulate the solutions to a broad range of query and data update problems using SQL.
4. Understand the normalization theory and apply such knowledge to the normalization of a database.
5. Inculcate the various implementation techniques and current trends.

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Course Objectives:
- To introduce students with basic concepts of operating system its function and services.
- To teach the features of operating system and the fundamental theory associated with process, memory and file management component of operating systems.
- To provide the knowledge about UNIX operating system.
UNIT - I Introduction

UNIT - II Processes and Scheduling

UNIT - III Inter-Process Communications

UNIT – IV Memory Management
Basic concept-Logical and Physical address map, memory allocation-Contiguous Memory allocation-Fixed and variable partition- Internal and External fragmentation-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 File and Directories
TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Create processes and threads.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) 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.

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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 a programming problem and implement it with a specific programming language – Python.
UNIT - I Introduction


UNIT - II Python Function


UNIT - III Class and Object

Introduction to Object Oriented Programming – Basic principles of Object Oriented Programming in Python – Class definition, Inheritance, Composition, Operator Overloading and Object creation – Python special Unit – Python Object System – Object representation, Attribute binding, Memory Management, and Special properties of classes including properties, Slots and Private attributes.

UNIT - IV Files and Exception Handling


UNIT - V Database and GUI

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. Understand the principles of File operation.
5. Obtain the knowledge of DBM and SQL databases from python.

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Course Objectives:
• To understand the basic structure and operation of digital computer.
• To study the two types of control Unit techniques and the concept of pipelining.
• To study the hierarchical memory system including cache memories and virtual memory.
• To study the different ways of communicating with I/O devices and standard I/O interfaces.
UNIT – I Introduction
Functional Units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Instruction set architecture – Addressing modes – RISC – CISC.

UNIT – II Fundamental Concepts
ALU design – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Nano programming.

UNIT – III Memory

UNIT – IV I/O Devices

UNIT - V Parallel Processing
Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network - Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling.

TEXT BOOKS :

REFERENCES :

Course Outcomes :
At the end of this course, the students will be able to
1. Understand the functional Units of a computer, bus organizations and addressing modes.
2. Design and analyze the pipelining concepts.
3. Knowledge about the principles Hazards.
4. Analyze RAM, ROM, Cache memory and virtual memory concepts.
5. Evaluate the various I/O interfaces.
Course Objectives:

- To enable students to understand and use a relational database system.
- To understand the role of a database management system in an organization.
- 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.
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.
17. Packages.
18. Factorial of a number.
19. Checking whether a number is prime or not.
20. Fibonacci series.

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

1. Design and implement a database schema for a given problem-domain.
2. Populate and query a database using SQL DML/DDL commands.
3. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.
5. Analyze front end tools to design forms, reports and menus.

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**CSCP408 OPERATING SYSTEMS LAB**

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**Course Objectives:**
- To understand the basic concepts such as techniques, management of operating systems.
- 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.
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 \( n^{Cr} \) 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.

**Course Outcomes:**
At the end of this course, the students will be able to
1. Choose the best CPU scheduling algorithm for a given problem instance.
2. Identify the performance of various page replacement algorithms.
3. Develop algorithm for deadlock avoidance, detection and file allocation strategies.
4. Use disk management and disk scheduling algorithms for better utilization of external memory.
5. Experiment with Unix commands and shell programming.

| Mapping of Course Outcomes with Programme Outcomes |
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|                  | PO1   | PO2   | PO3   | PO4   | PO5   | PO6   | PO7   | PO8   | PO9   | PO10  | PO11  | PO12  |
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| CO3               |       |       | ✓     |       |       |       | ✓     |       |       |       |       |       |
| CO4               | ✓     | ✓     |       | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |       |       |       |
| CO5               | ✓     |       |       |       |       |       |       |       |       | ✓     | ✓     |       |

**COURSE OBJECTIVES:**
- To understand and be able to use the basic programming principles such as data types, variable, conditionals, loops, array, recursion and function calls.
- To learn how to use basic mathematical problems are evaluated and be able to manipulate text files and file operations.
- To understand the process and will acquire skills necessary to effectively attempt a programming problem and implement it with a specific programming language - Python.
LIST OF EXERCISES

Write a Python program for the following:
1. To check if a Number is Positive, Negative or Zero.
2. To check prime numbers.
3. To check Armstrong Number.
4. To Solve Quadratic Equation.
5. To Transpose a Matrix.
6. To Find the Size (Resolution) of Image.
7. To Display the Multiplication Table using FOR loop.
8. To Find ASCII Value of Character.
9. To Convert Decimal to Binary, Octal and Hexadecimal.
11. To Display Fibonacci sequence Using Recursion.
12. To Shuffle Deck of Cards.
13. To Merge Mails.
14. To Find Hash of File.
15. To Root search.
16. To Solving initial value problem using 4\textsuperscript{th} order Runge-Kutta method.

Course Outcomes:
At the end of this course, the students will be able to
1. Create, debug and test a software application using python programming language.
2. Understand and implement modular approach using python.
3. Develop real world applications using oops and exception handling provided by python.
4. Understand the concepts of file I/O and be able to read data from a text file using Python.
5. Plot data using appropriate Python visualization libraries.

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Course objectives:
- Understand various computing models like Finite State Machine, Pushdown Automata and Turing Machine.
- Be aware of decidability and undecidability of various problems.
- Learn types of grammars.

UNIT-I Finite Automata
Introduction - Basic Mathematical Notation and techniques - Finite State systems - Basic Definitions - Finite Automaton - DFA and NDFA - Finite Automaton with $\epsilon$-moves - Regular Languages - Regular Expression - Equivalence of NFA and DFA - Equivalence of NDFA’s with and without $\epsilon$-moves - Equivalence of finite Automaton and regular expressions - Minimization of DFA - Pumping Lemma for Regular sets - Problems based on Pumping Lemma.

UNIT-II Grammars
Grammar Introduction - Types of Grammar - Context Free Grammars and Languages - Derivations and Languages - Ambiguity - Relationship between derivation and derivation trees - Simplification of CFG - Elimination of Useless symbols - Unit productions - Null productions - Greibach Normal form - Chomsky normal form - Problems related to CNF and GNF.

UNIT-III Pushdown Automata
Definitions - Moves - Instantaneous descriptions - Deterministic pushdown automata - Equivalence of Pushdown automata and CFL - Pumping lemma for CFL - problems based on pumping Lemma.

UNIT-IV Turing Machines
Definitions of Turing machines - Models - Computable languages and functions - Techniques for Turing machine construction - Multi head and Multi tape Turing Machines - The Halting problem - Partial Solvability - Problems about Turing machine-Chomskian hierarchy of languages.

UNIT-V Unsolvable Problems and Computable Functions
Primitive recursive functions - Recursive and recursively enumerable languages - Universal Turing machine. Measuring and Classifying Complexity: Tractable and Intractable problems - Tractable and possibly intractable problems - P and NP completeness - Polynomial time reductions.

TEXT BOOKS:
REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Design Finite state Machine, Pushdown Automata.
2. The decidability or undecidability of various problems.
3. The concept of different types of grammars.
5. Understand the principle of Turing Machine.

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CSPC502 COMPUTER GRAPHICS AND MULTIMEDIA

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Course Objectives:
- To develop, design and implement two dimensional and three dimensional graphical Structures.
- To acquire knowledge in OpenGL programming.
- To understand various aspects of multimedia.
- To learn the concept of sound, images and videos.

UNIT-1 Introduction
UNIT- II 2D Concepts


UNIT- III 3D Concepts


UNIT- IV Multimedia Systems Design


UNIT- V Multimedia File Handling and Hypermedia


TEXT BOOKS:


REFERENCES:


Course Outcomes:

At the end of this course, the students 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.
5. Gain knowledge of multimedia systems.
Mapping of Course Outcomes with Programme Outcomes

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CSCP503 | COMPUTER NETWORKS | L | T | P | C
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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 Data communication Components


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 Transport Layer and Application Layer

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

UNIT-V Services Mechanism


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.
### Mapping of Course Outcomes with Programme Outcomes

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### Course Objectives:
- To study the architecture of 8086 microprocessor and other processors.
- To learn the design aspects of I/O and memory interfacing circuits.
- To study about I/O peripheral communication and bus interfacing.
- To study the architecture of 8051 microcontroller.

### UNIT-I Introduction to 8086

### UNIT-II 8086 Processors

### UNIT-III Interfacing

### UNIT-IV Microcontroller
UNIT-V Advanced Topics


TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Develop the 8086 based assembly language programs for different applications.
2. Familiarize the architecture and instruction set of various advanced processors.
3. Acquire knowledge in interfacing the memory and I/O devices with microprocessor.
4. Design 8051 microcontroller based computing systems.
5. Knowledge about ADC and DAC.

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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.
4. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
5. Cohen Sutherland 2D line clipping and Windowing.
7. Three dimensional transformations - Translation, Rotation, Scaling.
8. Drawing three dimensional objects and Scenes.
9. Line DDA, chain of diamonds, chessboard.

GIMP:

1. Creating Logos.
2. Simple Text Animation.

Audacity:

1. Silencing,Trimming and Duplicating the Audio signal.
2. Giving the Advanced 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.
Course Outcomes:
At the end of this course, the students will be able to
1. To understand the various computer graphics hardware and display technologies
2. 2D and 3D viewing technologies.
3. Various 2D and 3D objects transformation techniques.
4. To understand the multimedia concepts for animation.
5. Design and implement computer animation with morphing.

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CSCP508 COMPUTER NETWORKS LAB

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. Networking Commands.
2. Implementation of Socket program for Echo.
3. Implementation of client and server for chat using TCP.
4. File transfer between client and server using TCP/IP.
5. Implementation of Remote command execution.
6. Client and Server application using UDP.
8. Socket Program to download a web page.
10. Implementation of server in C and Client in Java.

Course Outcomes:
At the end of this course, the students will be able to
1. Execute and Evaluate Network Administration Commands.
2. Demonstrate the Installation and Configuration of Network Simulator.
3. Implement the Socket programming for Client Server Architecture.
4. Analyze the Packet Contents of different Protocols.
5. Implementation of the routing Protocols.
Mapping of Course Outcomes with Programme Outcomes

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CSCP509 MICROPROCESSORS LAB

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Course Objectives:

- To understand the basic concept of microprocessor and its applications.
- To study the architecture of 8085 and 8086 microprocessors.
- To acquire the in-depth knowledge in assembly language programming using 8085 microprocessor.
- To familiarize with the 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 numbers.
9. Searching a string.
10. Digital clock.
11. Square wave generation using 8253IC.
12. Stepper motor interface using 8255IC.
13. Data transfer using USART.
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. Write Assembly level programs using the 8085 and 8086 instruction set.
2. Write modular programs using procedures and macros.
3. Interface 8086 to 8255, Keyboard, display and stepper motors.
4. Generate waveforms using Microprocessors.
5. Simulate traffic light control signal.
Course objectives:

- To understand and list the different stages in the process of compilation.
- Identify different methods of lexical analysis.
- Design top-down and bottom-up parsers.
- Identify synthesized and inherited attributes.
- Develop syntax directed translation schemes.
- Develop algorithms to generate code for a target machine.

UNIT – I Introduction to Compilers

Programming Language basics-Language processors – Analysis of the source program – Translators-Compilation and Interpretation- The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools – Applications of Compiler Technology.

UNIT – II Lexical analysis


UNIT – III Syntax analysis


UNIT – IV Syntax-directed translation & Run time environment

UNIT-V Code Generation


TEXT BOOKS :

REFERENCES :

Course Outcomes :
At the end of this course, the students will be able to
1. For a given grammar specification develop the lexical analyser.
2. For a given parser specification design top down and bottom-up parsers.
3. Develop syntax directed translation schemes.
4. Develop algorithms to generate code for a target machine.
5. Develop algorithms for intermediate code.

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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 Introduction to Software Process


UNIT II Design Concepts


UNIT III Quality Management


UNIT IV Configuration Management


UNIT V Software Project Estimation

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. Explore the various Management methods in Software Development Projects.
4. Analyze the strategies in Software Designing.

| Mapping of Course Outcomes with Programme Outcomes |
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Course Objectives:
• To make the students experiment on the basic techniques of compiler construction and tool.
• To perform syntax-directed translation of a high-level programming language into an executable code.
• To design and implement language processors in C by using tools to automate parts of the implementation process.
• To provide deeper insights into the more advanced semantics aspects of programming languages, code generation, machine independent optimizations, dynamic memory allocation, and object orientation.
LIST OF EXERCISES
1. Implementation of Lexical Analyser for IF Statement.
2. Implementation of Lexical Analyser for Arithmetic Expression.
3. Construction of NFA from Regular Expression.
4. Construction of DFA from NFA.
5. Implementation of Shift Reduce Parsing Algorithm.

Course Outcomes:
At the end of this course, the students will be able to
1. Understand the Lexical Analyzer Operation.
2. Implementation of language Recognizer.
3. Implementation of Various Parsers.
5. Construction Symbol tables.

Mapping of Course Outcomes with Programme Outcomes

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CSCP608 SOFTWARE ENGINEERING LAB L T P C
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Course Objectives:
- To provide the students with simple experiments to understand the basic aspects about the behavior of the testing techniques to detect the errors in the software.
- To understand standard principles to check the occurrence of defects and its removal.
- To learn the functionality of automated testing tool.
LIST OF EXERCISES

1. Write a C program for matrix multiplication to understand the causes of failures.
2. Write a C program for Binary Search - Path Testing.
3. Write a C program to derive test cases based on boundary value analysis
4. Write a C program for cause effect graph to check whether defect is found in the program.
5. Write a C program to perform data flow testing for the given code and find out all d-use Pairs.
6. Write a C program to demonstrate the working of the looping constructs.
7. Write and test a program to count number of check boxes on the page checked and unchecked count using selenium tool.
8. Write and test a program to provide total number of objects available on the page using selenium tool.
9. Write and test a program to login a specific web page using selenium tool.
10. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects).
11. Write and test a program to update 10 student records into table into Excel file using selenium tool.
12. Write a Java script to develop a web page which calculates the GCD of 2 numbers using Selenium tool.
13. Write and test a program to update 10 student records into table into Excel file using selenium tool.

Course Outcomes:
At the end of this course, the students will be able to
1. Investigate the Reasons for Bugs and Analyze the principles in Software Testing.
2. Implement various Test Processes for Quality Improvement.
3. Design Test Planning.
5. Manage the Test Processes and Track the Progress of a Project.

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## Course Objectives:

- To provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues.
- To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards, Exposure to Safety and Risk, Risk Benefit Analysis.
- To have an idea about the Collegiality and Loyalty, Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights.
- To have an adequate knowledge about MNC’s, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.

### UNIT-I Introduction


### UNIT-II Challenges


### UNIT – III Risk Analysis


### UNIT – IV Loyalty


### UNIT – V Business Ethics


### TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
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.
4. Understand the Risk analysis in Ethics.
5. Knowledge about Collegiality and Loyalty

Mapping of Course Outcomes with Programme Outcomes

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Course Objectives:
- To familiarize the students about the trends and challenges of Embedded System.
- To impart the knowledge in RTOS and scheduling algorithms.
- To understand the concepts of Internet of Things.
- To introduce network and communication protocols of IoT.
- To introduce Internet of Everything and its benefits.
UNIT – I Introduction to Embedded Systems

Introduction, Applications of embedded system, Features and Attributes of Embedded System, Challenges in Embedded System, Selection of Processors, Recent trends in embedded system, Embedded Firmware design approaches and development languages, embedded development life cycle.

UNIT – II Real Time Operating Systems

Prime Movers: Real time without RTOS, Task states, Task table and data–Multitasking operating systems–Context switches–Kernels–Task swapping methods–Scheduler algorithms –Inter process communication mechanism-memory communication, Message passing, Signals.

Overview of ARM Architecture, Programmer’s model and Development Tools.

UNIT – III Introduction to IoT

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, Machine to Machine, Difference between IoT and M2M, Software defined Network (SDN).

UNIT - IV Network and Communication Aspect


UNIT - V Raspberry PI with Python and Arduino


TEXT BOOKS :


REFERENCES :


Course Outcomes:
At the end of this course, the students will be able to
1. Recognize the key features of embedded systems in terms of computer hardware and be able to discuss their functions.
2. Know the extra-functional that are imposed on embedded systems.
3. Identify the key factors affecting the evolution of computing hardware.
4. Understand the concepts of IoT and IoE.
5. Analyze basic protocols in wireless sensor network.

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CSCP706  EMBEDDED SYSTEM AND INTERNET OF THINGS (IoT) LAB  

Course Objectives:
- To understand the working principle of Embedded System.
- To make use various sensors in IoT.
- To know how to use various tools in IoT for designing applications.

LIST OF EXERCISES

Embedded System
1. Alphanumeric LCD interface using 8051.
2. Study of ARM evaluation system.
3. Flashing of LEDs using ARM (LPC2148).
4. Interfacing keyboard and LCD using ARM (LPC2148).
5. Temperature sensor interface using ARM (LPC2148).

IoT
1. Distance Measurement.
2. Identifying Moisture content in Agricultural Land.
3. Fire Alarm Indicator.
5. Identifying Room Temperature.
6. How to Control PWM Signals.
7. Designing a Calculator using NumPi.
8. Designing Game using PyGame.
10. Identification of Earthquake.
11. Implementation of sorting mechanism.
13. How to create a video player.
14. Uploading data to cloud and monitoring in cloud.
15. Connecting social media (twitter).

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

1. Comprehend the basic elements of Microcontroller and their Programming.
2. Knowledge of Various Sensors.
4. Evaluate networking technologies for application within IoT.
5. Identify the Kits required for solving the Real World Problem and to write the Code.

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**Course Objectives:**

- To work/train on a technical topic/field work related to Computer Science and Engineering to acquire the ability of written/oral presentation and to have a practical knowledge in carrying out the Computer Science and Engineering related problems.
- To acquire the ability of writing technical papers for Conferences.
- To train and develop skills in solving problems during execution of the problems related to Computer Science and Engineering.

The students will work for two periods per week guided by student counsellor. They will be asked to present a seminar of not less than 15 minutes and not
more than 30 minutes on any technical topic of student’s choice related to Computer Science and Engineering and to engage in discussion with audience. They will defend their presentation. A brief copy of their presentation also should be submitted. Evaluation will be done by the student counsellor based on the technical presentation, the report and also on the interaction shown during the seminar.

The students will individually undertake a training program in reputed concerns in the field of Computer Science and Engineering during summer vacation (at the end of sixth semester) for a minimum stipulated period of four weeks. At the end of training the student has to submit the detailed report on the training undertaken within ten days from the commencement of the seventh semester. The student will be evaluated by a team of staff members nominated by the Head of the Department through a viva-voce examination.

**COURSE OUTCOMES:**

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

1. Face the audience and to interact during group discussion in the corporate interviews confidently.
2. To acquire the ability to work in the actual environment and to use the technical resources.
3. Apply prior acquired knowledge in problem solving and to demonstrate the use, interpretation and application of an appropriate international Computer Science and Engineering standard in a specific situation.
4. Analyze a given Computer Science and Engineering problem and to identify and implement appropriate problem solving methodology to propose a meaningful solution.
5. Present the solution acquired in the form of written and oral presentation.

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Course objectives:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To train the students in preparing project reports and to face reviews and viva voce examination.
Course outcomes:
At the end of this course, the students will be able to
1. Take up any challenging practical problems and find solution by formulating proper methodology.
2. Carry out any experiment based on Computer software and Hardware available.
3. Present the conclusions with understandability using appropriate tables and graph in the form of report.
4. Analyses any short coming while implementing a technical problem and to handle the same.
5. Implement any research problem in current thrust area using the gained practice knowledge.

Mapping of Course Outcomes with Programme Outcomes

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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 An overview of Perl

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  Files and Data

UNIT - IV  Subroutines and Unit

UNIT - V Regular Expressions

TEXT BOOKS :

REFERENCES :

Course Outcomes:
At the end of this course, the students will be able to
1. Ability to 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.
4. Understand the concepts of Subroutines.
5. Knowledge about the Files.

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Course Objectives:
- To get an introduction about .NET concepts.
- To enable the students to develop applications in VB.NET.
- To know about the implementation of object oriented concepts using VB.NET.
- To understand some advanced concepts in .NET technologies.

UNIT - I Visual Basic Fundamentals

UNIT – II Programming with .NET
Introduction to Data Types- Using Variables- Variable Scope- Converting Data Types- Creating and Using Structures- Storing Data in Arrays- Conditional Expressions- Using Decision Structures- Using Conditional Loop Structures- Restricting User Input- Validating Field Data- Validating Form Data- Built-In Functions- Mathematical and String Functions- User Defined Functions and Procedures.

UNIT – III Programming with Controls
Properties, Events and Methods of Form, Label, Textbox, List Box, Combo Box, Radio Button, Button, Check Box, Progress Bar, Date Time Picker, Calendar, Picture Box, Scrollbar, VScrollBar, Group Box, Tooltip, Timer. Creating MDI Parent and Child.

UNIT – IV Object Orientation with .Net

UNIT – V Advance Concepts

TEXT BOOKS:

REFERENCES:
Course Outcomes:

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

1. Understand .NET Framework and describe some of the major enhancements to the new version of Visual Basic.
2. Describe the basic structure of a Visual Basic.NET project and use main features of the integrated development environment (IDE).
3. Create applications using Microsoft Windows Forms.
4. Understand the concepts of XML.
5. Knowledge about the classes.

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Course Objectives:

- To understand the concept of static web designing using HTML.
- To understand the concept of dynamic web designing using Java Script and XML.
- To understand the concept of server-side web designing using PHP.
- To develop the different technologies used in the World Wide Web including XML, Perl, Rails and PHP.

UNIT - I XHTML


UNIT – II Introduction to SGML

UNIT - III Overview of PERL

UNIT - IV Overview of PHP
Origin and Use of PHP - PHP- General Syntactic Characteristics Operations and Expressions- Control Statements- Arrays- Functions-Pattern Matching- Form Handling- Files-Cookies-Session Tracking - Database Connectivity, Simple programs in PHP and MySQL.

UNIT - V RAILS

TEXT BOOKS :

REFERENCES :

Course Outcomes :
At the end of this course, the students will be able to
1. Develop web pages using basic HTML.
2. Apply XML techniques in web design.
3. Implement CGI using Perl.
4. Implement PHP & MySQL database connectivity for real world applications.
5. Use AJAX with Rails.

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| CO5             | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
Course Objectives:

- To introduce the fundamental problems, concepts, and approaches in the design and analysis of real-time systems.
- To emphasize the issues related to the design and analysis of systems with real-time constraints.
- To study the real time applications and their functional semantics.
- To provide a comprehensive idea about time management, language and tool support, real time operating systems, scheduling and communication, and related fault tolerance issues.

UNIT - I Introduction


UNIT – II Task Assignment and Scheduling

Classical Uniprocessor scheduling Algorithms - Clock-driven approach, weighted round robin approach, Priority driven approach, dynamic versus static systems, Effective release times and deadlines, Optimality of EDF and LST algorithms, Challenges in validating timing constraints in priority driven systems, Offline versus online scheduling. Task Assignment - Mode Changes - Fault Tolerant Scheduling.

UNIT – III Real-Time Communication


UNIT – IV Real-time Memory Management

UNIT – V Programming Languages and Tools

Desired language characteristics, Data typing, control structures, Facilitating hierarchical decomposition, packages, Run-Time error (exception) handling, overloading and generics - Multitasking, Low-level programming, Task scheduling - Timing specifications, Run-time-support Programming environments.

TEXT BOOKS :

REFERENCES :

Course Outcomes :
At the end of this course, the students will be able to
1. Apply formal software engineering methods and practices to the design, analysis and development of several small real-time systems.
2. Characterize various real-time approaches for reliability and fault tolerance issues.
3. Acquire the basic programming skills in the development of real-time computing systems.
4. Understand the general purpose and full featured real-time operating systems.
5. Characteristics of Memory Management.

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Course Objectives:

- To demonstrate the understanding of the fundamentals of Android operating systems.
- To demonstrate the skills of using Android software development tools.
- To demonstrate the ability to develop software with reasonable complexity on mobile platform.
- To demonstrate the ability to debug programs running on mobile devices.

UNIT – I Android


UNIT – II Building User Interface

Fundamental Android UI design - Android User Interface fundamentals - Layouts - Linear - Relative - Grid Layouts - Fragments - Creating new fragments - The Fragments Lifecycle - Introducing the Fragment Manager - Adding Fragments to Activities - Interfacing between Fragments and Activities.

UNIT – III Intents And Broadcasts Receivers


UNIT – IV Files , Saving State And Preferences


UNIT – V Advanced Topics

Alarms - Creating and using alarms - Using the Emulator with Location-Based Services – Using the Geocoder - Creating Map-Based Activities.

TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Understand the existing state of mobile app development via researching existing apps, meeting with industry professionals, and formulating new ideas.
2. Display proficiency in coding on a mobile programming platform.
3. Understand the limitations and features of developing for mobile devices.
4. Create a complete Mobile app with a significant programming component, involving the sensors and hardware features of the phone.
5. Understand the economics and features of the app marketplace by offering the app for download.

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Course Objectives:
- To understand the foundations of Distributed System.
- To introduce the idea of peer to peer services and file system.
- To understand the components and support required for distributed system.
- To understand the remote method invocation and objects.
- To understand the design process and resource management systems.
UNIT - I Introduction


UNIT - II System Model


UNIT - III Peer to peer Systems


UNIT – IV Clocks, events and process states


UNIT – V Process Management


TEXT BOOKS :


REFERENCES :

**Course Outcomes:**

At the end of this course, the students will be able to
1. Acquiring Knowledge on foundations of Distributed System.
2. Familiarizing the idea of peer to peer services and file system.
3. Familiarizing the components and support required for distributed system.
4. Acquiring Knowledge on remote method invocation and objects.
5. Gaining experienced skills on design process and resource management systems.

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**Course Objectives:**

- To impart knowledge on software testing, quality and Software Quality Assurance (SQA).
- To introduce the various software testing techniques and different levels of testing.
- To introduce the SQA standards and components of SQA system.
- To explain the components of quality plan for software projects.

**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 Performance Testing


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.
5. Understand the concepts of Qualification and Validation.
### Mapping of Course Outcomes with Programme Outcomes

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### CSPES-CN MOBILE COMPUTING

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**Course Objectives:**

- To study the concepts of mobile computing.
- To study the concepts of medium access control protocol.
- To understand the concepts of GSM.
- To study the concepts of mobile IP and mobile TCP.

**UNIT – I Mobile Computing**


**UNIT – II MAC**

Motivation for a specialized MAC –SDMA–FDMA– TDMA–CDMA and comparison of these methods.

**UNIT – III GSM**

Mobile services - system architecture - radio interface – protocols - localization and calling - handover – security - new data services – DECT : system and protocol architecture – TETRA.

**UNIT – IV Infrared Transmission**

Introduction - Infrared vs. radio transmission - Infrastructure and ad-hoc networks - IEEE 802.11: system and protocol architecture - physical and MAC layer – HIPERLAN: protocol architecture - physical layer and MAC sub layer - Bluetooth: physical and MAC layer.

**UNIT – V Mobile IP**

TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Understand the principles and concepts of mobile communication.
2. Analyze and compare the multiplexing techniques.
3. Describe the architecture of GSM.
4. Understand the protocol architecture of Bluetooth and HIPERLAN.

| Mapping of Course Outcomes with Programme Outcomes |
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Course Objectives:
- To Study the concepts of Computer Security and Cryptography.
- To Understand the Symmetric Key Algorithms and AES.
- To Study the concepts of Asymmetric Key Algorithms- Digital Signatures and RSA.
- To Understand the Network Security, Firewalls and Virtual Private Networks and Internet Security Protocols.

UNIT – I Introduction
Need for security - Principles of Security - Types of Attacks - Plain text and Cipher Text – Substitution techniques- Caesar Cipher- Mono alphabetic Cipher-Polygram- Polyalphabetic Substitution- Play air- Hill Cipher- Transposition
techniques- Encryption and Decryption- Symmetric and Asymmetric Key Cryptography- Steganography- Key Range and Key Size-Possible Types of Attacks.

UNIT – II Cryptography Algorithms
Algorithms types and modes- Overview of Symmetric key Cryptography- Data Encryption Standard (DES)-International Data Encryption Algorithm (IDEA)- RC4-RC5- Blowfish- Advanced Encryption Standard (AES).

UNIT – III Asymmetric Key Cryptography
Brief history of Asymmetric Key Cryptography- Overview of Asymmetric Key Cryptography- RSA algorithm- Symmetric and Asymmetric key cryptography together- Digital Signatures-Knapsack Algorithm- Some other algorithms (Elliptic curve Cryptography- ElGamal-problems with the public key exchange).

UNIT – IV Primary Key Management

UNIT – V TCP/IP and Firewalls

TEXT BOOKS :

REFERENCES :

Course Outcomes:
At the end of this course, the students will be able to
1. Understand the concepts of Computer Security, Cryptography, Symmetric Key Algorithms, AES, Asymmetric Key Algorithms- Digital Signatures, RSA.
2. Understand the Digital Certificates, Public Key Infrastructure (PKI).
4. Understand the concepts of 3G.
Mapping of Course Outcomes with Programme Outcomes

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CSPESCN | PERVASIVE COMPUTING | L | T | P | C
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Course Objectives:
- To introduce the characteristics, basic concepts and systems issues in pervasive computing.
- To illustrate architecture and protocols in pervasive computing and to identify the trends and latest development of the technologies in the area.
- To analyze and compare the performance of different data dissemination techniques and algorithms for mobile real-time applications.

UNIT - I Introduction

UNIT – II Device Technology

UNIT – III WAP

UNIT – IV Server Side Programming in Java
UNIT – V Application


TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation.
2. Gives knowledge about the strengths and limitations of the tools and devices for development of pervasive computing systems.
3. Discovers the characteristics of pervasive computing applications including the major system components and architectures of the systems.
5. Understand about interface.

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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 Routing

UNIT – II Quality of Services

UNIT – III Energy Management

UNIT – IV Sensor Networks

UNIT – V Hybrid Wireless Networks

TEXT BOOKS :

REFERENCES :

Course Outcomes :
At the end of this course, the students will be able to
1. Understand 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 the principles and characteristics of wireless sensor networks.
4. Knowledge of the current topics in MANETs and WSNs, both from an industry and research point of view.
5. Knowledge about the Hybrid Wireless Networks.
Mapping of Course Outcomes with Programme Outcomes

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CSPESCN DIGITAL IMAGE PROCESSING

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<td>• To introduce basic concepts like acquiring, storing and processing of images.</td>
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<td>• To provide details about enhancing the quality of images.</td>
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<td>• To introduce techniques for extraction and processing of region of interest.</td>
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<td>• To understand the applications of Image Processing.</td>
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UNIT - I Fundamentals


UNIT - II Image Enhancement


UNIT - III Image Segmentation


UNIT - IV Multi Resolution Analysis and Compression


UNIT - V Morphological Processing and Representation

TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Understand the basic image enhancement techniques in spatial & frequency domains.
2. Understand the basic multi-resolution techniques.
3. Understand the basic of segmentation methods.
4. Apply this concept for image handling in various fields.
5. Knowledge about Morphological operations.

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CSPESC N | MACHINE LEARNING | L | T | P | C |
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Course objectives:
- To introduce the fundamental concepts of machine learning and its applications
- To learn the classification, clustering and regression machine learning algorithms
- To understand the methods of solving real life problems using the machine learning techniques
Unit – I Introduction


Unit – II Maximum-likelihood and Bayesian Parameter Estimation


Unit – III Component analysis and discriminants


Unit – IV Classification Algorithms


Unit – V Clustering and Regression Algorithms

k-means clustering - fuzzy k-means clustering - Gaussian mixture models - autoassociative neural network. Regression analysis - support vector regression-Introduction to combining multiple learners.

Text Book:


REFERENCES:


COURSE OUTCOMES:

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

1. Understand the basic concepts of machine learning
2. Understand the classification, clustering and regression algorithms
3. Implement the classification, clustering and regression algorithms
4. Combine the evidence from two or more models/methods for designing a system.
5. Design and implement a method for solving real life problem using a suitable machine learning technique
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CSPESCN  DIGITAL SIGNAL PROCESSING | L | T | P | C
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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 of Digital Signal Processing Systems

UNIT – II Introduction to DFT
Properties of DFT - Filtering methods based on DFT - Relation between DTFT and DFT - FFT computations using Decimation in time and Decimation in frequency algorithms - Overlap-add and save methods.

UNIT – III Filters

UNIT – IV Quantization
Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error - Overflow error - Round off noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling.
UNIT V Multirate Signal Processing
Speech Compression - Adaptive Filter - Musical Sound Processing - Image enhancement - Applications of Multi rate signal Processing

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 projects in Signal processing, Image processing and Speech Processing.
4. Understand the Multirate signal processing.
5. Knowledge about quantization.

Mapping of Course Outcomes with Programme Outcomes

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Course Objectives:
- To know the fundamentals of cloud computing.
- To acquire the knowledge of cloud computing technologies and architecture.
- To be familiar with cloud services and applications of cloud computing.
UNIT – I Introduction

UNIT – II The Role of Networks in Cloud Computing

UNIT – III Enterprise Architecture

UNIT - IV Cloud Services and Cloud Roles
   Infrastructure as a Service - Platform as a Service - Software as a Service - Grids and Clouds - Application Scalability - Automating Scalability - General Cloud Architectures for Scaling - Delivering Scientific Computing services in the Cloud - A Dynamic Collaborative Cloud Services Platform.

UNIT - V Amazon Web Services
   Google App Engine - Microsoft Azure - Scientific Applications - Business and Consumer Applications - Case Study: Cloud as Infrastructure for an Internet Data Center - Cloud Computing for Software Parks - Cloud Computing Supporting SaaS.

TEXT BOOKS :

REFERENCES :

Course Outcomes :
   At the end of this course, the students will be able to
   1. Identify the fundamentals and technologies of cloud computing.
   2. Address different cloud architectures and cloud services.
   3. Explore various applications by integrating the cloud services.
   4. Fundamentals of Web services.
   5. Knowledge about Cloud Platform.
Course Objectives:

- To provide Knowledge with speech signals and their representations.
- To analyze the feature extraction techniques in both frequency and spectral domain.
- To provide knowledge on pattern comparison Techniques
- To provide the overview of speech based applications (speech recognition and synthesis).

UNIT – I Basic Concepts

UNIT – II Speech Analysis

UNIT – III Speech Modeling

UNIT – IV Speech Recognition
Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – n- grams, context dependent sub-word units; Applications and present status.
UNIT – V Speech Synthesis
Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this courses Students will able to
1. Understand the basic characteristics of speech signals.
2. Recall various feature extraction techniques used in many speech related projects.
3. Understand the algorithms for speech models.
4. Develop a speech recognition system.
5. Work on various speech based applications in their projects.

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Course Objectives:
- To understand the basics of Information Retrieval.
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

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UNIT - I Introduction


UNIT - II Basic IR models


UNIT - III Classification, Searching and Indexing


UNIT - IV Web – Search Engine Architectures


UNIT - V Content-based Recommender Systems


TEXT BOOKS :


REFERENCES :

Course Outcomes:
At the end of this course, the students will be able to
1. Understand the basics of Information Retrieval and its models.
2. Use an open source search engine framework and explore its capabilities.
3. Apply appropriate method of classification or clustering.
4. Design and implement innovative features in a search engine.
5. Design and implement a recommender system.

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Course Objectives:
- To Understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence.
- To expose the students to the concepts of Data warehousing Architecture and Implementation.
- To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining.
- To identify Business applications and Trends of Data mining.

UNIT – I Evolution of Decision Support Systems
Data warehousing Components – Building a Data warehouse - Data Warehouse and DBMS - Data marts – Metadata - Multidimensional data model - OLAP Vs OLTP - OLAP operations - Data cubes - Schemas for Multidimensional Database: Stars, Snowflakes and Fact constellations.

UNIT – II Types of OLAP Servers
Three – Tier data warehouse architecture - distributed and virtual data warehouses - Data warehouse implementation - tuning and testing of data warehouse - Data Staging (ETL) Design and Development - data warehouse visualization - Data Warehouse Deployment – Maintenance – Growth - Business Intelligence Overview - Data Warehousing and Business Intelligence Trends - Business Applications - tools- SAS.
UNIT – III Data Mining

KDD versus data mining - Stages of the Data Mining Process - task primitives - Data Mining Techniques - Data mining knowledge representation – Data mining query languages - Integration of a Data Mining System with a Data Warehouse – Issues - Data preprocessing – Data cleaning - Data transformation - Feature selection - Dimensionality reduction - Discretization and generating concept hierarchies - Mining frequent patterns – association - correlation.

UNIT – IV Decision Tree Induction


UNIT – V Statistics and Data Analysis


TEXT BOOKS :
1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, third edition, 2011.

REFERENCES :

Course Outcomes :
At the end of this course, the students will be able to
1. Evolve Multidimensional Intelligent model from typical system.
2. Discover the knowledge imbibed in the high dimensional system.
3. Evaluate various mining techniques on complex data objects.
4. Evaluate the performance of different data-mining algorithms
5. Understand and apply the data mining techniques ,such as text mining and web mining
### Mapping of Course Outcomes with Programme Outcomes

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**Course Objectives:**
- To understand programming constructs of Ruby.
- To learn Rails Techniques.
- To use Rails conventions to avoid redundant code.
- To deploy Ruby on Rails.

**UNIT - I Introduction**


**UNIT - II Rails**


**UNIT - III Ruby**


**UNIT - IV Developing Book Shelf**

UNIT – V Prototype


TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Able to understand Rails framework and also know program constructs in Ruby.
2. Able to develop application in Ruby on Rail.
3. Acquire knowledge about Object-Relational Mapping with ActiveRecord.
4. Apply knowledge to deploy Rails.
5. Understand the knowledge of Protocol.

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Course Objectives:
- To learn about Unix commands and Unix programming.
- To familiarize students with the Unix Utilities.
- To learn the Unix file systems.
UNIT - I Introduction to Open Source


UNIT - II Introduction to PHP


UNIT - III Working with Files and Directories

Getting information on files – Opening and closing files – Reading and writing to files – Reading and writing strings of characters – Testing – Reading and writing entire files – Working with file permissions – Working with directories – Introduction to databases and SQL.

UNIT - IV Exploring Python


UNIT – V Files Operations Commands


TEXT BOOKS :

REFERENCES :

Course Outcomes :
At the end of this course, the students will be able to
1. Understand the fundamentals of Linux operating system.
2. Describe the working of PHP programming.
3. Elucidate the concepts of file handling and database programming in PHP.
4. Analyze the basic concepts in Python.
5. Explain the programming concepts of files and error handling using Python.
Mapping of Course Outcomes with Programme Outcomes

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Course Objectives:

- To learn the various soft computing frameworks.
- To be familiar with design of various neural networks.
- To be exposed to fuzzy logic.
- To learn genetic programming.

UNIT - I Artificial neural network Introduction


UNIT - II Learning Networks


UNIT – III Membership Function

UNIT – IV Genetic Algorithm and Search Space


UNIT – V Neuro- Fuzzy Hybrid Systems


TEXT BOOKS :

REFERENCES :

Course Outcomes:
At the end of this course, the students will be able to
1. Apply various soft computing frame works.
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
4. Apply genetic algorithms to combinatorial optimization problems.
5. Applications of soft computing to solve problems in varieties of application domains.

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Course Objectives:

- To understand the concepts of Internet of Things.
- To introduce network and communication protocols of IoT.
- To build IoT applications.

UNIT – I Introduction to IoT

Defining IoT- Characteristics of IoT- Physical design of IoT- Logical design of IoT- Functional blocks of IoT- Communication models & APIs, Machine to Machine-Difference between IoT and M2M- Software defined Network(SDN).

UNIT – II Network and Communication Aspects


UNIT – III Challenges of IoT

Design challenges- Development challenges- Security challenges- Other challenges- Applications of IoT- Home automation, Industry applications, Surveillance applications- Other IoT applications.

UNIT – IV Raspberry Pi with Python and Arduino

Introduction to Python - Building IoT with RASPBERRY Pi- IoT Systems - IoT Physical Devices & Endpoints - IoT Device - Building blocks - Raspberry Pi - Board - Linux on Raspberry Pi - Raspberry Pi Interfaces - Programming Raspberry Pi with Python - Other IoT Platforms – Arduino.

UNIT – V Development IoTs

Developing sensor based application through embedded system platform, - Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT

TEXT BOOKS:


REFERENCES:


Course outcomes:

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

1. Understand the concepts of Internet of Things.
2. Analyze basic protocols in wireless sensor network.
3. Design IoT applications in different domain and be able to analyze their performance.
4. Implement basic IoT applications on embedded platform.
5. Explore IoT using Raspberry Pi and Arduino.
Mapping of Course Outcomes with Programme Outcomes

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Course Objectives:
- To know the basics of ERP.
- To understand the key implementation issues of ERP.
- To know the business units 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 ERP

Enterprise - An Overview – Basic ERP Concepts – Risks of ERP - Benefits of ERP - ERP and Related Technologies – Business Intelligence(BI) - Business Process Reengineering (BPR) - Data Warehousing - Data Mining – OLAP – SCM.

UNIT - II ERP Implementation


UNIT – III Maintenance and Management


UNIT - IV ERP Market Place


UNIT – V Advanced Topics


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. Have awareness of core and extended units of ERP.
3. Know about the business units of ERP.
4. Know about different ERP vendors.
5. Understand the latest implementation methodologies of ERP.

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Course objectives:
- To provide basic knowledge about the types of Electronic payment systems.
- To Provide guiding principles behind the design and strategy of the customer web interface.
- To illustrate the concepts of various On-Demand Education and Software Agents.
- To Understand the traditional and new communication/marketing approach.

UNIT – I E-Commerce Infrastructure
UNIT - II  E-Commerce and Web


UNIT - III  Electronic Payment Systems and EDI


UNIT - IV Inter Organizational E-Commerce and Marketing

Internal Information Systems - Macro forces and Internal Commerce – Workflow automation – Customization – SCM – Corporate Digital Library: Dimensions, Making a business case, Types of Digital Documents – Advertising on Internet – Charting the online marketing process – Market Research.

UNIT - V  On-Demand Education and Software Agents


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.
4. Understand Web marketing approaches and elements of branding.
5. Understand the software agents and the technology behind the agents.
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 Introduction

UNIT - II Different Approaches

UNIT - III Design

UNIT - IV Management

UNIT - V Integration
TEXT BOOKS:

REFERENCES:

Course Outcomes:
At the end of this course, the students will be able to
1. Acquire fundamental concepts in Supply Chain Management.
2. Build a competitive supply chain using strategies, models, techniques and information technology.
4. Manage a competitive supply chain using models, techniques and information technology.
5. How to align the management of a supply chain with corporate goals and strategies.

| Mapping of Course Outcomes with Programme Outcomes |
|---------------------------------|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
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| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CSOESCN | CYBER FORENSICS | L | T | P | C |
| 3003 | |

Course Objectives:
- To study the fundamentals of Computer Forensics.
- To learn, analyse and validate Forensics Data.
- To study the tools and tactics associated with Cyber Forensics.
UNIT – I Introduction


UNIT – II Computer Forensics Evidence and Capture


UNIT – III Computer Forensic Analysis


UNIT – IV Information Warfare


UNIT – V Computer Forensic Cases


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.
5. To identify methods for data recovery and to apply the methods for preservation of digital evidence.
## Course Outcomes Mapping

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## Course Objectives:

- 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 and simulate the operation of a dynamic system and make improvement according to the simulation results.

### UNIT-I Introduction

Simulation Terminologies - Application areas - Model Classification - Types of Simulation - Steps in a Simulation study - Concepts in Discrete Event Simulation - Monte Carlo Simulation - Simulation Examples.

### UNIT-II Statistical Models


### UNIT-III Input Modeling


### UNIT-IV Model Building

- Verification of Simulation Models - Calibration and Validation of Models - Validation of Model Assumptions - Validating Input - Output Transformations.
UNIT – V Simulation Tools


TEXT BOOKS:

REFERENCES:

Course outcomes:
At the end of this course, the students will be able to
1. Acquire knowledge of Simulation Terminologies and Classification.
2. Familiarize the idea of Mathematical Models.
3. Familiarize the Simulation Data.
4. Gain experience skills on Verification and Validation of Simulation Models.
5. Familiarize on Simulation Tools and Simulation Project Management.

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Course objectives:
- To introduce fundamental techniques and tools required for big 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 Introduction

Data science process – roles, stages in data science project – State of the practice in analytics – Role of data scientists – Key roles for successful analytic project – Main phases of life cycle – Working with data from files – Exploring data – Managing data – Cleaning and sampling for modeling and validation – Challenges of conventional systems – Web data – Evolution of Analytic scalability, analytic processes and tools; Analysis vs reporting – Modern data analytic tools. Introduction to Big Data Platform – Big Data and its importance, Five Vs, Drivers for Big data, Big data analytics, Big data applications.

UNIT – II R Programming

R basics – Reading and getting data into R – Ordered and unordered factors – Arrays and matrices – Lists and data frames – Reading data from files – Probability distributions – Statistical models in R – Manipulating objects – Data distribution – Simple programs using R.

UNIT – III Map Reduce


UNIT – IV Data Analysis Techniques

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

UNIT – V Data Visualization


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 MapReduce 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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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 Introduction


UNIT – II Knowledge Representation

UNIT - III  Evolution
Extracting evolution of Web Community from a Series of Web Archive –
Detecting communities in social networks – Evaluating communities – Methods for
community detection and mining – Applications of community mining algorithms –
Tools for detecting communities social network infrastructures and communities –
Decentralized online social networks.

UNIT – IV  Data Management
Understanding and predicting human behavior for social communities – User
data management - Inference and Distribution – Enabling new human experiences
– Reality mining – Context – Awareness - Privacy in online social networks – Trust
models based on subjective logic – Trust network analysis – Trust transitivity
analysis – Combining trust and reputation – Trust derivation based on trust
comparisons – Attack spectrum and countermeasures.

UNIT – V  Graph Theory
Graph theory – Centrality – Clustering – Node - Edge Diagrams – Matrix
representation – Visualizing online social networks, Visualizing social networks
with matrix - based representations – Matrix and Node-Link Diagrams – Hybrid
representations – Applications – Cover networks – Community welfare -
Collaboration networks – Co-Citation networks.

TEXT BOOKS :

REFERENCES :
1. Guandong Xu, Yanchun Zhang and Lin Li, “Web Mining and Social
2. Dion Goh and Schubert Foo, “Social information Retrieval Systems:
   Emerging Technologies and Applications for Searching the Web Effectively”,
   IGI Global Snippet, 2008.
3. Max Chevalier,Christine Julien and Chantal Soulé-Dupuy, “Collaborative
   and Social Information Retrieval and Access: Techniques for Improved user
   Modelling”, IGI Global Snippet, 2009.

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.
5. Be able to visualize social networks through various representations.
Mapping of Course Outcomes with Programme Outcomes

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Course Objectives:
- To understand the activities in project management.
- Plan effectively the software projects and create project plans which address the challenges of real-world management.
- To impart knowledge on project monitoring and control.
- To study about managing people and teams.

UNIT - I Software Project Planning
Project Definition–Contract Management–Activities Covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning.

UNIT - II Assessment and Evaluation Techniques

UNIT - III Project Scheduling and Risk Management

UNIT - IV Monitoring and Managing Contracts

UNIT - V Organizational Behaviour
TEXT BOOKS:

REFERENCES:

Course objectives:
- To know the structure of Nanocomputing.
- To learn Reliability of Nano computing.
- To understand the concepts of QCA implementation.
- To study the concepts of mobile IP and mobile TCP.

UNIT - I Nano Computing Fundamentals

UNIT – II Nano Computing with Imperfections

UNIT – III Reliability of Nano Computing

UNIT – IV Nano Scale Quantum Computing

UNIT-V QCA Designer and QCA Implementation

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Course Objectives:
- Search and discover intelligent characteristics of existing AI projects.
- Map a new problem and show different search strategies for that problem.
- Program a new game/problem in Prolog and evaluate different Knowledge representation schemes for typical AI problems.
- Design and implement an AI problem to be solved using Machine Learning Techniques.
- Design and implement futuristic AI applications.

UNIT - I Introduction

UNIT - II Knowledge Representation and Reasoning
Issues in knowledge representation-Predicate logic-Symbolic reasoning under uncertainty-statistical reasoning-weak,strong slot and filter structures. Ontological Engineering-Categories and Objects-Actions, situations and Events.

UNIT - III Problem Solving Methods

UNIT - IV Advanced Topics

UNIT - V Applications
TEXT BOOKS:

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Course Objectives:
- To comprehend graphs as modeling and analysis tool.
- To introduce various data structures with graph theory.
- To learn fundamentals behind principle of counting and combinatory.

UNIT – I Introduction

UNIT – II Trees, Connectivity & Planarity

UNIT – III Matrices, Clouring and Directed Graph

UNIT – IV Permutations & Combinations
UNIT –V Generating Functions


TEXT BOOKS:

1. Narsingh Deo, Graph theory, Prentice Hall India, 2008.
2. Douglas B. West, Introduction to Graph Theory, Prentice Hall India Ltd., 2001

REFERENCES:

3. “Graph Theory” by Frank Harary

Course Objectives:

• To present the mathematical, statistical and computational challenges of building neural networks.
• To study the concepts of deep learning.
• To introduce dimensionality reduction techniques.
• To enable the students to know deep learning techniques to support real-time applications.
• To examine the case studies of deep learning techniques.

UNIT - I Introduction

Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression) - Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates

UNIT - II Concepts of Deep Learning


UNIT - III Metric Learning

Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyper parameter optimization
UNIT - IV Optimization

UNIT - V Advanced Techniques
Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint Detection- BioInformatics- Face Recognition- Scene Understanding- Gathering Image Captions

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Course objectives:
- To introduce the basic concepts of linear programming.
- To educate on the advancements in Linear programming techniques.
- To introduce non-linear programming techniques.
- To introduce the interior point methods of solving problems.
- To introduce the dynamic programming method.

UNIT-I  Linear Programming

UNIT-II  Advances in LPP
Dualit theory-Dual simplex method-Sensitivity analysis—Transportation problems–Assignment problems-Traveling sales man problem-Data Envelopment Analysis

UNIT-III  Non-linear Programming
Classification of Non Linear programming –Lagrange multiplier method–Karush –Kuhn Tucker conditions–Reduced gradient algorithms –Quadratic programming Method–Penalty and Barrier method.
UNIT-IV Interior Point Methods

UNIT-V Dynamic programming
Formulation of Multi stage decision problem–Characteristics–Concept of sub-optimization and the principle of optimality –Formulation of Dynamic programming –Backward and Forward recursion –Computational procedure –Conversion of final Value problem in to Initial value problem

TEXT BOOKS :

REFERENCES:

Course objectives :
- To understand the need and fundamentals of parallel computing paradigms.
- To learn the nuances of parallel algorithm design.
- To understand the programming principles in parallel and distributed computing Architectures.
- To learn few problems those are solved using parallel algorithms.

UNIT – I Introduction to Parallel Computing

UNIT – II Parallel Algorithm Design

UNIT – III Programming using Message Passing and Shared Address Space

UNIT – IV Distributed Computing Paradigm
Paradigms for Distributed applications – Basic algorithms in Message passing Systems – Leader Election in Rings – Mutual Exclusion in Shared Memory.

UNIT – V Fault Tolerant Design

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Course Objectives:
- To provide the basic knowledge of various methods in watermarking.
- To know the current watermarking techniques.
- To understand the types of watermarking and optimization techniques.
- To understand the basic principles and different types of steganography.
- To make them understand the steganalysis.

UNIT-I Watermarking

UNIT-II Survey of Current Watermarking Techniques
Cryptographic and psycho visual aspects – Choice of a workspace – Formatting the watermark bits – Merging the watermark and the cover – Optimization of the watermark receiver – Extension from still images to video.
UNIT-III Steganography


UNIT-IV Techniques for Steganography


UNIT-V Steganalysis


Text books:


REFERENCES:
